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Faculty of Economics and Social Development

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ECONOMIC SCIENCE FOR RURAL DEVELOPMENT 2023

**10-12 May 2023, Jelgava,
Latvia**

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Cooperation, Supply Chains

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Preparation of the proceedings and organization: January 2023 – May 2023

Conference: 10-12 May 2023

Researchers from the following higher education institutions, research institutions, and professional organizations presented their scientific papers at the conference:

Baltic Studies Centre	Latvia
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Celteh Ltd	Latvia
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Nizhyn Agrotechnical Institute <i>(Separated Subdivision of the National University of Life and Environmental Sciences of Ukraine)</i>	Ukraine
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Foreword

The international scientific conference „Economic Science for Rural Development“ is organized annually by the Faculty of Economics and Social Development of Latvia University of Life Sciences and Technologies.

The proceedings of the conference are published since 2000.

The scientific papers presented in the conference held on 10–12 May 2023 are published in one thematic volume:

No 57 Circular Economy: Climate Change, Environmental Aspect, Cooperation, Supply Chains
Efficiency of Production Process and Competitive of Companies
Integrated and Sustainable Regional Development
New Dimensions in the Development of Society
Rural Development and Entrepreneurship
Sustainable Bioeconomy

The proceedings contain scientific papers representing not only the science of economics in the diversity of its sub-branches, but also other social sciences (sociology, political science), thus confirming inter-disciplinary development of the contemporary social science.

This year for the first time the conference includes the section on a new emerging kind of economy—bioeconomy. The aim of bioeconomy is to use renewable biological resources in a more sustainable manner. Bioeconomy can also sustain a wide range of public goods, including biodiversity. It can increase competitiveness, enhance Europe's self-reliance and provide jobs and business opportunities.

The Conference Committee and Editorial Board are open to comments and recommendations concerning the preparation of future conference proceedings and organisation of the conference.

Acknowledgements

The Conference Committee and editorial Board are open to comments and recommendations for the development of future conference proceedings and organisation of international scientific conferences.

We would like to thank all the authors, reviewers, members of the Programme Committee and the Editorial Board as well as supporting staff for their contribution organising the conference.

On behalf of the conference organisers

Anita Auzina

Professor of Faculty of Economics and Social Development
Latvia University of Life Sciences and Technologies

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**CIRCULAR ECONOMY: CLIMATE CHANGE, ENVIRONMENTAL ASPECT,
COOPERATION, SUPPLY CHAINS**

DIGITAL AGRICULTURE - TECHNOLOGICAL MEANS AND POSSIBILITIES OF DIGITAL TRANSFORMATION OF AGRICULTURE

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Abstract. In the last 20 years, the extensive integration of digital technologies has led to considerable changes in all industries, including agriculture. As a result, the agricultural sector has undergone a digital transformation. This shift has become increasingly necessary due to the many challenges faced by modern-day agriculture, such as rising temperatures, changing seasons, frequent extreme weather conditions, low availability of water resources, and decreased soil fertility. It is now evident that traditional farming methods are inadequate for achieving efficiency in agriculture, and innovative methods are essential. One such approach is digital agriculture, also known as smart agriculture or e-agriculture. This cutting-edge method utilizes digital technologies to collect, process, analyze, and disseminate information, enabling real-time decision-making in response to changing external factors.

Considering given factors, the paper discusses the main directions of the digital economy that could impact agriculture. It evaluates existing examples and models of digital agriculture, while identifying possible ways to apply digital technologies in the agricultural sector. Based on thorough research, the final section of the paper offers practical recommendations that can serve as useful tools for developing countries as they transition towards the digital transformation of agriculture. The research findings make it clear that digital technologies have become a critical component of modern-day agricultural activities. Without their integration, it would be impossible to sustain productive agricultural activities, meet the global demand for food, and respond adequately to changing environmental factors.

Key words: digital agriculture, e-agriculture, digital economy, technological revolution.

JEL code: Q16, O13, O31

Introduction

Digital agriculture entails the use of digital technologies to facilitate information collection, processing, analysis, delivery, and decision-making in response to changing external factors. This approach also encompasses the concept of precision agriculture, which is a management technique that involves observation, measurement, information gathering, analysis, and the implementation of predetermined actions. The ultimate objective of precision agriculture is to establish a robust decision-making system (DSS) that can effectively manage agricultural operations.

Currently, farmers primarily rely on personal experience, recommendations, and advice when making decisions about various agricultural operations, such as the amount and combination of fertilizers to use, the rate of planting seedlings, and the timing of such activities. However, a digital agriculture system provides more accurate and frequent data regarding the condition of the agricultural land. This data is then analyzed and interpreted to help farmers make more informed decisions. With the aid of robotics and artificial intelligence, these decisions can also be made faster and with greater accuracy. In the agricultural sector, various technologies are utilized such as sensors, communication networks, unmanned aerial systems (UAS), artificial intelligence (AI), the Internet of Things (IoT), and other advanced technologies. The utilization of these technologies offers solutions to the main challenges faced by agriculture, including increasing yields of agricultural lands, efficient harvesting, ensuring crop and livestock care, and promoting sustainable agriculture. Meeting the United Nations Sustainable Development Goal of achieving a 'world with zero hunger' by 2030 requires food systems that are more productive, efficient, sustainable, inclusive, transparent, and resilient (FAO, 2017). Digital agriculture has the potential to enhance agriculture by making it more productive, consistent, and resource-efficient. These advantages are not only beneficial for farmers but also offer social benefits for the wider society. Taking into account the challenges faced by the

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agricultural sector, such as rising temperatures, changing seasons, frequent extreme weather conditions, low availability of water resources, and decreased soil fertility, it is crucial to investigate methods of ensuring the sustainability and enhancing the efficiency of agricultural activities. The main objective of this paper is to study the means of achieving these goals and maximizing the benefits of agricultural activities.

To accomplish this, the paper centers on the discussion of digital transformation methods for agricultural activities, presentation of existing models, and evaluation of their effectiveness in regards to sustainability and efficiency. The latest literature in this field has been thoroughly examined within the framework of this work, and statistical data analysis, grouping, and modeling techniques have been employed. The discussion includes a detailed examination of selected countries that have already made significant strides in digitalizing agriculture. Additionally, strategies for digitalizing agriculture are described and current models are evaluated.

Research results and discussion

1. Tools for the digitization of agriculture in the digital economy

There are several primary directions that form the foundation of the digital economy and establish the necessary digital infrastructure for the digitization of various sectors and industries, including agriculture:

Information and Communication Technologies (ICT) - encompass various types of equipment and services that facilitate broadcasting, computing, telecommunications, information processing, and display (OECD, 2020). This includes communication equipment such as radio, television, mobile phones, computer and network equipment, and satellite systems. ICT serves as the foundation for people to utilize other components of the digital economy. It is crucial for the population to have internet access in order to fully benefit from these advancements; however, this remains a significant challenge in most developing countries.

Big data - big data refers to a collection of data that exceeds the capacity of traditional databases to efficiently gather, manage, and process within a short period of time. The emergence of artificial intelligence (AI), mobile devices, social media, and the Internet of Things (IoT) have led to the creation of increasingly complex data sources that contribute to the formation of these large databases. Big data has the potential to facilitate the development of new products, optimize services and processes, improve decision-making mechanisms, and enhance forecasting and market research. In the realm of digital agriculture, big data can enable farmers to make informed decisions based on data collected throughout the year, in addition to taking environmental factors into account, rather than solely relying on personal knowledge and experience. This can result in more accurate and effective decision-making in the agricultural process.

Artificial intelligence - AI is the ability of a machine, or a robot, to act to achieve a goal while taking external factors into account. The development of artificial intelligence has become possible based on the processing of a large amount of information, which allows the development of behavioral algorithms and scenarios. A good example of artificial intelligence is self-driving cars, search engines, etc. A subset of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn and adapt to new data without the help of humans. Deep learning techniques allow the machine to use a huge amount of unstructured information (text, image, video) in the learning process. Artificial intelligence provides a significant opportunity to automate numerous processes in agriculture. Through the use of AI, it is possible to swiftly adjust the intensity of agricultural activities, methods, and approaches based on information regarding weather, soil, seasons, and other external factors, in addition to existing data available on the Internet.

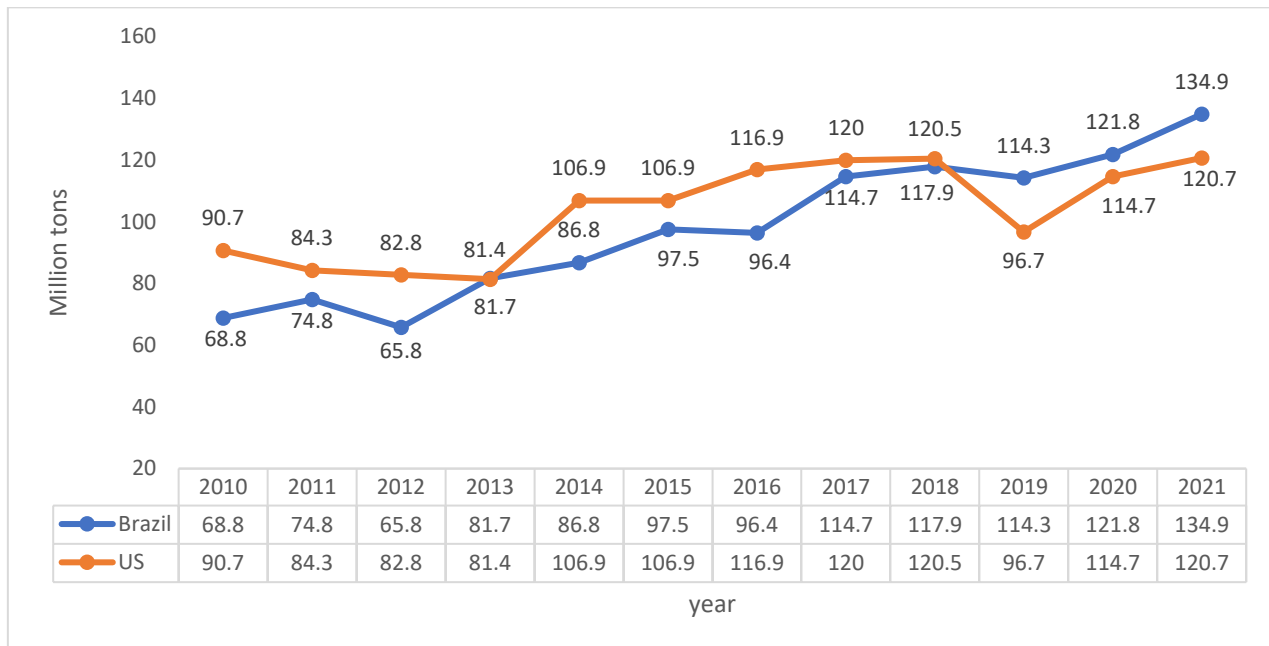
Internet of Things - IOT refers to interconnected devices that form a single intelligent ecosystem, where communication between devices included in the ecosystem is established through the sensors in the devices. It is a smart ecosystem that can be managed remotely via the Internet (Body of European Regulators for Electronic Communications, 2019). The IOT system can monitor a wide range of processes and, if necessary, make a decision independently without human intervention. IOT systems are successfully used for managing the existing infrastructure within the business, for the smooth operation of security systems, for regulating traffic flows on roads, and for monitoring soil, moisture, weather, and other related processes in agriculture. McKinsey Global Institute estimates that artificial intelligence has the potential to increase the world's gross domestic product by 26% until 2030. In the first quarter of 2022, the number of unique mobile network subscribers was 5.3 billion, with 10.6 billion devices connected to the network (GSMA, 2022).

Cloud computing - Cloud computing is a service that offers various types of online computing resources, such as software and memory, to users. This resource significantly reduces costs, increases flexibility and productivity, and provides higher safety and security. Farmers can benefit from more flexible digital solutions and economies of scale through cloud-based connectivity, which uses a live internet connection. Implementing cloud connectivity is a significant enhancement that allows farmers to observe and take action in real-time.

Automation and robotization - Nowadays, it is challenging to envision efficacious agricultural practices without resorting to robots and unmanned aerial systems. Robots and drones are proficient in facilitating tasks such as planting, harvesting, weed control, cleaning, and more. Furthermore, agricultural machinery has been notably efficient in livestock care. The International Federation of Robotics reported that the utilization of industrial robots has been steadily rising at an average of 10% per annum since 2010, with a total of 3.014.879 in operation as of 2020 (The International Federation of Robotics, 2021).

2. How can agriculture be digitally transformed?

Information holds paramount importance in agriculture. It is a domain that assimilates digital technologies effortlessly, and generates vast amounts of data. As we comprehend, information is a crucial production resource, pivotal in determining the prosperity of a company or nation. This aspect is particularly crucial in the digital economy era. As an example, Brazil is currently the world's foremost producer of soybeans. However, just a decade ago, the scenario was vastly different as Brazil only produced half of what it does today. In the past decade, Brazil has successfully doubled its production while simultaneously maintaining its current cost per hectare indicator (\$324), which is 12% less than the same metric in America. The Brazilian Agricultural Research Organization (EMBRAPA) credits this accomplishment to the effective processing of information derived from farms, utilizing the technique of data analysis. Farmers leverage data-supported seed placement to make informed decisions regarding seed selection, seeding technology, intensity, placement, and crop care for the forthcoming season. This method is not based solely on information from the previous year but employs artificial intelligence to process and optimize the given information.



Source: FAOSTAT, EMBRAPA, 2022

Fig. 1. Soybean production in the US and Brazil, 2010 - 2020

Currently, there exists an unprecedented opportunity for the digital transformation of agriculture, facilitated by visualization technologies that enable the creation of maps displaying temperature, fertility, and moisture gradients across the land. This allows for precise, individualized treatment of each section of the land. Variable rate applications (VRA) play a vital role in this regard, with sensor or map-based options available. In map-based VRA, a map created beforehand by the farmer is utilized as a data source.

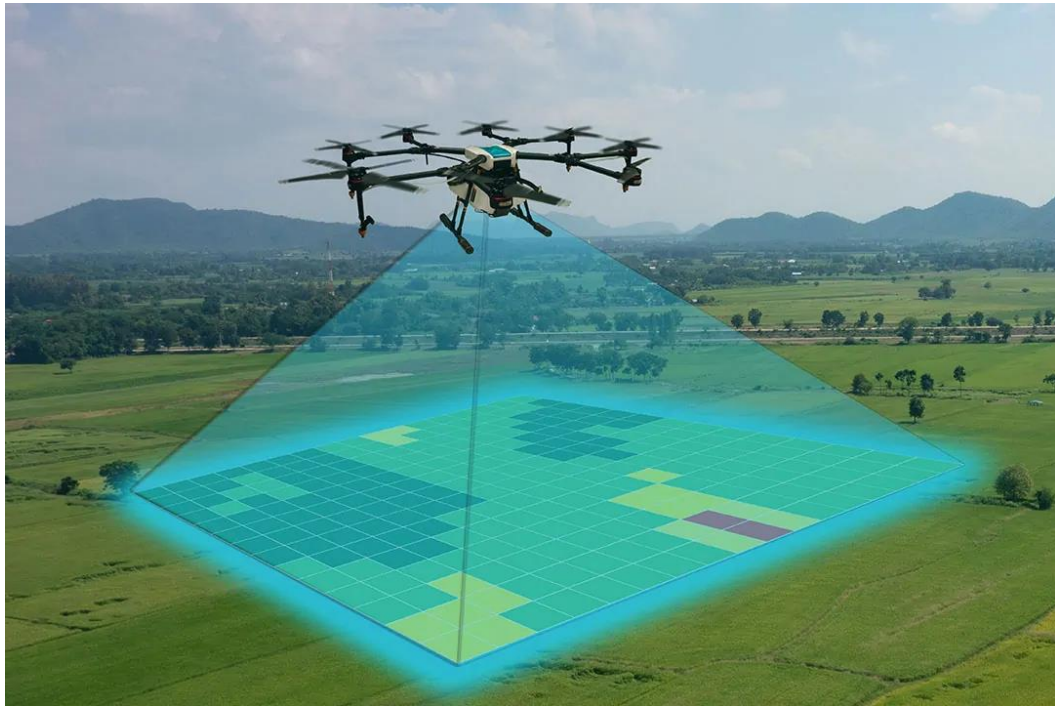
Some examples of VRA

Sowing with variable rate - this method permits the alteration of the rate, distance, amount, and depth of sowing. By utilizing variable-rate sowing, adjustments can be made to accommodate variations in soil conditions. Even on small plots of land, differences in soil structure can exist across sections, necessitating customized sowing techniques.

Weed control with variable rate - by collecting information from soil sensors, this method enables early identification of weeds in the soil, assessment of their intensity, and implementation of appropriate countermeasures.

Fertilizer supply with variable rate - plants do not always require the same amount of fertilizer, and the soil composition can vary across different parts of the land. A comprehensive approach is therefore required, which is provided by a variable-rate fertilizer delivery mechanism that utilizes sensors, climatic conditions, and GPS technology to adjust the amount of fertilizer delivered to various parts of the land. The land can be divided into desired-sized squares for this purpose.

Artificial intelligence, machine learning, agro-guide applications, precision agriculture technologies GPS, GNSS, RFID, IOT, sensors (weather, soil, plant) and, of course, variable rate technologies are successfully used to reduce costs and increase efficiency in agriculture.



Source: Themandarin, Futurefarming

Fig. 2. Agricultural land division based on variable rate applications

Today, the utilization of solar-powered robots and drones in agriculture has become increasingly prevalent, enabling the automation of land processing and harvesting procedures. Drones provide high-resolution visualizations of the land, aiding in the assessment of land conditions, yield levels, rainwater drainage channels, and more. The Internet of Things (IoT) is crucial to the digital transformation of agriculture, enabling sensor usage and the development of farm management software packages. For instance, IoT technology makes it possible to assess soil composition spectroscopically, reducing fertilizer use by up to 30% (M. Sophocleous and J. K. Atkinson, 2015).

These technologies are not limited to horticulture, as they are also successfully applied in animal husbandry. Animals can be equipped with internal and external sensors that assess their digestive system, organ health, movement patterns, external injuries, and optimal reproductive timing. The collected information is communicated to the farmer, leading to data-driven decision-making and accurate farming operations.

Monitoring technologies are also employed in beekeeping, using sensors to monitor temperature, humidity, CO₂ levels, and colony health. This enables early identification of potential problems in the colony and the implementation of effective solutions.

Additionally, smartphones and tablets are increasingly being used in modern agriculture, with a range of applications designed for agriculture, such as yield map makers, animal movement monitors, and GPS systems.

Lastly, machine learning technologies are used to effectively process information from various sources, creating a unique farm management system that automates a wide range of processes and enhances decision-making. These technologies significantly improve farm efficiency and reduce costs.

Conclusions, proposals, recommendations

The article highlights the importance of digital agriculture in addressing the many challenges facing the agricultural sector today. The integration of digital technologies has led to significant changes in all industries, including agriculture, and has become increasingly necessary to achieve efficiency in agricultural

activities. The article also highlights the different directions of the digital economy that could impact agriculture and evaluates existing examples and models of digital agriculture.

The practical recommendations offered in the final section of the paper can serve as useful tools for developing countries as they transition towards the digital transformation of agriculture. The research findings make it clear that digital technologies have become a critical component of modern-day agricultural activities. Without their integration, it would be impossible to sustain productive agricultural activities, meet the global demand for food, and respond adequately to changing environmental factors.

Therefore, it is recommended that governments, private sector actors, and other stakeholders prioritize investments in digital agriculture to promote sustainable agricultural activities. This could include investments in research and development, technology transfer, infrastructure development, and capacity building. Governments should also create an enabling environment for the adoption of digital technologies in agriculture by providing regulatory frameworks, promoting public-private partnerships, and ensuring access to affordable digital services.

Digital tools offer farmers a range of benefits, including improved communication with other farmers at regional and national levels, effective farm monitoring, informed decision-making, and time and cost savings. In today's modern world, these tools are essential for agricultural activity. However, farmers are often accustomed to traditional methods and may struggle to embrace technological innovations due to negative associations. To address this, the government must play a key role. It is essential to increase public access to digital technologies while also equipping society with the necessary knowledge and skills to use them effectively. These processes must go hand in hand, and the government should take steps to ensure that farms have access to digital tools and the skills required to use them.

In summary, the digital transformation of agriculture has become a necessity for sustainable agricultural activities. It is crucial that stakeholders prioritize investments in digital agriculture to promote efficiency and productivity, meet the global demand for food, and respond adequately to changing environmental factors.

- 1) Efficient agricultural activities cannot be ensured today without the integration of digital technologies.
- 2) The utilization of digital technologies offers an opportunity to enhance productivity and decrease costs per hectare.
- 3) Adequate digital knowledge and skills within society are crucial to fully harness the benefits of digital technologies in agriculture.
- 4) Government involvement is essential in facilitating the digital transformation of agriculture.
- 5) All segments of the agricultural value chain should be engaged in the digital transformation process.
- 6) They enable real-time decision-making in response to changing environmental factors.
- 7) The digital transformation of agriculture is necessary to sustain productive agricultural activities.
- 8) Digital agriculture can help address the challenges facing the agricultural sector, such as rising temperatures, changing seasons, and decreased soil fertility.
- 9) The integration of digital technologies can result in higher yields, reduced costs, and more sustainable agricultural practices.
- 10) Digital knowledge and skills are necessary for individuals and organizations to fully benefit from digital agriculture.
- 11) Governments play a crucial role in facilitating the adoption of digital technologies in agriculture.

12) The digital transformation of agriculture requires the involvement of all segments of the agricultural value chain, including farmers, agribusinesses, and input suppliers.

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ORGANIC SOILS ON THE WAY TO CLIMATE NEUTRAL EUROPEAN UNION: THE EXAMPLE OF ESTONIAN AGRICULTURAL LAND

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Abstract. European Union climate policy envisages climate-neutrality by 2050 and fosters Member States to find opportunities to reduce GHG emissions. Land use is a key sector to achieve net-zero emissions. To understand how each Member State can contribute to achieving climate goals, the impact of land use change on GHG emissions should be studied at the national level. The use of organic soils for crop production has a detrimental climate impact due to the large carbon stock decrease. In Estonia, approximately a quarter of GHG emissions from agricultural soils results from cultivation of organic soils. This study aims to show the impact of a scenario that assumes part of agricultural land (AL) will be converted into forest land (FL) and green focus areas; and that AL on organic soils will be converted into grassland (GL). Furthermore, 20% of this area will be rewetted. The future scenario of AL use was created using the Shared Socio-economic Pathways methodology. IPCC Guidelines were used in assessing GHG emissions. AL use changes following this scenario would help reduce GHG emissions by 90% by 2050 compared to 2020. In case of rewetting 20% of converted organic soils, the reduction would be 82% under assumptions about Estonian conditions. It is important to convert cropland on organic soils to GL and FL in order to reduce GHG emissions. However, before designing policy measures for changing AL use, it is important to analyse the actual status of organic soils in Estonia and determine emission factors at the national level.

Key words: organic soils, GHG, agricultural land use change, future scenarios.

JEL code: Q54, Q58

Introduction

The European Union's (EU) climate policy envisages achieving climate-neutrality by 2050 through significant reduction of greenhouse gas (GHG) emissions and finding ways to achieve a net-zero emissions balance (Climate change: what ..., 2023; Fit for 55, 2023). The land use, land use change and forestry (LULUCF) sector in combination with agricultural non-CO₂ GHG emissions, the so-called land sector, has the potential to become climate-neutral already by 2035. In addition to that, improved forest management, afforestation, avoided deforestation for forest lands (FL), stopping agricultural land use on organic soils and improved cropland (CL) management strategies on agricultural land (AL) have potential to cost-efficient GHG emission reductions and carbon sequestration. Additionally, the land sector can promote synergies between land-based mitigation measures and make possible more integrated policy-making and policy implementation at national and the EU level (Commission proposal on..., 2021; General approach on..., 2022). Considering this, the agricultural land (AL) and its use will play an important role in reducing GHG emissions and removing CO₂ from the atmosphere. In this case, the potential of the land sector needs more research and analysis, especially on the impact of agricultural land use (ALU) and agricultural land use change (ALUC) on GHG emissions. According to EU 2022 National Inventory Submissions (National Inventory Report and Common Reporting Format Table), crop production on organic soils has the most negative climate impact due the carbon stock decrease (European Union (Convention), 2022) and the first action on these areas should be conversion of CL to grassland (GL) or FL. Some studies showed that rewetting organic soils might also have a positive effect on reducing GHG emissions or help organic soils to become even a carbon sink (Wilson D. et al., 2016; Bianchi A. et al., 2021). In Estonia, approximately a quarter of GHG emissions from agricultural soils results from the cultivation of organic soils. In addition, the CL on organic soils causes significant carbon loss in the soil, and as a result, CL emits about 2.7 times more CO₂ than it sequesters (in the LULUCF sector) (Estonia.

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2022 Common ..., 2022). While the area of CL with organic soils has remained relatively stable since 1990, in Estonia, there conversion of GL to CL on the areas of organic soils is still taking place (Estonia. 2022 National ..., 2022). In order to better understand how each Member State of the EU can contribute to the achievement of EU climate goals, it is important to study the impact of land use change (LUC) on GHG emissions at the national level. The aim of the study is to show the impact of one possible ALU scenario on the climate footprint of agriculture in Estonia. Our study addresses two main research questions, first, what could be the climate impact of CL conversion to GL on organic soils by 2050. Second, whether rewetting of GLs with drained organic soil could have a positive effect on the climate change mitigation under Estonian conditions. This paper draws on the results of the research project "Analysis of changes in agricultural land use depending on future scenarios", financed by the Estonian Environmental Research Centre.

One of the ways to study possible development trends is the creation of scenarios, which became popular as a method since the beginning of the 2000s in the design of climate and sustainability policies, and can be used to study climate and environmental problems at the global, regional and national levels, considering complex causal relationships, limited knowledge and high uncertainty (van Vuuren D. P. et al., 2012; Vervoort J. & Gupta A., 2018; Lee S. H. & Hamelin L., 2023). The future scenario of ALU was created using the methodology of Global Shared Socio-economic Pathways and European agriculture socio-economic scenarios (Shared Socio-economic Pathways for European agriculture and food system) (Riahi K. et al., 2017; Frame B. et al., 2018; Mitter H. et al., 2019) and involving Estonian experts from various fields. The modelling of the future scenario of ALU was based on the data characterizing the land parcels and the land use (LU) conditions specified by the future scenario. Each field parcel was assigned a complex evaluation score characterizing its potential for agricultural use (so called 'goodness measure'). The modelling of changes in agricultural land use was based on the following principles. First, AL with lower 'goodness measure' goes out of use or is afforested. Second, green focus areas (landscape elements) are created or land is afforested on those land parcels which have low or medium cohesion of natural landscape (Helm A. et al., 2021). Finally, ALUC does not happen in semi-natural habitats (alvars). The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines ..., 2020), the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (2013 Supplement to ..., 2014), the Estonian 2022 National Inventory Submissions (Estonia. 2022 Common ..., 2022; Estonia. 2022 National ..., 2022) were used in the assessment of GHG emission. GHG emissions were converted to CO₂ equivalent (CO₂-eq) according to the IPCC Fifth Assessment Report (Climate Change 2014: ..., 2015). Given the high uncertainty of the scenarios and the partial lack of detailed data necessary for projection, only direct GHG emissions were estimated. In general, the cultivation of soils with high organic content and the related GHG emissions are considered under the agricultural sector according to the IPCC guidelines. Within the scope of this study, this emission has been taken into account in the LULUCF sector, as the logic of the calculations are better suited to the sector. In the scenario, due to the lack of specific emission factors in Estonia, it was assumed that green focus areas, semi-natural habitats, and unused agricultural land belong to the category of GL. In addition, it was considered that 100% of the GL and 18% of the semi-natural habitats located on the organic soils have been drained. Specific GHG emission factors related to ALU and ALUC were taken from the 2022 Estonian National Inventory Report as averages for the period 2016-2020, to take into account the dynamics of changes in the last five years.

Research results and discussion

1. Scenario 'Less is more'

The scenario 'Less is more', which is one of the five scenarios developed in the above-mentioned project, assumes the orientation of Estonian agriculture on the domestic market and the agricultural policy on the environmental protection. The preservation of the natural and living environment will be considered more important than the growth in agricultural output and food exports, and agricultural production becomes more extensive. A significant structural change of farmers will take place by 2050. Two-thirds of large-scale farmers will stop farming, half of their agricultural land will be converted into green focus areas, and the remaining half will be used by new small-scale farmers. In the scenario, the use of fertilizers will decrease, but at the same time yield of arable crops will remain the same. The number of pigs and dairy cows, and milk yield per cow will decrease. The number of beef cattle, sheep, and goats will increase, the number of poultry will be stable.

In addition to high-quality livestock production, society will value the maintenance of permanent GLs and semi-natural habitats, and the preservation of biodiversity. In the scenario, 57,971 ha (8%) of the former agricultural land were converted to green focus areas by 2050 (Table 1).

Table 1

Agricultural land use change 2050 vs 2020

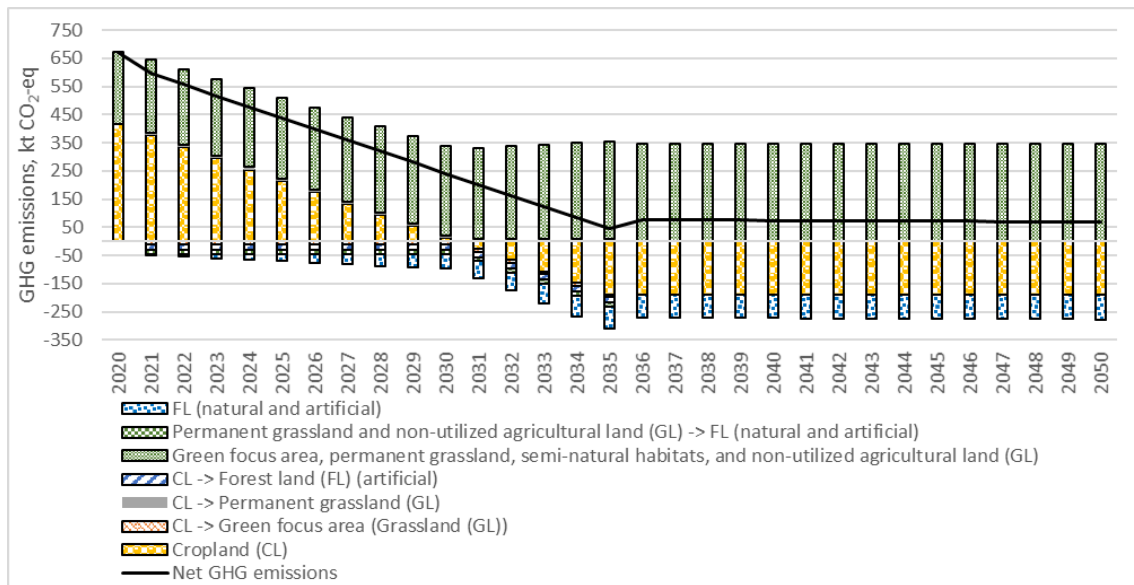
ALU	Situation in 2020, ha	Changes compared to the current situation, % or ha
Arable land	724 670	-17%
Permanent grassland	238 323	6%
Semi-natural habitats	130 307	0%
Non-utilized agricultural land	188 420	-19%
Green focus areas	0	57 971
Afforested agricultural land (natural and artificial)	0	88 603

Source: author's calculations based on the scenario narrative

To support the achievement of climate policy goals, 24,740 ha of agricultural land on deep organic soils were converted to permanent GL, and 43,605 ha of agricultural land on mineral soils were afforested (Table 1). As well as 9,999 ha of current permanent grassland and 19,999 ha of currently non-utilized agricultural land were afforested. Additionally, 15,000 ha of currently non-utilized agricultural land were converted to FL due naturally afforestation.

2. The climate impact of cropland conversion to grassland on organic soils

As of 2020, there were 24,740 ha of arable land on organic soils in Estonia. In the scenario, these were converted to permanent GL by 2035, i.e., 1,649 ha each year in the period of 2021-2035, and after that the land use remained without changes. The natural afforestation will continue until 2050 with pace of 500 ha per year. In the scenario, the impact of ALUC on the GHG net mission was mainly assessed in 2035 and 2050 compared to 2020 (Figure 1).



Source: author's calculations based on the scenario narrative

Fig. 1. GHG emissions of ALU and ALUC in the period 2020-2050

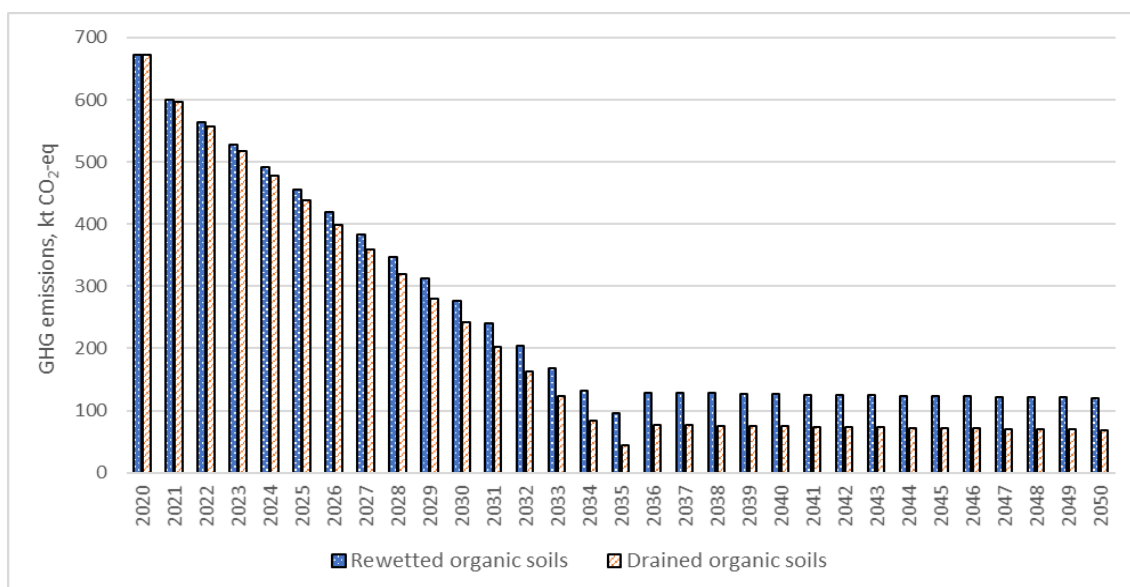
By 2035, agriculture related GHG emission in the LULUCF sector will decrease by 93.4% compared to 2020, but by 2050, with stabilized land use, the emissions will increase by 24.26 kt CO₂-eq. So, the final reduction of GHG emissions will be 90% by 2050 compared to 2020. CO₂ sequestration is particularly supported by the conversion of arable land to GL and FL and the conversion of GL to FL on mineral soils. The increase in GHG emission from 2036 is explained by the fact that the positive climate effect of ALUC will disappear. Some GHG emission reductions are supported by natural afforestation throughout the whole scenario period. According to the ALU and ALUC GHG emission estimates, it is clear that the greater positive climate effect of afforestation (land converted to FL) is manifested in Estonian conditions precisely on mineral soils. But if we compare the climate effects of GL and FL on organic soils, it is obvious that it is worth to convert CL and GL on organic soils into FL because the GHG emissions of FL per hectare on organic soils are about 2.6 times lower than in case of GL. So, the results of the study show that in order to reduce GHG emissions, it is important to convert CL on organic soils to GL, and if the growing conditions are suitable, it would be reasonable to convert GL on organic soils to FL.

3. The impact of rewetting organic soils on GHG emissions

Considering the descriptions of characteristics of organic soils in Estonia (Astover A., 2005; Kölli R., 2016; Aasta muld 2019 ..., 2019), it was assumed that agricultural production in Estonia takes place on nutrient-rich drained lowland soils. According to the 2006 IPCC guidelines (2006 IPCC Guidelines ..., 2020) and the Estonian 2022 National Inventory Submissions (Estonia. 2022 Common ..., 2022; Estonia. 2022 National ..., 2022), 3.33 t of CO₂-eq per hectare is annually emitted from grassland on drained organic soils. In case that CL on drained organic soils is converted to GL, it could mean that the GHG emissions increase, which, according to the literature (Wilson D. et al., 2016; Bianchi A. et al., 2021), could be avoided by rewetting these GL on drained organic soils. According to the EU 2022 National Inventory Submissions (European Union (Convention), 2022), the climate impact of rewetting of organic soils has been assessed only in the United Kingdom and Ireland. Therefore, the experience of these countries was taken into account, which means that the Tier 1 method of the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (2013 Supplement to ..., 2014) was applied. In the literature, the climate zone of Estonia is both boreal and temperate (Enno, S.-E., 2012; Anger-Kraavi, A. et al., 2020; Estonia. Current climate ..., 2021). The calculations were made with a

temperate climate zone in mind and only for 20% of GL on organic soils. Similar to the rationale for Ireland's National Inventory Submissions and due to the lack of national data, the study considered the following "due to non-woody vegetation/organic soils bio-geochemical reactions are assumed to not occur because organic soils are re-saturated since drainage does not occur on regenerated wetlands" (Ireland. 2022 National ..., 2022). Thus, the factor $CO_2-C_{composite}$ (on-site removal) was not taken into account, as was burning of rewetted organic soils due to the high uncertainty of the scenario.

In the case of rewetting of 20% of converted organic soils, the estimation shows a reduction of GHG emissions by 85.7% by 2035 (Figure 2). The difference in GHG emissions of rewetted and drained organic soils is 52 kt CO_2 -eq, which means that rewetting of drained organic soils would cause more GHG emissions in Estonian conditions. By 2050, in this scenario with rewetting of organic soils, the reduction of GHG emissions would be 82%, which is significant, but is smaller compared to the drained organic soil variant.



Source: author's calculations based on the scenario narrative

Fig. 2. GHG emissions of rewetted organic soils in the period 2020-2050

Rewetting of GL on organic soils can have a positive climate effect but mainly in the boreal climate zone. According to the IPCC guidelines (2013 Supplement to ..., 2014), the positive climate impact of rewetting depends on the $CO_2-C_{composite}$ factor, which is important to study at the national level. Considering the results of this study, rewetting of GL with drained organic soils is not a recommended climate measure for Estonia under the conditions studied and with the available data and knowledge.

Conclusions

- 1) Measures intended to support the EU climate policy (e.g., the creation of green focus areas, afforestation, protection of organic soils) affect both the agricultural and LULUCF sectors mainly through ALUC due to the limitation of land as a resource.
- 2) The ALUC taking place in the scenario had a more positive climate impact compared to the stable ALU that followed after the changes, but it is clear that a certain ALUC (for example, afforestation) cannot take place continuously and the climate impact of ALU must be taken into account.
- 3) From the point of view of climate, management on mineral soils is suitable for CL as well as GL and FL, but it is important to pay attention to organic soils. The study showed that it is important to convert CL on organic soils to GL, and if is possible to convert GL on organic soils to FL. In this way, it is possible to reduce GHG emissions and avoid a greater negative climate impact of ALU.

4) Rewetting of GL on drained organic soils showed an increase in GHG emissions under Estonian conditions (temperate climate zone and rich nutrient status), which means that (according to current and limited information) this possible climate measure is not suitable for Estonia. At the same time, it is clear that the topic of rewetting organic soils needs further research and data, precisely at the level of the National Inventory Report, so that the resulting impact can be taken into account in official climate reporting.

5) In order to better achieve the goals of the EU climate policy, it is important to study the processes of LU and LUC and their impact on GHG emissions at the national level of each EU Member State.

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INFORMATION SUPPORT FOR THE MANAGEMENT OF ENVIRONMENTAL ACTIVITIES OF AGRIBUSINESS ENTERPRISES IN UKRAINE

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Abstract. Due to the increasing pollution of the environment in Ukraine as a result of energy and water resource consumption, waste management and emissions, land use, and biodiversity by agricultural businesses, the issue of implementing a sustainable development strategy is becoming increasingly important. Research results show that the ESG direction is typical for a small number of agro holdings in Ukraine, which is associated with their attraction to foreign investments and loans. Most of Ukraine's large agricultural companies either do not report on sustainable development or are completely absent from the public space, indicating a low level of interest in implementing the best sustainable development practices. Our results show that one of the reasons that hinder the implementation of sustainable development principles in agricultural businesses in Ukraine is the lack of informational support in managing its environmental activities. The information provided to management for making decisions on the impact on the environment and climate with the aim of reducing and preventing environmental risks is based on an information base that is systematized and summarized in accounting. Taking this into account, the article explores the legislation of Ukraine and scientists' proposals on organizing the environmental aspects in accounting and the place of environmental accounting in the accounting system. In modern conditions of development, agribusiness has the following peculiarities: the presence of bioenergy resources that reproduce dynamic soil fertility as a result of the biological transformation, and the intensification of production that affects the state of the land, climate, safety, and public health. Therefore, the paper investigates the information support for environmental management of agribusiness enterprises, taking into account the peculiarities of assets that are the true wealth of humanity and multiply energy on Earth, as well as assets that have an intensive impact on the state of land and climate.

Key words: Ukraine, agribusiness, information support, ecology, sustainable development.

JEL code: M10, M11, Q13, Q20, Q25

Introduction

The technological features of agricultural businesses in Ukraine have a significant impact on resource depletion and environmental pollution. Therefore, in modern economic conditions, agricultural producers should focus on natural resource economics and be aware of their impact on society and the environment. The players in the agricultural sector are very diverse in terms of their work directions and sizes - from individual farms with a few hectares of land under cultivation to large agro holdings operating on hundreds of thousands of hectares. The impact of the latter cannot be underestimated, considering the scale of their activities, contribution to the national economy and local economic situation, as well their impact on the environment. In the context of modern development and production intensification, the agricultural sector appropriately changes the intensity and nature of its impact on the state of land and climate. In this context, there is a responsibility for businesses for their actions that affect the interests of many stakeholders and must be realized through reporting on the ecological aspects of their activities. Ukrainian agrarian companies are required to report on their activities that affect the environment and climate to the State Statistics Service of Ukraine, including the volumes of fertilizers and other agrochemicals used by the companies, pesticides used on crops, the areas in which they were applied, and the dynamics of these indicators for informational support of the analysis of anthropogenic load on soils (Standard quality report, 2020), as well as the expenses for environmental protection (Report on defense costs

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environment, 2022). However, such reporting does not allow for conclusions to be drawn regarding the compliance of the activities of agrarian enterprises with the provisions of the concept of sustainable development. At the request of stakeholders for disclosure of information on the activities of agrarian enterprises that affect the environment, such reporting can be carried out in non-financial reporting, which can be prepared and submitted in various formats: Progress Report on the Implementation of the Global Compact Principles; Sustainable Development Report prepared by the requirements of the GRI (Global Reporting Initiative) system; and a separate social report on indicators that are determined independently by the company.

Most scientists consider ESG practice as an element of the corporate strategy of companies from various economic sectors to determine criteria for financing by investors who take into account the ESG rating of the business when issuing loans (Gleißner, W., 2022; Kirsanova, V., 2018; Welch, K., 2022). There are also certain studies dedicated to the formation of non-financial reporting that reflects the company's image in the business sphere and society (Analysis of sources, 2022; Zamula, I., 2021).

Given that the main information base for the formation of non-financial reporting is provided by accounting, there are studies in foreign literature on environmental accounting and its impact on strategic management accounting (Ahmet Tanc, 2015), environmental accounting is a vital tool to help manage environmental and operational costs for natural resources (Iyyanki, V., 2017), and the development of a concept of accounting for sustainable enterprise development (Ordynskaya, M. E, 2021).

Ukrainian scientists have focused on the place of environmental information in the accounting system in their research (Zhuk, V. M., 2009; Shevchuk, V. O., 2009; Voronovska, O., 2011; Zhuk, V. M., 2012; Len, V. S., 2015; Gritsenko, O. I., 2016; Shtyk, Y., 2018; Liudvenko, D., 2020; Kundrya-Vysotska, O., 2021; Storozhuk, T., 2021; Malikov, V., 2022), as well as the reflection of the ecological component of the activity of enterprises in various economic sectors in accounting: coal mining (Bychkova, O. V., 2013), winemaking industry (Gutsalenko, L., 2020); livestock (Liudvenko, D., 2020).

One of the reasons hindering the implementation of sustainable development strategies in the agribusiness enterprises in Ukraine is the lack of sufficient regulatory framework and ineffective organization of information management related to environmental activities, which can be achieved through proper accounting in agricultural enterprises.

This research aims to justify the necessity of developing information management systems for environmental activities in agribusiness enterprises in Ukraine to achieve sustainable development strategies.

To achieve this goal, the following tasks were set:

- to study the achievements of sustainable development policies by agribusiness enterprises in Ukraine;
- to justify the necessity of developing information management systems for environmental activities in the agribusiness enterprises in Ukraine, taking into account its organizational, technological, and biological peculiarities.

The analysis of the achievements of agribusiness enterprises in Ukraine in implementing sustainable development policy was carried out by examining the corporate websites of companies and thematic industry resources of the largest agricultural sector companies in terms of land bank size in Ukraine, about compliance with the principles of sustainable development. The study identified several agricultural companies in Ukraine that report on their sustainable development activities using various formats with a focus on their impact on the environment and climate. An evaluation of the main directions of environmental reporting was also conducted.

In justifying the need for the development of information support for environmental activities, the legislation of Ukraine was examined, as well as proposals from scientists on the organization of environmental aspects in accounting, the place of environmental accounting in the accounting system, and the peculiarities of assets that are the true wealth of humanity and enhance the energy of the Earth and assets that have an intensive impact on the condition of land and climate.

Research results and discussion

1) In Ukraine, according to the ranking of agrarian enterprises based on the size of their land bank, the following leaders are officially identified: LLC "KERNEL-TRADE", PLC "UKRLANDFARMING", PRJSC MHP, AGROPROSPERIS GROUP, ASTARTA HOLDING PLC, CONTINENTAL FARMERS GROUP LLC, AGRICULTURAL ENTERPRISE "NIBULON" LLC, and others. Some representatives of the agricultural sector, who are among the top ten leaders, have already implemented various initiatives to achieve sustainable development goals. Therefore, to establish the state of implementation of sustainable development policies, it is appropriate to analyse the positioning of these companies regarding reporting on these goals. To conduct this research, information posted on the official websites of certain agricultural companies in Ukraine regarding their chosen sustainable development policies was used. As a result of the study, it was found that enterprises may be more or less involved in implementing sustainable development principles. This is influenced by the resources owned by the company, the scale of its activities (for companies whose shares are listed on stock exchanges of European Union countries, sustainable development is a more important issue), how the company positions itself, its impact on the environment. The research results are presented in Table 1.

Table 1

**State of implementation of sustainable development strategy
 in Ukrainian agribusiness enterprises as of 31 December 2022**

No	Agricultural company	Land Bank, thousand hectares	Company rating	Quotation of the company's shares on foreign stock exchanges	The positioning of the company regarding the implementation of the strategy of sustainable development
1.	LLC "KERNEL-TRADE"	530	1	Warsaw	GRI reporting
2.	PLC "UKRLANDFARMING"	500	2	-	website section
3.	PRJSC MHP	370	3	London	reports of the Global Compact
4.	AGROPROSPERIS GROUP	300	4	-	does not report
5.	ASTARTA HOLDING PLC	235	5	Warsaw	GRI reporting
6.	CONTINENTAL FARMERS GROUP LLC	195	6	-	CSR reporting
7.	AGRICULTURAL ENTERPRISE "NIBULON" LLC	82,5	17	-	CSR reporting

Source: created by the authors based on Agroprosperis group, 2022; Astartaholding. Sustainability, 2022; Continental farmers group, 2022; Kernel Sustainability, 2022; MHP. Sustainability, 2022; Nibulon. The social report, 2022; UkrLandFarming. Sustainability, 2022

In summary, regarding the Ukrainian practice of reporting by agricultural companies according to sustainable development standards, it can be concluded that agricultural companies, based on the size of their land bank, can be conditionally divided into 4 groups:

- agricultural companies that have prepared sustainable development reports in the last three years (have the largest land bank and their shares are listed on foreign exchanges);

- agricultural companies that do not have formulated policies, but implement measures that comply with the principles of sustainable development and prepare non-financial reports based on their activities;
- agricultural companies that do not have a developed sustainable development strategy or social responsibility program, but occasionally carry out various socially-oriented activities. Information about these events is usually published on their websites in the "News" section, and various media outlets publish news about them;
- agricultural companies do not even have information on their website or do not have a website at all.

It should be noted that some Ukrainian agricultural companies provide information on sustainable development on their websites. To improve the level of corporate social responsibility at these companies, it would be appropriate to formalize the information in a separate report (Baskov, O., 2020), which would help to implement best practices in the field of sustainable development.

Agricultural enterprises that disclose information according to sustainable development principles with a focus on the impact of their activities on the environment and climate report in the formats provided in Table 2.

Table 2

Reporting formats for sustainable development in Ukrainian agricultural companies

Reporting format	Characteristics	Form of presentation	Users
Report on progress in implementing the principles of the UN Global Compact	Annual reporting on the implementation of the 10 principles of the UN Global Compact	No uniform structure (certain key elements are outlined) Stakeholders	Stakeholders
Sustainability report prepared by the requirements of the GRI (Global Reporting Initiative)	system Reflects indicators characterizing economic growth, social justice, and environmental integrity	Any	Stakeholders
Social report based on indicators independently determined by the company	Prepared on an annual basis outlining the main directions of social responsibility development on a global scale	Any	Wide range of the public

Source: created by the authors based on Zamula I., 2021

As with any other management tool, reporting in various formats according to the concept of sustainable development in Ukrainian agrarian companies will bring benefits to the company: helping the company build a process of managing corporate social responsibility, building trust in the company among various stakeholder groups, increasing transparency of the company, increasing the company's readiness to work in other markets, strengthening business relationships, and promoting market expansion

The leading public agricultural companies in Ukraine (LLC "KERNEL-TRADE", PRJSC MHP, ASTARTA HOLDING PLC) were among the first to recognize the need to transition to international standards of sustainable development and modern management tools. The assessment of the environmental component of the ESG rating of these companies is carried out by studying their disclosure of indicators of interaction with the environment. Agricultural companies can disclose such information through a separate environmental report or as part of integrated reporting within non-financial indicators. These reports provide data on the size of harmful emissions, the transition of the company to "green" technologies, and participation in environmentally oriented programs. This data should indicate the contribution of the agricultural company to the sustainable development of the global economy.

Approaches to evaluating the main directions in environmental reports of the leading agricultural companies in Ukraine are presented in Table 3.

Based on the information provided in Table 3, it can be summarized that the most widely accepted and commonly used approach is to assess the following main areas in the environmental reports of agricultural companies: greenhouse gas emissions, water usage, waste management, land use (including the impact on biodiversity). However, this list is not standardized, as approaches to assessing environmental risks may vary depending on the industry and location of production.

Table 3

Approaches to assessing the main directions in environmental reports of leading agricultural companies in Ukraine

The direction of sustainable development	Agricultural company		
	LLC "KERNEL-TRADE"	PRJSC MHP	ASTARTA HOLDING PLC
Environmental	Energy Water and Effluents Waste Biodiversity	Energy Water Effluents Waste	Energy Water and Effluents Land use and Biodiversity Emissions and Responding to Climate Change Waste

Source: created by the authors based on Astartaholding. Sustainability, 2022; Kernel Sustainability, 2022; MHP. Sustainability, 2022

Agricultural companies such as LLC "KERNEL-TRADE", PRJSC MHP, and ASTARTA HOLDING PLC have developed a sustainable development strategy and claim that sustainable development is embedded in all business processes carried out by each company; therefore, it is an integral part of their operations (Astartaholding. Sustainability, 2022; Kernel Sustainability, 2022; MHP. Sustainability, 2022). As the main issues related to ecology are similar for these companies, it is appropriate to investigate the principles that each company focuses on and their strategies implemented for sustainable development in ecology (Table 4; Table 5; Table 6).

Table 4

The environmental direction of the sustainable development strategy of LLC "KERNEL-TRADE" in the business segments' breakdown

Industry	Energy	Water and effluents	Waste	Biodiversity
Strategy implementation regarding:				
Plant growing	consumption of natural gas and green electricity by silos	accurate application of fertilizers and pesticides to the soil and the use of modern pumps on distributed equipment to minimize technical water losses	the use of crop production waste as raw material for the production of livestock feed in our livestock business segment; as fuel during drying for steam generation; as bedding for animals	soil nutrition monitoring, seed quality control; integrated pest control system
Livestock	-	reducing water use by using a dry method of removing manure from cowsheds with scrapers	use of livestock waste as organic fertilizer in fields; disposal of livestock corpses in registered biothermal pits	provision of comprehensive and detailed monitoring of agricultural activity
Processing of agricultural products	optimization of the use of steam in technological processes	wastewater collection at factories to prevent soil and groundwater pollution, modernization of the condensate disposal system; full-cycle water treatment, to ensure biological, physical, and chemical purification	use of crop production waste as fuel, as biomass for electricity generation at thermal power stations; as raw materials for the production of fodder for cattle; as raw materials for the production of fertilizers; as soil fertilizers to return nutrients	provision of comprehensive and detailed monitoring of agricultural activity

Source: formed by the authors based on Kernel Sustainability, 2022

Table 5

The environmental direction of the sustainable development strategy of PRJSC MHP in the business segments breakdown

Industry	Energy	Water	Effluents	Waste
Strategy implementation regarding:				
Plant growing	reducing the use of energy from non-renewable sources at the expense of increasing the use of energy from renewable energy sources	reduction of water consumption through regular control of consumption, inspection, and maintenance of metering devices; updating the Register of wells, which includes information on the physical location of underground water sources, volume flow, physical condition, need for repair	the use of advanced technologies in wastewater treatment (the quality of treated wastewater must meet the requirements of the necessary regulatory standards, which the company strictly adheres to)	introduction of an effective waste management accounting system, including for the disposal of hazardous waste; regular verification of the availability of relevant certificates of contractors engaged in the disposal of hazardous waste; development of waste management processes, in particular, reuse
Livestock				
Processing of agricultural products				

Source: created by the authors based on MHP. Sustainability, 2022

Table 6

The environmental direction of the sustainable development strategy of ASTARTA HOLDING PLC in the business segments' breakdown

Industry	Energy	Water and effluents	Waste	Emissions and responding to climate change	Land use and biodiversity
Strategy implementation regarding:					
Plant growing	reduction of diesel fuel consumption per 1 ha by introducing new technologies	reasonable use of water when working with plant protection products	use of plant waste in cattle breeding as litter for livestock, as well as use in fields to preserve soil quality	obligation to measure greenhouse gases in the crop production segment and report on greenhouse gas emissions	implementation of modern methods of regenerative agriculture and reduced or zero tillage
Livestock	reducing the consumption of energy resources in livestock by using modern equipment	reasonable use of water when washing milking equipment	use of livestock waste in the fields as fertilizer	obligation to measure greenhouse gases in the activity of the livestock segment and report on greenhouse gas emissions	not locating the company's production facilities in natural territories with a special status, protected territories, territories with a high level of biodiversity
Processing of agricultural products	reducing the consumption of energy resources during the processing of plant products through the use of modern equipment	rotary water return	burning by-products of crop production processing into a granulated product	obligation to measure greenhouse gases in the activities of the industrial business segment and report on greenhouse gas emissions	the use of raw materials of own production or local farming, due to the non-location of the company's production facilities in natural territories with a special status, protected territories, territories with a high level of biodiversity

Source: formed by the authors based on Astartaholding. Sustainability, 2022

Small and medium-sized agribusinesses do not report according to the concept of sustainable development. This can be explained by the fact that such enterprises sell their products on the domestic markets, so there is no need for such reporting. However, in practice, large agro-industrial holdings build an agro-industrial ecosystem that unites people for quality changes and sustainable development of the national agrarian business in Ukraine. Moreover, large agricultural companies involve small and

medium-sized businesses in cooperation, creating business environments and ecosystems to strengthen the competitiveness of interested parties. For example, ASTARTA HOLDING PLC creates an agro-industrial ecosystem in the regions where its enterprises are located. The company provides access for small businesses (farms) to new technologies, resources, and markets. Then this company buys products grown by farmers. In addition to small agricultural enterprises, rural residents also benefit from this model, as it is based on the principles of sustainable business development (conservation of natural resources).

2) The traditional accounting system that exists in Ukraine does not provide for the organization of collection, accounting, and processing of information necessary for the company's management to make informed decisions regarding its environmental activities and their impact on the environment. This work is challenging at all levels of the company - from strategic planning to the work of each department.

A review of the literature on organizing environmental aspects in accounting indicates a lack of consensus among authors. Thus, in Ukraine, several scholars focus on the separation of an autonomous subsystem of the management information base within the framework of the traditional accounting system - environmental accounting (Gritsenko, O. I., 2016; Shtyk, Y., 2018). At the same time, scholars note that the term "environmental accounting" has different meanings to different authors (accounting for environmental protection, accounting for nature conservation activities, accounting for environmental activities) (Storozhuk, T., 2021), which is due to the lack of its normative and legal regulation at the legislative level. Some scholars consider the impact of such components as accounting information, political-legal, institutional, and socio-economic on environmental accounting (Liudvenko, D., 2020). Therefore, summarizing the above, it can be argued that there is no single approach among scholars in Ukraine regarding the place of accounting for a company's environmental activities and their impact on the environment in the accounting system.

There are various approaches to developing an environmental accounting system at the enterprise level. In the United States and Western Europe, a single conceptual framework developed by the US Environmental Protection Agency (EPA) serves as the basis for environmental accounting systems (Malikov, V., 2022). However, Ukrainian scholars argue that this framework does not consider the nature of accounting units and propose a modified environmental reporting model that takes into account the specifics of the agro-industrial complex, which includes the type of report, the reporting object, the recipient, and the reporting unit (Zhuk, V. M., 2012).

GAAP, IASC (International Accounting Standards Committee), FASB (Financial Accounting Standards Board), and others recommend that the nature conservation accounting scheme be based on principles such as significance, objectivity, timeliness, accuracy, and verifiability. The International Accounting Standards Board's (IASB) working group on international accounting and reporting standards includes financial accounting, environmental accounting, environmental reporting, and environmental auditing as part of the concept of environmental accounting (Voronovska, O., 2011).

Austrian scientists have proposed three components of accounting systems: financial and management accounting, social accounting, and environmental accounting. Social accounting includes social reporting, social balance, human resource accounting, corporate social audit, social indicators system, report on net value, and income distribution report. Environmental accounting includes ecological accounting, accounting of environmental costs, accounting of natural capital, eco-balances, eco-audits, life cycle analysis of products, and environmental reporting (Jobstl, H. A., 1997).

After analysing the approaches to integrating environmental accounting into the traditional accounting system in foreign and Ukrainian literature, scientists have identified the following options: as a prerogative

of management accounting, as a subsystem of financial and management accounting, as a separate subsystem of accounting, and as a separate system of environmental accounting (considered outside of traditional accounting) (Len, V. S., 2015).

The main problem in integrating environmental accounting into the traditional accounting system is the difficulties associated with assessing environmental impacts, such as air pollution, land depletion due to human activities etc., and the inability to express them in monetary terms (Voronovska, O., 2011).

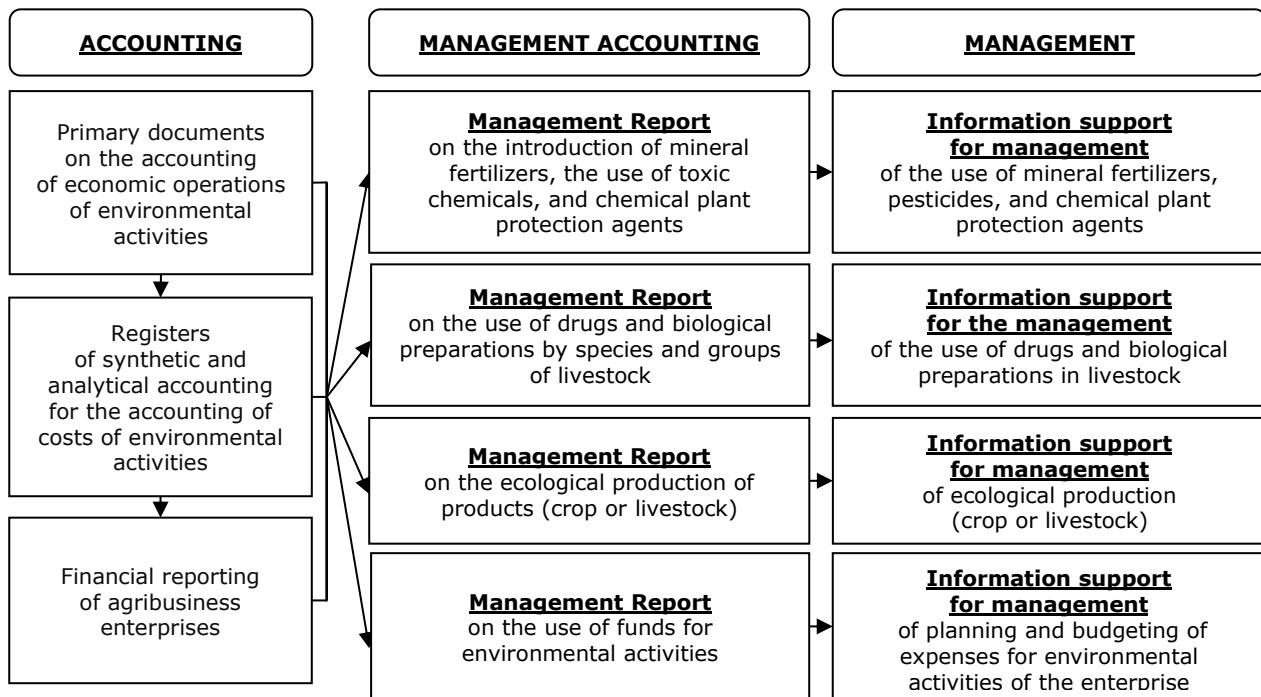
It is also noted that the defining direction for forming the information support for the analysis of sustainable development processes is the modification of the accounting balance based on the principles of physical and political economy requirements (Shevchuk, V. O., 2009).

Ukrainian researchers consider an accounting system for environmental activities that should include four main components: accounting for environmental costs, accounting for environmental obligations, reporting on environmental protection activities, and auditing relevant information, each of which has economic significance (Zhuk, V. M., 2012; Malikov, V., 2022).

According to the normative and legal regulation of the definitions of accounting and managerial accounting in Ukraine, for reporting based on the principles of sustainable development regarding the reflection of each enterprise's environmental impact, it is advisable to form information in managerial accounting based on the information that has been accumulated, summarized, and systematized in accounting.

Ukrainian scientists who researched the accounting software for the environmental activity of agribusiness companies note that the theory of physical economics "...poses the need for expanding the accounting objects of natural-resource potential, identifying and balancing the production and consumption of renewable energy assets for accounting purposes. In agriculture, this includes grain, feed, manure, and other agricultural products, which are the true wealth of humanity and multiply energy on Earth. According to Podolinsky, the problem of evaluating such assets with new methodological approaches is essential for the new physiocratic paradigm of accounting. These approaches prioritize energy and social factors over monetary exchange schemes" (Zhuk, V. M., 2009). This statement is also supported by the research results presented in Tables 4; 5, and 6 on the ecological direction of sustainable development strategy in LLC "KERNEL-TRADE", PRJSC MHP, and ASTARTA HOLDING PLC in the business segments breakdown.

When making management decisions, investors need to have information on environmental measures and expenses related to environmental activities. The development of agriculture today is impossible without the use of mineral fertilizers, pesticides, and chemical plant protection products in crop production, as well as drugs and biopreparations in animal husbandry. Failure to comply with scientifically substantiated measures during their use and the imperfection of methods of their use can lead to a negative impact on individual components of the biosphere, the state of the natural environment, and humans.



Source: created by the authors based on their research

Fig. 1. **Model information support for the management of environmental activities of agribusiness enterprises in Ukraine**

- Taking this into account, it is expedient to organize accounting support for the indicated objects of accounting for environmental activity management (Figure 1):
- in crop production - accounting support for the management of the use of mineral fertilizers, pesticides, and plant protection products by fields (monthly and cumulative from the beginning of the year);
- in livestock - accounting support for the management of the use of drugs and biopreparations by types and groups of animals (monthly and cumulative).

Organizing accounting support for environmental production management in agricultural enterprises will contribute to gaining advantages in competitive struggle, provided that the quality of the produced products is environmentally safe.

Organizing accounting support for planning and budgeting of environmental activity costs will contribute to the possibility of identifying and allocating nature conservation costs in such a way that the product has a substantiated assessment, and investment decisions are based on real costs and benefits. For this purpose, in accounting, it is expedient to organize accounting for capital and current costs in such areas: collection and purification of wastewater, waste management; protection and restoration of soils, groundwater, and surface water; preservation of biodiversity.

To collect primary information for organizing the accounting of the environmental activity of agricultural enterprises, it is advisable to use specialized forms of primary documents for accounting for production reserves in agricultural enterprises (acts on the use of mineral, organic, and bacterial fertilizers, and plant protection chemicals); income and expenditure books (journals for accounting for treated seeds and journals for accounting for the use of pesticides (in crops, orchards, greenhouses, etc.)); work completion certificates; quality certificates for fertilizers, pesticides, and agrochemicals; and other primary documents that record the facts of carrying out economic operations in ecological production of products and expenses for environmental activities of the agricultural enterprise. The information regarding the organization of accounting for environmental activity of agricultural enterprises is summarized in registers of synthetic and analytical accounting for costs of production, work performance, and services rendered; for general

production expenses, administrative expenses, and other expenses of operational activities; and material reserves.

Each agricultural enterprise, taking into account its organizational and legal form of management and organizational and technological peculiarities of activity, can build a model of accounting support of environmental activity management, which will allow its management to obtain information for making managerial decisions aimed at preventing environmental risks or reducing their manifestation.

Conclusions, proposals, recommendations

The results of research on the information support of environmental management of agribusiness enterprises in Ukraine provide a basis for asserting that the goal of the study to substantiate the need for the development of information support for environmental management has been achieved through the tasks set, which made it possible to draw the following conclusions and provide suggestions for their implementation in agribusiness enterprises in Ukraine to implement sustainable development strategies.

- 1) The resources owned by a company, the scale of its activities, and its level of impact on the environment are factors that influence the involvement of agricultural enterprises in Ukraine in implementing the principles of sustainable development. In Ukraine, the implementation of sustainable development principles is typical for large agricultural companies, which is justified by the attraction of foreign investments and credits. Over the past few years, only LLC "KERNEL-TRADE", PRJSC MHP, and ASTARTA HOLDING PLC have positioned themselves as pursuing sustainable development by creating Sustainable Development Reports. A large number of agricultural companies in Ukraine either implement measures that promote sustainable development through the creation of CSR reports, carry out sustainable development measures in a non-systematic way with the results being published on the company's website or in the media, or do not carry out or report on sustainable development measures at all. To implement best practices in sustainable development in the future, it is advisable to compile the information published on the company's website into a separate report.
- 2) To provide more detailed recommendations for implementing a sustainable development strategy for agribusiness enterprises, the implementation of sustainable development strategies by the top agricultural companies in Ukraine that report according to the concept of sustainable development in various formats with a focus on the impact of their activities on the environment and climate were investigated. The list and completeness of directions that are significant for the environment vary somewhat but correspond to the industry-specific thematic content of the environmental direction of the reports, namely: energy consumption, waste, water resources, response to climate change, greenhouse gas emissions, land use, and biodiversity. However, this list is not standardized, as approaches to assessing environmental risks are influenced by the type of industry and the location of production.
- 3) Research on the Sustainability Reports of LLC "KERNEL-TRADE", PRJSC MHP, and ASTARTA HOLDING PLC has shown that sustainable development is integrated into all business processes of each company and is an integral component of their operations. The key issues of significance are very similar; therefore, a study was conducted on the implementation of their strategies. In addition, in practice, large agricultural companies build agro-industrial ecosystems that involve small and medium-sized businesses by providing access to new technologies, resources, and markets, as well as rural residents to educate them on the principles of sustainable use of natural resources.
- 4) One of the key factors in the successful management of agricultural businesses is information. Operating in a rapidly changing, unpredictable external environment, agricultural companies in Ukraine

require proper information support. An important aspect of information support for the ecological interests of agricultural companies is consumer awareness of the ecological aspects of agricultural production. The successful implementation of environmental policies largely depends on information support, which can be considered as a set of information flows of different nature that accumulates, generalizes, and systematizes in accounting and is intended for making managerial decisions in the field of ecological activities.

5) The traditional accounting system in Ukraine does not include the organization of collection, accounting, and processing of information necessary for the company's management to make informed managerial decisions regarding the environmental activity of the enterprise and its impact on the environment. According to the regulatory framework for defining accounting and managerial accounting in Ukraine, it is appropriate to use the information accumulated, summarized, and systematized in accounting for management purposes, to report on the principles of sustainable development regarding the reflection of the environmental impact of each enterprise on the environment and climate.

6) In addition to renewable energy assets that are characteristic of the agricultural business sector (humus, grains, livestock, manure, feed), which are considered bioenergy capital that reproduces dynamic soil fertility through biological transformation, it is advisable for agricultural companies to generate information flows in crop production - on the application of mineral fertilizers, the use of pesticides and chemical plant protection products; in animal husbandry - on the use of medicines and biopreparations; on environmentally friendly production of agricultural products; on the costs of environmental activities of the enterprise to generate relevant management reports on the impact on the environment to reduce and prevent environmental risks.

The proposed recommendations on information support for the environmental management of agricultural enterprises can be an instrument for further research on the problem of managing the effectiveness of environmental processes in Ukrainian agricultural companies.

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THE IMPORTANCE OF COMMUNICATION IN BEHAVIOURAL CHANGE FOR CONSUMER INVOLVEMENT IN THE CONTEXT OF BIO WASTE SORTING IN LATVIA

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Abstract. Within the framework of the European Green Deal, a circular economy is ensured, which is defined as a sustainable development model that preserves the value of products, materials and resources in the economy as much as possible. Waste sorting is of great importance in this process, as it enables rational management of resources and the return to circulation of already used products, which become raw materials for the production of other products. The proportion of unsorted waste in Latvia is higher than in other European countries, and the shared waste collection system operates with certain problems. In particular, this applies to the collection and management of bio-waste, which is currently one of the weakest sectors in the industry, despite the fact that the Landfill Directive of the European Parliament and the Council stipulates that a separate collection system for bio-waste must be in place by the end of 2023. In the event that the system of separate collection of biological waste is not organized during this period, sanctions may be applied to Latvia. Therefore, it is urgent to understand how to change consumer behaviour and increase involvement in waste sorting as the amount of waste increases, what opportunities and responsibilities exist for the organizations and consumers involved in this process. In this research, the study of consumer behaviour changes and their causes is analysed in the context of public communication and its opportunities.

The aim of the article is to assess the importance of communication in encouraging changes in consumer behaviour in waste sorting in Latvia, especially in the bio-waste segment. In order to achieve the goal, an analysis of literature and documents was carried out on consumer behaviour, factors influencing it, consumer habits and communication possibilities for changing them. Consumer involvement and habits in biowaste sorting were investigated through a secondary analysis of previous relevant studies. In order to characterize the communication of waste management companies about waste sorting, a content analysis was carried out. In order to assess the current communication about waste management and sorting and its impact on consumer behaviour, interviews were conducted with communication experts.

In general, it can be concluded that the waste management industry in Latvia is fragmented, which promotes competition between companies. However, each waste managing company has different waste sorting systems and other rules, which are not clearly explained to consumers, this communication is general and is not formed on a strategic basis, and it does not contribute to changes in consumer behaviour and an increase in waste sorting.

Key words: bio waste, communication, consumer behaviour, waste sorting.

JEL code: R58, R11, O13, O18, Q01

Introduction

The amount of waste around the world is constantly increasing, it affects the urgent requirements for the preservation and cleanliness of the environment. It is becoming more and more important on an international and a national scale to sort out the issues of waste sorting so that it is a natural and self-evident daily activity in every home. Researchers from different countries are looking for solutions to change or improve citizens' waste sorting habits, thus promoting waste management and waste recycling. The main problems in this area are: 1) insufficient special regulation and budget of national governments for household waste management; 2) education of households: households do not know about waste recycling needs; 3) missing recycling technologies; 4) management expenses, - the high cost of waste book classification (Chu et al., 2018).

The proportion of unsorted waste in Latvia is higher than in other European averages – in 2020, the amount of sorted waste in relation to the total amount of waste was 39.6% (the European average was 47.8% respectively). Compared to 2019, the amount of sorted waste has decreased, not following the

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growing trend in other European countries (Eurostat, 2022). Although the difference in this indicator is not large, nevertheless, taking into account the goals set by European countries and Latvia, it is necessary to increase the amount of sorted waste in Latvia compared to the total amount of waste. Each resident of Latvia produces on average more than 400 kilograms of waste per year, which is mostly buried in landfills forever, but the resources of landfills are decreasing every year. The way to reduce the generated household waste is to sort it properly. As a result of waste sorting, the recycling of raw materials is promoted, the negative impact on the environment is significantly reduced, and natural resources are saved (Latvijas Zalais Punkts, 2023).

Biodegradable waste (or biological waste, or bio-waste) is an essential section of sorted waste. Biowaste is defined as biodegradable garden and park waste, food and kitchen waste from households, restaurants, catering establishments and retail premises, as well as similar waste from food processing plants (European Commission). Biowaste is the largest component of household waste in the EU with a share of 34%, but in Latvia it is approximately half of household waste (Eurostat, 2022). Organizing the area of biowaste sorting is an essential task within the industry, which will also improve the overall waste sorting process. Bio-waste is the one that creates unpleasant smells, and separating this part of the waste and removing it often enough can reduce not only the odours, but also the frequency of unsorted waste disposal. As soon as we sort bio-waste, our unsorted waste becomes drier, but we can get more materials from dry unsorted waste. It is not the same as trying to collect cardboard mixed with banana peels and apple cores or materials from dry waste. The remaining waste, which is not suitable for processing, can also be directed to the production of quality energy - it has a higher calorific value and a lower moisture content. They could use the waste imported to Latvia for incineration in cement factories, because the quality of local waste is not good enough (Luse, 2023).

Within the framework of this research, it is necessary to find out how to create strategic communication about waste management and sorting that reaches consumers in order to increase the involvement of consumers in waste sorting. The study is relevant, because in previous studies of sorting habits, Latvian residents indicate that information on waste management is not complete, nor is it placed in channels conveniently used by residents on a daily basis. Waste sorting, on the other hand, is a critically important aspect for achieving Europe's green goals.

The aim of the study is to assess the importance of communication in encouraging changes in consumer behaviour in waste sorting in Latvia and to look for solutions to improve communication. The tasks of the research are: 1) to analyse literature and documents on consumer behaviour, factors affecting it, consumer habits and communication possibilities for changing them; 2) to perform a secondary analysis of previously conducted studies on consumer involvement and habits in biowaste sorting; 3) to describe the communication of waste management companies about waste sorting; 4) to conduct interviews with communication experts in order to evaluate the current communication of the waste management companies about waste sorting and its impact on consumer behaviour. The sources of information in this study are the works of consumer behaviour change and communication theorists (Grunig, Hunt, 1984; Narvanen et al., 2020; Ferron, Massa, 2013), research conducted in the European Union and Latvia on issues of waste sorting, waste regulatory acts of management, as well as public communication of the participating organizations.

Research results and discussion

1. Sustainable consumer behaviour

Solving sustainability issues is often thought to be linked to product innovation. If products and services became environmentally friendly, sustainability would no longer be an issue. However, there are several problems with this view. For example, environmentally friendly products often require large investments, political support, consumer acceptance, and a willingness to pay. Given the high number of product innovation failures, research on consumer behaviour seems crucial to guide various interventions aimed at promoting sustainable behaviour. Sustainable consumer behaviour can be viewed from a variety of perspectives, including policy makers, marketing, consumer interests, and ethics (Antonides, 2017). It follows that sustainable consumer behaviour is largely influenced by entrepreneurs, but entrepreneurs must also have an incentive to change their actions. At this point, it becomes natural that consumers are the ones who can influence the actions of entrepreneurs, but entrepreneurs are the ones who can influence the actions of consumers. In this regularity it is necessary to insert a factor that affects both sides, thus promoting action and fulfilling the regularity, resulting in more sustainable solutions.

Researchers Gilli, Nicolli, Fainelli, by surveying 618 households in Italy, have studied the following regularities: there are three different types of motivation – intrinsic, extrinsic, and pressure. Internal motivation works in a situation when the consumer themselves experiences positive emotions about work and decides, for example, to change a habit. In the case of intrinsic motivation, the consumer rewards themselves only with the feeling of accomplishment. On the other hand, extrinsic motivation is the one where the stimulus comes from someone else – that is, receiving some benefit in return. The benefit can be material, financial, or social. The motivation of pressure occurs when people around a consumer perform an action, which may be a socially (or otherwise) more responsible action, and this creates pressure for that particular individual to change their behaviour in order to fit in and not place themselves lower in a social sense. A correlation was observed between the level of education and involvement in waste sorting - in the group that sorted waste due to pressure-based motivation, the number of people who had completed basic education was lower, while in the groups where the motivation was formed by internal or external factors, the proportion of higher education among the respondents was higher (Gilli, Nicolli, Farinelli, 2018).

Consumer involvement and motivation, openness to the implementation of sustainable solutions on a daily basis are key factors to change their habits. It is very important to educate and create awareness about the importance of waste sorting, not only the message of the environment and economic aspects, but also informing about the importance of bio waste in the entire waste recycling cycle. There are several barriers to sustainable consumption that are listed below.

- The level of education – society's understanding of sustainability and the binding processes of the topic. Actions, effects: the more knowledgeable the consumer, the more responsible purchases and actions are taken.
- Consumer age (scepticism) – the younger generation is more open to more innovative solutions than older generations. Younger consumers follow trends more and are not afraid try a product obtained in a different way, for example from recycled materials.
- Fast fashion – clothing collections on store shelves regularly change, and significantly reduced sustainable clothing consumption is possible.

- Price – one of the most powerful factors that determine consumer actions. The lower the salary, the more advantageous/cheaper products the consumer will choose, and, in this variant, the impact of sustainability is not considered.
- The level of well-being – as the level of well-being in the country and the world improves, consumers will be able to do more to allocate funds for responsible purchases.
- Lack of information – governmental and non-governmental organizations, as well as brands and companies themselves, must actively inform the public about sustainability, as well as about positive benefits for the environment and the economy. Communication is the key to change.
- Lack of motivation – there is no motivation to act responsibly, which is also facilitated by the previously-mentioned disinformation. By understanding these barriers, brands can inform consumers about a solution or a response to existing barriers by helping consumers understand the value and necessity of the industry (Euromonitor International, 2022).

By identifying the above-mentioned barriers, companies and organizations can develop strategies for different consumer groups, dividing them into segments and adjusting the content and channels of marketing communication. The correlation between education level and waste sorting habits is a significant factor that prompts understanding whether the weak link is the lack of information reaching consumers or other factors that influence it. In this case, pressure motivation is also potentially less likely to occur if the consumer's social circle includes consumers without a higher education, as well as those who do not sort waste (Euromonitor International, 2022). Social groups have a great influence on their members, and accordingly, communication channels and content are very important. In different groups, it is precisely in matters of waste sorting that the economic benefit may become the most significant in some groups, but it may not provide a long-term effect for changing habits.

2. Communication as a means of involving consumers in waste sorting

Effective communication and its strategic planning are very essential to improve public awareness of waste management issues and to help change waste sorting habits both in general and by separate groups of sorted waste. When developing any communication strategy, plan or guidelines, one must remember the need for dialogue with the audience, because dialogue is not only a democratic process, but also an excellent way to acquire/transfer knowledge.

US professor James Grunig, whose theory of four public relations models developed together with Todd Hunt in 1984, has been the basis for the theoretical framework of public relations communication for several decades. Grunig and Hunt divided organizational communication (in the sense of public relations) into one-way and two-way communication, each of them in turn being divided in more detail depending on the desire of the communicator to involve the recipients of information in the overall communication process, as well as to create feedback (Grunig, Hunt, 1984). One-way communication models include the publicity model, which is characterized by persuasion and manipulation to influence the behaviour of the audience in the interests of the organization, and the public information model, in which information about the organization is disseminated using press releases and other one-way communication tools. Two-way communication models are represented by the two-way asymmetric model, in which research is used by communicators to find out the best way of persuasion, and feedback to the target audience is important in this model, and the two-way symmetrical model, in which consultation with the target audience takes place to resolve conflicts and ensure mutual understanding and respect between the organization and its target audience (Grunig, Hunts, 1984).

In 1995, Grunig developed this theory in collaboration with David Dozier and Larissa Grunig by creating a model of excellence in public relations and emphasizing the importance of two-way symmetrical public relations in organizational communication. The model, as described in this theory, aims to ensure that the decisions made by the organization are not only mutually understandable, but also mutually beneficial for the organization and its audience (Grunig, 2013).

The findings of Grunig and his colleagues are an important theoretical and practical basis for creating communication in the field of waste sorting and searching for arguments that are important to the audience involved in this process. For example, in the UK, WRAP (The Waste and Resources Action Programme, a climate action NGO founded in 2000 that works in more than 40 countries around the world to address the causes of the climate crisis and ensure a sustainable future for the planet) helps individuals, businesses and local authorities work with programs to improve waste reduction and sorting, thereby making better use of natural resources and helping to combat climate change. WRAP has produced a research-based guide, 'Improving Recycling Through Effective Communication', which guides the development of a communication strategy to promote the collection of sorted waste. The guide is based on WRAP's experience of leading national recycling and waste prevention campaigns, as well as other local authority examples across the UK. WRAP's research shows that the key to success is properly designed communication with the community to overcome barriers to people's participation. When developing the guidelines, the latest research and theoretical insights were used to provide local governments and waste management companies with comprehensive information on aspects of communication planning. The manual's chapter on strategy development states that in addition to initial research information or situational analysis and knowledge of key target audiences and budget options, it is important to decide which mix of communication methods will be most effective in reaching the target audience (WRAP, 2013).

For example, WRAP lists communication methods that can be chosen depending on the type of information one wants to give people about waste sorting:

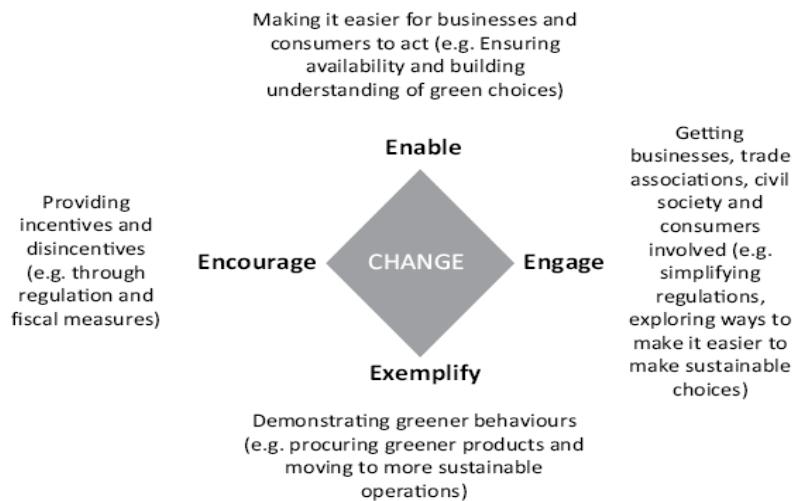
- advertising is suitable for short, simple messages such as awareness raising and simple calls to action;
- public relations in the local press can effectively provide both simple and more complex information, for example, about the introduction of a new service, or explain how waste processing takes place;
- on flyers and calendars delivered to every household, and on the company's website, detailed information can be provided on what can be thrown into the sorted waste container, or what is the container removal schedule;
- in direct communication, customer service specialists can provide detailed information that each person needs individually (WRAP, 2013).

Depending on the situation, communication about waste separation may involve one or more of the above, as well as different tasks, such as creating and maintaining awareness; interest should be promoted; provide practical information; barriers (people's prejudices) must be removed; encourage behaviour change; people must be attracted and involved over time. In addition, the factor that different communication methods and activities have different effects on different audiences should be taken into account:

- TV and radio are suitable for targeting the entire region with the same message;
- the local newspaper can be used to address the people of the local municipality;
- informative posters in certain places will be intended only for people visiting these places;

- social media channels can be an effective way to communicate information about services and allow engaging in a two-way dialogue with residents to spread messages, improve customer service and build relationships;
- mobile phone text messaging and information services can be an effective way, e.g. reminders about taking out waste bins (Pelenur, 2022).

There is no single solution to influencing consumer behaviour. Changing deeply ingrained habits is difficult and requires a consistent, strategic approach. The Department for Environment, Food & Rural Affairs (DEFRA) of Government of the United Kingdom developed the 4Es model to help plan appropriate communication to achieve these goals. The model was developed in 2011 as part of the UK's Sustainable Development Strategy, which aimed to engage individuals, households and communities in implementing sustainable behaviour change. So, it was defined that four elements are needed for change to happen: opportunity, involvement, encouragement and setting an example, and then over time human action becomes a certain norm (Figure 1).



Source: Department for Environment, Food & Rural Affairs (DEFRA) of Government of the United Kingdom, 2011

Fig. 1. **4Es model of behaviour change**

Moreover, WRAP developed guidelines based on the 4E model with four main steps to be taken in order to change consumer habits and make waste sorting a self-evident daily activity.

- 1) **Enable** – making it easier: provide people with the support they need to make responsible choices (e.g. by building food waste champions, and providing cookery courses).
- 2) **Encourage** – give the right signals: understand and offer the benefits to change which are as important as providing regular feedback (e.g. using members of the public as case studies, providing food waste diaries to record progress, prize draws and equipment trials).
- 3) **Engage** – get people involved: involve people early on so that they understand what they need to do – help them develop a sense of personal responsibility. Work with the grain of lifestyles and through trusted partners and intermediaries to develop 'social norms' (e.g. printed media and PR, and using businesses as intermediaries to host events).
- 4) **Exemplify** – local authorities need to lead by example: Review internal policies and take action to 'exemplify' the same behaviour (WRAP, 2015).

The option is to make waste sorting easier, that's the starting point – there's no point asking residents to sort waste if they don't know how to do it, or if they know how to sort waste but don't have the

infrastructure to do it. People need help to make choices, so education, skills and quality information must be provided. On the other hand, encouragement means giving the right signals, choosing the most effective techniques to force a change in behaviour and promote waste sorting.

3. Characteristics of types of waste and the divided waste management system in Latvia

The waste management sector is one of the most important sectors in the country, and the waste management system is one of the most important directions in EU and Latvian legislation in the field of environmental protection and good management and management of resources. In general, this field is regulated by more than 40 regulatory acts and documents in Latvia, of which the Waste Management Law is considered the main regulatory act of the industry.

According to the Waste Management Law, waste is any object or substance that its owner gets rid of, decides to get rid of or is forced to get rid of. A waste generator is any natural or legal person whose activities generate waste (the original waste generator) or who performs waste pre-treatment, mixing or other activities, as a result of which the composition or properties of waste change. The classification of waste according to its origin is as follows: hazardous waste is waste that has one or more properties that make it dangerous; household waste is waste generated in the household, trade, in the process of providing services or elsewhere, if it is similar in terms of characteristics to waste generated in households; production waste is waste generated during the production process or construction; biological waste is biodegradable waste from gardens or parks, food and kitchen waste from households, restaurants, public catering establishments and retail premises and other similar food production waste (Saeima, 2010).

The law also defines what waste sorting is – manual separation of certain types of waste from the total waste flow at the point of waste generation, manual or automated separation from the total waste flow at waste collection and sorting sites, as well as in waste recovery and waste disposal facilities. On the other hand, waste recovery (any activity, the main result of which is the beneficial use of waste in production processes or the economy, replacing with them other materials that would have been used for the relevant activity, or the preparation of waste for such use) and waste recycling (waste recovery activity, in which waste materials are processed into products, materials or substances according to their original or other use) (Saeima, 2010) is closely related to today's essential aspects of sustainability, the importance of which is growing year by year.

The basis of an environmentally friendly waste management system is its sorting by people, consumers of goods and services. For this purpose, specialized containers and waste machines are placed in Latvia, so that residents separate their waste by type: paper, plastic, glass, metal, bio-waste. Next, the waste divided into containers is taken to sorting centres, where the waste is re-sorted – according to the type and quality of the material – into useful, suitable for utilization and waste for disposal. Useful waste from sorting centres is sent to factories for processing, unsuitable for recycling – to landfills (Zolt, 2022).

4. Sorting of biodegradable waste and examples of its communication in Latvia

Bio-waste is defined as biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants. It does not include forestry or agricultural residues, manure, sewage sludge, or other biodegradable waste such as natural textiles, paper or processed wood. It also excludes those by-products of food production that never become waste (European Commission). Recently revised waste legislation within the EU's circular economy strategy has introduced a number of targets and provisions that will drive both the prevention and the sustainable management of bio-waste. Recycling of bio-waste is key for meeting the EU target to recycle

65 % of municipal waste by 2035 (European Environment Agency, 2020). About 60 % of bio-waste is food waste. Reducing the demand for food by preventing food waste can decrease the environmental impacts of producing, processing and transporting food. The benefits from reducing such upstream impacts are much higher than any environmental benefits from recycling food waste. The Sustainable Development Goals' target of halving food waste by 2030 has helped to put preventing food waste high on the policy agenda in most European countries (European Environment Agency, 2020).

Separate collection and recycling of organic waste such as food and garden waste is important for several reasons. First, it helps reduce the amount of waste going to landfill. Second, in the sorting plant, where unsorted household waste is sorted and prepared for further waste management operations, other waste arrives drier and cleaner and thus has a better potential for further recycling. Thirdly, by processing biological waste, technical compost and biogas can be produced, which are further used for the production of electricity and heat (Dukalska, 2023). The residents' understanding of what should go in the brown bio waste container is quite different, however, the overall trends paint a positive picture. If households are educated and offered convenient sorting solutions, such as small containers and special bags (compostable bags), the amount and quality of sorted waste increases. Biological waste in compostable bags was the most carefully sorted compared to the contents of other bags. Those sorters who do not use bags should also be praised. In the composition of the received biological waste, the most frequently observed additives were such household waste as, for example, paper napkins, beverage packaging, food that was not removed from plastic packaging, the contents of the cat's toilet. This waste should be sorted in other containers or placed in an unsorted household waste container. One of the factors to increase the motivation to sort organic waste is the monthly waste removal bill. If currently the tariff for the removal of household waste and organic waste is approximately the same, then in Estonia, the removal of organic waste is half the price. The results of the pilot project for the sorting of biological waste of Riga residents show that the wider education of the population about what kind of waste should not be placed in the biological waste bin and direct communication will be of the greatest importance on the way to the introduction of high-quality separate collection of biological waste not only in the capital, but also in the whole of Latvia (Dukalska, 2023).

In order to evaluate the communication with citizens about the sorting of biowaste and its possibilities to change the sorting habits, the information on the websites of three Latvian waste management companies was analysed. The companies were selected based on the fact that their offer included a bio-waste sorting service. The Clean R group (company 1) consists of six companies delivering more than 40 different environmental services to 50,000 clients around Latvia in such fields as waste management, property maintenance, cleaning and improvement of indoor and outdoor spaces, as well as cleaning of roads and public access areas. Services of the environmental management company LLC Eco Baltia vide (company 2) are available to every resident and company in Latvia. The company provides the widest range of environmental management services – collection of household and sorted waste, management of used packaging, construction waste and bulky waste management, cleaning of premises and territories, and different seasonal services. Lautus Vide PS (company 3) is a general partnership of two waste and environmental management companies, established in 2020 for the implementation of a common goal – a cleaner capital city – in the territory of Riga, combining the forces of the managers Pilsetvides serviss Ltd. and Lautus Ltd.

During the content analysis, it was found that all companies use not only abundant text, but also images and video materials in their communication about the waste sorting. The first company has placed information on the separation of biodegradable waste on its website. Added a visual explanation,

information on eligible waste types, container type and costs. Information about the need for special waste bags could be confusing for consumers, it can create additional difficulties for the sorting of biodegradable waste. Information on the conditions for separating bio-waste can be found on the second company's website. However, the information is textual and descriptive, with particular emphasis on the type of waste container. Specially marked 120-liter bags for garden waste are available in all Eco Baltia environmental management districts. On the website of the third company, very extensive textual information is available, the specifics of bio-waste sorting are described in detail. Information on container types and specialized bags is available.

However, since the rules of waste management in each company (and therefore also in each territory managed by these companies) are different and sometimes even mutually contradictory, in general, a unified, clearly perceptible and understandable message about the sorting of bio-waste in Latvia is not created for consumers. The situation is also made more complicated by the fact that these rules differ in each municipality, and sometimes even within the same municipality, as is the case, for example, in the Adazu district, where waste management is carried out by two of the mentioned companies – Clean R and Eco Baltia vide, and the inhabitants are often confused and do not understand why there are one set of rules in the neighbouring village, but different rules in the village itself, and how it should actually be on the scale of the whole of Latvia.

5. Interviews with communication experts about waste management communication in Latvia

In order to evaluate the communication of waste management companies with citizens about waste sorting, three interviews were conducted with communication experts. All experts have more than 15 years of experience in the field of public communication (Table 1).

Table 1

List of experts

Nr.	Name	Status
1.	Vineta Vitolina	Head of the Development Department of Turība University, former long-time head of Public relations of Kekava region
2.	Jana Bunkus	Head of the J. B. Spark Communication Ltd., Board member of the Latvian Association of Public Relations Professionals (LASAP)
3.	Jolanta Derkevica	Head of the Board JDP Integrated Communications, Ltd.

Source: created by the authors

All the experts admit that in order to promote a change in the citizens' behaviour in waste sorting, it is not enough just to provide communication and provide information about how important waste sorting is, what its benefits are, and what its impact is on our environment and the country. This issue must be solved in a complex way, that is, at the same time as the change of society's values and communication with the society, suitable conditions and infrastructure must also be created, so that it is convenient for the consumer to realize his intention – to live "green" and sort waste. Otherwise, if the infrastructure and process for waste sorting are not organized, including legislation, most people will not be motivated to change their usual and routine daily habits. In this case, human nature and laziness work, only for the minority – consumers with fanatical "green thinking" beliefs – the disorganized infrastructure may not be an obstacle. Therefore, the involvement of all parties is essential in changing the behaviour of the society – the person himself, the state, the municipality and entrepreneurs, waste managers.

As one of the successful examples, one of the experts cites Kekava county, where in 2019 the municipality started a pilot project with a waste manager to promote waste sorting directly in the villages of private houses, where the population is not as dense as in cities, and where it is easier to organize and provide waste sorting points. This pilot project provided that the residents of the neighbourhood of private houses, where five or more private houses are concentrated, and where sorting containers near apartment buildings are not available, can apply for the creation of a sorting point. The municipality surveys the possible location of the point and accepts it if it is technically suitable, for example, it is easily accessible to the waste manager. This pilot project provided that the residents of the neighbourhood of private houses, where five or more private houses are concentrated, and where sorting containers near apartment buildings are not available, can apply for the creation of a sorting point. The municipality surveys the possible location of the point and accepts it if it is technically suitable, for example, it is easily accessible to the waste manager. In this way, all the "players" are involved in this process, and citizens must take responsibility or be given the opportunity to be co-responsible. And here communication is like an effective binder.

The opinion of the experts fully agrees with the 4Es model of behaviour change mentioned earlier in this article, and the creation of communication about waste sorting, including in the bio-waste segment, should be integrated into broader general policies as one of the means of achieving an optimal result throughout the country: 1) enable – making it easier for business and consumers to act (e.g. ensuring availability and building understanding of green choices); 2) engage – getting businesses and consumers involved (e.g. simplifying regulations, exploring ways to make it easier to make sustainable choices); 3) exemplify – demonstrating greener behaviours e.g. procuring greener products and moving to more sustainable operations; 4) encourage – providing incentives (e.g. through regulation and fiscal measures).

Conclusions, proposals, recommendations

- 1) Sustainable consumer behaviour is a concept that increases its importance every year. Entrepreneurs can influence sustainable consumer behaviour, while sustainable solutions for entrepreneurs are influenced by consumers. It is very important to act in such a way that both parties interact in the context of sustainable solutions and to naturally find a factor that would motivate one of the parties to initiate change.
- 2) The main barriers that prevent consumers from engaging in waste sorting are complex system, too little information, as well as between municipalities and companies. Everyone involved has own procedure and approach to waste sorting, which confuses consumers. Nor is there one a great solution to involve the majority of the public in waste sorting, but there is a need to change for the entire industry and consumer mindset, as well as innovation.
- 3) In Latvia, the field of waste is regulated by more than 40 regulatory acts, as well as the internal regulations of different municipalities. Also, for each waste manager are different rules for waste sorting, which are not explained in communications with consumers, or are explained only partially. Their consumers do not develop a common understanding of the need for waste sorting and, after that, do not encourage the desire to change their habits.
- 4) The creation of communication about waste sorting, including in the bio-waste segment, must be dealt with in a complex manner, at the same time as the change of society's values and communication with society, suitable conditions and infrastructure must also be created so that it is convenient for the consumer to realize his intention – to live "green" and sort waste.

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DEGROWTH BY DISASTER OR DESIGN: CONVERGENCE OF CRISES AND POSSIBLE PATHWAYS IN LATVIA

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Abstract. The ongoing climate and environmental breakdown, the COVID-19 pandemic, and the Russian war in Ukraine are some of the key events creating a continuous convergence of crises that will likely affect most societal groups and the whole global (dis)order. Based on research within the Latvian Council of Science funded project 'Ready for change? Sustainable management of common natural resources', this paper explores firstly, the evidence-based impossibility of perpetual growth; secondly, the already visible signs of socio-economic hardship throughout 2020 - 2023; and thirdly, the possible pathways for actions in Latvia, based on long-term involvement in degrowth movement and participatory action research. We conclude that the early warnings for 'Limits to growth' 50 years ago have proven correct and dramatic reductions in emissions and material throughput are necessary to ensure a liveable planet for humans and broader biodiversity. The only substantial historical reductions have happened during the crises, and the decoupling of growth from environmental destruction remains a dangerous illusion. Therefore, the degrowth body of knowledge must be considered as a 'vision for a better future' with understanding and respect to planetary boundaries, social equity and other limits. Unfortunately, the lessons from crises indicate that corporate and political elites are afraid to reorganize the growth hegemony-driven economic and political systems. Still, the environmental breakdown has not yet provided such a sense of urgency that COVID-19 did, despite all warnings. The possible pathways in Latvia are not unique in this sense as our research confirms such a lack of sense of urgency and prioritisation of economic aims above environmental/existential, immediate above the more distant. There are aspects of valuable societal and environmental resilience in Latvia that are likely to be useful in adaptation to crises, but growth-based environmental destruction is generally not understood even among many environmentally active people. The strategic vision for alternative development strategies is very limited in Latvia. The high risk of degrowth by disaster remains.

Key words: degrowth, convergence of crises, environmental breakdown, material throughput, resilience.

JEL code: Q5

Introduction

There are two relevant meanings of growth:

- 1) The natural development of an immature system or organism to maturity.
- 2) A pathology in which a mature system or organism continues to grow.

[...] any system which grows beyond its mature state without limit will in due course crash. It may not know it, but it is in danger. And the more successful it has been in sustaining its development in this sense, the greater will be the crash. This is the central problem of the market economy' (Fleming, 2016, 182-184).

The context of our interdisciplinary research through the years 2020 - 2023 has been very demanding due to challenges such as the COVID-19 pandemic and the Russian war in Ukraine which led us to move from the original focus on the environmental breakdown to analysis of the complex setup of convergence of crises (Zobena & Felcis, 2022, Felcis & Felcis, 2022). Our research has multiple references to the degrowth paradigm understood as a social movement, research, and critical economic theory. Restating the severity of socio-economic and planetary-ecological circumstances is essential – the side-effects of aspirations for infinite growth on a finite Planet Earth. Material 'sources' and 'sinks' are perceived as externalities in orthodox economic schools, while ecological economists and degrowth scholars emphasise the importance to understand our material throughput to ensure liveable futures for humans and broader biodiversity.

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Even relatively conservative panel of scientists like the Intergovernmental Panel on Climate Change (IPCC) are using very direct language about climate breakdown, risks being higher than previously thought, that any increment of warming makes matters worse and creates compound future risks. 'For any given future warming level, many climate-related risks are higher than assessed in [Assessment Report 5] AR5, and projected long-term impacts are up to multiple times higher than currently observed. Risks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming. Climatic and non-climatic risks will increasingly interact, creating compound and cascading risks that are more complex and difficult to manage' (IPCC, 2023, p. 15). Several summary report illustrations indicate increasingly larger areas of Earth turning uninhabitable for animals and dangerous for humans with every warming increment above the currently already achieved state (IPCC, 2023, p. 14-16).

Therefore, in this article firstly, we will explore the inevitability of the end of growth as planetary boundaries and carrying capacity does not allow for ever-increasing growth-driven material throughput and climate breakdown, secondly, we will assess what can be learned from the responses to COVID-19 pandemic and Ukraine war and thirdly, discuss the circumstances in Latvia within this wider context.

This article is based primarily on the review and synthesis of interdisciplinary literature on limits to growth, alternatives of degrowth and convergence of crises in order to further the limited discussion in Latvia and wider Eastern Europe about growth-degrowth dilemmas in order to have more courage for strategic national aims and plans instead of predominantly reactionary political action. Few scientists dare to think beyond the prevailing economic and development orthodoxies. Furthermore, quantitative and qualitative research material within 'Ready for change' project (Zobena & Felcis, 2022, pp. 39-78) enables further interpretation of Latvian circumstances, possibilities and limitations within a global context.

Research results and discussion

The inevitability of degrowth

One of the degrowth definitions is 'the democratic transition to a society that – in order to enable global ecological justice – is based on a much smaller throughput of energy and resources, that deepens democracy and guarantees a good life and social justice for all, and that does not depend on continuous expansion' (Schmelzer et al., 2022, p. 4). The authors are importantly summarising that growth is not just the increase in Gross Domestic Product (GDP), it is an ideological construction, a social process, and a material process. Firstly, it is an aspect of neoliberalism ideology and became the dominant perspective since 1950. Secondly, it is a stabilizing social process when both individuals and nation-states focus on growth as a hopeful perspective of the ability to catch up with peers or other states. Thirdly, any economy has its material throughput or metabolism, and growth is 'the flows of energy and matter that are passing through societies – extracted in some useful form, put to work or consumed, and eventually emitted as waste' (Schmelzer et al., 2022, p. 62). The key problem is that this planetary metabolism is by far exceeding the carrying capacity of planetary ecosystems and resources (Rockstrom, 2009, Steffen et al. 2015a, 2015b), and therefore growth as the dominant ideological construction is unable to solve the problems that it itself creates with constant expansion.

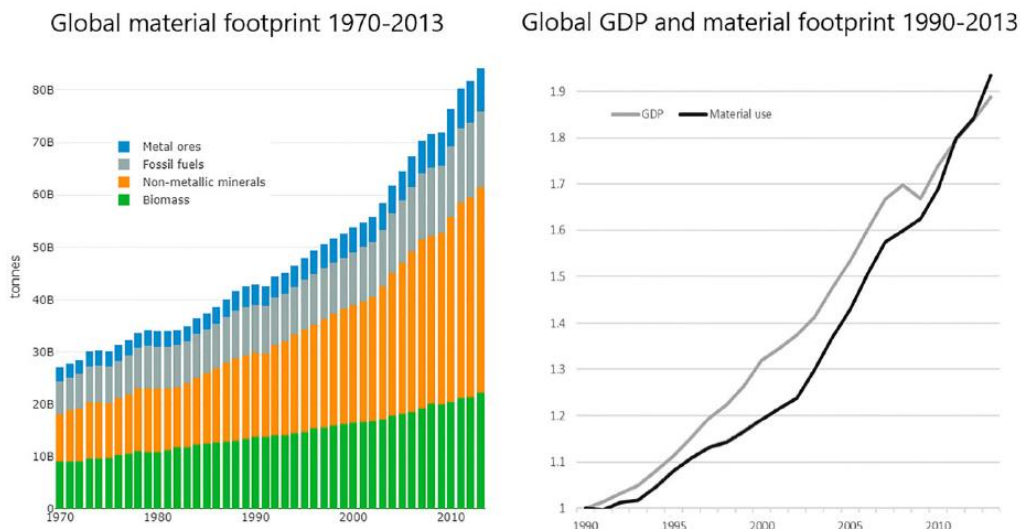
One of the earliest works to question to benefits of growth as an overall ideology was the 'Limits to Growth' report (Meadows et al., 1972). As shown in the figures about the 'Great Acceleration' since 1950s (Steffen et al., 2015b), growth is capable of increasing prosperity and well-being of many people, but simultaneously becoming pathological in the perspective of planetary biophysical reality – growing material throughput.

In the following decade, the so-called 'Bruntland report' (WCED, 1987) was famous for phrasing arguably the most common definition of sustainable development. However, it is rarely emphasised that the report was very optimistic about the prospects to maintain infinite economic growth while not causing environmental degradation. 'Far from requiring the cessation of economic growth it (i.e. sustainable development) recognises that the problems of poverty and underdevelopment cannot be solved unless we have a new era of growth in which developing countries play a large role and reap large benefits' (WCED, 1987, p. 40). Furthermore, report authors expressed a belief that 3-4% growth rates in the developed countries are the minimum necessary for global development and could be environmentally sustainable. Without analysing in more detail, such a vision implies doubling the size of 'developed' economies (and their related environmental and material throughput impacts) every 20-25 years and doubling of 'developing' economies even less than every 10 years, using simple mathematical rules of exponential growth. Economic growth further contributes to increased social metabolism in natural resource, energy use and related emission growth which leads to human-caused climate breakdown.

Another widespread term to justify further growth is 'Green economy'. It was introduced in 1980s and has become increasingly more used as another response to environmental problems becoming more evident. The transition to a green economy was at the centre of the Earth Summit 2012 (UNEP, 2011). It is a common argument that green economy principles through 'speaking in understandable language' (i.e. expression of ecosystem services and other natural capital in monetary terms) allows one to appreciate the importance of a viable environment and hence mobilise action to maintain it. Simply speaking, the green economy is envisaged as a win-win-win strategy for everyone involved with a disproportionate emphasis on economic instruments.

This approach has received a critique that it leads to the commodification of the environment because of its simplistic combination of social, ecological, and economic understanding while denying biophysical realities (Spash, 2012; Steffen et al., 2015a). 'Green economy' initiatives typically achieve only relative improvements while absolute/total conditions degenerate.

The widely circulated reports like the United Nations (UN) resolution 'Transforming our world: the 2030 Agenda for Sustainable Development' (UN, 2015), the Sustainable Development Goals (SDG), and 'Better Growth, Better Climate' follow the same line of logic 'that countries at all levels of income now have the opportunity to build lasting economic growth at the same time as reducing the immense risks of climate change' (The New Climate Economy, 2014, p. 8). This is based on a continuous growth paradigm and aims to achieve sustainable development through decoupling of economic growth from environmental degradation, at the same time. However, numerous times over the last decade it has been demonstrated as impossible to be achieved (Jackson, 2016: 67-86, Fletcher & Rammelt, 2016; Ward et al., 2016; Parrique et al., 2019; Hickel, 2021).



Source: Hickel & Kallis, 2019, p. 5. (a) Global material footprint, 1970-2013; (b) Change in global material footprint compared to change in global GDP, 1990-2013

Fig. 1. Global material footprint and comparison to GDP

Hickel and Kallis (2019) visualise very clearly the material throughput continuously increases since 1970 and is tightly correlated with global GDP. Further on they conclude that 'the empirical data suggest that absolute decoupling of GDP from resource use (a) may be possible in the short term in some rich nations with strong abatement policy, but only assuming theoretical efficiency gains that may be impossible to achieve in reality; (b) is not feasible on a global scale, even under best-case scenario policy conditions; and (c) is physically impossible to maintain in the longer term' (Hickel & Kallis, 2019, p. 7).

Multiple degrowth thinkers (for example, D'Alisa et al., 2014; Schmelzer et al., 2022) are developing a systems-level explanation why most of the widely shared beliefs and strategies for development are very likely to fail in long-term perspective. And yet there is strong resistance to this economic analysis supported by clear mathematical and physical arguments. From a sociological point of view, there can be two explanations. Firstly, most often on the individual level, this is a complicated mental exercise to accept that many aspects of our societies are impossible to continue sustainably if to continue at all in the future. Secondly, it is difficult to motivate people to action or mobilisation when the risks are so distant and invisible from an individual perception.

These two phenomena have been already analysed in the past. Sociologist Anthony Giddens emphasised the danger in this invisibility and according to 'Giddens Paradox': '[...] since the dangers posed by global warming aren't tangible, immediate or visible in the course of day-to-day life, however awesome they appear, many will sit on their hands and do nothing of a concrete nature about them. Yet waiting until they become visible and acute before being stirred to serious action will, by definition, be too late' (Giddens, 2009, p. 2).

More than a decade after Giddens assessment it is already too late to avert many climate change related dangers, because the previously invisible risks that environmental movement activists and scientists have been talking about for decades are becoming ever more visible. For example, Jem Bendell (2020) calls for deep adaptation to acknowledgement that in many regards it is 'too late'. 'Some future changes are unavoidable and/or irreversible but can be limited by deep, rapid and sustained global greenhouse gas emissions reduction. The likelihood of abrupt and/or irreversible changes increases with higher global warming levels' (IPCC, 2023, p. 19). For example, there has been no slowing of CO₂ concentration, material throughput, frequency of extreme weather conditions and average global temperatures, where

'the 10-warmest years on record have all occurred since 2010, with the last nine years (2014-2022) among the all-time 10-warmest years' (NOAA, 2023).

In all this convergence of crises, degrowth is largely about building alliances across the world and showing the multiplicity of paths that can be taken to achieve better future societies that are conscious of the limits of global biophysical reality. Degrowth 'strength is its holistic view. [It] relies not on a single strand of growth critique but has, from its very inception, braided the seven emancipatory strands [...] together into a cohesive, well-developed, and broad critique of growth' (Schmelzer et al., 2022, p. 177). These seven strands of critique can be briefly summarised.

- **Ecological critique** implies that economic growth leads to destruction of the ecological foundations of human life and there are inevitable limits to growth.
- **Socio-economic critique** states that economic growth is not measuring genuine well-being and equality, and after a certain income level further growth has more costs than benefits and thus becomes 'uneconomic'.
- **Cultural critique** in essence demonstrates that people are becoming less happy and fulfilled in modern industrial societies and critiques the reductionist perspective of humans as homo economicus; David Graeber succinctly describes many current day workplaces as 'bullshit jobs' (Graeber, 2018).
- **Capitalism critique** points out that economic growth depends on continuous capitalist exploitation and accumulation that inevitably leads to more environmental degradation and social inequalities – both widely recognised problems in various political circles.
- **Feminist critique** adds the gender perspective in lasting inequalities and the essential role of reproductive and care activities that are carried out predominantly by women.
- **Critique of industrialism** emphasizes the unequal distribution of benefits from industrial progress that furthers other already mentioned problems.
- Finally, the **South-North critique** points to lasting post-colonial heritage in global (dis)order, where economic growth inevitably depends on relations of domination, extraction, and exploitation of the 'developing' world that is locked in this impossible catch-up game with the 'developed' countries.

From all these critiques we can conclude that there are structural problems with further growth aspirations - they are not likely to bring further environmental, social, and even economic benefits for current and future generations. Unfortunately, there is still a lot of 'designing' for growth, not degrowth. 'The Limits to Growth' (Meadows et al., 1972) was ridiculed 50 years ago, 20 years ago the authors confirmed the worrying trends (Meadows et al., 2004), in 2021 we could see that the trends of the last 50 years have matched the closest with the 'business-as-usual' scenario that 'indicate a halt in growth over the next decade or so' (Herrington, 2021, p. 614), and the acceptance of limits is ever more a reckoning with the biophysical planetary reality.

Therefore, the degrowth body of knowledge is very valuable in the ongoing convergence of crises that are probably starting to bring about the 'degrowth by disaster'. In this article, we use the degrowth movement phrase 'degrowth by disaster or design' to discuss the possibility of 'designing' preventive, thoughtful degrowth transitions at the time of relative stability or the likelihood of 'disaster' – crises and collapses with dramatic reductions in material throughput and only consequential realignment with reality. Indeed, there is a risk that the latter option will not lead to many desirable degrowth transition outcomes.

Socio-economic hardship in 2020-2023

As indicated in the introduction, since 2020 there have been multiple large-scale global events or even disasters. The COVID-19 pandemic is interesting in the context of this article because responses to it can

be perceived as a partial form of degrowth – reductions and limitations for the common good: 'the politics to fight the pandemic can be interpreted as a deliberate and planned shutdown of large parts of economy, with the goal of furthering the common good. [...] To achieve this shutdown and cushion its effects, governments introduced policies that had long been deemed impossible [...] all by using the government's sovereign power of money creation. [...] they led to (temporary) significant reductions in emissions and material throughput' (Schmelzer et al., 2022, p. 285-286).

The first key aspect here is about government actions that are deemed possible or not. Many politicians and economists would argue that it is impossible to stop, change or fundamentally alter the current status quo, while the pandemics demonstrated that under emergency situations radical changes are implemented. The second aspect is about the reductions - this is noted also by multiple other authors (e.g. Hickel & Kallis, 2019) and visible in country emissions reports that the only emissions and material throughput reductions that have happened during the last decades are during crises.

For example, the collapse of the Soviet Union led to dramatic emissions reductions in the newly independent countries, including Latvia. Surely, that was not because of environmentalists in the government, but because of the collapse of large industrial enterprises and the economic hardships of many people. The next moments of reductions are during the impacts of the late 1990ties Asian and Russian crises and the post-2008 global economic crisis. We will return to the last one later to explain the fragility of the recovery from that crisis and the structural problems that are lasting since then. In summary, if only crisis situations with slower economic growth rates are linked to reductions in emissions and material throughput, then once again the key worry must be about ensuring well-being without further economic growth.

The ecological economist Clive Spash early in the COVID-19 pandemic had precisely compared that the sense of emergency in the pandemic should have been similar regarding the climate and environmental breakdown. For example, after reaching the Paris Agreement in 2015 it should have led to 'oil markets collapsing, fossil-fuel investments being decimated, airlines cutting flying and going bankrupt and people stopping daily commuting [...]. Instead, they occurred as a reaction to the Coronavirus pandemic and as things to be reversed as soon as possible' (Spash, 2020b, p. 14). Spash continues his analysis to warn that the pandemic had demonstrated that politicians in the current hegemonic economic thought paradigm 'will only act to counter corporate and financial interests, and the consumer throwaway society, under domestically actualised extreme circumstances' (Spash, 2020b, p. 14). This indeed can be perceived as a system test that asks the question of not whether, but when the resource, climate, and ecosystem circumstances will become extreme enough to act on them like in an emergency. The current elites seem to be afraid of demands to reorganize the economic and political system (Spash, 2020a, p. 20) and also authors of IPCC (2022, 2023) and IPBES (2019) reports note that vested interests are slowing down the necessary actions.

Just when the pandemic was becoming less deadly in early 2022, Russia started the full-scale invasion of Ukraine. That refocused the attention of many, especially in the Baltic States with their complex history of Russian/Soviet occupations. Immediate crises always are perceived as more urgent, as discussed above. Later in 2022, the war intensity had slowed down, but its ongoing impacts, primarily the need to reorganize energy and resource supplies from elsewhere than Russia, had brought up sustained high inflation rates in most of Europe and elsewhere in the world.

While this is a straightforward correlation between energy sources and prices, there is a limited analysis of the other interconnected drivers of inflation. For example, climate crisis and environmental degradation are negatively affecting agricultural productivity, while its production is heavily reliant on diesel tractors

whose fuel and maintenance costs in turn have gone much more expensive. More extreme weather conditions are also creating more damage to infrastructure and higher costs to rebuild it.

In addition to that, since the post-2008 crisis, many countries have created into existence enormous volumes of new money through 'quantitative easing' (USA), European Central bank promises to buy any national bonds and other programs. In other words, it has been a lot of borrowing from future generations to maintain further expansion of economic growth. That continued during the pandemics and war in Ukraine, all done with many years of record-low interest rates of all the biggest national banks in the world.

The usual fiscal recipe to limit the high inflation rates is to raise interest rates, which is ongoing in the EU, USA, and the UK in 2023, but is unable to bring down the inflation because of its above-mentioned multiple causes and is likely to bring more bank bankruptcy risks as have already happened in March 2023 with the Silicon Valley Bank collapse, problems in the Credit Suisse, its acquisition by UBS and other risks of banks that are 'too big to fail', as we have learned in post-2008 crisis.

The fragile recovery since 2008 with a lot of debt creation that bring ever smaller increases in GDP and lower oil prices because of lower demand through the demand drop in especially 2009 and 2020-2021, is unlikely to deliver further economic stability and can burst into the next global financial crisis in any time between 2023 and 2030. The various forms of debt might become impossible to be repaid and oil prices might keep fluctuating in a higher range regardless of economic downturns because of the inevitable oil supply limits where conventional sources have peaked in 2015 and shale oil and gas added production is likely to peak in this same decade until 2030. The absurdity of our dependence on fossil fuel corporations is highlighted by British Petroleum, Exxon Mobile and Shell reported historical all-time record profits in 2022. IPCC alarmingly emphasize that 'there is a rapidly closing window of opportunity to secure a liveable and sustainable future for all. [...] The choices and actions implemented in this decade will have impacts now and for thousands of years' (IPCC, 2023, p. 25). What is relatively clear from the current trends is that it will not be possible to:

- Grow the economy and simultaneously efficiently mitigate climate breakdown;
- Grow the economy by replacing fossil fuels (currently they make up 80-85% of world's energy sources) with renewables;
- Expect people to leave fossil fuels in the ground, while IPCC reports that the operation of the current energy infrastructure guarantees exceeding the internationally agreed desirable 1.5-degree limit (2023);
- Expect governments to explain limits to growth before limits to growth are well past.

Since major economic downturns are likely within this decade, the key question remains about the viability to achieve democratically planned reductions in material throughput while reducing inequalities and improving well-being, all at times of crises. Unfortunately, the observed trends are not hopeful – profiteering from crisis and politicians' unwillingness to counter vested interests in sustaining the unsustainable.

Possible pathways in Latvia

In the bleak picture of the global context, further we want to reflect on what characterises recent developments in Latvia; not because of its uniqueness, but because of, a) the historical understanding of its past and present, b) social and political activism for change, c) understanding of its dependency on external international processes and d) possible capacity for resilience in such complicated circumstances.

Valuable insights about local, rural settings in Latvia can be learned from the outcomes of the EU funded research project 'My own corner, my little bit of land' (www.savskaktins.lu.lv). For example, social

anthropologist Dace Dzenovska has carried out extensive fieldwork resulting in her monograph about emigration and emptiness in rural Latvia. She discusses the global pressures and stages of post-Soviet transitions, critiques development paradigm hegemony, and then relate these pressures to responses of personal coping strategies (Dzenovska, 2012). Cimdiņa and Raubisko (2012) monograph within this project is challenging the dominant production intensification paradigm through an in-depth depiction of work and place attachment in rural Latvia.

Authors emphasise that most of the work remains invisible for market monetisation and therefore statistically appears as inefficient, but at the same time small and medium farms in Latvia are characterised by 'culturally and socially embedded management logic [...] that is more encompassing and meaningful than market economy logic' (Cimdiņa & Raubisko, p. 162). Statistics on increasing organic farming conversion in Latvia are supporting the argument about Latvian rural resilience and aspirations for environmentally friendly and regenerative farming/management (Felcis & Felcis, 2021).

However, there are also instances where people resist the return to some aspects of the past legacy, as they feel the need to 'break' with a past of hardships as in the Soviet Latvia until 1990 (Dzenovska, 2012). Since the fall of the Soviet Union and its influence sphere, there is a dominance of convergence paradigm of growth-based 'catching up' throughout the Central and Eastern European (CEE) countries. It includes sentiments as Hungarians looking at Austria as an example of how they should have developed if not for the Soviet occupation; in the same way Latvians have their widespread narratives of being equal to Scandinavian countries before World War II. Furthermore, in the CEE and Latvia is a strong sense of failure of communism, fragile democracies and people who are often disillusioned, and it makes it very difficult to involve people in social movements, especially if they can be linked to communism as is the risk in case degrowth.

Therefore, it is a very complex challenge in Latvia for anyone willing to adapt or adjust some of the ideas, language, and practices of global movements towards sustainability; for example, permaculture, agroecology (Felcis & Felcis, 2021), transition towns and degrowth, which are all encompassing the types of 'real utopias' (Wright, 2010) that could be worked towards in the settings of Latvia. Such actions can be easily labelled as reversing the development trend towards the genuinely difficult times of recent history and therefore discrediting any such attempts. That reduces the likelihood of actions towards 'degrowth by design' in Latvia.

One of the first academic publications in Latvian to explicitly discuss degrowth as a development alternative is the 2016 book on climate change and sustainable development (Kļavins & Zaijoksnis 2016, pp. 327-329). However, while authors are highly critical of a 'business-as-usual' development approach, their recommendations and future vision is inconsistent and abruptly end with the wishful proposition that 'green economy' + 'national happiness' = 'sustainable world' (ibid., p. 345), which is not a useful or actionable development or economic transformation aim.

A similar lack of transformational potential can be observed in key policy planning documents in Latvia – they include inconsistencies in development visions – sustainability is frequently mentioned as an end goal, but the paths to sustainability are often conventional and inconsistent with genuine sustainability or degrowth. For example, the Latvian Sustainable development strategy (Latvija 2030) has an overall focus on human-centred development and maintains the belief in sustainability model as an answer to global challenges. However, National Development Plan for 2014-2020 (NDP 2014-2020) had moved away from human-centred development and has an explicit focus on 'economic breakthrough' and growth, even using technical and fossil fuel focused language in setting the objective of 'Prioritising national economic growth acts as fuel in the engine of Latvia's 'economic breakthrough'' (NDP 2014-2020, p. 17).

Furthermore, the whole Latvian Operational Programme for 2014-2020 planning period Cohesion Policy funding was titled 'Growth and Employment' (Ministry of Finance, 2014). This obvious link has been criticized as the lack of strategic thinking based in the most recent economic thought and response to global risks and challenges and NDP serving only as the framework to spend the funds available from the EU. The latest NDP 2021-2027 somewhat refocuses the attention to human centred perspective, has sustainability mentioned in different contexts more than 60 times, and mentions the European Green New Deal, but unsurprisingly still includes no mentions of degrowth as development alternative to achieve climate neutrality or other sustainability aims.

These planning documents are highlighting the overall policy-making scene in Latvia that is following the same dominant neo-liberal economic paradigm and belief in infinite economic growth (Felcis & Felcis, 2017). That makes conscious degrowth-oriented actions in Latvia complicated and underlines the necessity to contribute to the development of alternative political-economic relations. On one hand much can be learned from social experiments with universal basic income, widespread participatory budgeting, time banks, transition towns and other initiatives across Europe, but on the other hand, Latvian society is characterised with still widespread set of skills and abilities that are important for societal resilience, for example in the back-to-landers and permaculture movement (Felcis & Felcis, 2021).

Conclusions, proposals, recommendations

Human progress is causing side effects that cannot be solved while remaining in the same economic paradigm. The challenges reflected in this article reassure that spaces must be created to imagine 'real utopias' (Wright, 2010) – utopian from the perspective of current economic hegemony, but real because they could be well functioning in human societies in long-term perspective. As the section on degrowth inevitability demonstrates, it is less utopian to work towards regenerative alternatives without further material throughput expansion than to believe that the current dominant principles of economic organisation can continue indefinitely.

Decoupling is a dangerous illusion, 'Limits to growth' modelling proves frighteningly correct 50 years later and the relatively conservative IPCC uses increasingly alarmist language in its synthesis reports. The degrowth perspective has the potential to encourage thinking and acting in different paradigms from the dominant ones. It 'is not only a critique of the present but also a proposal and a vision for a better future (Schmelzer et al., p. 180).' Regarding degrowth, 'designing' would mean a preventive, thoughtful degrowth transitions at the time of relative stability, while 'disaster' – crises and collapses with dramatic reductions in material throughput and only consequential realignment with reality, that is not guaranteed.

From this article, we can conclude that because of biophysical limits and societal inabilities to achieve fast and deep transformations, the economic growth will rather come to an end by 'disaster'. The already visible crisis-time responses in 2020-2023 reaffirm the concerns – corporate and political elites are afraid to reorganize the growth hegemony-driven economic and political systems. Still, the environmental breakdown has not yet provided such a sense of urgency that COVID-19 or war in Ukraine did, despite all IPCC and other scientists' warnings. The possible pathways in Latvia are not unique in this sense as our research confirms such a lack of sense of urgency and prioritisation of economic aims above environmental/existential - on individual, corporate and political levels. There are aspects of societal and environmental resilience in Latvia that are likely to be useful in adaptation to crises, but growth-based environmental destruction is generally not understood even among many environmentally active people.

It is relatively clear from the observed trends that it will not be possible to a) grow the economy and simultaneously efficiently mitigate climate breakdown; b) grow the economy by replacing fossil fuels with

renewables; c) expect people to leave fossil fuels in the ground not to exceed the desirable 1.5-degree limit; d) expect governments to explain limits to growth before limits to growth are well past. In either way, it is clear that the system that will need to be developed without growth and respecting the resources externalities will not be a reformist revision, but a fundamentally different way or human socio-economic organisation.

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ENVIRONMENTAL SAFETY OF AGRICULTURAL BUSINESS IN UKRAINE: ACCOUNTING AND ANALYTICAL SUPPORT

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Abstract. Delimitation of the environmental component of national and corporate economic activity is one of the ways to present information on environmental activities in the accounting and reporting system. An important problem of this system of accounting for natural resource and environmental indicators is the lack of methods for the formation of such business transactions. Only if environmental indicators are taken into account in the economic activities of enterprises, an objective assessment can be given and a competitive agricultural business can be formed.

The purpose of the study is to find out the importance of environmental safety of the agrarian business of Ukraine and its accounting and analytical support. It is determined that the primary role in the process of environmental management is designed to perform accounting as a system that reflects the events of economic life, including the impact of the enterprise on the environment.

The article discloses the role of accounting in ensuring environmental safety of business. The volume of expenses of business entities for the implementation of environmental measures, including waste management, is investigated. The costs of environmental protection of agriculture, forestry and fisheries in Ukraine are analysed.

It is revealed that the main objects of accounting for environmental activities are assets, liabilities and results of the enterprise. The article reveals the essence and methodology of environmental accounting of these objects: natural resource potential, production waste, non-current assets of environmental purpose, environmental liabilities, environmental costs, environmental income and financial results from the environmental activities of the business entity.

Key words: environmental safety, accounting, agricultural business.

JEL code: M 40, M 41, Q 15

Introduction

Environmental safety is one of the most important problems of the modern world. Climate change, air and water pollution, biodiversity loss and other environmental problems are becoming increasingly serious. In other words, ensuring environmental safety is becoming an increasingly important task for the whole world.

Environmental safety can be described as the process of ensuring the protection of the vital interests of not only the individual, but the society as a whole, as well as the state and nature from threats created by anthropogenic or natural impact on the environment.

Successful results of environmental activities of enterprises depend on the continuity of making balanced and consistent decisions of its managers, each of which is based on the existing information base and ultimately causes a better or worse impact on the environment. A positive factor in this is the inclusion of environmental activities in the accounting system.

The purpose of the research is to clarify the importance of environmental safety of agrarian business in Ukraine and its accounting and analytical support, which is specified by the following tasks: studying the role and place of environmental activity of a business entity in the environmental safety system; studying environmental safety in the agrarian business of Ukraine, substantiating the relevance of introducing

environmental accounting in agriculture, as well as studying the objects of accounting for environmental activities in the agrarian business and organization of their accounting.

During the research, the method of scientific knowledge, analysis of scientific research, definition of the main categories of the theory of environmental activity were used, methods of analysis, systematization, comparison, synthesis and generalization were applied in the formulation and scientific substantiation of research results.

Research results and discussion

The modern model of economic relations demonstrates the inconsistency of their mechanism in overcoming the global scale of environmental and social problems and the limited idea of mankind about the methods of solving them. In this regard, there is a need to rethink the processes of safe functioning of economic systems of different levels and the introduction of sustainable development provisions as an alternative direction for their formation and application. The above-mentioned determines the intensification of scientific research on the role of the accounting system in the information support of environmental safety of enterprises.

The development of accounting in the context of the formation of the information space for managing the environmental safety of enterprises is a rather complicated and disordered process. This is due, first of all, to the fact that today neither in science nor in practice it is determined in which direction the main theoretical and methodological provisions of accounting should be formed and developed. Formation of theoretical and methodological design of accounting as an information subsystem of management economic and environmental safety of the agro-industrial enterprise will determine the fundamental tenets of the development of the science of accounting in modern economic conditions in ensuring the provisions of the theory of sustainable development.

The ecological activity of the enterprise is an appropriate segment of its operational activity, which should ensure a balance between the public interests and the interests of the enterprise, as a result of which the natural environment should be preserved as much as possible in the state in which it was until recently. Environmental activities of the enterprise related to the implementation of certain activities and works that would ensure the balance of interests of people living nearby, with a balance of interests of its owners (tenants, shareholders) (Deriy, 2015, p. 195).

Each type and subspecies of economic sectors has its own specific directions for the formation of environmental activities and environmental factors that must be taken into account when forming a development strategy for a particular enterprise or a group of enterprises of the same type.

The main directions of ecological activity include: the development of natural resources, their extraction (or extraction of minerals), use, reproduction and protection; greening of production technology; actually, environmental activities of the enterprise as a complex of environmental measures.

According to the Law of Ukraine "On Environmental Protection", environmental safety is a state of the environment in which the prevention of deterioration of the ecological situation and the emergence of a danger to human health is ensured ("On Environmental Protection", 1991).

Environmental safety is the goal and at the same time the task of the activities of all interested actors, and the process of its provision or activity in this area does not mean the result. That is – a business entity must carry out proper environmental activities to ensure the environmental safety of business, region and state.

It is known that agricultural production is one of the largest polluters of the environment. Methods of its management are characterized by extensive use of natural resources, the active involvement of various

techniques and the use of chemicals that have a negative impact on the environment, life and health of people.

The development of various forms of ownership and management of land without strict and reliable state environmental and customs control over the import of hazardous waste, the lack of an appropriate legal framework lead to a consumer attitude to land. The use of a large amount of mineral fertilizers, pesticides and other chemicals together with industrial and radiation pollution can further complicate the environmental situation in Ukraine, reduce the reproductive capacity of the biosphere and the environmental sustainability of agricultural landscape.

Business perceives natural resources as a practically free production resource, which in the process of carrying out production activities are not only excessively polluted and exhausted, the state of the environment deteriorates, obstacles to its self-reproduction are created (Trinko, 2014, p. 117).

The reason for the environmental crisis in the agricultural sector is mainly economic factors, namely:

- 1) extensive development of agricultural production, which is not able to provide the population of the state in sufficient quantities with environmentally friendly food products;
- 2) lack of environmental justification of plans and projects of economic development developed by the relevant departments of ministries and departments on the basis of departmental methods and instructions, regulatory and technical documentation for the placement, construction and operation of economic facilities and complexes, for the creation of new equipment, environmentally safe technologies for the production of agricultural products;
- 3) there are almost no effective administrative and economic mechanisms for environmental protection; low moral level of society and lack of environmental management thinking (Voronovska, 2010, p. 294).

The rapid development of organic production in Ukraine and the world is a response to the desire and growing opportunities of the population to consume healthy food and public awareness of the real threat and harm of industrial agriculture due to negative environmental, social and economic consequences. Organic agriculture itself is one of the key factors in solving global environmental and social problems and in achieving the goals of sustainable development (Ishchenko, 2021).

Greening is the main activity of agricultural enterprises and is based on the development of ecological and economic methods of management to ensure the expanded reproduction of natural resources through the formation of sustainable ecological and economic systems, increasing the production of competitive environmentally friendly products, creating agricultural systems using environmental management methods (Lepetan, 2021).

In the course of the study of environmental safety, a number of negative trends that agriculture has faced can be identified: violation of crop rotations; giving preference to growing crops for which there is an increased demand; increasing the load on pastures; expanding the use of agrochemicals; narrowing the specialization of agricultural production and land concentration, consolidation of farms; the structure of supply and demand is formed without taking into account the most complete reflection in the composition of costs production of all types of goods of "objective" economic assessments of natural resources and environmental actions (Sokolskaya, 2012, p. 58).

Organic production is based on the principles of health, ecology, justice and care, uses the principle of biological synergy. The main methods of organic agriculture include: refusal to use herbicides, pesticides, fungicides, fertilizers; use of biological plant protection products; use of animal and vegetable waste as fertilizers; application of crop rotation to restore the soil; the use of manual labour in the care of crops;

organization of a closed cycle agriculture livestock (crop production – fodder, livestock – fertilizers); in animal husbandry – grazing, refusal to use synthetic feed additives, hormones, antibiotics (Kaletnik, 2023).

The European choice of national economic development opens up not only new opportunities for expanding foreign economic activity, attracting foreign investment, participating in large European scientific and technical programs and projects, but also requires strengthening the impact on the efficiency of environmental activities of enterprises, regions, and the country as a whole. In this regard, the urgent issue is not so much the complete reform of the regulatory mechanism of environmental safety, but rather its direction towards the coherence of the state's environmental policy and the environmental policy of individual enterprises. It is this format of cooperation that will allow to objectively and timely identify the most significant threats and risks in this area, which is an important prerequisite for making effective management decisions in the system of ensuring environmental safety.

Accounting is one of the most important management functions, identifying and systematizing data on economic activity, while ensuring the adoption of informed management decisions. Accounting information should allow timely determination of external and internal conditions, provide an opportunity to investigate, analyse and take measures to eliminate significant differences between the potential capabilities of the enterprise and the requirements of the processes that take place in the environment.

Timely and accurate information support of the management system through efficiency of high-quality accounting and control functions is an integral part of agribusiness activities (Gutsalenko L., Marchuk U., Hutsalenko O. & Tsaruk N., 2020).

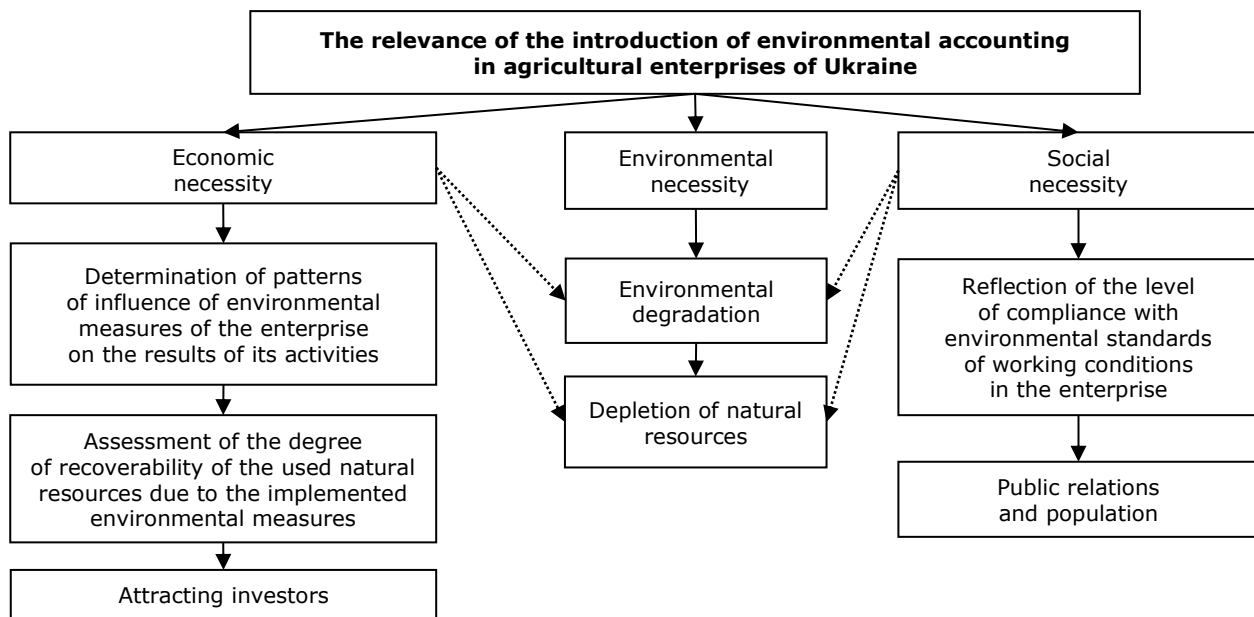
Information formed in the accounting system relating to the environmental activities of the enterprise or the environmental consequences of its functioning is the basis for the information revolution. Such an information breakthrough is necessary for the owner of capital in the activities of preserving the state of the environment, and, accordingly, for their own safety.

Environmental safety is designed to ensure the integrity of ecosystems through the preservation of their abilities for self-healing. The information source on the quantity and quality of natural systems is called upon to serve as environmental accounting data.

Environmental accounting can be a driving method of accounting for the costs of environmental protection and determining the approach to the phenomena of economic activity of enterprises, considering all means and processes in their direct movement and development, unity, interconnection and mutual agreement.

The main prerequisites for accounting for environmental activities are: 1) operations related to interaction with the environment, as well as their impact on financial results, should be reflected in the accounting system; 2) creditors and investors need information about the environmental activities of the enterprise to make decisions on building partnerships; 3) obtaining competitive advantages in the condition of production of environmentally friendly products; 4) accounting of environmental activities is a means of achieving sustainable economic development (Zamula, 2010, p. 60).

The importance of environmental accounting is due to economic, environmental and social challenges (Fig. 1).

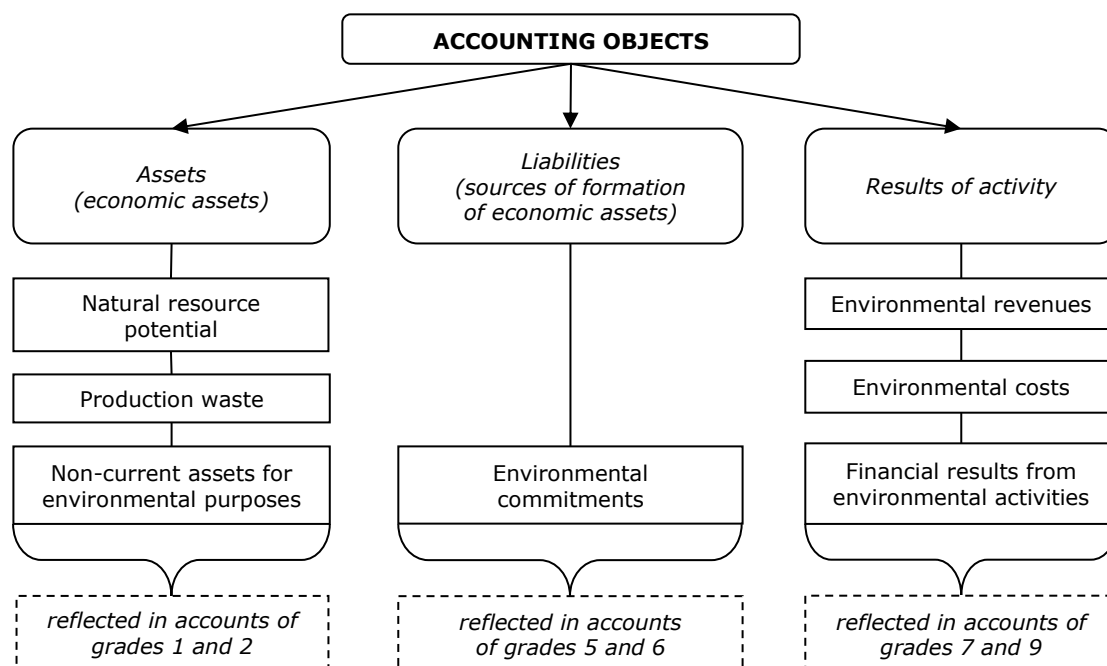


Source: created by the authors based on Gangal (2015)

Fig. 1. The relevance of the introduction of environmental accounting in agricultural enterprises of Ukraine

Environmental accounting of the enterprise should form information on: the availability of natural resources (in quantitative and cost meters), the degree of development and the ecological state (quality) of natural resources; the presence of impacts (positive and negative) of the business entity on the natural environment; measures taken by the business entity to protect the environment, as well as their effectiveness.

We consider it necessary to single out three main objects of accounting for environmental activities: assets, liabilities and results of the enterprise. The group of objects that are economic means (assets) includes natural resource potential, production waste, non-current assets for environmental purposes. The sources of formation of economic assets (liabilities) include environmental obligations. The results of the activity are environmental revenues, environmental costs and financial results from the environmental activities of the business entity. We propose to combine the objects of accounting of environmental activities into three groups for the purpose of their accounting reflection (Fig. 2).



Source: Tomchuk, Lepetan, Zdyrko & Vasa (2018)

Fig. 2. Objects of accounting of environmental activities

Reflection in the accounting of the enterprise of operations related to its environmental activities will allow to form information on the environmental management of the enterprise and publish it in order to inform the public about the results of such activities, which is one of the factors in the formation of a business image and contributes to strengthening economic security at the local and global levels (Lepetan, 2019).

Let us consider in more detail the accounting support of individual objects of accounting for environmental activities.

The natural resource potential of agricultural enterprises is a set of natural resources, conditions and processes that are used by enterprises to conduct effective, environmentally safe, socially oriented economic activities. Its main components include: land resources; water resources; forest resources; faunal resources; mineral resources; natural and recreational resources.

We consider it appropriate to reflect the components of the natural resource potential in the context of business transactions proposed by I. V. Zamula.

- 1) The presence and movement of natural resources (if they are the property of this subject).
- 2) Operations on the lease of natural resources.
- 3) Operations on the protection of natural resources: the activities of the enterprise to prevent pollution; the impact of the enterprise on the environment; activities of the enterprise to eliminate pollution.

The basis of the natural resource complex of Ukraine, as rightly noted by Kaletnik G. M., Kozlovsky S. V. and Tsikhanovskaya V. M. – the potential of land resources (agricultural land), which is about 2/5 of the total natural resource potential of the state. Land belongs to a category that covers a certain set of natural as well as socio-economic objects and their properties. Due to its unique characteristics, land is an important means of production in many branches of the national economy (Kaletnik, Kozlovsky, Tsikhanovskaya, 2012, p. 2).

Agriculture of Ukraine is the most environmentally intensive industry with a powerful natural resource potential, which includes 41.31 million hectares of agricultural land (68.5% of the territory of Ukraine),

including 32.75 million hectares of arable land (54.3%), 7.53 million hectares of natural forage land - hayfields and pastures (12.5%).

According to the Land Code of Ukraine, land protection includes:

- 1) justification and ensuring the achievement of rational land use;
- 2) protection of agricultural land, forest lands and shrubs from their unreasonable removal for other needs;
- 3) protection of land from erosion, villages, flooding, waterlogging, secondary salinization, re-drying, compaction, pollution by production waste, chemical and radioactive substances and from other adverse natural and man-made processes;
- 4) conservation of natural wetlands;
- 5) prevention of deterioration of aesthetic condition and ecological role of anthropogenic landscapes;
- 6) conservation of degraded and unproductive agricultural land (Land Code of Ukraine, 2001).

In order to ensure the preservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems, promote sustainable forest management, restore degraded lands and soils using innovative technologies, the Ministry of Economic Development and Trade of Ukraine approved the State Environmental Policy Strategy for the period up to 2030 (Ministry of Economic Development and Trade of Ukraine, 2017).

The data in Figure 3 indicate that by 2030 it is positive to plan a decrease in arable land by 4170.3 thousand hectares, increase in the area of agricultural land of extensive use – by 1695.5 thousand hectares and an increase in the area of organic land – by 2589.4 thousand hectares.

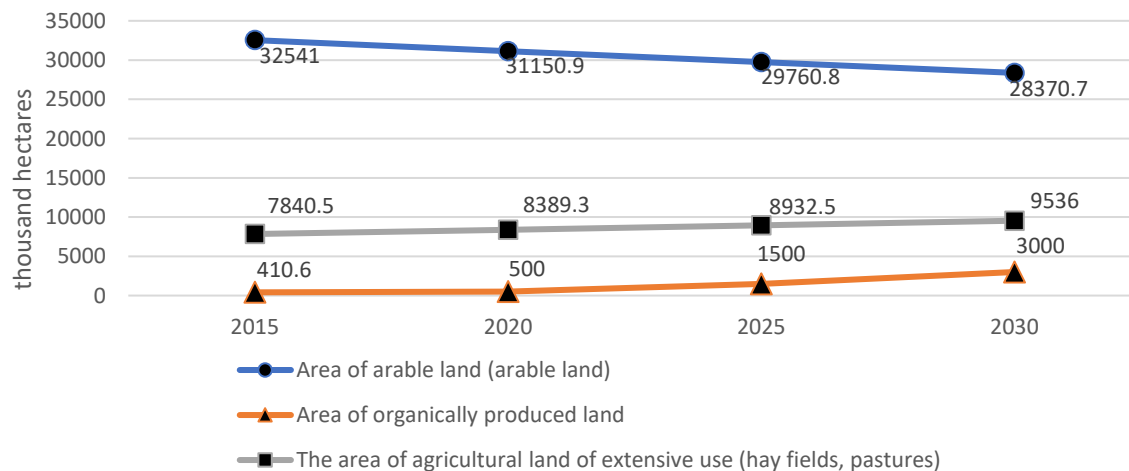


Fig. 3. **Planned indicators for the protection and restoration of land resources of Ukraine during 2015-2030**

The accounting system that exists in Ukraine at the present stage reflects the following objects of land relations:

- 1) land plots;
- 2) rights to use land plots;
- 3) capital expenditures for land improvement.

Among the main directions of ensuring environmental safety of business is the management of production waste, which requires the implementation of certain regulatory activities in this area, namely a properly organized system for accounting for the formation, collection, processing, placement, disposal

of waste; establishing control over the material balance of production in order to stimulate the introduction of low-waste technologies; implementation of qualification monitoring control of waste movement at all stages of their life cycle; creating conditions for the development of entrepreneurial activity in the field of waste management, etc. (Rudenko, 2019).

Today, unfortunately, not enough attention is paid to the problem of waste, and especially to their accounting reflection.

The results of the analysis of Table 1 make it possible to conclude that the largest share of waste generation from all types of economic activity is occupied by the mining industry and quarrying. Waste generation in 2020 in Ukraine has increased significantly compared to 2018. In general, waste generation for all activities in 2020 increased by 31.2% compared to 2018. However, the generation of agricultural, forestry and fisheries waste decreased by almost 11%.

Table 1

Waste generation by type of economic activity of enterprises and households of Ukraine, thousand tons

Types of economic activity	2018 year	%	2019 year	%	2020 year	%	Deviation, +/-
All types of economic activity	352333.9	100	441516.5	100	462373.5	100	110039.6
Agriculture, forestry and fisheries	5968.1	1.7	6750.5	1.5	5315.4	0.1	-652.7
Mining and quarrying	301448.9	85.6	390563.8	88.5	391077.9	84.6	89629.0
Processing industry	31523.2	8.9	30751.8	7.0	52311.0	11.3	20787.8
Supply of electricity, gas, steam and air conditioning	6322.7	1.8	5959.2	1.3	5333.7	1.2	-989.0
Water supply, sewerage, waste management	397.4	0.1	411.8	0.1	338.3	0.1	-59.1
Construction	378.8	0.1	188.7	0.01	14.5	0.003	-364.3
Other economic activities	751.3	0.2	994.0	0.2	2033.0	0.4	1281.7
Households	5543.5	1.6	5896.7	1.4	5949.7	1.3	406.2

Source: State Statistics Service of Ukraine

Analysis of waste management costs (Fig. 4) showed their annual fluctuation. Thus, in 2020, the share of waste management costs in total costs increased by 5% compared to 2018, and in 2020 compared to 2019 it decreased by 2.43% and amounts to 34.11%.

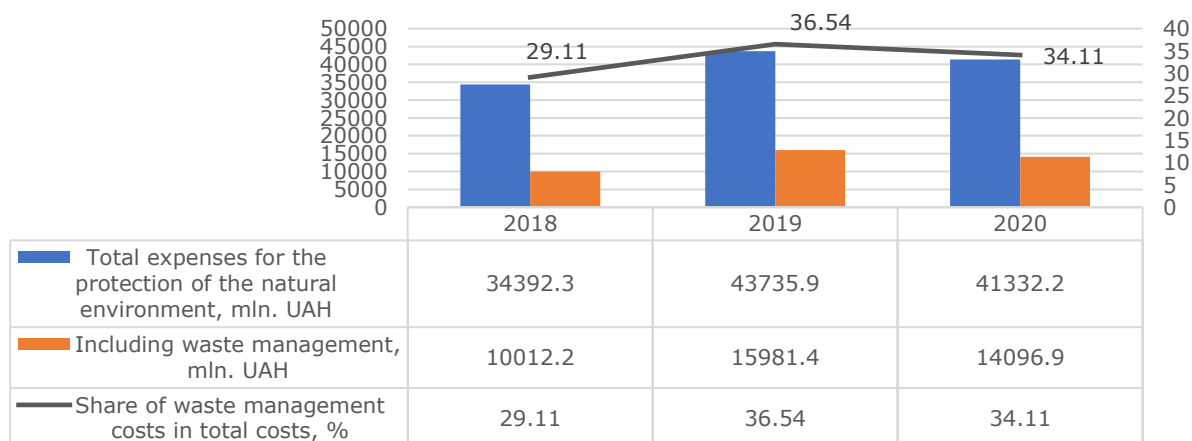


Fig. 4. Waste management costs for 2015-2020

Accounting of industrial waste will allow you to form information about their presence, condition and movement in order to manage them; to promote their complete and safe processing through the detailing of information on the composition and toxicity of such waste; monitor the availability, movement and composition of industrial waste.

Taking into account the specialization of agriculture in Ukraine, the main waste of crop production includes straw formed after the processing of wheat, corn and sunflower stalks, residues of fruits and vegetables, etc. Livestock waste includes manure of cattle, pigs, sheep (provided that it is unsuitable for use as organic fertilizer) and poultry, etc. However, not all manure can be considered waste, because if it is properly prepared, it is a valuable scarce organic fertilizer instead of mineral fertilizers, the use of which significantly pollutes the earth with chemical elements. Therefore, the question arises, which manure can be considered a valuable raw material for agriculture, and which – waste, which must be handled carefully without polluting the environment.

We agree with the position of Zamula I. V. and Bondarchuk V. V. on the reflection of waste on subaccount 208 "Agricultural Materials" (Zamula, Bondarchuk, 2013).

The third component of environmental assets that are reflected in accounting are non-current assets for environmental purposes. In order to manage, control, finance and account for expenses, non-current assets for environmental purposes can be proposed to be accounted for on separate analytical accounts in the relevant subaccounts of accounts 10 "Fixed Assets", 11 "Other Non-Current Tangible Assets", 12 "Intangible Assets". Depreciation of these objects must be recorded on analytical accounts to the subaccounts of account 13 "Depreciation (depreciation) of non-current assets".

The next object of accounting for environmental activities is environmental costs. Of particular importance for improving the level of environmental safety of the country are the volume of expenses of business entities for the implementation of environmental measures and the ability to attract capital investments. In Fig. 5 shows the share of costs for environmental protection of agriculture, forestry and fisheries of Ukraine in 2018-2020. According to the analysis, it can be concluded that the share of these costs tends to decrease in different ways. Thus, in 2020, the share of expenditures on environmental protection of agriculture, forestry and fisheries of Ukraine in total expenditures amounted to only 0.01%, which is 1.21% less than in 2018.

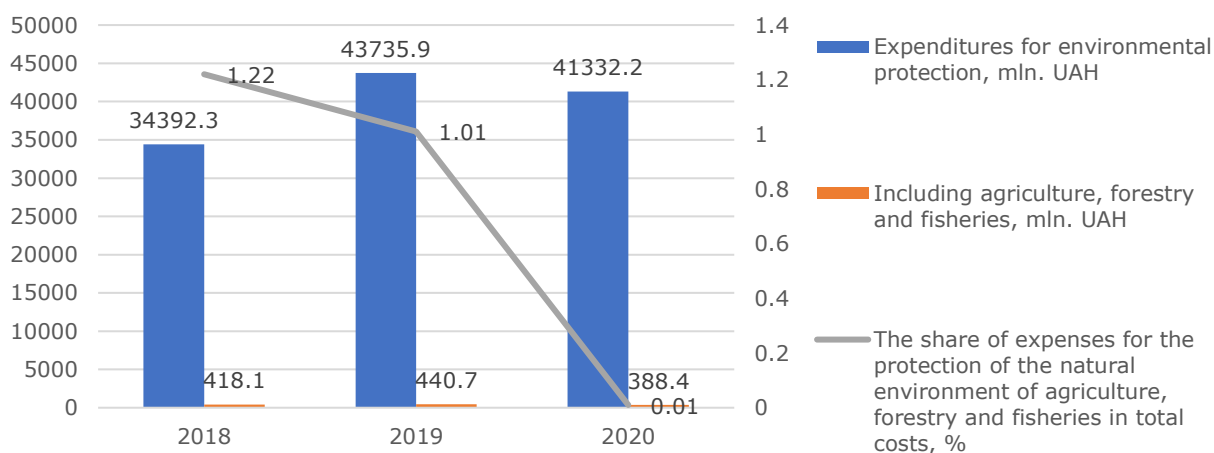


Fig. 5. **Costs of environmental protection of agriculture, forestry and fisheries of Ukraine in 2018-2020, mln. UAH**

Environmental costs are a reduction in the economic benefits of an enterprise or an increase in obligations related to the reproduction and rational use of natural resources, maintaining in a normal state

and improving the quality characteristics of the environment, preventing its pollution or other damage, as well as paying for the use of resources of natural ecosystems or compensation for damages caused to them.

At agricultural enterprises, it is worth dividing the environmental costs into those related to specific types of crop or livestock products, and general production environmental costs.

NR(S)A 16 "Costs" the costs of environmental protection are supposed to be included in the overhead costs. We believe that depending on the type of environmental costs, they should be accounted for in accounts 15 "Capital investments", 23 "Manufacturing", 91 "Overhead costs", 92 "Administrative expenses", 93 "Sales costs", 94 "Other operating expenses".

Environmental income as an object of accounting is less obvious than expenses, which is associated with the probabilistic, according to capital owners, nature of such income.

Sources of environmental income are: the introduction of waste-free, environmentally friendly production (effect as saving raw materials and natural resources, economic incentives); production of environmentally friendly products (the effect is formed by pricing); revenues in the form of economic incentives (tax, credit benefits, compensation from the budget).

The implementation of environmental activities by enterprises leads to the emergence of environmental obligations.

In our opinion environmental obligations should be understood as obligations arising from the activities of business entities that affect the state of the environment, and for non-compliance with environmental legislation entail compensation for damage, payment of fines.

Environmental obligations may arise as a result of: the implementation of core activities (payment for the use of natural resources, including as a reservoir for the disposal of production waste); non-compliance with environmental legislation, which entails compensation for damage, payment of fines, etc.; voluntary actions of the enterprise to eliminate negative impacts on the environment based on considerations of concern for its reputation and competitive position in the market.

Conclusions, proposals, recommendations

Thus, the conducted research allows us to draw the following conclusions.

- 1) Ensuring environmental safety is one of the key tasks of national policy, an important factor in the successful development of any country. Actually, such security personifies the state of protection of the vital interests of the individual and society from internal and external threats.
- 2) The conducted analysis of the level of environmental safety of Ukraine indicates the existence of problems associated with both the lack of necessary funds for financing environmental programs and the lack of a system for coordinating the interests of the state and domestic enterprises to consolidate efforts in solving urgent environmental problems.
- 3) The accounting of environmental activities is a subsystem not only of accounting, but also of part of the environmental management system, the information basis for conducting environmental audits, insurance and evaluation of investment projects.
- 4) In accounting and reporting, any economic activity, including environmental activity, is reflected with the help of indicators of costs, income and the order of their formation. Nevertheless, the system of accounting for the environmental activities of enterprises in Ukraine is only in its infancy.

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THEORETICAL ASSESSMENT OF SUSTAINABLE SOIL MANAGEMENT PRACTICES AND THEIR CONTRIBUTION TO ACHIEVING FARM AND CLIMATE GOALS

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Abstract. The new European strategy envisages addressing the problems of climate change, which significantly affects the agricultural sector, as, for example, in Latvia it accounts for 22% of all greenhouse gas emissions. However, the data show that since joining the European Union, the main objective has been to increase the productivity of the sector. Therefore, in order to achieve the set climate goals, it is necessary to evaluate the implementation of practices corresponding to the goals set, where, as part of this study, we examine the theoretical benefits of sustainable soil management, as well as evaluate the information available in literature sources about the current situation.

The data show that currently, the implementation of such practices is in the process, as it has been observed that it is affected by both technical and financial problems, where it is expected that the implementation of these practices will increase. As well as it is concluded that sustainable soil management practices ensure the achievement of goals of different categories - financial, environmental, and social. Therefore, to objectively evaluate the benefits, a complex approach is needed.

Key words: cover cropping, no-till, minimal tillage, carbon cycle, northern Europe.

JEL code: Q10, Q56

Introduction

Agriculture is a vital sector of Latvia's economy, contributing approximately 4.6% of the country's GDP and employing over 3% of the population. However, the sector also contributes to greenhouse gas emissions (GHG), with approximately 22% of Latvia's emissions coming from the agricultural activities, where the trend of the sector GHG is only increasing (European Parliament, 2021). At the same time European Union (EU) has set a goal of reducing its GHG emissions by 55% by 2030, compared to 1990 levels. This target was set in 2020 as part of the European Green Deal, which aims to make Europe carbon-neutral by 2050. To achieve this goal, the EU is investing in different climate-efficient measures to reduce emissions, where one of them is carbon farming. European Commission implies that even at the low end of estimated potential, carbon farming could offset 26% of the EU's annual agricultural emissions, which in 2019 were 389 Mt CO₂ yr⁻¹ (McDonald et al., 2021).

Carbon farming practices are increasingly recognized as a way to mitigate the environmental impact of agriculture and offer economic benefits for farmers. For instance, cover cropping can reduce soil erosion and nutrient loss up to 40%, while intercropping can diversify crops and generate additional income streams. These practices can also sequester carbon in the soil or plant biomass, reducing GHG emissions and supporting climate change mitigation efforts. Despite these potential advantages, Latvian farmers has implemented only limited amount of carbon farming practices, that increase soil organic carbon content. Such practices could reduce CO₂ emissions by 0.5 to 7 t CO₂ per ha⁻¹ annually. (McDonald et al., 2021). This may be due in part to a lack of knowledge and awareness of the benefits of these practices, as well as financial and technical barriers (Vanino et al., 2023). Therefore, a theoretical analysis of all kind of benefits of carbon farming practices in Latvia is important to encourage the adoption of these practices by farmers. In this paper we **aim** to highlight the potential benefits of sustainable soil management practices for individual farmers and the broader economy, while also contributing to climate change mitigation efforts. Accordingly, the **tasks** are as follows: 1. analyse the theoretical framework for sustainable soil management and its contribution from the agronomical perspective; 2. evaluate how such practices fit into

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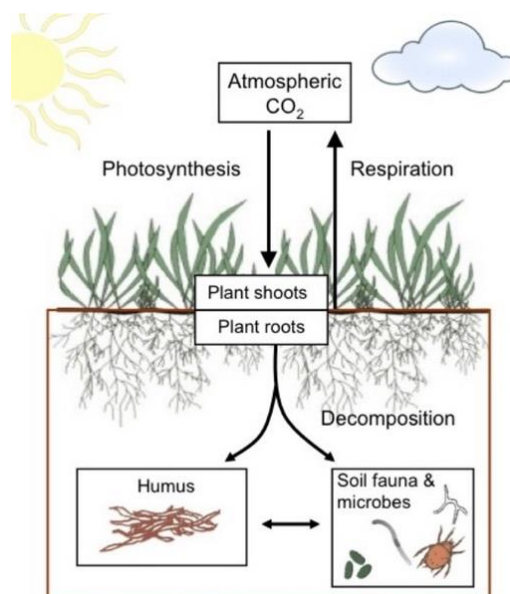
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the agricultural sector of Latvia; 3. define the outcome of the implemented practices and their belonging to a specific beneficial category.

Research results and discussion

1. Theoretical framework of mineral soils, soil organic carbon and soil fertility

Mineral soils make up about 90% of the Earth's land surface and are formed through the weathering of rock and other materials over time. They consist of mineral particles, like sand, silt, and clay, which accumulate with organic matter and microorganisms to create a complex soil ecosystem. Mineral soils vary depending on climate, geology, and topography, with arid regions having more sand and humid regions having more clay and organic matter. They support plant growth, provide habitat for soil organisms, and cycle important nutrients. At the same time an important component of mineral soils is soil organic carbon (SOC), which consists of carbon-containing organic matter such as plant and animal residues, decayed organic matter, and living microorganisms. It is an important soil component that is essential for maintaining soil health and productivity. SOC is formed through the process of photosynthesis, in which plants absorb carbon dioxide from the atmosphere and convert it into organic compounds, which are then deposited in the soil (Fig. 1.) (Ontl, Schulte, 2012; Daryanto et al., 2020).



Source: Ontl, Schulte, 2012

Fig. 1. Soil organic carbon (SOC) cycle in soil

When organic matter enters the soil, it can be broken down by soil microorganisms, releasing nutrients that can be taken up by plants, as well as contributing to the formation of stable soil aggregates and soil structure. SOC is an important part of the global carbon cycle because it can act as a carbon sink, helping to mitigate the effects of climate change by sequestering carbon from the atmosphere, where carbon dioxide is one of the greenhouse gas emissions responsible for global warming. However, human activities such as land-use change and intensive agricultural practices can lead to SOC loss, which can negatively affect soil health and exacerbate the effects of climate change. The amount and quality of SOC in mineral soils depend on a range of factors, including climate, vegetation type, land use, and soil management practices and it can influence soil properties such as water-holding capacity, nutrient availability, soil structure and biodiversity and also carbon sequestration (Aertsens et al., 2013; McDonald et al., 2021).

FAO has identified key practices that increase organic matter, and hence carbon, in soil. Mainly emphasizing the increase of biomass - more efficient plant cultivation, ensuring the water regime and the need for nutrients, as well as emphasizing the incorporation of plant residues into the soil, which can be achieved by cover cropping, leaving plant residues or straw on the field, and the use of organic fertilizers (manure, digestate). In addition, an essential practice is the preservation of organic matter in the soil, or "conservation", which is basically done by reducing mechanical tillage, choosing minimal tillage or even no tillage (FAO, 2017). The same is stated also by various authors, where in addition to FAO practices, there are included also organic farming and legume crop incorporation in crop rotations (Söderström et al., 2014; Hajduk et al., 2015).

Analysing soil management practices that can increase SOC sequestration in croplands, available information shows a great variability, often ranging from 0.1 to over 1.0 t C ha⁻¹ yr⁻¹, where 1 t C is equivalent to 3.67 t CO₂ (Paustian et al., 2019). For example, change in tillage practice may sequester from 0.37 to even 1.06 and 1.39 t CO₂ ha⁻¹ yr⁻¹ (Aertsens et al., 2013). Research conducted in temperate climate conditions shows, that no-till benefits most of the time are associated with plant residues left on field as well as cover crop and crop rotational changes, where it is also found out, that cereal straws may sequester from 0.2 to 0.7 t CO₂ ha⁻¹ yr⁻¹ (Kertesz, Madarasz, 2014), while the use of cover crops, combined with reduced tillage, can increase the organic carbon stock more rapidly. Practising them yearly, the amount of stored carbon can reach 0.58 t CO₂ ha⁻¹ yr⁻¹ (Gay et al., 2009). Also Niggli et al. (2009) estimates that reduced tillage combined with organic fertilizers and high plant biomass can sequester up to 1.8 t CO₂ ha⁻¹ yr⁻¹.

Evaluating SOC sequestration by using sustainable soil management practices, it is concluded, that overall EU potential range from 9 Mt CO₂ yr⁻¹ to 56-70 Mt CO₂ yr⁻¹ (Roe et al., 2021). It is also important to note that a large part of Europe's soils are mineral soils, which means that changes in soil management are essential not only for the potential capture of emissions, but also for the preservation of their fertility, as they require sustainable management, which also includes the return of biomass to it (Wiesmeier et al., 2019). However, at the same time, it must be taken into account that even within the borders of Europe, climatic conditions vary significantly, for example, Northern Europe - from Poland up to Norway and Finland together covers 74% of all peatlands and is characterized by particularly high air humidity. Also, in this region, soil management is essential to reduce carbon emissions. On the other hand, for example, in southern Europe, as in Spain, agroforestry is mentioned as one of the most effective ways to limit soil degradation (Roe et al., 2021). Therefore, it is essential to identify the climatic conditions of the specific territory, as well as the practices used by farmers and how they can be reconciled with the solutions proposed in the theoretical literature.

2. Implications for Latvian agriculture

Agricultural sector is the third largest emitter of GHG emissions in Latvia, which in 2020 emitted a total of 21.5% of the total emissions in the country (2250.88 kt CO₂ eq.). The largest part - 51.6% - is made up of emissions from agricultural soils, 38% animal intestinal fermentation processes, while the remaining 7.2% is manure management and 3.1% liming and urea use (LVGMC, 2022).

As 51.6% of the emissions comes from agricultural soils, country's latest summary shows, that in Latvia there are 2.3 Mha, where 1.97 Mha or 89.7% are classified as cultivated land. The largest sector is grain cultivation, the sown area of which in 2021 was 777.4 thousand hectares or 59.6% of the entire sown area. Data analysis in a 20-year long period shows that the approximate distribution between crops is 55% winter and 45% spring crops, and evaluating the sowing structure of cereal areas, it is concluded that the largest

areas are sown with winter wheat - 54.9% of the entire cereal area. Beside grains, also rapeseed has an important role in the agricultural sector of Latvia, where in 2021 its sowing area occupied 147 Kha – 132 Kha of winter and 14 Kha of spring rapeseed (Zemkopibas ministrija, 2022).

There is currently very little information on soil cultivation practices, but after evaluating the data available from the EU and FAOSTAT as well as practical experience, it can be concluded that at least 65% of the entire arable land area is plowed, less than 10% is cultivated with the minimum type of soil cultivation, while approximately 3% with direct sowing, whereas information is not available for 22% of the area (Agri-environmental indicator..., 2020). And it is stated that reduced tillage systems have the same or even higher yield than conventional-till, at least in short term (Auzins et. al., 2021).

Therefore, it can be concluded that, although no-till tillage is gradually entering the agricultural sector of Latvia, traditional tillage still dominates.

Evaluating data of cover cropping and undersows in Latvia, it can be concluded that these specific practices in arable land areas are increasing – in 2019 they were 175 Kha, while in 2021 already 214 Kha. Similar situation can also be observed in the cultivation of nitrogen-fixing crops – in 2019, they were 307 Kha, and in 2021 already 316 Kha (Zemkopibas ministrija, 2022).

Although the existing information on the types of tillage, as well as cover crop sowing areas is relatively little, it is expected that it will be more widely available in the coming years, as the new CAP 2023-2027 envisages Ecoschemes support for both the documentation of the tillage types and cover crop sowing (The commission approves..., 2022).

Nevertheless, theoretical literature shows that the mentioned soil management practices contribute to the good properties of soil as a resource, it has been concluded that their integration in farms is a relatively big challenge. For this reason, in the following, we will look at the main factors influencing the transition to more sustainable practices. In addition, it is important to note that there is a significant lack of qualitative method studies in Latvia that would analyse the farmers' position and general attitude towards the use of sustainable practices. The base of the existing researches mainly emphasizes the increase of productivity and its analysis - the correlation of soil cultivation methods and yield, and the economic justification is studied, but there is a significant lack of research that would explain the psychological factors. Therefore, studies from all over Europe will be used to analyse the main challenges, with an emphasis on the northern part of Europe.

Soil conditions and yield variability: The possibility for production fluctuation or losses is one of the main worries that farmers may have when thinking about no-till operations. However, findings show that no-till methods resulted in either no yield loss or a gain in yields (Daryanto et al., 2020). No-till boosted crop output by an average of 6.6%, according to a meta-analysis of 28 research comparing it to conventional tillage techniques (Pittelkow et al., 2015). In the long term, using no-till farming techniques can boost crop yields, despite some short-term production variability. However, it's important to note that not all soil types are suitable for no-till. For instance, soils with high clay content may become compacted and resist water penetration, making conservation tillage a more suitable option in certain cases, and, as an example, no-till also can result in lower soil temperatures and slower seedling emergence in soils with large levels of surface residue. However, studies have shown that incorporating no-till with techniques like cover cropping can lessen these issues and enhance soil health (Kravchenko et al., 2017).

Pest, weed and fertilizer management: While it is true that tillage plays a crucial role in managing weeds, pests, and nutrients, the perception that no-till farming requires more inputs is not entirely unfounded. Eliminating or reducing tillage without implementing alternative management techniques may result in increased use of herbicides, pesticides, and fertilizer (Kertesz, Madarasz, 2014). Nevertheless,

such negative consequences can be prevented by utilizing alternative strategies. For optimal results with no-till farming, it is crucial to consider three key factors. Firstly, it should be a permanent practice to enable soil life to thrive and prevent harm to soil structuring processes. Secondly, a permanent cover of organic material is necessary to protect the soil from environmental factors and provide nourishment for soil organisms, resulting in benefits such as carbon sequestration, erosion control, and water infiltration. Finally, sowing a variety of crops, either by rotating them or sowing them together, is crucial to imitate the stability and resilience of natural systems (Daryanto et al., 2020).

For instance, research has shown that adopting cover crops and diverse crop rotations can assist to reduce weed pressure over time - the right species choice is important, where different mixtures is able to provide nutrient retention and to reduce the use of herbicide due to their phytosanity properties. At the same time, however, it should be borne in mind that their sowing properties, such as sowing rate and time, are also important factors (Fraiser et al., 2017; Travlos et al., 2017).

Equipment and material costs: When conducting a study on the position of Scandinavian farmers regarding cover cropping, it was concluded that, mainly as a result of lack of knowledge and also high costs, farmers are not motivated to sow cover crops. The respondents mainly point out that cash crops are mostly winter species, which means that the time of harvest and the sowing of the following winter crops is quite a busy time, which accordingly makes it difficult to sow cover crops, because the priority is cash crops, which bring immediate monetary result. Likewise, the interviewed farmers stated that they are not sure that cover crops provide the expected result and some even admitted that when making the basic crop fertilization plan, they do not take into account the generated nutrients by cover cropping. And they also mentioned the high implementation costs, for example seed costs, but at the same time only 20% of farmers have ever tried to use their own seed material. Looking at the profile of a farmer who has integrated cover crops into his crop rotation, it can be concluded that they are mostly with the higher education, younger than 50 years, farmers with experience in the cultivation of special crops, and often they are organic farmers (Peltonen-Sainio et al., 2023).

No-till is mainly associated with high equipment costs – sowing machinery, cultivator and others, but at the same time, reduced tillage can significantly save operational costs, as well as depending on the climatic conditions, improve the yield of crops due to the improvement of the qualitative properties of the soil (Deines et al., 2019). It is also defined that reduced tillage also affects the yield, but the main cause of this is mostly high soil compaction, nutrient deficiencies, and/or high weed pressure (Pittelkow et al., 2015), which can be corrected by higher vegetation index or, for example, establishing cover crops. It is expected that reduced tillage will continue to grow, where the main driver is reduced operating, labour, and input costs, and on enhancing environmental benefits, which will affect soil erosion. This will also be facilitated by the new CAP, where eco-schemes provide financial support for minimal or no-tillage (The commission approves..., 2022).

Lack of knowledge. Vanino and others (Vanino et al., 2023) conducted a study where they researched sustainable soil management position of various European regions, including Latvia, and it was concluded that one of the most important challenges is the exchange of knowledge. Although the challenges in soil conservation differ in European regions, all industry stakeholders jointly concluded that the main problems are: 1. creation of new and appropriate solutions; 2. effective exchange of knowledge; and 3. transfer of the information obtained through research to the end-consumer, or in this case, how the scientific institutions deliver the information to the farmers. These problems have also been highlighted by Demenois et al. (2020), where it was concluded that most of the limitations are not entirely technical, but

rather refer to the low level of knowledge, lack of experience and skills, proper management of processes, which also results in the ability to fully evaluate social, environmental and financial benefits.

Summarizing the above, it can be concluded that mainly two problems arise: 1. lack of knowledge and thus faith in the practices to be implemented and 2. the ability to fully assess the financial as well as additional benefits. Although these problems complement each other, they are fundamentally affected by different factors, so in the following we will consider a theoretical framework for the evaluation of sustainable practices.

3. Definition of benefits in implementing sustainable soil management practices

Adopting sustainable soil practices can provide a range of benefits that extend beyond just enhancing soil health. They can improve crop yields, reduce production and operational costs, and increase farms profitability (Ontl, Schulte, 2012). In addition, these practices can also have a significant impact on mitigating climate change by decreasing GHG emissions from fertilizer use and tillage and increasing carbon sequestration in the soil, helping to improve water quality by reducing runoff and erosion, retaining water in the soil, and enhancing biodiversity, wildlife habitat, and ecosystem services like pollination and pest control (Aertsens et al., 2013). Overall, the adoption of sustainable soil practices can result in numerous positive outcomes for farmers, the environment, and society as a whole.

Table 1

Benefits of sustainable soil management (SSM) practice implementation and distribution by category (F – financial, E – environmental, S – social).

Beneficial outcome	Category			Description	References
	F	E	S		
Soil fertility increase	x	x		SSM promotes beneficial soil organisms like microbes, fungi, and earthworms, which enhance soil health, nutrient cycling, and plant growth. This leads to more resilient and productive soil that can better withstand pests, diseases, and climate change impact like droughts, floods etc and produce higher yields.	(5) (7) (8)
Higher crop yields	x		x	SSM improves soil organic matter increase, improve nutrient cycling, which leads to more productive crop growing and resilient soil. Various authors indicate, that crop yield may increase from 5 to 15%. This leads to higher farm profitability and overall economic development.	(1) (3) (6) (7)
Input and operational cost reduction	x	x	x	Minimal and no-tillage can reduce the need for fuel, machinery and labour, while saving time resources. Cover cropping can reduce the need for synthetic fertilizers and pesticides.	(1) (3) (5)
Improved water and air quality		x	x	SSM can have a profound impact on improving water and air quality. Through the reduction of soil erosion and runoff, and the promotion of healthier soils that retain water and nutrients more effectively, these practices can effectively mitigate the negative impact of nutrient and sediment runoff on downstream ecosystems and aquatic habitats. Particularly, these practices help to address the pressing issue of nitrate and phosphorous contamination, which leads to eutrophication. As well as reduce ammonia emissions.	(3) (5) (7) (8)
Reduced GHG emissions		x	x	Tillage change from conventional to reduced and no-till can decrease CO ₂ emissions by 33 to 46%. As well as reduced fertilizer input reduces ammonia and nitrate emissions.	(1) (5) (7) (8)
Reduced soil erosion	x	x		Cover cropping and reduced tillage can help to improve soil structure and reduce erosion, which can help to protect water quality and prevent soil loss. This leads to healthier soil material as well as environmental benefits.	(5) (7) (8)
Biodiversity enhancement		x	x	SSM practices like cover cropping, intercropping and reduced tillage promote plant diversity, which exposes the soil to a wider range of organic compounds. This supports a greater variety of soil organisms and creates a more complex and resilient soil ecosystem, which attracts also other species e.g. pollinators, birds and others.	(7) (8)
Exchange of knowledge and cooperation	x	x	x	SSM can encourage collaboration and knowledge sharing among farmers, researchers, and other stakeholders in agriculture. This can promote more sustainable and fair food systems and encourage involved parties towards new innovations and best practices.	(2) (4) (9)
Additional income streams	x	x	x	SSM also contributing to carbon farming practices provides an opportunity to participate in different carbon sequestration schemes from private and governmental sector. Farms can receive additional subsidies for implementing such practices, as well as certifies sequestered carbon on their soils and receives payments for each ton of CO ₂ .	(8)
Improved food security	x		x	Food security improvement by boosting crop yields, enhancing food quality, and increasing nutritional value. This leads to more resilient and productive agricultural systems, which can provide better access to healthy food for local communities.	(1) (2) (3) (6) (7)
Enhanced rural livelihoods	x		x	Improving soil management can boost farm productivity and profitability, create job opportunities, and support local economic development, ultimately enhancing rural livelihoods.	(2) (4)

(1) Auzins et al., 2021; (2) Peltonen-Sainio et al., 2023; (3) Kertesz, Madarasz, 2014; (4) Rust et al., 2020; (5) Daryanto et al., 2020; (6) Pittelkow et al., 2015; (7) Ontl, Schulte, 2012; (8) Aertsens et al., 2013; (9) Aznar-Sánchez, 2020

Source: author's construction

By summarizing the most frequently mentioned benefits in the theoretical literature and grouping them accordingly to their usefulness in a specific category, it can be concluded that all of the mentioned benefits fall into more than one category. As well as at least 3 of them creates financial, environmental and social benefits.

Evaluating the proposed practices and benefits at the national level, it can be concluded that no-till is still relatively underdeveloped, while minimal tillage is becoming more and more relevant (Eurostat, 2020). This can be associated both with the high costs required for the renewal of the machinery, as well as with the additional amount of knowledge to be acquired, which is necessary to change the usual way of farming (Peltonen-Sainio et al., 2023). However, when evaluating the changes in the subsidy paid out over the years, it can be seen that both the area of legumes and the establishment of cover crop areas are constantly increasing (Zemkopibas ministrija, 2022).

Looking at the GHG emissions and the current situation in Latvia, it can be concluded that emissions from soil management consists of direct dinitrogen emissions from the following factors - organic soil management, the use of nitrogen mineral fertilizer, organic manure and other types of organic fertilizers, post-harvest residues and pastures. Indirect emissions of nitrous oxide from managed soils are determined by evaporation and leaching processes. They are an important source of emissions, accounting for 51.6% of the total emissions of the agricultural sector in 2020, in which nitrogen mineral fertilizers accounted for the majority of total agricultural emissions, where the share is as follows: soil management (34%), managed organic soils (24%), post-harvest residues (15%). Emissions from pastures and nitrogen mineral fertilizers have been growing the fastest in recent years. This can be explained by the increase in the number of beef cattle in the pastures and the increase in the sowing area (LVGMC, 2022). This factor could also be improved to some extent by including more sustainable use of soil treatments. It can also be concluded that this will be facilitated by the new CAP, where the involvement of farmers in the implementation of sustainable practices is encouraged by applying for support of eco-schemes, where, for example, Eco-scheme No. 1 provides EUR 43 support per hectare, if the crop rotation is diversified and the number of several species is introduced depending from managed hectares; Eco-scheme No. 2 contributes to improving the quality of water and soil, limiting erosion, reducing the use of PPP, preserving biological diversity, incl. preservation of pollinators, where the amount of support varies, but, for example, by integrating cover crops, it is possible to receive 80 EUR per hectare, as well as Eco-scheme No. 4 envisages promoting reduced soil cultivation methods, ensuring the improvement of the natural fertility and health of the soil, air and moisture circulation, increasing organic content and the amount of phosphorus in the soil - by introducing reduced tillage practices, it is possible to receive financial support of 15 EUR per hectare (Kopejas Lauksaimniecibas..., 2023).

It is also important to note that there are various types of additional income streams that are increasingly developing in the agricultural market, for example, voluntary carbon market (VCM) mechanisms, which provide that by integrating sustainable soil management practices, it is possible to certify the tons of CO₂ sequestered to the soil, which can then be sold. Currently, in 2023, there are two companies in Latvia that already offer their programs - the Danish company Agreea and the Estonian company eAgronom, which provide that farmers can sequester up to 0.5 to 2 t of CO₂ ha⁻¹ yr⁻¹ in specific climatic conditions (Dienas bizness, 2022; Lauku bizness, 2023). It is expected that this market will continue to develop, where a significant contributing factor will be the carbon removal framework developed by the European Commission, the purpose of which is to develop a binding VCM framework and guidelines for all the member states (Hunt, 2022).

The obtained information shows that the benefits are not unambiguous, as often assessed by farmers and other representatives of the industry (Peltonen-Sainio et al., 2023), so when considering the implementation of any sustainable soil management practice, the additional contribution that it brings must be taken into account, which obviously makes it difficult to evaluate it from monetary perspective.

Conclusions

- 1) Sustainable soil management refers to the inclusion of environmentally friendly practices in the daily production process - minimal tillage or no-till technology, cover crop and intercrop cultivation, use of organic fertilizers, crop rotation diversification. The aim of these practices is to increase soil organic matter, reduce nutrient leaching and soil erosion, and reduce emissions from agricultural sector.
- 2) Currently, the implementation of such practices is in the process, as it has been observed that it is affected by both technical and financial problems, where it is expected that with the actualization of climate change and the implementation of relevant political strategies, popularity of these practices will increase.
- 3) By summarizing the benefits of implementation of sustainable soil practices, it can be concluded that each of them ensures the achievement of goals of different categories - financial, environmental and social. Therefore, in order to objectively evaluate the benefits, a complex approach must be used, which is often a challenge at the farm level.

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BIOGAS PRODUCTION EUROPEAN UNION AND NATIONAL REGULATORY ENACTMENTS AND REGULATIONS IN LATVIA

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Abstract. The article analyses the laws and regulations governing the production of biogas in the European Union (EU) and in Latvia, which determine practical economic solutions in the biogas industry. The strategic goals and basic directives of the EU energy policy are the ones on which the renewable energy sector in Europe is based, which are largely focused on a sustainable energy sector, putting the EU as a world leader in this field with a common energy market. However, each EU Member State has its own energy policy, so in order to achieve the common goal of a higher share of renewable energy in the national economy, the Member States choose different ways to achieve the goal. *The aim of this article* is to find out whether the regulatory acts in Latvia regulate the development of the biogas industry in a favourable way. Considering the unprecedented geopolitical situation created by Russia's invasion of Ukraine, during 2022 the renewable energy indicators to be achieved by 2030 were reviewed in the EU. They were adjusted to promote Member States' energy independence and, in the long term, the goals of climate neutrality and zero pollution, as well as to phase out dependence on Russian fossil fuels and reduce energy prices. The research shows that Latvia, following the legislation of the EU in the field of energy and also focusing on the use of renewable energy sources, to which biogas belongs, has adapted its package of policy planning documents and regulatory acts in order to comply with the goals set by the EU.

Key words: bioenergy, biogas, renewable energy sources, regulations, policy documents.

JEL code: K32; O13.

Introduction

The European Commission (EC) (European Parliament..., 2021a) has emphasized that significant investments and efficiency measures are needed to meet the growing energy demand in the EU. Ambitious energy and climate change goals for 2020 were set already in 2007 - reducing greenhouse gas emissions by 20%, but increasing to 30% in case of appropriate conditions, as well as increasing the share of renewable energy to 20% and energy efficiency to 20% (European Parliament, 2007). In 2014, the European Council approved energy and climate targets for the EU for 2030: to reduce the total economy's greenhouse gas emissions by at least 40%, to improve energy efficiency by at least 27%, and to reach at least 27% of the renewable energy consumed in the EU. Later, a new target for 2030 has been introduced for the EU - to reach the share of renewable energy of at least 32% and to improve energy efficiency to the level of 32.5% (European Parliament..., 2018c). The EC (2019) Communication "The European Green Deal" sets out a new growth strategy that brings together a comprehensive set of mutually reinforcing measures and initiatives aimed at achieving climate neutrality in the EU, including reducing net greenhouse gas emissions to zero by 2050. Its aim is to transform the EU into a fair and prosperous society with a modern, resource-efficient and competitive economy where economic growth is decoupled from resource use (Pilvere, I. et al., 2022).

In recent years, both the EU and the Member States at the national level have adopted a series of regulatory acts to bring their countries closer to this ambitious goal - climate neutrality. The COVID-19 pandemic has affected the economy of the EU and the level of greenhouse gas emissions to an extent that cannot yet be fully determined. At the same time, the EU is implementing its biggest ever stimulus package, which also potentially affects emissions. In order to implement stronger climate action strategies over the next five years (2023-2027), support measures are needed to enable Member States to adapt to stricter

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regulation. The total expected cost of EU support measures is 1.75 million euros (European Parliament and..., 2021a). Due to these uncertainties, it is appropriate to review the emissions data in 2025 and adjust the annual emission allowances if necessary (General Secretariat of..., 2022). A new challenge has emerged in the process of achieving this global goal. In the current geopolitical situation, when the Russian invasion of Ukraine took place and which affected the availability of energy resources and their price in European countries, it is essential to promote the production and availability of renewable energy sources (RES), including biogas. Since the summer of 2022, the energy crisis has worsened, which means that urgent action is needed. Due to the increase in energy costs, the purchasing power of citizens decreases and companies lose their competitiveness. Insufficient gas and electricity supplies and relatively inelastic energy demand in the EU has led to significant price increases and volatility in gas and electricity prices (European Commission, 2022b).

Latvia's electricity generation industry is largely dependent on RES. Already in 2009, it was established that Latvia had the third highest share of RES in energy consumption in the EU (European Parliament ..., 2009a). In recent years, the dependence on RES in Latvia has increased. This is confirmed by the fact that in 2021, the share of RES in electricity production was 51.4%, while their share in gross final energy consumption was 42.11% (Official Statistics Portal..., 2022).

According to the definition of EU Directive 2009/72/EC (European Parliament..., 2009b), "biogas energy" is one type of energy obtained from renewable sources and "biogas" is a gaseous fuel produced from biomass. Biogas is a suitable form of RES within the European Green Deal. The researchers (Iriarte, L. et al., 2021; Lenerts, A. & Strikis, V., 2013; Zeverte-Rivza, S., 2014; Zeverte-Rivza, S. et al., 2014) emphasize that increased biomass production and its local use for energy production could increase the energy security of local communities. Dispatched bioenergy (biogas, biomethane) could contribute to flexibility in electricity systems with a high share of renewable energy. According to research (Priekulis, J. & Aboltins, A. 2015; Priekulis, J. et al., 2015; Zeverte-Rivza, S. 2014), biogas produced in accordance with EU guidelines and correct production technologies practically does not produce either methane or nitrogen emissions. The proportion of biogas production (gas from landfills, sewage sludge gas, other biogas) is insignificant, although sufficient resources for its production are available in Latvia. Biogas production would make a more significant contribution to electricity consumption.

It is important to understand how to practically manage the achievement of the goals of the European Green Deal in Latvia from a national institutional perspective regarding biogas production. Therefore, *the aim of this article* is to find out whether the regulatory acts in Latvia regulate the development of the biogas industry in a favourable way. In order to obtain a more complete picture, legal and regulatory acts issued by EU institutions and other international organizations, national laws and regulatory documents adopted in Latvia regarding RES were used. The task is to find out the shortcomings of the regulatory acts in Latvia for the further development of biogas as a form of RES defined and applied within the framework of the European Green Deal.

The framework of normative documents is of great importance for energy market regulation. Regulators and politicians must constantly balance economic and environmental concerns, including grid stability and other technological challenges, and social inclusion policies (Toporek, M. & Campos, I., 2019). Over time, policy makers and scientists have been actively working to create a sustainable electricity market in EU Member States. Regarding the field of bioenergy, various strategies, action plans, regulations, directives, etc. have been developed over the years. They are complex and contain few references directly related to biogas production. The documents were changed, clarified and improved, so within the framework of this article, mainly those regulatory documents that stipulate and/or affect biogas production will be reviewed.

In practice, it is important for biogas industry participants to be aware of the scope of regulatory documents that must be considered in order to be able to work successfully and receive state support.

EU and Latvian policy plans and regulatory acts, which relate to and affect renewable energy production and consumption, as well as available scientific research on the field of biogas, were used for the study. Analysis, synthesis, logical and construction, induction and deduction were used to perform research tasks.

Research results and discussion

1. Brief review of the main EU regulatory enactments

The European Green Deal is a new strategy at the EU level, but the EU's climate action and regulatory documents also for renewable energy was introduced much earlier. At a time when Latvia was not enrolled in the EU, the Directive 2001/77/EC came into force in 2001 on the promotion of electricity produced from RES in the internal electricity market (RES-E Directive) (European Parliament..., 2001). This directive established a minimum framework for RES-E policy and stipulated that each Member State is allowed to choose the support scheme that best suits its specific situation. The Directive 2001/77/EC was replaced by a new one. The Directive 2009/28/EC (European Parliament..., 2009a) on the promotion of the use of renewable energy sources was a very important EU directive regulating the field of RES for several years. It determined that by 2020, 40% of the primary energy in Latvia must be provided using RES. Member States built their bioenergy strategies in line with national targets based on this directive until it expired on 30.06.2021 when a new Directive (EU) 2018/2001 (European Parliament..., 2018b) on promoting the use of RES energy entered into force.

The EU Member States are bound by Regulation (EU) 2018/842 (European Parliament..., 2018a) introduced to help achieve the goals of the Paris Agreement (2016), as well as the EU's climate neutrality goal by 2050 at the latest under the European Climate Law (European Parliament ..., 2021b). The Regulation (EU) 2018/842 helped to achieve the goals of the Paris Agreement as well as the EU's climate neutrality goal by 2050 at the latest under the European Climate Law, which requires the convergence of all Member States' efforts while taking into account specific national circumstances. The Regulation (EU) 2018/842 required Latvia to reduce greenhouse gas emissions compared to the 2005 level by a total of 6% by 2030. This regulation emphasized the transition of transport modes to the use of sustainable RES in transport after 2020. The European Climate Law has set a legally binding goal for the EU to achieve economic climate neutrality by 2050 – a reduction of net greenhouse gas emissions by 2030 by at least 55% compared to the 1990 level. Thus, policy planning documents and regulatory acts must be developed in each Member State and also in Latvia in order to achieve the goals set by the EU and international commitments.

The development of the bioenergy field is defined in the EU Bioeconomy Strategy (European Commission, 2018a, 2018b) – residual streams from high-value raw materials used for bioproducts should be considered as valuable sources in the energy sector, as the collected waste streams are used for bioenergy production at the end of the useful life of the biomaterials. In general, describing the driving forces and trends of the EU Bioeconomy Strategy and action plan (European Commission, 2018b; Muska, A. et al., 2023) for 2030 and 2050 (assuming the successful implementation of a sustainable, circular EU bioeconomy), the researchers (Fritsche, U. et al., 2020) admit that bioenergy would become less important, while biomaterials and ecosystem services would gain significantly, strengthening the EU's competitiveness and creating jobs. Describing the EU's Bioeconomy Strategy, they recognize that despite the impressive potential of wind and solar, biomass would provide grid balancing services and help sectors that are difficult to decarbonize with electricity, such

as aviation, heavy-duty and marine transport, high-temperature industrial processes. By 2050, bioenergy would play a complementary role. The EU also determines the need for the monitoring of Member States in relation to the climate neutrality goals and greenhouse gas emissions adopted in the policy planning documents. Regulation (EU) 2018/2066 (European Commission, 2018c) on the monitoring and reporting of greenhouse gas emissions and performance data specifies a number of indicators to be submitted, including fuel (including biogas) emission factors related to the lowest calorific value and the lowest calorific value per mass of fuel.

Paying increased attention to RES in Member States and including biogas production, a new regulation has been adopted in September 2022 – Regulation (EU) 2022/996 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria (European Commission, 2022a). This regulation lays out common rules to ensure efficient and consistent checks of whether businesses are: 1) complying with the EU sustainability criteria; 2) providing accurate data on greenhouse gas emission savings; 3) complying with the criteria for certification of low indirect land-use change risk biofuels, bioliquids and biomass fuels.

In response to Russia's aggression in Ukraine and to promote the energy independence of the Member States, the EU Council adopted the Regulation (EU) 2022/2577 (Council of the EU, 2022a) laying down a framework to accelerate the deployment of renewable energy. Among other things, this regulation mentions that the presumption that renewable energy production is of paramount importance to the public interest would mean that such projects could immediately be subject to a simplified assessment, if necessary, with regard to specific derogations provided for in the relevant EU environmental legislation. Unfortunately, in this regulation, nothing is mentioned about the promotion of biogas production, contrary to the fact that wind, solar, heat pump energy production is mentioned.

In 2022, politicians in the EU have prepared proposals for the "Fit for 55 Package", which also affects the RES sector (Council of the EU, 2022b; European Commission, 2022b). However, regarding biogas production, the regulation has not yet been specified.

2. The main policy planning and regulatory documents for biogas production in Latvia

A report on the situation in Latvia was prepared as part of a European project aimed at identifying barriers and simplifying the use of RES (Biseniece, E. et al., 2020). The report covered RES-E technologies, including biomass. The authors reported that the process of obtaining all necessary permits and the choice of production site for renewable energy technology is complicated. The process is governed by several different laws and subordinate regulations of the Cabinet of Ministers of the Republic of Latvia. The simplified procedure is intended only for small-scale devices (microgenerators up to 16A and 11.1 kW). The procedure includes an agreement on a grid connection with the distribution system operator and consultation with the local building board on the necessary approval. Larger project developers should agree with different institutions at different stages of the project. Although the amount of electricity produced in power plants using biomass would decrease by 2030 compared to 2017, it is still an important source of energy (Biseniece, E. et al., 2020). In addition, Latvia plans to modernize the existing biomass power plants in order to increase the share of RES in heating (Cabinet of Ministers..., 2020a).

The National Energy and Climate Plan for 2021-2030 (Cabinet of Ministers..., 2020a) is an ambitious policy planning document that identifies Latvia's objectives and their execution measures for the energy sector, such as a reduction in greenhouse gas emissions and an increase in carbon dioxide, and an increase in renewable energy. At the EU level, the development of the national plan, its content, national target indicators to be included in it, goals and contributions to the achievement of the EU goals, as well as

performance indicators were determined by several regulatory acts, the main of which were: Conclusions of the European Council on Climate and energy policy framework for the period up to 2030 (General Secretariat..., 2014); Conclusions of the Transport, Telecommunications and Energy Council on Governance system of the Energy Union (General Secretariat..., 2015) and Regulation (EU) 2018/1999 (European Parliament..., 2018).

Regarding biogas, the Regulation (EU) 2018/1999 (European Parliament..., 2018) established the need to define the share of energy from biofuels and biogas produced from feedstocks (different types of food and feed crops) in energy consumption in transport in national energy plans. These requirements are included in the National Energy and Climate Plan of Latvia. Among the measures to be implemented mentioned in the National Energy and Climate Plan 2021-2030 (Cabinet of Ministers..., 2020a), there are several to be emphasized that refer to biogas: 1) promote the production of biogas and biomethane and the use of biomethane – develop relevant legal acts to ensure the installation of biogas purification (biomethane production) equipment within the framework of EU structural funds or other funding sources after 2021; 2) analyse the potential of renewable energy from Latvian territorial waters – the use of marine for biofuel/biogas extraction and energy production; 3) determine the obligation of energy suppliers to implement RES, combining it with the obligation to reduce cycle GHG emissions per unit of supplied energy – by 2030, achieve a share of at least 3.5% of modern biofuels and biogas from the volume of realized transport energy; 4) the possibility of setting the lowest possible excise tax rate for biomethane and biofuels in the period from 2022 has been evaluated, evaluating the possibility of differentiating the reduced rates for first-generation biofuels and modern biofuels and biogas.

The context of the Latvian National Energy and Climate Plan 2021-2030 policy is related to policy planning documents in Latvia and the policies specified therein (Table 1).

Table 1

Relationship of the Latvian National Energy and Climate Plan 2021-2030 to other Latvian policy planning documents and the policy directions specified therein

No	Policy planning documents, acceptance date	The document includes targets and/or measures		The main directions of policy in the policy planning document
		For RES	For biogas	
1.	Sustainable Development Strategy of Latvia until 2030 (2010)	yes	yes	Use of biomass for heat and electricity production. Use of biogas resources.
2.	Latvia's national reform program for implementation of the "EU 2020" strategy (expired) (2011)	yes	no	Increasing the proportion of RES: 1) arranging a legal base; 2) providing access to financial resources for renewable energy production; 3) promotion of biofuels in the transport sector.
3.	National Development Plan of Latvia for 2014-2020 (expired) (2012)	yes	no	Use of RES in energy production by reducing fossil energy dependence and promotion of energy efficiency in centralized heat supply.
3.1.	National Development Plan of Latvia for 2021-2027 (2020)	yes	no	The share of energy produced from RES in transport should reach 5.85% in 2027. The share of energy produced from RES in the total final energy consumption should reach 47.5% in 2027.
4.	Latvian Energy's long-term strategy 2030 – competitive energy for the society (2013)	yes; provide a 50% proportion of RES in gross energy final consumption	yes	Promoting Sustainable Energy: 1) promote wider use of RES in public transport, including the use of public transport transitions for biofuels; 2) waive direct state aid for 1st generation of biofuels by maintaining compulsory biofuels in the medium term for fossil fuel; 3) develop a state support mechanism for promoting 2 nd larvae of biofuels; 4) to ensure the compliance of RES use (including biomass and biofuel) with the sustainability criteria and the positive impact of the RES on the related sectors.
5.	Latvian Rural Development Program 2014-2020 (expired) (2015)	yes	no	Promote the supply and use of resources, by - products, waste, residues and other food raw materials for bioeconomy.
5.1.	Latvian Rural Development Program 2014-2022 (a current version) (2022)	yes	yes	The need to support technologies and equipment that helps reduce the amount of GHG emissions: both promoting the use of agricultural by - products for energy production and thus reducing the use of fossil resources and the digestate of biogas in the production process as a fertilizer.
6.	Energy Development Guidelines for 2016-2020 (expired) (2016)	yes	no	Implement measures to increase: 1) RES proportion of gross energy final consumption; 2) the proportion of energy from RES in the final consumption of energy in transport.
7.	Alternative Fuel Development Plan 2017-2020 (expired) (2017)	yes	yes	Promote the development of alternative fuels and reduce the negative effects of transport on the environment. Evaluate the possibilities of sustainable biofuels (both liquid and gaseous) to determine the minimum excise duty rate, considering the heat capacity of biofuels.

Source: authors' calculations based on Cabinet of Ministers..., 2016, 2017, 2020a; Cross-Sectoral Coordination Centre..., 2012, 2020; Ministry of Agriculture..., 2015; 2022; Ministry of Economics..., 2011, 2013; Saeima..., 2010

The production and use of biogas is implicitly covered by strategies and regulatory documents designed to manage the bioeconomy, including RES. The specific regulatory documents applicable to the field of biogas production are the Directive (EU) 2018/2001 (European Parliament..., 2018b), the Regulation (EU)

2018/2066 (European Commission, 2018c) and Regulation (EU) 2022/996 (European Commission, 2022a). The new Regulation (EU) 2022/996 will be in force from 30.12.2023, which means that the national legislation must be ready for its implementation.

In order to gradually implement the measures defined in the National Energy and Climate Plan 2021-2030, as well as in compliance with EU directives and regulations, the relevant laws and regulations have been implemented in Latvia. Table 2 shows the legal acts that directly or indirectly regulate biogas production. Since Latvia joined the EU, the Latvia's Parliament and the Cabinet of Ministers have adopted some new rules and changed the old ones, based on the regulatory enactments adopted by the EU regarding RES.

Table 2

The main documents regulating biogas production in Latvia

No	Legal act, acceptance date	The main directions of policy in the document	Based on EU document
1.	Energy Law (1998; Amendments to the law from 14.07.2022)	The purpose of the amendment is to adopt the provisions of Directive (EU) 2018/2001 regarding the certification of gas origin. A certificate of origin can be obtained both for the gas obtained from the RES supplied by the gas distribution or transmission network, and for the gas obtained from the RES that is sealed, traded and used outside the grid (off-grid). Produced energy must meet sustainability and greenhouse gas emissions saving criteria.	Directive (EU) 2018/2001
2.	Biofuel Law (2005)	The purpose of the Law is to promote the trade in biofuel, thereby supporting the use of environmentally friendly and safe in supply RES. The law determines the basic principles of the state policy for the circulation of biofuels, including biodiesel, bioethanol and biogas.	Directive 2003/30/EC
3.	Electricity Market Law (2005; Amendments to the law from 19.05.2016)	The purpose of the law is to promote the production of electricity using RES as well as promote the country's energy independence by providing various suppliers of energy resources necessary for electricity production. Amendments excluded the article on the production of electricity in power stations using biomass or biogas, due to the entry into force of the Cabinet of Ministers' regulations regarding this article.	Directive 2012/27/EU
4.	Procedure for awarding state and EU support to the sub-measure "Energy production from biomass of agricultural and forestry origin" of the measure "Support for the creation and development of enterprises (including diversification of non-agricultural activities)" (No 268) (2010)	The purpose of the sub-measure is to support businesses that ensure energy production from biomass of agricultural or forestry origin, with the intention of selling the electricity produced in the form of biogas cogeneration.	Regulation (EC) 1698/2005; Regulation (EC) 1974/2006
5.	Subsidised Electricity Tax Law (2013)	Determines reduced tax rates for taxable income, for example, from: 1) the electricity sold within the scope of mandatory procurement, in the production of which RES were used; 2) the electricity from biogas sold within the framework of mandatory procurement, 3) if the several criteria are met at the same time.	Regulation (EU) 1407/2013
6.	Construction Law (2013)	One of the principles of sustainable construction is the one according to which the construction process creates a quality living environment for existing and future generations, increasing the efficient use of RES.	-
7.	Regulations on the application of subsidized electricity tax (No 1521) (2013)	The regulations determine the criteria and procedures for applying the subsidized electricity tax rate, including for a high-efficiency cogeneration biogas plant.	Regulation (EU) 1407/2013
8.	Regulations Regarding the Generation of Electricity Using Renewable Energy Resources, and also the Procedures for Price Determination and Monitoring (No 560) (2020)	The regulations lay down detailed conditions and criteria regarding: for the production of electricity, the right to compulsory purchase of the electricity produced, the price for electricity using RES, depending on the type of energy resources; as well as measures to promote the production of electricity from biomass.	Directive 2004/8/EC; Directive 2009/28/EC; Directive 2012/27/EU; Directive (EU) 2018/2001

No	Legal act, acceptance date	The main directions of policy in the document	Based on EU document
9.	Regulations on electricity generation, monitoring and pricing in the production of electricity in cogeneration (No 561) (2020)	The regulations determine the detailed conditions and criteria according to which cogeneration plants are qualified for the compulsory purchase right of the produced electricity; procedures for compulsory procurement and its monitoring; the procedure for determining the price of electricity depending on the electric capacity of the cogeneration station and the fuel to be used, including biogas. The merchant must use waste of organic origin as fuel raw material for biogas production in the biogas production facility.	Directive 2004/8/EC; Regulation 794/2004/EC; Directive 2009/28/EC; Directive 2012/27/EU
10.	Regulations on the requirements for the introduction and transportation of biomethane and liquefied natural gas converted into a gaseous state into the natural gas transmission and distribution system (No 567) (2022)	The regulations determine the requirements for sustainable and safe introduction and transportation of biomethane and liquefied natural gas converted into a gaseous state into natural gas transmission and distribution systems.	Directive 2009/73/EC; Regulation (EU) 2015/703
11.	Regulations on sustainability and greenhouse gas emissions savings criteria, criteria for electricity produced from biomass fuel and procedures for justifying, certifying and monitoring compliance with said criteria (No 686) (2022)	The regulations determine the essential requirements for a specific type of fuel, as well as for electricity produced from forest biomass - sustainability and greenhouse gas emission savings criteria and specific criteria for electricity (including from biogas).	Directive (EU) 2018/2001; Regulation (EU) 2018/2066; Regulation (EU) 2022/996

Source: authors' calculations based on Cabinet of Ministers ..., 2010, 2013, 2020b, 2020c, 2022a, 2022b; Saeima ..., 1998, 2005a, 2005b, 2013a, 2013b

In the current geopolitical situation, which creates instability of energy prices, it is important to create additional opportunities for the wider production and availability of local RES. The latest regulations demonstrate the efforts of Latvian politicians to promote high-quality gas production in biogas stations, adaptation of natural gas networks, and will also promote the entry of new market participants into the market by setting uniform requirements for the quality of biogas and the introduction of gases into the natural gas system.

Conclusions, proposals, recommendations

- 1) The importance of bioeconomy and bioenergy governance is recognized at the EU level, but its measures are implemented in a fragmented manner, without comprehensive cross-sectoral and cross-border coordination.
- 2) Although significant efforts have recently been made at the EU level to promote the development and use of bioenergy, only certain regulatory documents are directly applicable to the field of biogas, giving priority to other RES types, for example solar and wind energy.
- 3) Politicians pay little attention to the regulation of the biogas market, although the raw materials required for biogas production (for example, food waste) are widely available in all Member States and efficient technologies have been developed for their processing.
- 4) Latvia currently has several policy planning documents that affect the development of biogas cogeneration stations, but they do not provide a sufficient basis for long-term development.
- 5) Latvia's policy planning and regulatory documents include the relevant requirements of EU-level regulatory documents, but it would be advisable to pay more attention to the development of the local biogas market and to create regulatory framework supporting its sustainability.

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OPTIMAL CAPITAL INVESTMENT STRATEGY THROUGH A FLEXIBILITY SERVICES APPROACH

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Abstract. As the demand for electricity consumption and generation connection capacity to the infrastructure of the distribution system operator managed by JSC "Sadales tikls" (ST) increases, a shortage of available capacity is observed due to physical constraints of the network infrastructure. Historically, the company has addressed capacity constraints through capital investments in network upgrades, thereby increasing the nominal capacity of the elements installed in the network and increasing the capacity of the network. European experience shows that capital costs in network reinforcement can be deferred by offering the customers their desired capacity with temporary constraints. This study defines a process for designing an optimal investment strategy, which allows ST to compare the investment in network reinforcement against restrained capacity offer through customer demand flexibility.

It was concluded that the concept of flexibility services versus reinforcing the existing network is the most cost-effective option to maintain a consistently high quality of energy supply while minimising the cost to the utility if the customer flexibility cost does not exceed 300 EUR/MWh. Adding that only by updating and improving input data, calculations and forecasts flexibility services can be further developed and implemented in Latvia.

Key words: flexibility services, investment strategy, network development, capital investment deferral.

JEL code: E22, G11, O13, Q41, Q42, Q56

Introduction

The development of the distribution system operator's (DSO) electricity network has historically been driven by the need to renew the network infrastructure for its security and the energy well-being of society, resulting in network reinforcement through the construction of complementary or new infrastructure to replace technically obsolete infrastructure. The emergence of new commercial or industrial customers may also require the rebuilding of a distribution network that is in a technical and operational state in order to provide the necessary connection capacity and to protect the electricity network from overloading. As a result, "premature" capital investments are made in both ST and customer infrastructure, replacing network elements, whose economic life cycle has not yet ended. This in turn results in an increase in the overall cost of the electricity network, which feeds through to the electricity distribution system service tariff.

The need to increase network capacity is driven in particular by the European Union's (EU) policy initiative - the Green Deal. One of its key components to address decarbonisation is increased electrification and the massive use of renewable energies, which includes sustainable electricity. To achieve this goal, support is being developed for the transition from fossil fuels to renewables in power plants, including the creation of a decentralised energy system with a primary focus on increasing solar, wind power generation capacity and micro-generator capacity for household self-consumption (Green Deal, 2019). Although local renewables are highly welcomed, the connection of high-capacity grids to the distribution system in regions of Latvia, far from consumption centres, leads to the need to invest in grid reconstruction.

Demand for renewables has increased further in the face of geopolitical instability, the risk of supply disruptions and high electricity prices in the EU. In Latvia, a total of 32 solar power plants with a total capacity of 3.2 MW were connected to the ST infrastructure in 2021, but in 2022 capacity grew around three and a half times – 121 plants with a total capacity of 11 MW. The number of rooftop solar PVs on private homes has reached almost 12 000, with a total generating capacity of almost 100 MW. At the same

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time, the capacity reserved for the construction of power plants throughout the network already exceeds 1 000 MW.

The urgency of the problem is demonstrated by the fact that a consumer or generation-driven network reinforcement may not be economically viable option. The security of supply requirements of the grid require that the grid infrastructure follows the N-1 design theory. For example, if the peak load is 1.0 unit and the maximum ability that network element can handle is 1.0, then the network operator must provide a minimum capacity of 2.0 units so that, in the event of a single element failure, the distribution system operator is able to supply the relevant customers. However, if a new consumer joining the grid would reach a peak load of 1.1 units and would occur only a few times a year, the N-1 principle would no longer provide the highest economic return - the design and maintenance principles of the grid would need to be changed. Thus, the current approach of grid reinforcement, which does not consider the potential magnitude and frequency of grid congestion, may lead to under-utilisation of available capacity after grid reinforcement and stranded costs (Jing, Zhou, Wu, 2022).

In recent years, there has been a growing practice in Europe to assess the possibility of introducing **flexibility services** as an alternative (EURACTIV, 2022). One of the reasons for this development has been Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity, which in Article 32 mentions incentives for the use of flexibility in distribution networks. According to Article 1(51) of the Electricity Market Law, which was implemented based on aforementioned Directive, a flexibility service is a temporary change in the use or production profile of electricity, which a user or producer has undertaken to perform voluntarily in a contract with another market participant. The implementation of flexibility services may enable a user to connect to the distribution system infrastructure at a lower cost without having to reinforce the network. At the same time, existing customers can increase capacity as needed (following the new principles of flexibility services, an approach in which a participant is able to reduce electricity use at a given time). The development of a market for these services brings added value to the power system - the possibility for electricity consumers to generate additional sources of income and, for example, for farms or entrepreneurs in the regions to suspend or postpone production to a later period of the day, when it's economically viable to reduce consumption (electrical load) (Silva, Alves, Ferreira, Villar, & Gouveia, 2021).

In the United Kingdom, DSOs are required to assess the options for a flexibility service as an alternative before each network reinforcement. The Energy Networks Association (ENA) has developed a publicly available cost-benefit analysis tool (ENA, [n.d.]) For the analysis, the study draws on the experience of the UK, where a common methodology - the Common Evaluation Methodology (CEM) - has been developed for six DSOs to evaluate flexibility services in the form of a tool (based in Excel) based on the principles of Cost Benefit Analysis (CBA). The main objective of the tool is to allow the user to find the optimal investment strategy by comparing network reinforcement options and flexibility service solutions for one or more years. It allows the user to test different flexibility strategies under different scenarios of capacity changes. The CEM tool also provides valuable insights to help make strategic decisions under uncertainty of future load growth (ENA, 2022). One of the major drawbacks of the tool is the manual preparation of the input data: in order to objectively assess the outcome of the proposed strategy, the user needs to carefully evaluate and prepare the input data according to its requirements, tailoring it to the specific situation. It is important to mention that the tool is adapted to the Latvian use case. Also, the price of flexibility services is currently unknown in Latvia since no such services have been provided to date. The methodology tool was developed by ENA together with consultants from Baringa Partners and is believed to be the first of its kind in the world. All DSOs in the UK agreed to use the CEM tool in April 2021. Based

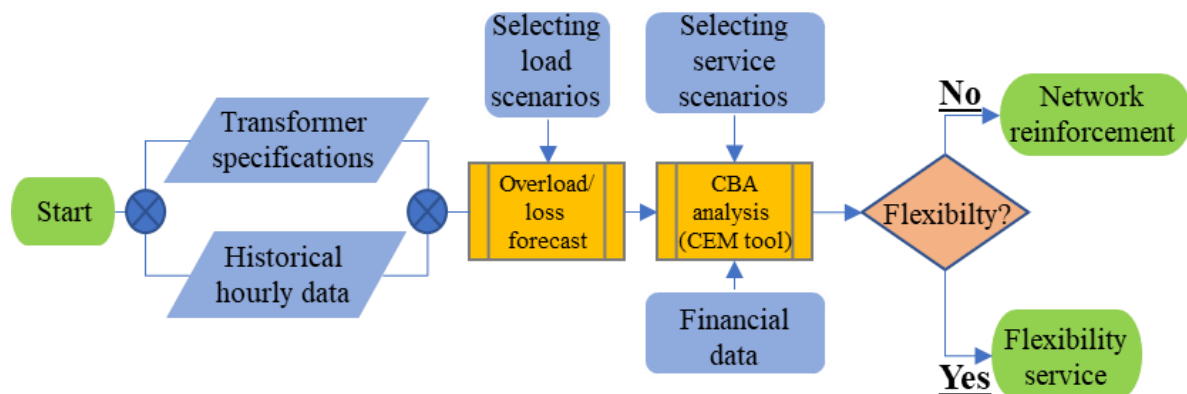
on the CEM tool, the majority of DSOs carry out two procurement processes per year. The tool should only be used to get an idea of the benefits and costs from the system operator's perspective (Smart energy, 2022).

The aim of the study is to develop a methodology for identifying and assessing flexibility needs in Latvia, in order to identify the criteria under which flexibility services are the most valuable network management strategy for business and society. The results will demonstrate at which congestion levels and prices flexibility services are a better approach than traditional approaches to distribution system management and development. This study is part of a larger project in which a number of EU network holders and related organisations are driving the research and deployment of flexibility services.

Methodology

1. Process of business analysis

In order to identify the congestion risks in the electricity distribution network and the possible assessment of flexibility services, a flexibility requirements determination process (Figure 1) based on the preparation and analysis of input data in the ST licence area was developed within the framework of this study. The business analysis process is developed using the CEM tool as a "backbone" before a decision is taken. The tool indicates in the process the optimal investment strategy for the connection. The company's Electricity Distribution System Development Plan 2023-2032 highlights its assets and forecasts that make up the electricity distribution network.



Source: author's study, 2023

Fig. 1. Flexibility requirements determination process in JSC "Sadales tikls"

It should be noted that the process of defining flexibility requirements also indicates the optimal duration of the use of flexibility services, which gives an indication of the desired procurement and contracting period. The possibility to provide indications on flexibility need is noted, with the aim of helping to build an understanding of the size of the market for potential participants.

2. Input data

Input data for the business analysis (describing all the data used for the study) is obtained during the study. Overload forecasts were made for a period of 40 years, assuming useful lifetime cycle of network elements mentioned in the study. The forecasted values, such as the maintenance and deployment costs of flexibility services, the discount rate, the price of power outages, etc., are influenced by real-time events. Therefore, the projections made in this study are valid for the next year - looking at the current economic situation, where high inflation and increasing energy costs are noticeable, the projections of values for the next planning periods should be reviewed.

In this study, flexibility services are applied to **110 kV transformers**, which are the ownership and service boundary between distribution and transmission network operators. And it is the overload management of these elements that is the focus, as:

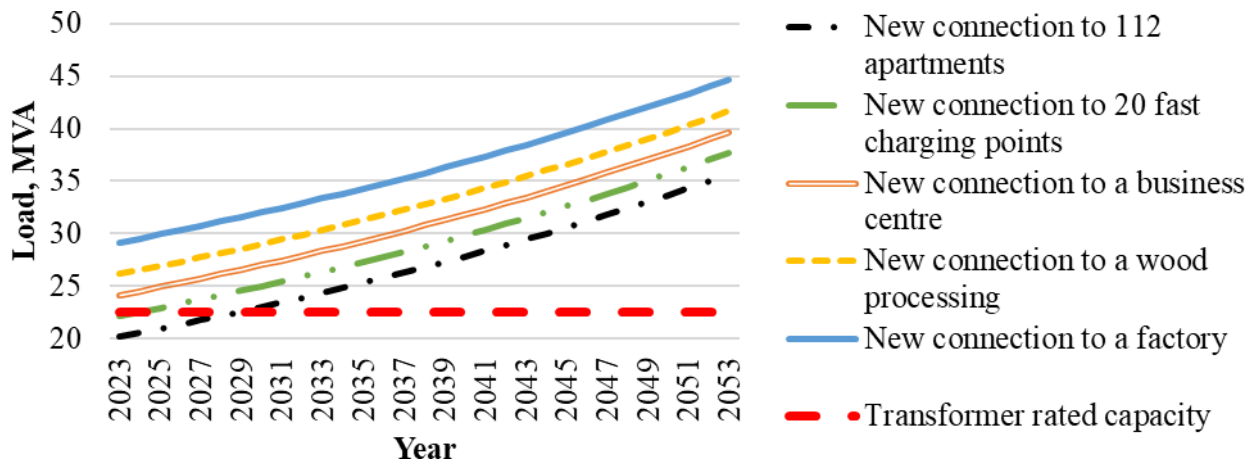
- Equipment failures affect large areas of the electricity supply and a large number of system users;
- Estimated installed surplus transformer capacity in 2022 is ~1000 MVA;
- The cost of building a new transformer can be € 0.5-2 million. EUR and more.

According to the System connection rules for the electricity distribution system, all of the transformer construction costs must be covered by the user. As a result, this section of the Latvian electricity grid limits further development of customer consumption (electrification) but in particular the development of generation (decentralised electricity production) on a national scale. In addition to the impact on the distribution system operator, the under-utilisation of installed transformers increases its costs (electricity losses) and, consequently, the electricity tariff component in Latvia.

The analysis consists of the cost of 6.3 MVA to 32 MVA transformers, their purchase, installation, and maintenance costs. The organisation studied has set the load capacity at 70-90% of the rated capacity to avoid unexpected overloading as well as to reduce energy losses in the equipment. Consequently, the transformer capacity is assumed to be 90% of the peak for the calculations.

Historical hourly data informs the need for flexibility services. This data answers the question - how much time or electricity will be needed in a given period. The hourly data in the study represents the consumption and the reserved grid connection capacities of 2021, depending on the scenario - generation or consumption. The CEM tool inputs are entered - the average number of hours per day, the total number of hours per year, the total number of days per year and the amount of energy per year that needs to be activated through flexibility services.

The study includes the calculation of **overload and loss forecasts** using the Python programming language (an interpreted, object-oriented, high-level programming language with dynamic semantics (Python, [n.d.])). This section of the input data considers **scenarios of load demand** from new customers and additionally assumes a load growth of 2% per year from existing customers, resulting in network overload forecasts. In the CEM tool, the calculations are made assuming three activation prices and five required flexibility capacities, which can also be called new loads (**1, 3, 5, 7, 10 MW**). New loads are compared to the averages of loads existing customers have, as apartment buildings, where 9 kW of capacity is most commonly available to owners, which equates to 112 apartments of 1 MW respectively. Fast charging points are installed with a capacity of 150 kW, which makes a set of 20 points, reaching a capacity of 3 MW. Other load comparisons are based on data available from ST, regarding the nature of new connections. As an example, see the #1 Substation overload forecast in Figure 2, given the above input data.



Source: author's calculations based on input data, 2023

Fig. 2. #1 Substation transformer rated capacity vs. new load growth forecast, MVA

Looking at the projections in Figure 2, the increase in new consumption capacity will require network reinforcement. The increase in new consumption load compared to the 90% rated capacity of the existing transformer is 22.5 MVA. As a result, under the consumption flexibility market scenario, this forecast reflects at which of the selected load levels it is feasible to substitute network reinforcement with flexibility services, or when it would be economically feasible to do so.

Part of the input is a **choice of service scenarios**, which includes the cost of flexibility services:

- Implementation costs, which are incurred regardless of how long the flexibility strategy is implemented, even if the planned network reconstruction is postponed, e.g., for only one or two years (EUR/year);
- Administration costs, which are only incurred while the flexibility strategy is being implemented. For example, if the network reinforcement is deferred for two years, these costs will only be incurred over a two-year period (EUR/year).

Implementation and administration costs depend on the desired growth rate of flexibility services. In turn, the projections of how these costs relate to the network units are assumed for the whole system (all 132 Substations), thus ensuring the possibility to deploy the service in several substations, achieving a high platform utilisation.

Financial data consists of monetary parameters (shaped by monetary policy), monetizable costs, rates, and ratios. They include the weighted average cost of capital, the capitalisation rate and the discount rate. As part of the study, it is important not to forget the costs that relate to the organisation and its existing or potential customers - capital and operating expenditure. "*Understanding the difference between capex and opex is very important for any company trying to make the best use of funding, making sure the right approach is used for capital expenditure and other types of expenditure.*" (Carey, Knowles, Towers-Clark, 2017). Both types of costs are important when planning the implementation of a new service, as they affect the incentives of market players to offer and buy. Outside the scope of the study, the design of the service is planned for wider market growth, with the aim of creating competitive conditions and more favourable conditions, offers for all players. Faced with these motivations, the costs and attractiveness of using flexibility services must be seen not only on the system operators side, but also on the customers side.

The CEM tool is driven by scenario control, depending on the selected event scenario, it may not be necessary to use all input data. As an example, consider an event scenario where one specific connection case is evaluated, where a specific load forecast for an individual customer is known.

3. Cost-benefit analysis

CBA illustrates several important points in decision-making. Strengths include cataloguing benefits (positive) and costs (negative), assessing the impact in monetary terms (assigning a value) and then determining the net benefit of the proposal relative to current policy (net benefit equals additional benefits minus additional costs) (Boardman et al., 2018). CBA is a systematic and analytical process that compares benefits with costs to assess the potential of a project or programme - most often of a financial nature. The objective of the analysis is to answer questions such as the merits of the proposed project, the optimal scale at which to implement it and its respective constraints. CBA is fundamental to management decision-making and has proven to be a common technique for making sound decisions using the resources of an organisation (Mishan, Quah, 2020). The CBA analysis is implemented in the CEM tool, which performs the calculations taking into account the analysis framework.

4. Common decision-making based on the tool's results

The tool's outputs include tables and graphs for each scenario, demonstrating the benefits of flexibility at a given price and a weighted average analysis of the benefits of deferring network reinforcement and a detailed CBA for a given number of deferral years for a given scenario. A standard case for which the CEM tool is used is the calculation of flexibility to find out the future financial savings from network reinforcement deferral. Other use cases include the use of flexibility to manage different maintenance situations or temporary outages, to reduce the number and duration of customer interruptions, and flexible grid interconnections in current and low load regimes (Smart energy, 2022). Once the CBA has been carried out, it needs to be interpreted in a coherent way, using the results provided by the CEM tool, to determine the future direction of the strategy for the development of the network. The CEM tool has demonstrated the results used in the study in a number of ways (but not limited to):

- 1) **strategy benefit** – for a set of base costs and user-defined flexibility costs (reservation, activation and software costs), the model shows the net benefit of flexibility solutions over the forecast period;
- 2) **insights and reports** – show summary tables of the benefits of the strategy outcomes. Additional analysis is provided to allow comparisons between strategies under different scenarios;
- 3) **CBA summary** – although the user cannot edit this results section, it is possible to check the detailed CBA calculations performed by the CEM tool (ENA, 2022).

The results of the study are based on the results of a weighted average analysis, which allows the prediction of the percentage of scenarios realised, with each scenario being accompanied by its percentage probability of occurrence.

Research results and discussion

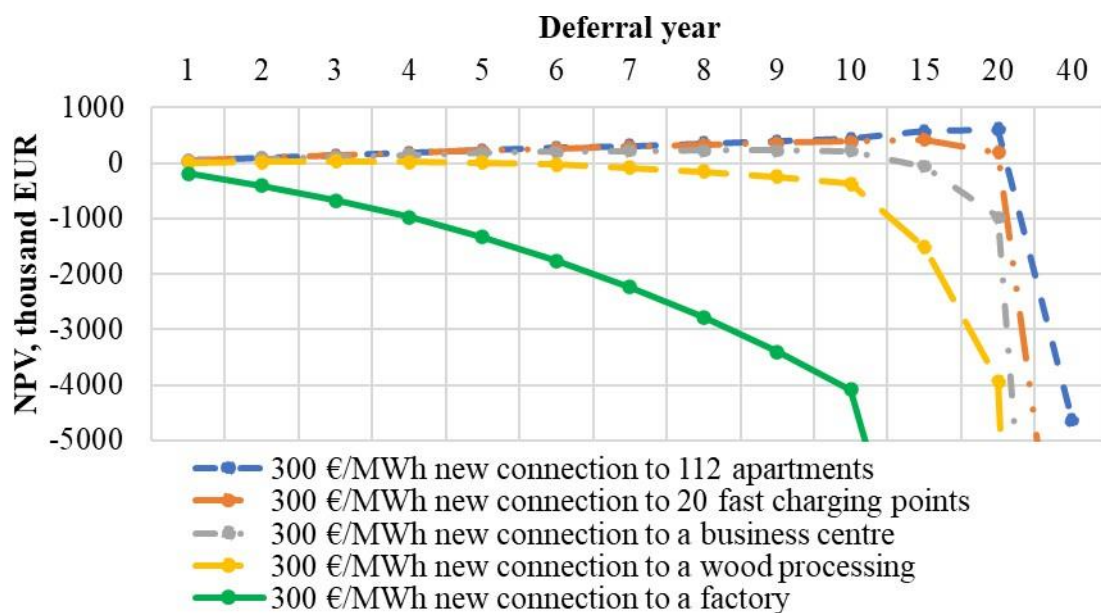
Given the lack of prior knowledge of the compensation price at which customers would be willing to provide flexibility services, three price scenarios were evaluated, corresponding to the current exchange electricity price range of **100, 300** and **500** EUR/MWh.

The development of flexibility services and their market design starts with a **market scenario for consumption flexibility**, where it is assumed that the consumption of the new customer is not flexible and that this customer compensates the service providers for their flexibility. In order to create an incentive to compensate the service providers (flexibility implementers), the system operator has to bear the costs of the network reinforcement and by limiting consumption for a certain period of time they will receive compensation for the limited capacity (EUR/MWh), which is the activation price as defined in this chapter.

One of the two transformers is normally in an off state and no new transformers are being built at the substations. This scenario requires the ability to dynamically change the operating modes of the equipment in a timely manner in order to maintain the safety of the network in case of default by the participants. Based on an assessment of the future development of the network, the authors have determined the probability of the loads filling up to a uniform level (**20% each**). The aim is to investigate at which price it is more profitable to buy flexibility and at which required flexibility capacity this is possible. In this scenario, a full flexibility market with compensation for **consumption perspective** is created.

Five Substations have been selected for the study. The main reasons are based on electricity consumption data and a forecast of future load or generation increases made by the Network Development function of ST. The names have been changed to ensure the safety conditions of the infrastructure, names #1 to #5 are given. The results for Substation #1 are presented in more detail later in the study.

Substation #1 is planned to have a third transformer installed with a rated capacity of 25 MVA in addition to the two existing transformers, making it the largest of the five substations in the case study. Hence, following the above business process steps and calculations in the CEM tool may be indicative in favour of deferring the cost of the Substation #1 reinforcement. According to electricity price indicators in Nord Pool power market based on data from 2022, 300 EUR per MWh is the closest to a realistic price that could be paid to compensate customers for their flexibility in the Baltic region. Analysing the results of Substation 1# at this price (Figure 3), the economic benefit of flexibility services at new loads between 1 and 7 MW can be identified. If 10 MW flexibility capacity is needed for new connections or load increases, a network reinforcement is required.



New connection is calculated in MW, where 1 MW – 112 apartments, 3 MW – 20 fast charging points, 5 MW – a business centre, 7 MW – a wood processing, 10 MW – a factory.

Source: author's calculations, 2023

Fig. 2. #1 Substation transformer rated capacity vs. new load growth forecast, MVA

As the graph shows, there is no cumulative deferral benefit (NPV) in euros at 10 MW load. In this case study, deferring the network reinforcement for at least three years would be the most favourable option. The projections adopted in the CEM tool indicate an 80% probability (4 out of 5 cases) of saving money by not reinforcing the network, while at the same time generating income from new sources of connection. After the third year, as the new load reaches 7 MW, the efficiency of the flexibility service approach

decreases. There is no change in the graphs as the activation price changes. Changes only occur in the monetary value of the benefit and in the period.

With an activation price of € 100/MWh, flexibility services are not more cost-effective than network reinforcement option at 10 MW load, while at 7 MW load it is possible to defer network reinforcement for more than five years (compared to € 300/MWh). At an activation price of 500 EUR/MWh for flexibility services, a 7 MW load does not offer any benefits, which is clearly seen in more detail in Table 1.

Table 1

**Results of the market scenarios for consumption and generation flexibility
 Substations 1# - 5#, thousand EUR**

Substation Serial No.	Price EUR/M W	Consumer flexibility market					Generation flexibility market				
		Load, MW					Generation, MW				
		1	3	5	7	10	5	10	15	20	25
1#	100	734.22	596.64	390.76	186.52	-34.59	1442.53	1442.53	1442.53	1442.53	1135.22
	300	605.55	423.00	225.53	30.29	-187.02	1442.53	1442.53	1442.53	1442.53	520.60
	500	544.93	362.75	154.42	-5.67	-339.45	1442.53	1442.53	1442.53	1442.53	-94.02
2#	100	310.29	13.76	-418.24	-1600.99	-4321.95	1282.31	1282.31	1282.31	1282.31	1258.69
	300	255.40	-37.61	-1327.05	-4875.31	-13038.18	1282.31	1282.31	1282.31	1282.31	1211.45
	500	235.15	-86.79	-2235.86	-8149.62	-21754.41	1282.31	1282.31	1282.31	1282.31	1164.21
3#	100	1321.80	895.21	873.60	723.26	275.25	1602.75	1602.75	1602.75	1594.33	1179.38
	300	896.83	891.95	827.13	583.73	119.81	1602.75	1602.75	1602.75	1577.49	332.65
	500	896.83	888.69	780.67	510.24	63.86	1602.75	1602.75	1602.75	1560.65	-514.09
4#	100	296.55	23.60	-233.32	-985.77	-3203.87	1282.31	1282.31	1282.31	1071.75	-1199.34
	300	198.36	-35.49	-773.48	-3030.83	-9685.12	1282.31	1282.31	1282.31	650.63	-6162.63
	500	158.47	-83.65	-1313.63	-5075.88	-16166.36	1282.31	1282.31	1282.31	229.51	-11125.93
5#	100	367.64	-76.49	-1607.87	-3551.09	-6466.03	729.34	575.07	0.00	0.00	0.00
	300	300.07	-264.13	-4858.29	-10687.94	-19432.75	729.34	266.53	0.00	0.00	0.00
	500	292.05	-451.78	-8108.70	-17824.79	-32399.48	729.34	-42.01	0.00	0.00	0.00

Colour identification of results for monetary values: green - gain, pink - loss, orange - calculation was not performed due to low transformer power.

Source: author's calculations, 2023

The results summarised in the table above show that for 3 out of 5 Substations, reaching the required capacity of 3 MW for a new connection or load growth is not economically feasible to implement the flexibility services approach. It is important to mention that ST often receives connection requests with capacities below 3 MW. In most cases, it is possible to implement a flexibility service approach, especially if the customer (demanding party) has assessed the required electricity capacity according to accepted standards and forecasted its consumption based on real data. On the other hand, looking at the results of the generation flexibility market scenario, in most cases it is a reasonable option, but the generation capacities do not reach the levels assumed by the authors at the time of the study according to actual indicators. This points to the need for a reassessment of the situation when the power generation capacity of the Substations studied will increase. Complementary indications are the results of the CEM tool on the years of deferment of grid reconstruction, shown in Table 2.

Table 2

**Results of the market scenarios for consumption and generation flexibility
 Substations 1# - 5#, years**

Substation Serial No.	Price EUR/M W	Consumer flexibility market					Generation flexibility market				
		Load, MW					Generation, MW				
		1	3	5	7	10	5	10	15	20	25
1#	100	20	20	15	8	0	40	40	40	40	40
	300	20	15	8	3	0	40	40	40	40	40
	500	15	10	6	0	0	40	40	40	40	0
2#	100	9	2	0	0	0	40	40	40	40	40
	300	8	0	0	0	0	40	40	40	40	0
	500	7	0	0	0	0	40	40	40	40	0
3#	100	40	20	20	20	9	40	40	40	40	40
	300	20	20	20	15	5	40	40	40	40	40
	500	20	20	20	15	3	40	40	40	40	0
4#	100	10	2	0	0	0	40	40	40	40	0
	300	7	0	0	0	0	40	40	40	40	0
	500	6	0	0	0	0	40	40	40	40	0
5#	100	20	0	0	0	0	40	40	0	0	0
	300	15	0	0	0	0	40	40	0	0	0
	500	15	0	0	0	0	40	40	0	0	0

Colour identification of results for monetary values: green - gain, pink - loss, orange - calculation was not performed due to low transformer power.

Source: author's calculations, 2023

The results of the generation flexibility market scenario described in Table 2 point to the aforementioned conclusion that there is not enough generation capacity to trigger a network reinforcement study. The 40-year result in all categories, with some cases at 25 MW, confirms this. In contrast, the market scenario for consumption flexibility shows results for different periods of years. The economic rationale is mainly developed in the short term (1-5 years), where the deferral of network reinforcement can lead to a continuous increase of connections in substations with low overcommitted capacity. At the same time, developing solutions for network reinforcement and carrying them out over a 3-5-year period, which is the average duration of major capital projects such as Substation reconstruction, modernisation, increasing capacity.

The results lead to the conclusion that the higher the price of flexibility compensation, the higher the total cost of flexibility. At the same time, if the required load exceeds the rated capacity of the transformer from the first year onwards, flexibility services are more expensive than reinforcing the network (note: it is technically impossible to provide such a large overload compensation). As the amount of flexibility required (MW) increases, the number of compensations paid when activating them also increases.

Concluding that the results are positive, and the service has the capacity to deliver economically viable benefits, the following study focuses on further research opportunities and conclusions.

Conclusions and proposals

Within the framework of this study was developed a unique business analysis model for selecting the optimal investment strategy. This is the first project of its kind involving Latvia's largest distribution system operator, opening the door to new types of congestion management services. However, this research also highlighted a number of limitations of the proposed business analysis methodology for flexibility services, which are recommended to be improved in future iterations. The findings presented here should be considered as a discussion and recommendations for further research and development of flexibility services.

Conclusions

1) **The CEM tool has weaknesses.** Given that ST has to cover network technical losses, the business case for flexibility services does not include it and the corresponding costs in the calculations. This constitutes a significant cost category when choosing between flexibility services or a traditional network reinforcement approach.

The financial data is forecasted for the next 10 years with increasing certainty over time. 10 years can also be considered a short period relative to the useful life of the asset. Currently, the functions responsible for finance generate costs for discount rates, purchase prices for losses and other financial parameters. This period should be extended to at least 20 years.

2) **The future development of flexibility services is based on assumptions.** While the costs of a traditional network retrofit are well known, the costs of developing a flexibility platform were identified through a price survey with a developer of such a platform in the UK. At present, the study does not reflect a specific direction on how developers plan to address the flexibility platform issue - no decision has been taken whether ST will build a new platform with its own resources or purchase and integrate an existing solution. This may lead to inaccurate input data projections.

3) **About 95% of 110 kV transformers in substations are not owned by ST.** The situation with the ownership boundaries of substations makes the implementation of the service more complicated, as the operation is performed by the transmission system operator's staff. ST is the largest customer, but decisions related to the safety and operation of the network are taken by the network owner. The company's managing directors have already decided to evaluate investments in their assets by purchasing transformers through the procurement process when replacing transformers in high voltage (110 kV) substations, thus moving the boundary before the transformer, but this has only been done in a few substations. The switching of the equipment mentioned in the study is currently primarily motivated by safety reasons rather than economic factors.

Further recommendations for the development of the study

1) **Forecasting.** Short and long-term forecasting needs to be improved. For short-term forecasts, forecasting algorithms based on mathematical models such as regression algorithms or machine learning algorithms are needed. In this work, data for 2021 were used and exploited to the future. However, when working with forecasts, it can be concluded that the cost of flexibility services would be higher due to the appearance of congestion when it was not forecast. There would also be times when the overload forecast did not come true. However, the customer is still entitled to compensation for the flexibility service provided. For short-term forecasts, SCADA data should be used in the forecasting, as using data at one-minute intervals would give a more accurate view of load peaks than using hourly average load values. The problem here would be with data storage, as it is logical that 60x the amount of data would need to be stored using minute-by-minute data.

To improve the long-term projections, it is necessary to compare the traditional reinforcement investment scenario with flexibility services, where the analysis should cover the entire life cycle of the asset (in the context of the study, the economic life cycle of a transformer is 40 years). The study concluded that limited information is available on how customer consumption will evolve over such a period. There is a large uncertainty factor in long-term projections. In this work an annual 2% load growth was used, but this method is too simplistic for large-scale investment project forecasts.

Use 15-minute data. It would be equally important to use shorter smart meter intervals in the future so as not to overpay for the flexibility provided by the customer. For example, it may be the case that an overload is only expected for 15 minutes. However, if the minimum meter reading interval is one hour, then the shortest period for which flexibility can be purchased is also one hour. Consequently, both the distribution network overcharges the customer and the customer's commercial or industrial operations may be interrupted for longer than necessary.

2) **Improvements in calculations including electricity losses.** Given that the system operator has to financially cover network losses, the business case for flexibility services should include a calculation of electricity losses and associated costs for all present and future scenarios. In this way, the decision on the optimal investment strategy would become even more accurate.

3) **Creating load profiles for new connections.** It is important to use the available information about the new customer's expected load. In this work several scenarios were considered assuming that new customers will demand 1,3,5,7 and 10 MW. However, in practice it is possible to replace this unknown factor by carrying out a business process and operational analysis of the new customer. For example, if a new farm wants to apply for a new electricity connection, it is possible to carry out a load profile analysis of similar sized farms to understand when and how much electricity this type of customer is likely to consume. It is equally important to start this discussion with the demanding party of the connection to understand their business needs. As a result, one scenario can be used that would very accurately reflect the expected load changes when a new customer comes on board.

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BLUE ECONOMY: ANALYZING AQUACULTURE FARMS ON THE EXAMPLE OF THE AUTONOMOUS REPUBLIC OF ADJARA (GEORGIA)

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Abstract. The Blue Economy is a relatively new concept that relies on sustainable use of ocean resources for economic growth, improved livelihoods and jobs while preserving health of ocean systems. This concept has lately been regarded as a very promising tool in achieving several Sustainable Development Goals set by the United Nations. Understanding and proper implementation of the Blue Economy principles in coastline territories have become urgent and topical issues. The purpose of this study is to analyse and assess the feasibility and potential of introducing a fish and seafood production sector in the Autonomous Republic of Adjara, which is located in Georgia. The current study explores the opportunities, challenges, and potential benefits associated with establishing such sector in this region, characterizes existing aquaculture farms and identifies reasons that hinder the increase of farms' productivity. In scope of this study, a survey of 70 fish farms was carried out, and the research results highlight possibilities to develop scenarios for further field development where collaboration between aquaculture farms and the government can be identified as crucial issues to stimulate the production of fish products. By summarizing the research results and analysing the data, the following conclusions can be drawn: Georgia faces a challenge in introducing the modern Blue Economy and its principles; the existing aquaculture farms in the Autonomous Republic of Adjara have low productivity; farmers lack the necessary knowledge for sector development; it is crucial to strengthen aquaculture farms with government support.

Key words: Blue Economy, aquaculture, Georgia, Adjara.

JEL code: Q22, Q50, R11

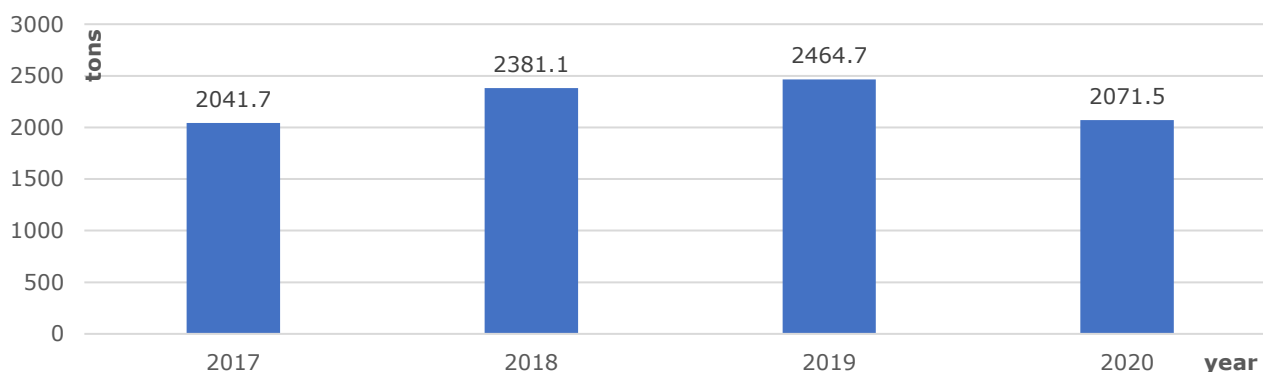
Introduction

The economy, based on its characteristics, can be compared to a living organism. At the global level, important economic, social, and environmental issues such as increasing consumption, unequal distribution of resources, socio-economic inequality, unemployment, and climate change are prevalent (BRIDGE-BS, 2022). This paper discusses the Blue Economy, which responds to the UN Sustainable Development Goals (Goals 1, 8, 14, 15 and 17). Most natural resources used daily for production and household purposes are non-renewable, including water, ocean, and sea resources (OECD, 2022). According to the World Bank, the Blue Economy refers to the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem" (The World Bank, 2017). The Blue Economy includes areas such as fisheries, maritime transport, waste management, marine renewable energy, tourism, and climate change.

According to the literature, in the 18th century, the English scientist Thomas Robert Malthus spoke about limited resources and unsustainable consumption. Other classical scientists, such as David Ricardo, John Stuart Mill, and William Stanley Jevons, predicted that the scarcity of natural resources would lead to economic decline, and therefore described economics as a "dismal science" (Toman, 1997). The problem is particularly acute in developing countries. The term "Blue Economy" was first used in 1994 by Gunther Pauli in his book "Blue Economy 3.0", where he highlights that economic processes are rapidly developing in maritime regions (Pauli, 2011).

Nowadays, approximately half of the world's population, which is around 3 billion people, lives within 200 kilometres of a coastline. According to anthropologists, this figure is likely to double by 2025 (Creel, 2020). In recent years, awareness of the concept of the Blue Economy has been growing, although it is still not a widespread policy with formulated goals (EUMOFA, 2022). The Autonomous Republic of Adjara is located on the coast of the Black Sea. Hence, it is urgent to develop and implement the appropriate

Blue Economy policies, including those related to fish and seafood production (BSEC, 2019). In order to plan the right policy, it is necessary to study the current situation, the status quo. The contribution to Georgia's gross domestic product of agriculture, hunting and forestry, fishing, fishing sector from 2015 to 2020 was in the range of 7.9-8.2%. Fish products foreign trade balance has always been negative and in 2020 amounted to 17-22 thousand tons. The share of imported products in the Georgian fish market is high, namely, 85-90% of fish products on the market are imported (Geostat, 2021). According to the data of the National Statistics Agency of Georgia, in recent years, the number of fish produced in aquaculture farms has decreased. The produced amount of aquaculture products in 2020 equalled 2.0-2.5 thousand tons (Fig. 1).



Source: author's calculations based on GEOSTAT data

Fig. 1. Volume of fish produced in aquaculture farms in Georgia

The mentioned fact is important and needs to be studied at a scientific level. Water resources are not used commercially, which is a loss for the real economy (AGENDA, 2021). Considering the given facts, it is necessary to study the challenges faced by aquaculture farms. The development of the fisheries sector is of special importance to the coastal regions of Georgia, where most of the fishing companies are located. Companies in the fisheries sector are not able to work with traditional and obsolete technology, equipment and complexity (BRIDGEBS, 2020).

It should be noted that positive changes in the aquaculture sector can be observed in Georgia starting from 2021. This is primarily due to the adoption of the draft Law on aquaculture. With the mentioned change, from 2024, permits for aquaculture activities will be issued taking into account permit conditions. According to the explanation of the Environmental Protection and Natural Resources Committee of the Parliament of Georgia, aquaculture, extensive aquaculture and mariculture are distinguished in the sector (at this stage it was not represented in Georgia at all). This process will lead to the utilization of water resources through environmentally friendly activities. Additionally, it will facilitate the commercialization of these resources, the protection of aquatic species, and most importantly, establish a legal framework for the sector. To complement these efforts, it is imperative to gather statistical data that will accurately describe the current state of the sector and provide a clear overview of potential development opportunities. Since 2017, the National Statistics Agency of Georgia has been publishing statistics on aquaculture farms every year. However, this study alone is not sufficient, as the data and indicators presented in it do not allow for detailed analysis, particularly on a regional level (including the Adjara region). Therefore, the research conducted by us, which identifies the challenges faced by aquaculture farms in the Adjara region, is crucial. There is a lack of such research in this sector, which adds significant practical value to this research paper. Based on the findings of this research, it will be possible to develop state policies that consider the needs of the farmers.

Research methodology

The paper aims to clearly reflect the peculiarities of the Blue Economy and problematic issues in Georgia, especially in the direction of fishing and aquaculture. Also, determining the condition and challenges of aquaculture farms in Adjara within the framework of the Blue Economy. To achieve the aim, two specific research tasks were set: 1) to conduct a review of theoretical literature on the role of the fish products industry in Adjara; 2) to analyse problems faced by aquaculture farms.

The research employed general and structural sociological research methods (interviews and questionnaires). The descriptive, analysis and synthesis methods were used to formulate the research results. The analysis conducted on the subject matter utilized a variety of sources to gather specific information. These sources include both international and local literature, which may consist of academic publications, research studies, and other written material that pertains to the topic under consideration. Additionally, practical studies were examined to provide real-world insights into the matter. Furthermore, the sources of analysis also included governmental and non-governmental organizations. These organizations may have provided statistical data, reports, and case studies on the subject matter, which were analysed to gain a comprehensive understanding of the topic at hand. Overall, the analysis utilized a diverse range of sources to ensure a thorough and well-rounded understanding of the subject matter. Experience shows that due to the nature of the problem, complex and multifaceted research is needed.

The research process involved the use of statistical data analysis methods and surveys. A quantitative method was employed to obtain data from representative surveys containing questions developed by the author. The surveys were designed to resemble in-depth qualitative research interviews, with open-ended and closed-ended questions to allow respondents to provide detailed feedback. In some cases, mobile phones were used for conducting interviews.

The questionnaires were thoroughly reviewed for inconsistencies and technical errors. If any issues were found, the questionnaires were edited. A pilot survey was conducted to identify any missing or incorrect information and make necessary modifications. This approach helped to ensure the quality of the questionnaires. This approach allowed for the efficient and effective collection of data.

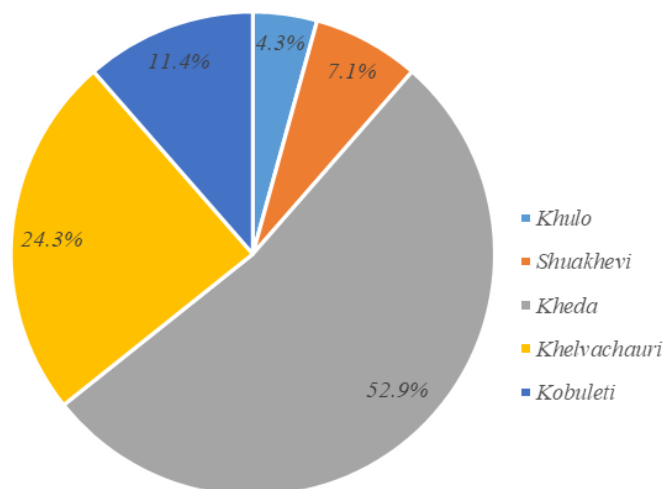
The object of the research is fish and seafood farms, specifically aquacultures located in the Autonomous Republic of Adjara. The subject of the research is to investigate the factors that affect the functioning of these aquaculture farms in the Adjara region. To obtain data, surveyed and interviewed farms were selected based on their business activities and experience. The main selection criterion was that the respondent must be the owner of a farm located in the Adjara region that has been in operation for at least the last 10 years. As a result of these selection criteria, the presented research report is reliable and relevant because the survey respondents have considerable experience in the aquaculture industry. This ensures that the data obtained is based on the practical experiences of established aquaculture farmers in the region.

The survey results were processed by means of the data processing program SPSS (Statistical Package for the Social Sciences). Microsoft Excel for Windows was used for a graphical analysis of the data.

Research results and Discussion

The main data set that was analysed in this study was obtained from 70 questionnaires. These questionnaires were distributed and interviews were conducted by using the cluster analysis method. The clusters were represented by municipalities in the Autonomous Republic of Adjara (Khulo, Shuakhevi, Keda, Khelvachauri, Kobuleti). The surveys were conducted from May to July 2022. There were 3 datasets from

Khulo municipality, 5 from Shuakhevi, 37 from Keda, 17 from Khelvachauri, and 8 from Kobuleti. Distribution of fishing farms by municipalities (clusters) are summarized in Figure 2.

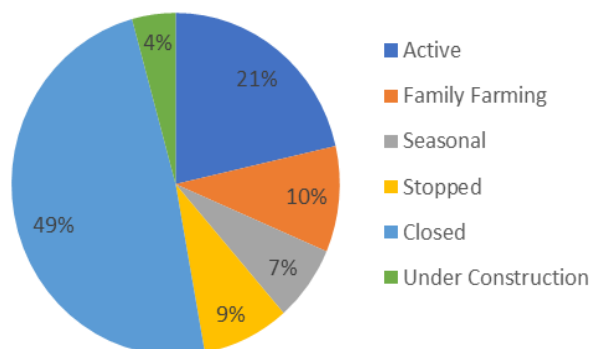


Source: author's calculations based on survey (n=70) results

Fig. 2. Distribution of fish farms by municipalities

Based on the research findings and secondary data, the following conclusion can be drawn: the surveyed aquaculture farms and their production rates differ from each other. 37% of the surveyed fish farms are in operation (active all year - 20%, family farming (family consumption) - 10%, seasonal - 7%). Most of the farms are registered as individual entrepreneurs, and some don't own real estate (mainly fish farms on the river) due to legal regulations. Family members, on average 2-3 people, are employed in these farms. The research showed that one of the obstacles to the development of the fishing industry in the Adjara region is the age of the employees. The people employed in the sector are old, which indicates that young people are less interested. Also, the majority of owners of surveyed farms are men. 22% of the surveyed employees of fisheries farms are in the age group of 60+ years. Most of the employed are in the 45-60 age group (48%). As well as a large proportion of employees are in the age group of 30-45 years (21%). The number of young people employed is relatively small, the lowest number of employees is in the age group under 30 - only 9%. This fact is related to such factors as the location of farms in rural areas, lack of qualifications for working in the fisheries sector, low profit margins, and others. All this makes it difficult to introduce innovations in the sector and increase its efficiency and productivity.

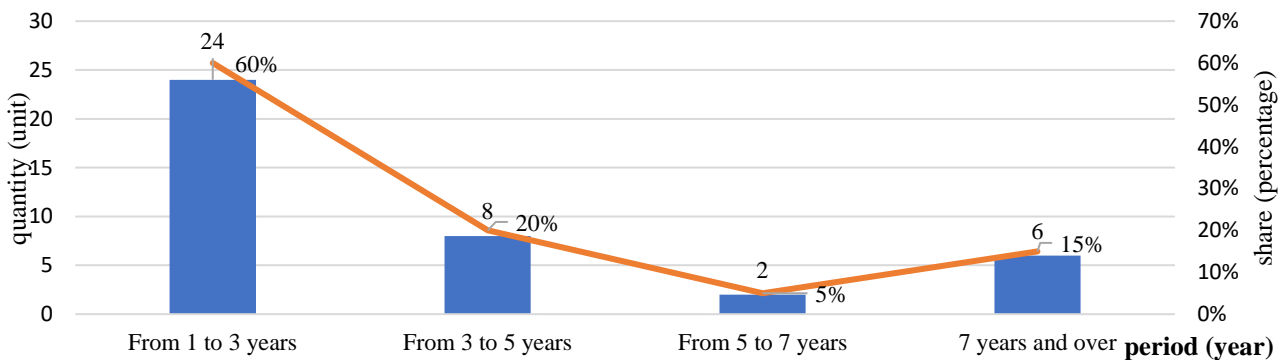
Mostly these farms were built in the 1990s and 2007-2010. During the last 5 years, about 2 new enterprises have been added, although it is worth noting that these enterprises are provided with much higher performance and better infrastructure.



Source: author's calculations based on the survey (n=70) results

Fig. 3. Distribution of fish farms by status

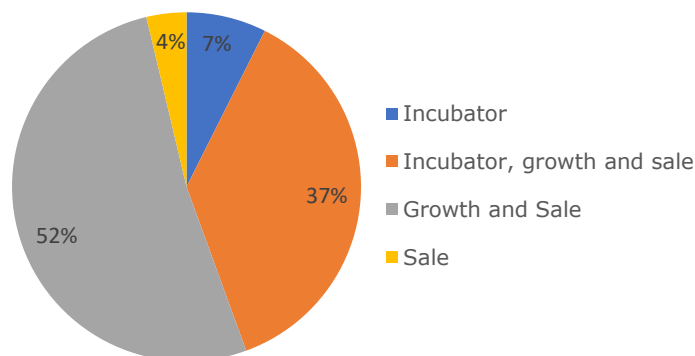
According to analysis of distribution of surveyed fish farms by status (Figure 3), the majority (58%) are closed (49%) or their operation is suspended (9%). According to the obtained data, the authors can say that most of them (60%) were closed in 2019-2021. The respondents evaluated the reasons for the production of aquaculture farms with a 5-point Likert scale, where 1-point means "very bad" and 5 points means "very good". The list of the main reasons contain the following arguments: expensive raw materials (food, drugs) and lack of access to them (restricted imports), problems related to sales (restriction of movement, lack of transport), financial problems, spread of diseases and others (Figure 4). The main reasons for farm closures in 2016-2018 were financial problems, poor food quality and widespread diseases.



Source: author's calculations based on the survey (n=70) results

Fig. 4. Distribution of suspended and stopped farms by years

According to survey results, the production cycle of 53% includes the purchase, growth and sale of spawn, 37% have a fully realized production cycle, 7% are limited to the shares of incubators and 4% of sellers (Figure 5). This indicates that every stage of the entire production cycle is quite well developed in the Adjara region. Farmers often cooperate and form a value chain. An example of this is the organic aquaculture development association "Foreji", which was established in Keda municipality with the financing of the European Union. "Foreji" is an association that develops organic aquaculture, facilitates the project to ensure that healthy fry is hatched from quality-bred roe, guaranteeing an uninterrupted supply for fisheries throughout the business year. In addition, the main task "Foreji" sees for itself is changing the minds of fish farmers. Currently, the general mindset both hinders development of the field and distorts the income of the farmers.



Source: author's calculations based on the survey (n=70) results

Fig. 5. Distribution of active fish farms according to production cycles

Due to difficult environmental conditions and deficiencies in the incubation cycle (water quality, common viral and bacterial diseases, lack of ichthyologists), hatcheries and fish farms operate at high losses. The challenging environmental conditions and inadequacies in the incubation cycle, such as poor water quality, frequent viral and bacterial diseases, and a shortage of ichthyologists, result in significant losses for hatcheries. Small fish don't have high immunity, which affects the growth rate and duration of the

production period. This will ultimately affect the increase in the cost of products. The commercial weight of rainbow trout (*Oncorhynchus mykiss*), a common fish species in Adjara, is 200-250 grams, which takes 8-9 months to 13-18 months to grow (depending on water quality, temperature and amount of food).

During the survey, it was revealed that farmers often bring small fish and fish feed from the neighbouring country Turkey. There are also imported Polish, Italian, Danish products, the price of which depends on the exchange rate of the euro. In ichthyology, it is accepted that to grow 1 kilogram of trout, about 1-1.2 kilograms of fish food is needed. Due to the increased production period, the local fish farm has to supply about 1.5 – 2 kilograms, which increases the prime cost of the products.

Most of the respondents have not created their brand name for better marketing. Only 26% of respondents have their trade mark. They mainly use traditional ways for sales and they do not use online sales and other digital platforms. Only 15% of fish farms operating in Adjara have a webpage on social media. Only two of the surveyed farms indicated participation in the local exhibition. The lack of direct contact with the customer, the absence of websites and catalogues reduces the number of sales as they do not feel the need for them at the moment. However, as practice shows, it is possible to introduce new products to customers faster through social networks and online sales. Aquaculture farms with production volume of more than 1 ton implement wholesale trade (selling to resellers), delivering to "Melkimoria", rural market and supply catering facilities (mainly seasonal cafes and restaurants, in some cases their own).

As mentioned in the interviews, local aquaculture farmers are also exposed to problems related to various aquaculture diseases. An alternative is to move to a neighbouring country Turkey, where aquaculture is much more developed and they can accurately diagnose such diseases. It is difficult to find an ichthyologist who can accurately diagnose and treat fish diseases throughout the Adjara region and not only Adjara, but the whole of Georgia. Firstly, there are no qualified personnel, secondly, there is no special laboratory where it will be possible to conduct the research.

From the survey results the authors can conclude that vast majority of people (85%) working in this sector are less interested in acquiring theoretical knowledge and sharing practice. Knowledge gap is one of the issues that is highlighted also in other studies in the field of aquaculture. For example, A. Sapkota and co-authors (2008) summarize that one of the urgent issues in aquaculture farms is knowledge concerning major chemical, biological and emerging agents that are employed in modern aquaculture facilities and their potential impacts on public health. Situation analysis and survey results in Georgia highlights that aquaculture farmers think that they don't need additional training. The main part of existing knowledge in aquaculture farms is based on practical experience and traditional knowledge, which is not sufficient to introduce new sustainable production methods. The mentioned fact is related to the demographic indicators of the employees in the sector (age, gender).

The research focused on analysing the essential resources needed to develop business models for aquaculture farms. The study highlighted those physical resources, such as tanks, equipment, support buildings, laboratories, and food, intellectual resources like brand and customer database, human resources in terms of employee competencies, knowledge, and creativity, along with financial resources are the most crucial resources for the development of aquaculture farms' business models. Similar findings can be found in other studies that also explore challenges and opportunities for aquaculture development (Ugalde et al., 2023). Furthermore, the study found that family farms are the most prevalent type of farm, but they are less likely to receive information on financial performance compared to other farm types.

One of the significant drawbacks of the existing aquaculture farms in Adjara is the limited modernization of their production processes. This ultimately leads to low productivity, causing a decrease in production levels (FAO, 2022). One of the contributing factors to this issue is the lack of knowledge regarding advanced

aquaculture production practices. As a result, only a small quantity of fish products is released into the market, which is not sufficient to meet local demand. Moreover, this situation fails to generate the expected total added value in the economy, thereby adversely impacting economic growth.

Conclusions

The review of scientific literature and discussions dedicated to the Blue Economy concept has confirmed that the development prospects for aquaculture farms in Georgia, particularly in the Autonomous Republic of Adjara, are promising. The growth of this industry will undoubtedly contribute to improving the socio-economic conditions of the local population, specifically among those living in rural areas, by increasing local employment opportunities.

The development of aquaculture farms will ultimately lead to a rise in fish and sea product production, which will be crucial in reducing and possibly substituting imports in the medium-term. This, in turn, will have a positive impact on the overall economy, benefiting both producers and consumers. At this stage, based on the research, the authors have made several conclusions.

- 1) The paper describes the results of the research conducted in the aquaculture farms in the Autonomous Republic of Adjara. The research revealed the main problems faced by farmers. Among them, the following should be highlighted: lack of availability of fish food (it is imported and has high and unstable prices); lack of ichthyologists and laboratories; outdated knowledge among farmers and lack of innovation in the field; low access to finance.
- 2) Based on the findings, the local and central governments should support aquaculture farm owners to maintain production and overcome the existing challenges. At the same time, it is necessary to maintain the necessary infrastructure for farmers, share new knowledge, practices and provide financial support.
- 3) A limitation of this research is its relatively small sample size. Therefore, future studies should aim to expand the sample size and cover a wider range of regions in Georgia to provide more comprehensive insights into the aquaculture industry. Additionally, conducting further practical studies would be beneficial in providing practical solutions to the challenges faced by farmers in this sector.

Acknowledgment

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ENERGY PRODUCTIVITY IN AGRICULTURE IN EU COUNTRIES – DIRECTIONS AND DYNAMICS

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Abstract. The productivity of inputs, especially energy, is a subject of interest in many countries, including the countries of the European Union and the EU itself. To achieve a more sustainable economy, the EU launched the European Green Deal, a development strategy to transform the EU into a zero-emission economy. The study aims to assess changes in the productivity of energy inputs in agriculture in EU countries in connection with the changes in the volume of production and energy inputs. Based on Eurostat data, changes for the period 2010-2020 were determined. It was found that agricultural production in the EU-27 increased by 1.36%, while the amount of energy used in agriculture increased by as much as 12%. As a result, energy productivity decreased by as much as 10% from EUR 360,000 to EUR 325,000 per 1 TJ of energy input. A decrease in energy productivity was observed in 20 of the 27 countries surveyed. On average, production or energy use volume changes in particular countries were not large and did not exceed 5% in the analysed period. An increase in the efficiency of energy use in agriculture is possible through rational concentration of production, mechanization and introduction of innovations in production technologies. The phenomenon of emission leakage outside the EU and large imports of food should be avoided, as the efficiency of energy use in agriculture in the EU is higher than in less developed countries. Achieving a reduction in energy consumption in agriculture seems to be difficult to reconcile with maintaining production volumes.

Key words: energy productivity, agricultural productivity, energy inputs, Green Deal.

JEL code: Q11, Q49

Introduction

Energy is the currency of the economy of nature. Because the human economy is a subsystem of the biosphere, energy is similarly the fundamental currency of human economies (Daly & Farley, 2009). Energy is a scarce resource, especially in its direct form as solid, liquid, gaseous fuels or electricity. Currently, most energy comes from non-renewable fuels such as coal, oil and gas. The use of such resources must be subject to the principles of rational management, significantly when the available resources of such fuels are decreasing. An important aspect is the reduction of GHG emissions, including those from non-renewable fossil fuels.

Global climate change has been recognized as an essential threat to Europe and the world. To limit these changes, the EU launched the European Green Deal, a development strategy to transform the EU into a sustainable economy. Established in 2019, the European Green Deal outlines actions for a resource-efficient and zero-pollution EU by 2050. At the heart of the plan are UN climate protection goals to limit the temperature increase to 1.5°C, in line with the Paris Agreement (Dolge & Blumberga, 2021; European Commission, n.d.). Therefore, it is necessary to introduce technological improvements and innovations that maintain agricultural production at the current level and reduce the volume of inputs in that energy (Viksnina & Leibus, 2022).

Reducing the energy intensity of agricultural production is also supported by the fact that the increase in energy prices is not compensated by a proportional increase in the price of farm products, so it usually leads to a deterioration of profitability in agriculture (Ball et al., 2015).

The Green Deal will also affect agricultural production, considered an important source of air, water and soil pollution. This applies to reducing the use of fertilizers, pesticides, and energy in agriculture. In agriculture, energy use is not only supposed to be effective, but it is also necessary to reduce GHG emissions from fuels by using biofuels (Adamickova et al., 2020; Muska et al., 2021) and other renewable

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energy sources in accordance with the sustainable development paradigm (Naglis-Liepa et al., 2021; Naglis-Liepa & Pelse, 2014; Naglis-Liepa, Filipiak et al., 2022). It should be remembered that direct energy in agriculture is less than 30% of the total amount of energy that is embodied in fuels, fertilizers, pesticides, feed, seeds etc. (Giampietro, 2003; Vittuari et al., 2016).

Higher productivity of energy inputs in agriculture is observed in developed countries than in less developed ones. This is related to superior technology and better farm management (Mushtaq et al., 2009) but also results from a higher level of direct energy inputs correlated with an appropriate level of production mechanization (Karkacier et al., 2006). Progress in agricultural mechanization brings effects also reducing energy use per one unit of production, especially when technological progress in agriculture is observed (Bartova et al., 2018; Wicki, 2018).

In industrialized countries, most farmers rely on mechanization, and larger farms may be able to utilize their equipment more fully (Shahin et al., 2008), thereby increasing fuel efficiency per unit output. A study of Swiss dairy farms suggests that larger farms are more energy efficient than smaller farms (Pelletier et al., 2011).

Roughly 50% of the increase in energy inputs in agriculture was a consequence of a shift toward more energy-intensive technologies in place of comparatively expensive labour input. Relationships between energy inputs and production are complex and nonlinear. The diminishing returns law is often observed (Pelletier et al., 2011). However, some studies have confirmed that efficiency may change in accordance with the Environmental Kuznetz Curve; such relationships are more often observed in non-agricultural sectors (Zaman & Moemen, 2017).

It has also been shown that animal production is characterized by a much higher energy intensity than plant production, even intensive cash crops (Vittuari et al., 2016). Reducing energy consumption may therefore result from a change in the production structure with a reduction in animal production. Reducing direct energy consumption within crop production is more complicated, as it mainly concerns machinery fuel (Ziaei et al., 2015). In this context, it should be noted that a holistic approach is required, as, for example, increasing the volume of production of energy crops, which is profitable, leads to an increase in energy consumption (Prabhakar & Elder, 2009), and may also lead to additional emissions from LULUC.

Another important issue is the huge variation in energy input per unit of the same product produced in different places, even in one country. Complex and interdependent factors affect the amount of energy used per unit of food produced, including climate, soil conditions, farming practices, fertilizer systems, crop yields and other variables. Differences in inputs were even several times for different production systems in one country (Woods et al., 2010).

One of the major trade-offs in terms of energy use and greenhouse gas emissions from agriculture is whether to increase production by increasing the area under cultivation or to achieve higher yields in already cultivated areas using more inputs per hectare (Phalan et al., 2011). Such an increase in production intensity is more beneficial than deforestation, which still occurs in less developed countries. Maintaining or increasing inputs per hectare is beneficial as long as it allows for higher input productivity (Tubiello et al., 2015). In Europe, there is an afforestation of agricultural land, and production is concentrated on better soils (Danilowska, 2019; Daugaviete et. al., 2020; Feldmanis, Pilvere, 2021). Therefore, it is possible to produce intensively and keep the output level without increasing the agricultural land area. In addition, increasing the scale of production is beneficial concerning the productivity of inputs. Higher input productivity is obtained in larger farms, including higher energy productivity. In addition, farms have a higher level of income and are more sustainable (Kusz et al., 2022; Wicki, 2019). In such large farms, obtaining part of the energy from renewable sources, e.g., biofuels and agricultural biogas, or

even from photovoltaic installations, is more accessible (Adamickova et al., 2020; Wicki, 2017; Naglis-Liepa, Filipiak, et al., 2022; Pietrzykowski, Kusz, et al., 2022). Overall, actions to reduce energy consumption in agriculture usually lead to reduced agricultural production. Still, there is scope to reduce direct energy consumption by changing production techniques without harming crops. As a result, it is possible to save 10-14% of energy (Tsatsarelis, 1991).

Aim and method

The study aims to assess changes in the productivity of energy inputs in agriculture in EU countries in connection with the changes in the volume of production and energy inputs. There are three research tasks: 1) determining the level and structure of energy use in agriculture; 2) determining the level and dynamics of agricultural production in the EU countries; 3) determining the changes of productivity of energy in EU agriculture.

The data used for the analysis are from Eurostat databases: Economic accounts for agriculture - values at real prices (AACT_EAA04) and "Simplified energy balances" (NRG_BAL_S). We also used data on energy use in agriculture from FAOSTAT database Energy use. Data concern the period 2010-2021. The choice of the data period resulted from the fact that the EU Member States that joined the EU in 2007 already provided comparable data to Eurostat after 2007, and the method of measurement of energy input in agriculture did not change within the researched period. In the case of a lack of data on energy consumption in agriculture in Eurostat for a given year and country or data inconsistency, data from Eurostat were supplemented with information from FAOSTAT. Another reason for adopting 2010-2021 was that all EU countries' production value was expressed in fixed prices in Euros. Adopting a more extended period for analysis may lead to distortions resulting from changes in the value of national currencies.

Data in annual intervals were obtained for each country on: 1) total agricultural production value in basic prices expressed in constant 2015 euros; 2) energy input in agriculture in TJ.

The energy productivity (EP) per unit of energy inputs was adopted as the basic indicator:

$$EP = \frac{Production}{Energy} \quad (1)$$

Where: *EP* is energy input productivity, *Production* is total value of agricultural production in constant 2015 euros and *Energy* is total direct energy input in agriculture in energy units (TJ).

It can be assumed that an increase in the production per unit of energy input shows desired changes toward low-input and low-emission agriculture. Improvement in agricultural practices, lowering intensity and changes in the agricultural production structure, according to EU policy toward agriculture, should result in higher production per unit of energy. Therefore, the indicator we use is a reversal of the relationship that is often considered in the context of energy use, i.e. energy intensity. However, using the energy productivity indicator is beneficial as it can be easily compared to such indices as land and labour productivity. An increase in energy productivity in agriculture, preferably resulting from an increase in production with a decrease in energy consumption, would be a desirable outcome of the changes.

Changes in EP over time were determined using the dynamics index and the annual growth rate index. First, the ratio of the dynamic was calculated by comparing the level of variables for 2018-2021 to that for 2010-2013 (formula 2). Four-year averages were used for comparison to avoid the accidental influence of the results in the base or final year on the result. It should be remembered that the analysis covered EU countries, and the phenomena affecting production level, e.g. drought, do not occur simultaneously in the entire EU. The second indicator is the average annual growth rate calculated based on the course of the

exponential function for the time series. The function given below (formula 3) was used. Beta is the average annual growth rate.

$$\text{Dynamics indicator} = \frac{\text{sum}(x_{2018}:x_{2021})}{\text{sum}(x_{2010}:x_{2013})} \times 100 \quad (2)$$

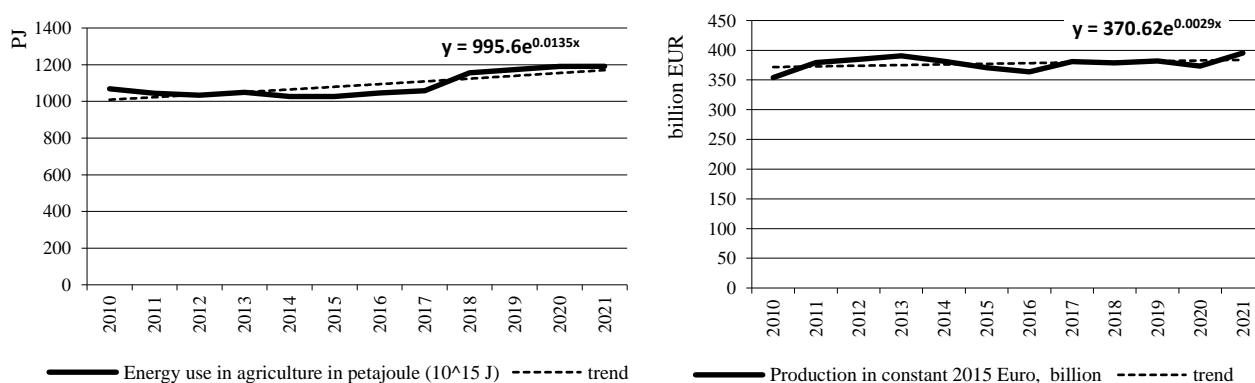
$$y = a \cdot e^{\beta x_i} \quad (3)$$

Where: x_i – means annual data for individual country or whole EU-27.

Research results and discussion

Agricultural production and energy inputs in agriculture

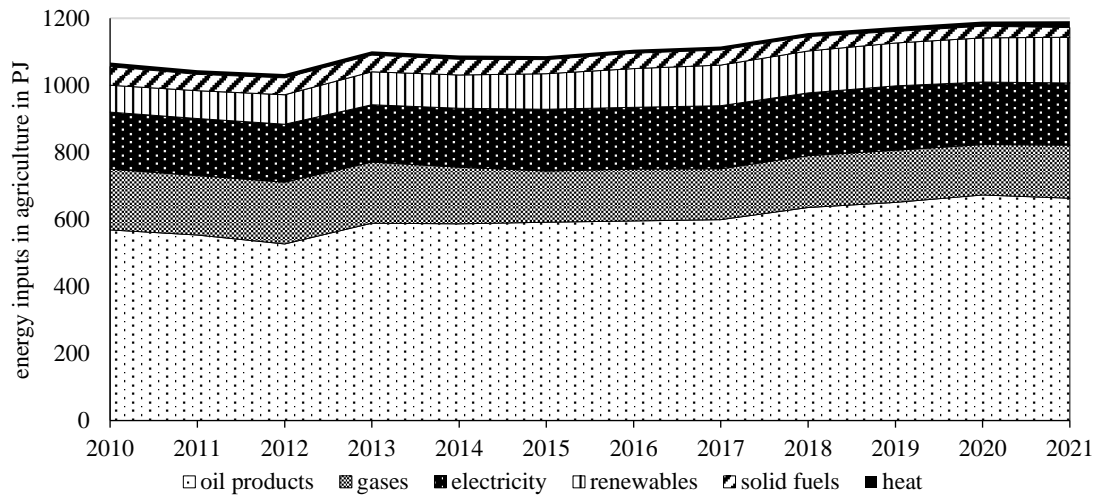
Direct energy use is an essential element of inputs in agriculture. Energy inputs are necessary not only for direct use in production processes, such as heating farm buildings or glasshouses, but are mostly used for indirect use. The energy, depending on the carrier, is used for heating, driving field machines or engines driving stationary machines. It is expected that with the increase in the scale of production, agricultural intensity and technological progress, energy inputs per unit of production will decrease (Wójcicki, 2006). Figure 1 presents energy inputs in agriculture in the EU-27 countries in 2010-2021. In 2010, in the EU-27, energy consumption in agriculture was around 1100 petajoules (PJ); by 2021, it had increased to about 1200 PJ per year. Energy consumption increased by 12.3% over the period, with an average annual increase of 1.35%. On the other hand, agricultural production in 2010-2021 (in constant 2015 prices) increased by only 1.36%. In 2010-2013, the total production value was EUR 377 billion, and in 2018-2021 it was, on average, EUR 382 billion. The average annual growth rate was 0.29%. As a result, the productivity of energy (EP) has been reduced by 10% (annual growth rate: -1.05%) (see also Table 1).



Source: author's calculations based on Eurostat data

Fig. 1. Energy consumption in agriculture (in PJ) and value of agricultural production (2015 constant prices, EUR billion) in the EU-27 countries in 2010-2021

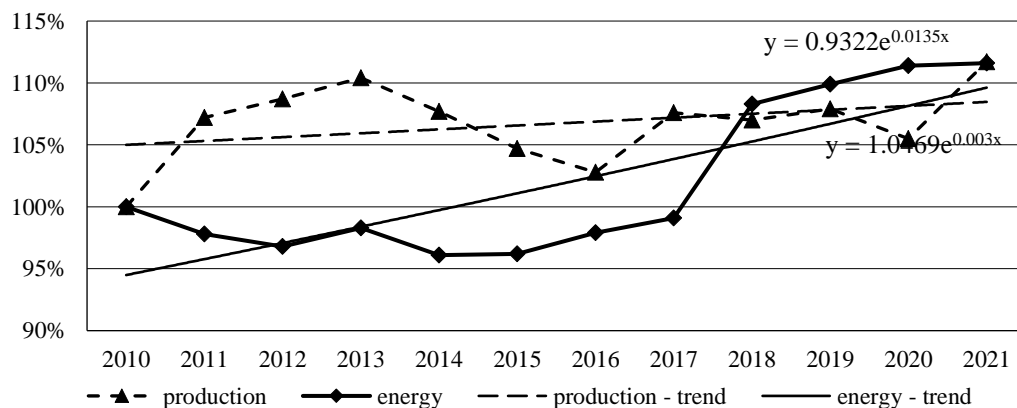
The structure of energy consumption is dominated by energy from oil products (Fig. 2). In 2010, it was about 53% of total consumption, and in 2021 already 56%. The second item in the energy consumption structure is electricity, with a share of about 15%, followed by gas. The energy from gaseous fuels was 17% in 2010 and 13% in 2021. The percentage of renewable energy in the total energy consumption in agriculture in the EU was not high. In 2010 it was 7.5%, and in 2021 it was 11.4%. It can be concluded that there were no significant changes in the structure of energy sources used in agriculture. The increase in mechanization in agriculture is associated with the growing demand for liquid fuels. A certain reduction in the energy demand can be expected with the rise in the scale of production on farms, which will enable the achievement of economies of scale in machinery use.



Source: author's calculations based on Eurostat data

Fig. 2. Level and structure of energy inputs in agriculture in the EU-27 countries in 2010-2021 (in PJ)

Figure 3 shows the dynamics of energy inputs in agriculture compared to production dynamics. In particular years, there were deviations from the trend. However, it can be noticed that energy inputs slowly but steadily increased, while production in agriculture, especially after 2013, did not increase. More important than the annual change assessment is the trend observation. It is clear that in the group of EU-27 countries in the last decade, the dynamics of energy consumption were higher than the dynamics of production. At the same time, this means that less and less product is produced per unit of energy.



Source: author's calculations based on Eurostat data

Fig. 3. Dynamics of energy inputs in agriculture and agricultural production in the EU-27 countries in 2010-2021 (2010 = 100%)

Changes in energy productivity in agriculture in EU countries

Individual EU countries differ in the amount of agricultural production and energy consumption in agriculture, as well as due to the direction and dynamics of changes. Data for all countries individually are summarized in Table 1. An increase in energy productivity (EP) was observed for seven countries and a decrease for 20 (Table 1). In countries where EP increased, this resulted mainly from maintaining or slightly reducing energy inputs with a simultaneous increase in production. In two countries, Denmark and Slovakia, some decrease in production was observed, but the decline in energy consumption was more than proportional.

Table 1

Level and dynamics of changes in energy inputs, production and energy productivity in agriculture in EU countries in 2010-2021

EP#	Energy inputs	Production	Country	The dynamics of change ((2018-2021)/(2010-2013))*100			Annual change rate		
				energy	production	EP	energy	production	EP
Increase	increase	increase	Spain	105	121	115	0,90%	2,45%	1,55%
			Poland	105	110	105	0,57%	1,42%	0,85%
	decrease	increase	Ireland	91	115	125	-1,12%	2,08%	3,19%
			Greece	93	116	124	-0,68%	1,79%	2,47%
			Sweden	95	108	114	-0,68%	1,04%	1,72%
		decrease	Denmark	84	96	114	-2,19%	-0,32%	1,87%
			Slovakia	93	97	104	-0,84%	-0,04%	0,81%
Decrease	increase	increase	Luxembourg	101	100	99	0,15%	0,10%	-0,05%
			Lithuania	105	102	96	0,74%	0,67%	-0,07%
			Slovenia	105	105	99	0,56%	0,31%	-0,26%
			Italy	105	100	95	0,60%	0,17%	-0,43%
			Czechia	112	106	94	1,50%	0,87%	-0,63%
			Portugal	122	113	93	2,47%	1,62%	-0,85%
			EU-27	112	101	90	1,35%	0,29%	-1,05%
			Cyprus	119	107	90	2,37%	0,96%	-1,40%
			Latvia	135	115	85	3,72%	2,09%	-1,63%
			Hungary	142	108	75	4,12%	1,17%	-2,95%
	decrease	decrease	Estonia	103	98	98	0,05%	0,12%	0,08%
			France	101	99	99	0,11%	-0,07%	-0,18%
			Austria	100	96	96	0,09%	-0,33%	-0,41%
			Netherlands	106	98	93	0,60%	-0,08%	-0,68%
			Belgium	110	95	87	1,27%	-0,36%	-1,63%
			Germany	109	89	82	0,88%	-1,25%	-2,14%
			Croatia	106	84	80	0,65%	-1,88%	-2,54%
			Romania	124	94	75	2,81%	-0,79%	-3,60%
			Malta\$	139	79	54	4,05%	-2,81%	-6,85%
			Bulgaria	98	85	87	-0,23%	-1,79%	-1,56%
Finland	98	86	87	-0,13%	-1,81%	-1,67%			

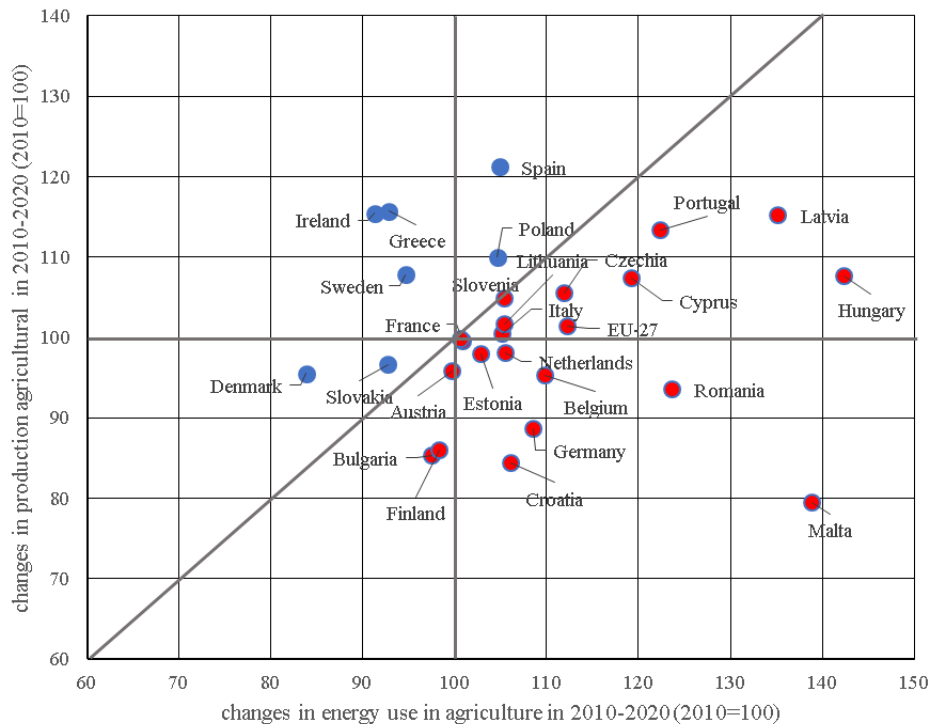
– productivity of energy inputs; \$ – data for Malta are not entirely reliable; this does not affect the EU-27 results

Source: author's calculations based on Eurostat data

Two subgroups can be distinguished in the group of 20 countries where EP reduction was observed. In the first (9 countries), both energy inputs and production increased, but the dynamics of production growth were lower than energy inputs dynamics. On the contrary, in the second subgroup of countries, an increase in energy inputs and a decrease in production volumes were observed.

It is worth noting that the increase in EP can be obtained both in the strategy of increasing production and in the strategy of reducing it. Due to certain constant energy inputs for specific activities in agriculture, it seems reasonable to strive to increase output with specific energy inputs. Reducing production through its extensification may lead to a reduction in the consumption of such inputs as fertilisers, pesticides, fodder, etc., but reducing direct energy inputs per production unit is a challenge. In some countries, the strategy of greening agriculture may lead to an increase in the overall energy intensity of agricultural production.

Figure 4 shows the visualization of the relationship between the change in energy consumption in agriculture and the change in production volume.



Note: objects for which energy productivity decreased (below the diagonal) are marked in red, and objects for which energy productivity increased in blue.

Source: author's calculations based on Eurostat data

Fig. 4. The relationship between the change in energy inputs in agriculture and the change in production in agriculture in EU countries in 2010-2021

In the years 2010-2021, production increased in most EU-27 countries, but the dynamics were lower than the dynamics of energy inputs in agriculture. This means that achieving an increase in agricultural production in the conditions that exist for agriculture in EU countries requires a more than proportional increase in energy inputs, which is usually associated with an increase in the mechanization of work. On the other hand, reducing production does not lead to a proportional reduction in energy input. This is because lower production intensity allows for reducing the consumption of, e.g. fertilizers, which leads to lower yields, but energy expenditure for cultivation operations does not decrease proportionally, as they have fixed costs character. As a result, the productivity of energy inputs decreases. Other studies found that overall GHG emissions from agriculture in EU countries per unit of production decreased after 2010, but this reduction resulted mainly from better agricultural practices, lower inputs and a change in the production structure. Farm Gate Energy Use connected to direct energy inputs did not change significantly and did not contribute much to such reduction (Wicki & Wicka, 2022).

Taking into account changes in EP from agricultural production in the EU, in most countries, it is possible to maintain the volume of the agricultural output while maintaining the current consumption of direct energy in agriculture or with some reduction of energy consumption. The choice of development path depends on the policy in a given country. From the point of view of energy productivity in agriculture, it may be beneficial to increase the scale of production on farms, reduce the share of animal production and exclude the poorest soils from agricultural use (Danilowska, 2019; Daugaviete et al., 2020; Feldmanis & Pilvere, 2021). Striving to reduce production without structural changes leads to decreased output per unit of direct energy input. On the other hand, if a strategy to reduce greenhouse gas emissions

is adopted, it is necessary to consider the effect of lowering all inputs. As E. Bennetzen (2016) points out, rational intensification of production is more effective than increasing the area of land used for agricultural production, especially when it is associated with deforestation.

Conclusions

- 1) In the countries of the European Union, the introduction of the Green Deal principles is associated with changes in each of the sectors of the economy, including agriculture. The use of non-renewable inputs in agriculture, including energy, is expected to decrease, according to sustainable development goals (SDG 7). This creates great challenges for this sector, especially if the current level of agricultural production and the modernization of agriculture is to be maintained. In particular, in some of the new Member States, agriculture is fragmented and structural changes are still needed. As a result, achieving environmental goals can be difficult.
- 2) The energy inputs structure was dominated by oil fuels, with a share of as much as 56%, followed by the consumption of electricity - 16.6%. The percentage of oil-based fuels, electricity and renewables increased in the input structure. The use of energy from oil increased by 17%, electricity by 10% and renewable energy by as much as 48%. Renewable energy in 2021 had a share of 11.4% of the total energy consumption in agriculture. Counting in the amount, the consumption of oil fuels increased the most, by as much as 96 PJ, i.e. by 8% of the total consumption. This resulted from the increase in the level of mechanization in agriculture.
- 3) Direct energy inputs in agriculture in the EU-27 countries increased in 2010-2021 by 12.3% to 1200 PJ per year, and the average annual growth rate was 1.35%. At the same time, agricultural production increased by only 1.36% to EUR 382 billion. This means that changes in energy consumption were not correlated with the size of production and, as a result, the relation production-energy deteriorated. On average, in the EU-27, direct energy productivity decreased from 360 to 325 thousand euro/TJ over the period under review, i.e. by around 10%. Energy productivity decreased at a rate of 1.05% per year. Therefore, it can be said that the intentions presented in the Green Deal policy, so far, are not reflected in the real economy. This may be due to the relatively short sustainable development policy implementation period.
- 4) Changes in the productivity of direct energy inputs were different in individual EU countries. In 7 countries, an increase and in 20 countries, decreases in energy productivity were observed. Most often, in as many as 18 countries, the dynamics of energy consumption were higher than the dynamics of production, and a decrease in agricultural production occurred in 14 countries. Nevertheless, changes in energy consumption and production volumes were not large, usually not exceeding 5 per cent compared to the base period. The trends found allow us to conclude that efforts to reduce the impact of agriculture on the environment should primarily consider the level of inputs or emissions per unit of production and not in relation to the acreage of production or considering the total amount of inputs used in given country.
- 5) An increase in the efficiency of energy use in agriculture is possible through the pursuit of rational concentration of production and its mechanization with the simultaneous introduction of innovations in production technologies. Another direction of action may be to change the production structure to one more dominated by plant production, which is less energy-intensive. However, the phenomenon of carbon leakage outside the EU and large imports of food of animal origin should be avoided, as the efficiency of energy use in agriculture is higher in highly developed countries.

Limitations

The presented results are subject to certain limitations. The research period is relatively short; in a more extended period, one may observe different tendencies. Additionally, data presented in Eurostat are collected differently between countries and, in some cases, change rapidly from year to year. Therefore, it is difficult to demonstrate the changes for all EU countries more accurately in a comparable manner. Also, if one includes indirect energy use, i.e. in fertilisers, pesticides, and machinery, it may lead to a different picture of input efficiency changes in agriculture based on such a more comprehensive approach.

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**EFFICIENCY OF PRODUCTION PROCESS AND COMPETITIVE
OF COMPANIES**

TRENDS IN AGRICULTURAL LABOUR PRODUCTIVITY IN THE EU

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Abstract. Labour productivity represents production efficiency and is the key factor in income and consequently the standard of living. Incomes are lower in rural areas than in urban areas in any country. Labour productivity in the agricultural industry varies significantly, i.e. tenfold, across EU Member States, with the lowest labour productivity being reported mostly in East European Member States, which makes it necessary to achieve higher productivity in these Member States. The present research aims to examine trends in agricultural labour productivity in EU Member States. The research found that the fastest increase in agricultural labour productivity occurred in East European Member States, while a mixed situation was observed in West European Member States, i.e. in some Member States the productivity increased at a lower rate or even decreased. An analysis of correlation between agricultural labour productivity and the number and average size of agricultural holdings revealed that the situation was mixed across the Member States, with some of them showing a positive trend, whereas some had a negative trend. The Member States with the lowest agricultural labour productivity need to foster increases in it through encouraging their farmers to own/manage larger areas and take advantage of economies of scale.

Key words: agriculture, labour productivity, EU Member States.

JEL code: Q1

Introduction

Disparities in the standard of living (incomes) between countries, as well as between urban and rural areas vary, sometimes very significantly. One of the factors is disparities in labour productivity, especially this refers to those between countries. Low labour productivity in East European Member States is a problem both for rural areas and the entire national economy, mostly the tradable sector or the business economy. Solving a problem such as low incomes in rural areas particularly in East European Member States requires increasing labour productivity in agriculture and other primary industries. Accordingly, it is important to examine trends in agricultural labour productivity in each EU Member State, focusing particularly on East European Member States.

Disparities in agricultural labour productivity between EU Member States have been a research focus for a number of researchers. For example, A. Pawlewicz and K. Pawlewicz (2018) have found that the countries that joined the EU in 2004 and 2007 differed considerably from the EU-15 Member States in land, labour and capital productivity. L. Wicki (2012) has established that in the period 1998-2011, the Member States with lower initial labour efficiency showed a higher average growth rate but absolute growths were lower there. No convergence has been found with respect to labour efficiency in agriculture and the division into two groups (old and new Member States) has persisted. The most important factors limiting the occurrence of convergence were connected with farm structure and the number of agricultural workers. C. Forgacs (2020) has found that land and labour productivity depended on farm specialization.

The present research employed Eurostat data on agriculture and aims to examine trends in agricultural labour productivity in EU Member States. To achieve the aim, the following specific research tasks were set: 1) to examine disparities in agricultural labour productivity and long-term changes therein in EU Member States; 2) to identify correlations between agricultural labour productivity and the number and average size of agricultural holdings.

The research employed statistical analysis and correlation analysis to identify the strength of correlation between the mentioned variables based on Eurostat data.

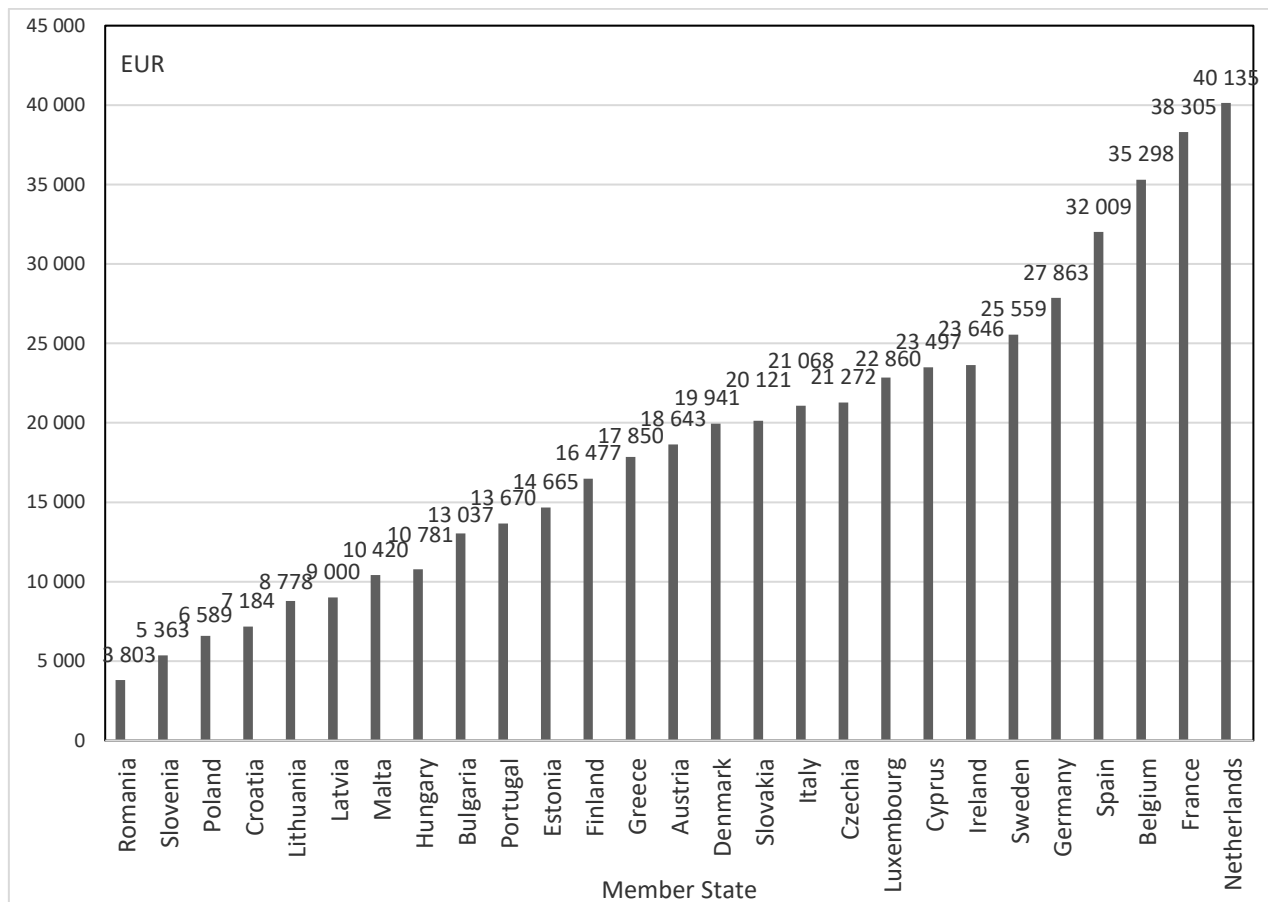
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Research results and discussion

Because of the specifics of agriculture, labour productivity in the agricultural industry is measured as factor income expressed per full-time labour equivalent (annual work unit – AWU). It is a measure of the net value added by the equivalent of each full-time worker in the agricultural industry, measured in real terms (adjusted for inflation) (Eurostat). Agricultural labour productivity is affected by a number of factors, e.g. the size of farms. J. Golebiewski (2013) has found that a higher increase in labour productivity was observed among the large agricultural production enterprises, which have attained the level comparable with the highly developed EU Member States or even the USA. The larger the farm in size is, the higher labour productivity the farm can achieve. For this reason, an increase in average farm size is definitely a positive trend, which decreases the number of farms in a country. A. Kijek et al. (2020) have found that convergence processes took place in the groups of countries with low and medium levels of labour productivity. In the club of countries where labour productivity was high, opposite processes (i.e. divergence) were observed. A. Nipers et al. (2018) have projected a significant increase in labour productivity in various agricultural industries in Latvia in the period up to 2030 and also beyond.

1. Disparities in agricultural labour productivity across the EU Member States

In 2021, as shown in Figure 1, the lowest agricultural labour productivity was reported in Romania at approximately 4000 EUR/employee, whereas the highest figure was in the Netherlands with more than 40000 EUR/employee, i.e. the disparity was tenfold, which was abnormally wide, requiring making labour productivity-focused agricultural policies in the Member States with low agricultural labour productivity.



Source: author's construction based on Eurostat

Fig. 1. Agricultural labour productivity in EU Member States in 2021

Agricultural labour productivity was low in almost all East European Member States, with the exception of Czechia and Slovakia, as well as in Malta and Portugal. The relatively high productivity in Czechia and Slovakia and the relatively low productivity in Malta and Portugal could be explained if analysing the average size of holdings in the EU Member States (see below). Next, the research analyses change in agricultural labour productivity in the Member States in a 20-year period.

Table 1

**Agricultural labour productivity and changes therein
 in EU Member States in 2001-2021**

Member State/Year	2001	2005	2010	2015	2020	2021	2021/ 2001, %
Belgium	32 403	30 034	40 938	37 808	39 283	35 298	8.9
Bulgaria	3 777	3 209	3 956	6 172	9 810	13 037	245.2
Czechia	7 857	10 462	12 962	17 885	21 187	21 272	170.7
Denmark	42 480	33 664	39 554	27 496	31 641	19 941	-53.1
Germany	22 733	20 002	28 819	23 815	29 415	27 863	22.6
Estonia	4 574	8 289	12 366	12 415	14 663	14 665	220.6
Ireland	18 147	19 451	13 925	16 667	20 311	23 646	30.3
Greece	15 983	13 387	16 263	15 677	18 813	17 850	11.7
Spain	27 918	25 015	24 314	30 450	34 063	32 009	14.7
France	26 355	24 266	30 490	32 673	32 928	38 305	45.3
Croatia*	n.d.	4 189	5 056	5 345	7 278	7 184	71.5
Italy	20 955	18 069	15 647	20 681	21 438	21 068	0.5
Cyprus	14 575	13 962	16 124	16 391	23 346	23 497	61.2
Latvia	1 755	3 168	4 536	5 927	8 884	9 000	412.8
Lithuania	2 027	3 576	4 501	6 092	8 546	8 778	333.1
Luxembourg	31 166	28 619	19 727	19 170	22 555	22 860	-26.7
Hungary	3 502	4 383	5 239	7 959	10 119	10 781	207.9
Malta	17 799	16 884	15 745	14 746	11 043	10 420	-41.5
Netherlands	45 833	40 298	46 339	47 102	41 214	40 135	-12.4
Austria	17 670	17 096	19 383	16 337	18 446	18 643	5.5
Poland	2 020	2 842	4 289	4 801	6 896	6 589	226.2
Portugal	8 706	8 262	8 669	10 088	12 308	13 670	57.0
Romania	3 001	2 637	3 206	3 726	4 124	3 803	26.7
Slovenia	2 894	4 788	5 131	5 854	6 663	5 363	85.3
Slovakia	5 208	5 551	9 352	13 360	19 371	20 121	286.3
Finland	21 077	21 337	26 399	17 930	21 269	16 477	-21.8
Sweden	17 964	19 825	24 332	26 069	24 968	25 559	42.3

* - for Croatia, the period of analysis is 2005-2021 due to data unavailability

Source: author's calculations based on Eurostat

In the period 2001-2021 in most of the East European Member States, agricultural labour productivity tended to steadily increase, which could be explained by the low initial level of agricultural labour productivity in these Member States; their accession to the EU fostered increases in it. In contrast, the situation was diverse in West European Member States. In Finland, for example, the highest agricultural

labour productivity was achieved in 2012, which was volatile and tended to slightly decrease in the next years.

In the period of analysis, the lowest productivity was reported in Latvia (less than 2 thou. EUR/employee in 2001, yet the country succeeded in increasing it significantly over this period (second highest increase in relative terms). The relatively highest increase was achieved by Bulgaria (245%) in this period. In 2001 compared with Latvia, a little higher productivity was reported in Lithuania and Poland (slightly more than 2 thou. EUR/employee), and both countries also succeeded in significantly increasing it by 333% and 226%, respectively. Among East European Member States, the relatively lowest increase was observed in Romania at 27% (in absolute terms, the country had the lowest productivity in the EU in 2021), and several West European Member States had a higher rate of increase in productivity: Cyprus (61%), Portugal (57%), France (45%), Sweden (42%) and Ireland (30%). In the 20-year period, however, the following Member States – all of them represented Western Europe – had a decrease in productivity: Denmark (-53%), Luxembourg (-27%), Malta (-42%), the Netherlands (-12%) and Finland (-22%). The figures for Denmark and Finland were significantly higher for 2020 than for 2021; in other Member States, the situation was diverse in 2021 compared with 2020 – some of them reported also a decrease, whereas some Member States reported an increase, which was presumably determined by some country-specific factors, as price changes in the single EU market are similar and so are other factors.

2. Correlation between agricultural labour productivity and selected variables

The research calculated coefficients of correlation between agricultural labour productivity and two variables: number and average size of holdings. Both variables are interdependent because, for example, a decrease in one variable leads to an opposite change in the other, as utilised agricultural areas do not tend to change significantly. Eurostat provides data on the number of holdings only for the years 2005, 2007, 2010 and 2013; therefore, the research selected data on agricultural labour productivity for the same years. It needs to be noted that a negative correlation coefficient indicates a positive trend in the agricultural industry, i.e. an increase in efficiency, as labour productivity increases owing to decreases in the number of holdings. As shown in Table 2, a strong negative correlation was found for almost all East European Member States, except for Croatia and Slovenia. The strongest negative correlation (positive trend) was found for Bulgaria, Hungary, Slovakia, Poland and all the Baltic States. As regards West European Member States, a positive correlation was identified for Luxembourg, Malta and Austria (insignificant), whereas a very strong negative correlation was found for Denmark, Italy, Germany and the Netherlands that could be considered to be leaders in this respect among the West European Member States. Overall, the positive trend prevailed in the EU – the number of holdings tended to decrease, thereby increasing agricultural labour productivity and consequently incomes in rural areas.

Table 2

Correlation between agricultural labour productivity and the number of holdings (thou.) in EU Member States

Member State/Year	2005	2007	2010	2013	2005	2007	2010	2013	Cor. coef.
	agricultural labour productivity				number of holdings				
Belgium	30 034	40 125	40 938	36 236	51.54	48.01	42.85	37.76	-0.43
Bulgaria	3 209	3 120	3 956	6 377	534.61	493.13	370.49	254.41	-0.94
Czechia	10 462	12 404	12 962	17 509	42.25	39.40	22.86	26.25	-0.67
Denmark	33 664	38 289	39 554	42 198	51.68	44.62	41.36	38.28	-1.00
Germany	20 002	26 366	28 819	35 400	389.88	370.48	299.13	285.03	-0.90
Estonia	8 289	11 273	12 366	16 391	27.75	23.34	19.61	19.19	-0.89
Ireland	19 451	17 721	13 925	16 603	132.67	128.24	139.89	139.60	-0.70
Greece	13 387	13 750	16 263	13 707	833.59	860.15	723.06	709.50	-0.53
Spain	25 015	26 867	24 314	27 446	1 079.42	1 043.91	989.80	965.00	-0.29
France	24 266	30 321	30 490	27 302	567.14	527.35	516.10	472.21	-0.39
Croatia*	4 189	5 037	5 056	4 573	n.d.	181.25	233.28	157.44	0.76
Italy	18 069	17 055	15 647	23 318	1 728.53	1 679.44	1 620.88	1 010.33	-0.91
Cyprus	13 962	12 644	16 124	18 317	45.17	40.12	38.86	35.38	-0.73
Latvia	3 168	4 274	4 536	4 705	128.67	107.75	83.39	81.80	-0.95
Lithuania	3 576	4 760	4 501	6 231	252.95	230.27	199.91	171.80	-0.89
Luxembourg	28 619	33 193	19 727	17 932	2.45	2.30	2.20	2.08	0.76
Hungary	4 383	5 018	5 239	7 943	714.79	626.32	576.81	491.33	-0.91
Malta	16 884	16 269	15 745	12 631	11.07	11.02	12.53	9.36	0.71
Netherlands	40 298	47 385	46 339	48 030	81.83	76.74	72.32	67.48	-0.82
Austria	17 096	21 512	19 383	18 424	170.64	165.42	150.17	140.43	0.03
Poland	2 842	3 817	4 289	5 754	2 476.47	2 390.96	1 506.62	1 429.01	-0.85
Portugal	8 262	7 847	8 669	9 184	323.92	275.08	305.27	264.42	-0.28
Romania	2 637	1 985	3 206	3 641	4 256.15	3 931.35	3 859.04	3 629.66	-0.60
Slovenia	4 788	5 191	5 131	4 675	77.17	75.34	74.65	72.38	0.26
Slovakia	5 551	7 156	9 352	12 182	68.49	68.99	24.46	23.57	-0.89
Finland	21 337	24 283	26 399	22 758	70.62	68.23	63.87	54.40	-0.10
Sweden	19 825	27 320	24 332	22 506	75.81	72.61	71.09	67.15	-0.22

* - for Croatia, data for the year 2005 are unavailable

Source: author's calculations based on Eurostat

Next, the research calculated the average size of holdings for each Member State based on data presented in Table 2 (number of holdings). As shown in Table 3, the average sizes of holdings were very diverse across the EU, ranging from 1.2 ha in Malta to 133 ha in Czechia. Abnormally small average sizes were also in Cyprus (3.1 ha), Romania (3.6 ha), Slovenia (6.7 ha) and Greece (6.8 ha). Nevertheless, Greece, Malta and Cyprus, located in the Mediterranean region, had relatively high agricultural labour productivity, whereas two East European Member States – Romania and Slovenia – had approximately threefold lower productivity. This allows us to conclude that Mediterranean farming gives a possibility to reap two harvests a year and enables small farms to achieve high labour productivity. Certainly, other factors such as agricultural cooperation and specific crops also contribute to it.

Even though a few Member States had a small average size of holdings and, at the same time, achieved relatively high agricultural labour productivity, normally a large size of holdings is a way to achieve high agricultural labour productivity and contribute to higher incomes in rural areas. Table 3 also presents calculations of correlation between agricultural labour productivity (based on data presented in Table 2) and the average size of holdings. The calculation results revealed that the coefficients of correlation were both positive (positive trend) and negative (negative trend), as an increase in the average size of holdings should lead to an increase in agricultural labour productivity. A negative correlation was identified for Ireland, Croatia, Cyprus, Luxembourg, Malta and Slovenia. Agricultural labour productivity in Ireland, Cyprus and Luxembourg was relatively high and steady over the 20-year period (Table 1), and only Malta performed poorer in recent years. For this reason, one can conclude that a negative correlation identified for the four mentioned Member States do not indicate a pronounced negative situation in farming. As regards Croatia, the situation was different, as agricultural labour productivity in the country in the years of analysis did not tend to increase, yet the average size of holdings increased twofold, which was a positive trend. In the period 2015-2021, however, agricultural labour productivity increased in Croatia, which definitely was also a positive trend. This allows us to conclude that the negative trend identified for Croatia in the period 2007-2013 changed to positive in the later period.

Table 3

Utilised agricultural areas and correlation between agricultural labour productivity and the average size of holdings in EU Member States

Member State/Year	2005	2007	2010	2013	2013/ 2007, %	2005	2007	2010	2013	Cor. coef.
	utilised agricultural area					average size of holdings				
Belgium	1385.6	1374.4	1358.0	1307.9	-5.6	26.9	28.6	31.7	34.6	0.4
Bulgaria	2729.4	3050.7	4475.5	4650.9	70.4	5.1	6.2	12.1	18.3	1.0
Czechia	3557.8	3518.1	3483.5	3491.5	-1.9	84.2	89.3	152.4	133.0	0.6
Denmark	2707.7	2662.6	2646.9	2619.3	-3.3	52.4	59.7	64.0	68.4	1.0
Germany	17035.2	16931.9	16704.0	16699.6	-2.0	43.7	45.7	55.8	58.6	0.9
Estonia	828.9	906.8	940.9	957.5	15.5	29.9	38.9	48.0	49.9	0.9
Ireland	4219.4	4139.2	4991.4	4959.5	17.5	31.8	32.3	35.7	35.5	-0.9
Greece	3983.8	4076.2	5177.5	4856.8	21.9	4.8	4.7	7.2	6.8	0.7
Spain	24855.1	24892.5	23752.7	23300.2	-6.3	23.0	23.8	24.0	24.1	0.4
France	27590.9	27476.9	27837.3	27739.4	0.5	48.6	52.1	53.9	58.7	0.3
Croatia*	n.d.	978.7	1316.0	1571.2	60.5	-	5.4	5.6	10.0	-1.0
Italy	12707.9	12744.2	12856.1	12098.9	-4.8	7.4	7.6	7.9	12.0	0.9
Cyprus	151.5	146.0	118.4	109.3	-27.8	3.4	3.6	3.0	3.1	-0.9
Latvia	1701.7	1773.8	1796.3	1877.7	10.3	13.2	16.5	21.5	23.0	0.9
Lithuania	2792.0	2649.0	2742.6	2861.3	2.5	11.0	11.5	13.7	16.7	0.9
Luxembourg	129.1	130.9	131.1	131.0	1.5	52.7	56.9	59.6	63.0	-0.8
Hungary	4266.6	4228.6	4686.3	4656.5	9.1	6.0	6.8	8.1	9.5	0.9
Malta	10.3	10.3	11.5	10.9	6.1	0.9	0.9	0.9	1.2	-1.0
Netherlands	1958.1	1914.3	1872.4	1847.6	-5.6	23.9	24.9	25.9	27.4	0.8
Austria	3266.2	3189.1	2878.2	2726.9	-16.5	19.1	19.3	19.2	19.4	0.2
Poland	14754.9	15477.2	14447.3	14409.9	-2.3	6.0	6.5	9.6	10.1	0.9
Portugal	3679.6	3472.9	3668.2	3641.6	-1.0	11.4	12.6	12.0	13.8	0.6
Romania	13906.7	13753.1	13306.1	13055.9	-6.1	3.3	3.5	3.4	3.6	0.4
Slovenia	485.4	488.8	482.7	485.8	0.1	6.3	6.5	6.5	6.7	-0.3
Slovakia	1879.5	1936.6	1895.5	1901.6	1.2	27.4	28.1	77.5	80.7	0.9
Finland	2263.6	2292.3	2291.0	2282.4	0.8	32.1	33.6	35.9	42.0	0.1
Sweden	3192.5	3118.0	3066.3	3035.9	-4.9	42.1	42.9	43.1	45.2	0.1

* - for Croatia, data for the year 2005 are unavailable

Source: author's calculations based on Eurostat

The research found that overall in the EU, a positive trend prevailed in the average sizes of holdings that tended to increase, utilised agricultural areas were steady in most of the Member States with some exceptions. In the period presented in Table 3, a significant decrease was reported in Cyprus, yet in the later period the decrease changed to an increase. Only Austria has significantly decreased its utilised agricultural area.

Conclusions, proposals, recommendations

- 1) The disparity in agricultural labour productivity was tenfold between EU Member States, in the range of approximately 4-40 thou. EUR/AWU, i.e. abnormally wide, with the lowest productivity being

reported in EastvEuropean MemberVStates, which needs to be reduced through making labour productivity-focused agricultural policies in most of the East European Member States.

2) In the period 2002-2021 in most of the East European Member States, agricultural labour productivity tended to steadily increase, which was a positive trend.

3) Agricultural labour productivity in Czechia and Slovakia was relatively high, the highest among East European Member States, which was due to the largest average sizes of holdings among all the EU Member States, 133 ha and 81 ha, respectively.

4) In the Member States of the Mediterranean region – Greece, Malta and Cyprus – the average farm size was very small, although agricultural labour productivity was relatively high, which was determined by a possibility to have two harvests a year owing to the favourable Mediterranean climate and specific crops.

5) An analysis of correlation between agricultural labour productivity and the number and average size of agricultural holdings revealed that the situation was mixed across the Member States, with most of them showing a positive trend, whereas some had a negative trend (Malta, Luxembourg), which determines the need to implement a specific agricultural policy.

6) The Member States with the lowest agricultural labour productivity need to foster increases in it through introducing support measures aimed at encouraging their farmers to own/manage larger areas, thereby taking advantage of economies of scale.

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IMPACT OF THE COVID-19 PANDEMIC ON THE VOLUME AND STRUCTURE OF AGRICULTURE PRODUCTION IN POLAND

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Abstract. The article aims to identify the impact of the COVID-19 pandemic on the volume and structure of agricultural production in Poland. The literature on pandemics in the past shows that plague influenced the volume and the structure of agriculture output. The consequences varied between the pandemics and in the frame of the same pandemic between countries. What's more, the length of the analysis period matters. The short-term effects were generally damaging however, the evaluation perspective matters. The assessment of long outcomes is complex. The positive, profound long-run effects were identified. The past pandemics impacted the economy and agriculture through the decrease in the availability of labour because of massive deaths. In the pandemic COVID-19, this channel of transmission occurred as well, but in the form of shortages of labour forces due to governments' restrictions on people's movement. The analyses found that in the first year of the COVID-19 pandemic in Poland, agriculture production did not decrease. It stemmed from the time gap between the production decisions and getting output. A modest reduction occurred in the second year of plague. The analyses of the structure and dynamics of the sown area show that farmers restrain themselves from the changes in plant production. Larger adjustments took place in the sector of animal products than in plant products. The most remarkable changes took place in branches of animal production depending on export. Because of the plummet in egg prices, egg production decreased in 2020 and 2021. The fall in meat prices in 2020 resulted in a drop in the meat production in 2021. Despite the unfavourable changes in milk prices, milk production was stable.

Key words: COVID-19, agricultural production, plant production, sown area, animal production.

JEL code: Q10, O13

Introduction

The research on the economic effects of pandemics in the past shows that pandemics can severely affect economies. Each plague has its specific characteristics, so the consequences vary between the pandemics and in the frame of the same pandemic between countries and sectors of the economy. What's more, the length of the analysis period matters. The short-term effects are generally damaging however, the evaluation perspective matters. The assessment of long ones is more complex, and the positive, profound long-run effects can occur at least in some areas of the socio-economic life (Danilowska A., 2022; Alfani G., 2020; Bell C. L. & Lewis M., 2005).

Agriculture is an important sector of the economy. Although in developed countries its share of the GDP is very small, the global pandemic reminds us that agriculture plays a fundamental role in the existence of humanity. Caring for access to food at a global level just at the COVID-19 pandemic beginning, the heads of the World Trade Organization and the UN Food and Agriculture Organization issued a joint statement calling on governments to minimise the impact of COVID-19-related border restrictions on food trade (WTO, 2020). During the first months of the pandemic, concern about food security was expressed in many research papers (Laborde D. et al., 2020; O'Hara S. & Toussain E. C., 2020; Kumar A. et al., 2020; United Nations, 2020). Although from the perspective of 2023, it seems that the pandemic is under control, the problem of food insecurity connected to the pandemic phenomenon persists in developed countries like the United States of America (Ridley W. et al., 2022, Vos R. et al., 2022) as well as in developing countries (Rahman T. et al., 2022; Abay K. A. et al., 2023). It shows why the examination of the pandemic channels and the pandemic consequences for the agriculture sector is an important issue.

The article aims to identify the impact of the COVID-19 pandemic on the volume and structure of Polish agriculture production.

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The research is to answer the following questions: (i) what were the past pandemic consequences for agriculture; (ii) what measures of pandemic influence on agriculture were implemented by the researchers examining past pandemics; (iii) was agriculture more sensitive to pandemics than other sectors of the economy; (iv) how pandemic COVID-19 influenced the Polish agriculture (output and its structure).

Data for the analysis concerns some years before the pandemic COVID-19: 2015-2019 and 2 years of the pandemic - 2020, 2021. In the case of particular problems, shorter periods were examined.

Statistics Poland was the basic source of data on Polish agriculture. The data on pandemics in the past were taken from relevant literature. Because of the distance in time, any figures for Black Death resulted from research on the problem estimations. They mainly relate to Western Europe. For the Spanish flu, the statistics are also scarce. Since it occurred just after the World War I, it is a problem of separating war outcomes from pandemic outcomes, especially for countries on which territories the fights took place. It is probably the main reason for scant economic analyses for the European countries. There are relatively many studies on plague economic effects on the United States economy and India's economy. It is worth mentioning that India was the most affected by the pandemic country over the world.

As the leading research method we used analysis of empirical data on the volume and structure of agriculture production and sown area structures in Poland. The choice of indicators stemmed from the review of the literature on the past pandemic impacts on agriculture.

The paper proceeds as follows. In Section 2, we discussed the impact of past pandemics on agriculture. In Section 3, we examined the data on the size and structure of agriculture output in Poland before and during the pandemic COVID-19. In the next section, the conclusions were drawn out.

Research results and discussion

The pandemic influence on agriculture in the past

The international literature on pandemics in the past shows that plague influenced the volume and the structure of agriculture output. The first effects occurred quite fast after the pandemic outbreak, while the further ones stemmed from the adjustment of the farmers to conditions created by a pandemic.

According to Brenner R. (1985), the Black Death pandemic depopulated rural areas noticeably. It must be reminded that in the later Middle Ages, the vast majority of the population lived in rural areas. The plague spread quickly throughout the countries and continents, and the time between the infection and the fatal result was only a few days, so the consequences appeared immediately. The region by region depopulated very quickly and very deeply. However, there were spatial differences. Western Europe suffered much heavier than less populated Middle and Eastern Europe. The situation in rural areas was aggravated by the migration of the rural population to the cities that were affected even worse by the pandemic than rural areas but offered new possibilities for newcomers. The size of the phenomenon was so great that in many countries, the return to the pre-pandemic state took about two centuries. The phenomenon that rural areas close to higher-mortality cities recovered their populations around a century after the recovery in urban populations can illustrate the significance of migration in rural areas depopulation (Jedwab R. et al., 2019). These reasons resulted in severe shortages of rural labourers. The large areas of agricultural land were abandoned. The marginal land was forested or converted into pasture. The findings of Hasund S. (1920) illustrate the Black Death pandemic's consequences for Norway's agriculture. He showed that the pandemic caused the plummet in land rents and land prices and counteracted settlements. A similar phenomenon occurred in England (Saltmarsh J., 1941). In such circumstances, you can assume that agricultural production decreased. Due to a lack of data, it is difficult to find relevant estimations of the phenomenon scope in the literature. Although the very likely decrease

in food production occurred, the enormous drop in population led to a relative overproduction of agricultural products in the years following the epidemic (Zietz B. & Dunkelberg H., 2004). The proportion between the population and the available food improved with positive consequences in short-run and in long-run (Brenner R., 1985). The relationship between labour and land improved as well.

The Spanish flu pandemic in 1918-1920 caused much less population loss than the Black Death pandemic. There were very distinctive differences between the countries. In most European countries, the flu death rate³ was lower than 1.00%, but in African and Asia countries generally, the rates were higher. The highest rate of 5.22% was for India (Barro R. et al., 2020). However, in contrast to the Black Death pandemic, the flu targeted young and middle-aged, healthy people. Taking into consideration the fact that the rates of the decrease in the working-age population were much higher than such ones for the total population, the pandemic had to harm the economy. At the beginning of the XX century, societies were still rural, so the pandemic had to impact agriculture remarkably. The research of Donaldson D. and Keniston D. (2016) shows that the decrease in the population of India had a positive but short-term impact on agriculture output per capita, and hence on wealth, despite the decrease in farmed areas occurred. There was no effect of the pandemic on crop yields. The authors point out that after the pandemic the situation quickly normalised because the severe shortages of labour were overcome by the influx of workers, even from great distances. Although the labour deficit, the wages of agricultural workers did not change significantly. In light of the findings, it can be expected that the branches of agriculture based on hired labour were much more affected than those relying on family work. Such a situation occurred in Java in 1919, where sugar production dropped noticeably while aggregate food production did not decline (Gallardo-Albarran D. & De Zwart P., 2021).

Completely different situation occurred in Africa, where in many countries the deaths and illnesses hit the farmers' abilities to carry out regular farming⁴. As many young people fell sick, there was nearly nobody to plant or weed or take care of the animals (Musambachime M. C., 1993). The massive agriculture production abandonment caused famine in Tanzania and severe malnutrition in Nigeria, South Africa and Northern Rhodesia. Farmers tried to adjust to the situation by switching to fast-growing varieties of maize or beans. In Nigeria, they changed the cultivation of yams to cassava as a less labour-intensive plant (Ellison J. G., 2003; Phillips H., 2017).

The above revision of literature shows the ambiguous pandemic impact on agriculture output in the past. In some countries, agriculture was not affected, while in others pandemic led to hunger. Moreover, the conclusions of evaluation depend on the applied indicators. The conclusions from the analyses in relative terms are more positive and sometimes adverse to those from the analyses in absolute terms. The past pandemic transmission channels to agriculture, as for the whole economy, were connected mainly to the pandemic impact on the workforce.

Contrary to the above aforementioned past pandemics, the COVID-19 pandemic was especially dangerous for not active professionally elderly people. That is why the channels of the pandemic to the economy were connected not to reduced workforce like in the past, but to the vast range of measures counteracting the spread of the pandemic undertaken by governments. The lockdown was an especially severe tool. Workers could work but not allowed to travel, so farm production was affected by the labour shortages. The restrictions on travel caused disruptions in transport to markets or processors. The limited availability of farm inputs like chemicals, equipment, feed, and seeds led to lower productivity

³ Death cases/total population

⁴ Death rates from influenza average between 3-5 per cent in Africa.

(The COVID-19 Global). To that list, Schmidhuber et al. (2020) add the international trade channel, exchange rates channel, energy markets channel, and credit channel.

After three years of the pandemic, the identification of the consequences of the COVID-19 pandemic for Polish agriculture based on empirical data are feasible and can be fruitful.

The COVID-19 pandemic impact on agriculture production in Poland

Like many governments all over the world, the Polish government reacted to the COVID-19 pandemic by introducing a lockdown. Due to the much lower rate of COVID-19 spread in Poland in comparison to other European countries, citizens' travels were not prohibited. The manufacturing, construction and transport sectors were allowed to conduct unlimited operations.

Despite that, the restrictions affected the Polish economy painfully and unevenly (Table 1). In 2020, the total added value in Poland decreased by 2% comparing 2019, but in many sectors, the fall was stunning. The spectacular drop amounted to 25%, occurred in the Accommodation and gastronomy industry. The sectors such as Financial and insurance activity, Transport, Construction, and Retail trade recorded a much smaller decrease. Contrary to the many industries, added value in agriculture soared. It was an effect of the farmers' decisions undertaken in the pre-pandemic year what characterised by quite favourable natural conditions. Szajner (2021) states that the impact of the pandemic on the production of cereals in Poland and in the world is practically unnoticeable, because weather conditions are decisive. The opposite situation occurred in the next year. The total added value in the economy increased by 6.6%. In almost all sectors it rose, in some industries like Transport or Accommodation the rate of growth was very high. But in Agriculture sector, the added value dropped remarkably – by 11%.

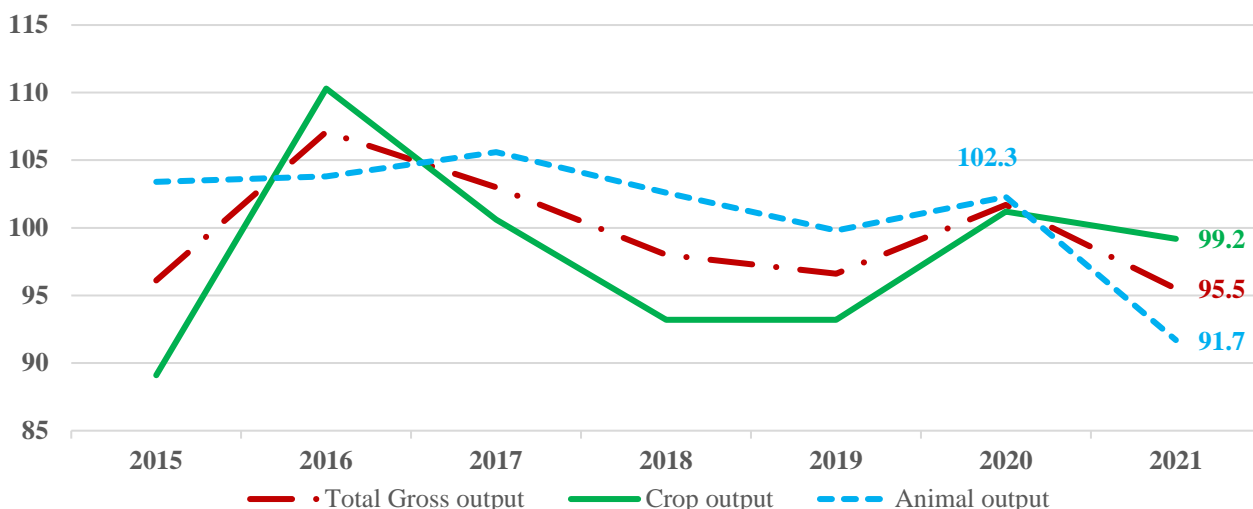
Table 1

Dynamics of gross added value in the main sectors of the Polish economy (constant prices, previous year = 100)

Year	Total added value	Manufacture	Agriculture	Construction	Transport	Trade	Accommodation and gastronomy	Financial and insurance activity
2019	104.3	104,7	97.8	99.2	102.6	103.8	100.8	110.1
2020	98.0	96.5	115.3	92.0	90.3	96.7	74.2	87.0
2021	106.6	102.8	88.9	105.3	116.0	109	115.0	96.7

Source: Statistics Poland (2022). Statistical Yearbook of the Republic of Poland 2022, Warsaw

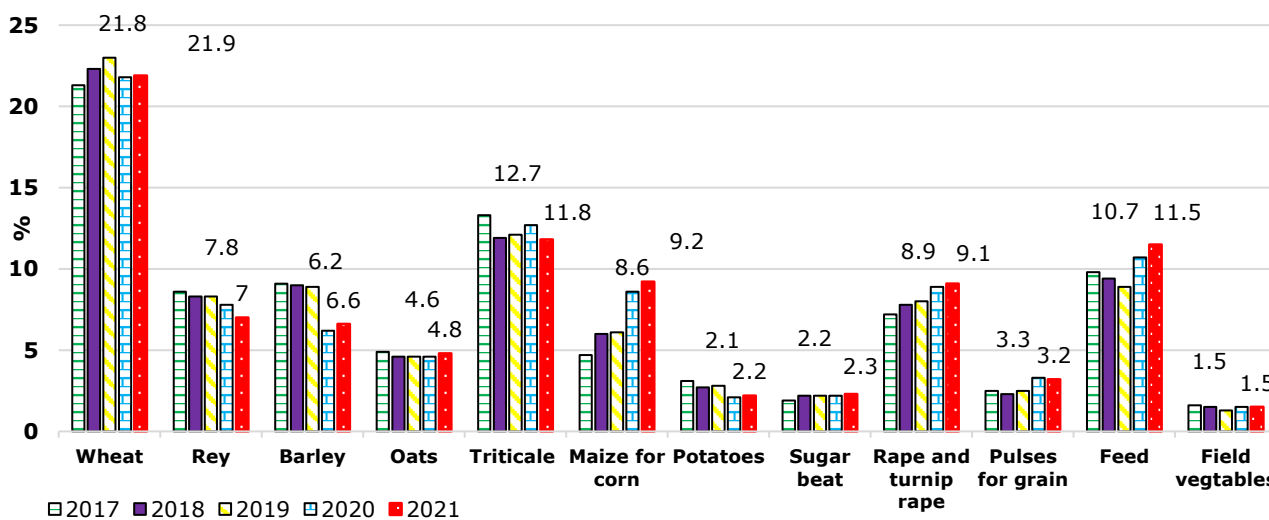
The decline in the agriculture sector in 2021, illustrated by the dynamic of added value, stemmed from a fall both in crop production and animal production. The gross crop output decrease was rather small – less than 1%, whereas gross animal output amounted to more than 8% (Fig. 1). The fall can only be partly explained by the pandemic. As determinants, Statistics Poland (2022b) indicated unfavourable natural agrometeorological conditions during the growing season and the reduction of some crops area. Although the aforementioned decrease in volume, the value of global agricultural production at current prices increased by 6.5% compared to 2020 due to the rise of prices of agricultural products in domestic and international markets. In the sector of plant production, the price increased by 8.3% and in animal production by 4.6% (Statistics Poland, 2023).



Source: author's elaborations based on Statistics Poland 2020, 2022b

Fig. 1. Indices of agricultural output (constant prices)

As the experiences from the past show, the pandemic can cause changes in the structure of output due to farmers' attempts to adjust to new conditions of farming, for example, shortages of labour. Agriculture output depends on many factors, some of which are unpredictable, so for the identification of the Polish farmers' adaptation to challenges stemming from the COVID-19 pandemic, the changes in the structure of sown area were examined (Fig. 2). Such approach is recommended by Alfani G. (2020).



Source: author's elaborations based on Statistics Poland 2020, 2022b

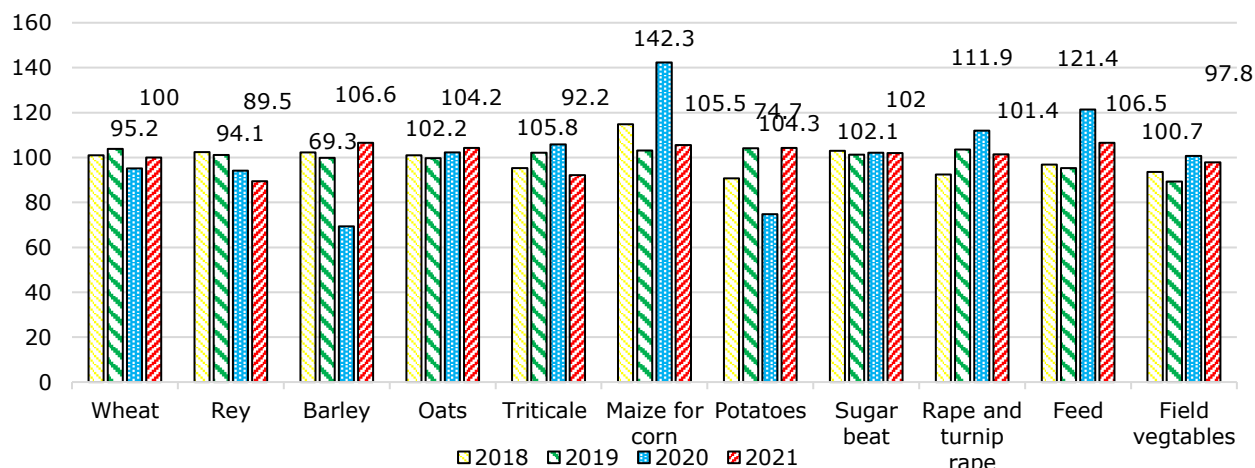
Fig. 2. The share of the particular crops in the sown area in 2017-2021

The analysis of the share of particular crops in sown areas in the pre-pandemic and pandemic years gives rather ambiguous results. In 2020, the first year of the COVID-19 pandemic, the structure of sown area was the result of farmers' decisions undertaken in pre-pandemic 2019 year. Only when making decisions about production in 2020 for 2021, farmers had to take into account the factors related to the pandemic. It was similar in 2021 when they decided on the production directions in 2022.

In 2021, in comparison with 2020, there were very few changes in the share of wheat, barley, oats, potatoes, sugar beet, field vegetables, and pulses for grain in the total sown area. Although the share of some crops changed, it could have been a result of the trend, not a pandemic. It was in the case of rye and maize for corn. Only for triticale and feed the share changes were more significant and they did not result from the trend, as in previous years their shares fluctuated. It is difficult to assess whether their

changes resulted from the pandemic or other factors. Unfortunately, there is no available data on 2022 yet.

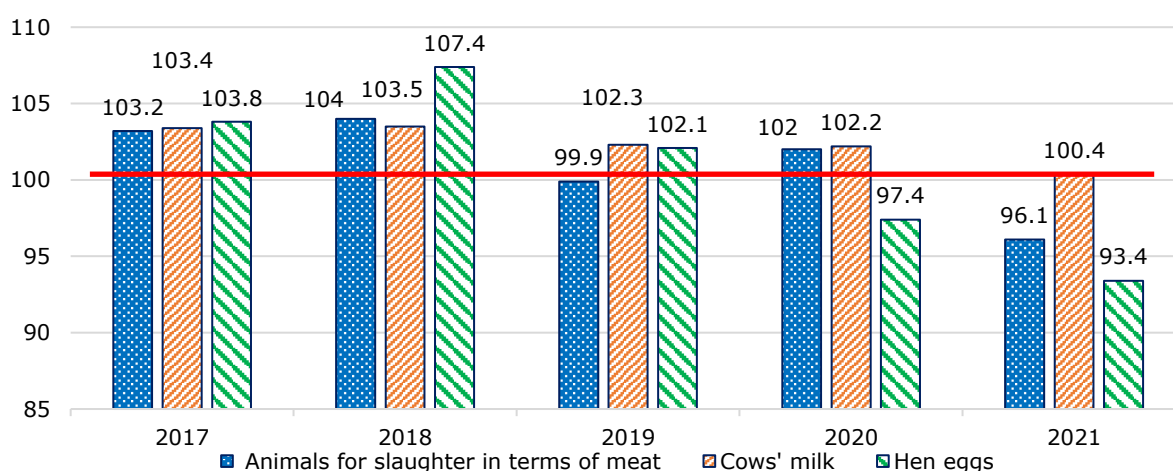
The analyses of the dynamics of the sown area of each cultivated plant can help to explain if Polish agriculture responded to the pandemic.



Source: author's elaborations based on Statistics Poland 2020, 2022b

Fig. 3. The dynamics of the particular crops area 2018-2021 (previous year = 100)

The examination of Figure 3 shows that in 2021, farmers did not change the wheat sown area. It is an important observation as this crop occupies the largest area. In the case of three plants - rye, triticale and field vegetables - the cultivated areas were reduced. The remarkable fall was for rye and triticale, whereas the area of vegetables decreased slightly. For rye, it was a continuation of the downward trend, but for two other plants, the situation was different. In the case of field vegetables, their cultivation area fluctuated in 2018-2020. In 2021, it decreased compared to 2020 but remained higher than before the pandemic. The area of triticale in three constitutive years (2018-2020) rose, so the drop in 2021 below the 2018 level is rather an unexpected outcome. In 2021, the cultivation of other plants covered larger areas than in 2020, but the rates of change were low. The biggest increases were for barley and feed. The results of the analyses correspond with the conclusions on the change in total agriculture output.



Source: author's elaborations based on Statistics Poland 2020, 2022b

Fig. 4. The dynamics of the production of particular animal products in 2017-2021 (previous year = 100)

The pandemic had almost no effect on plant production, but its impact on animal production was noticeable. It is illustrated in Figure 4. In 2017-2018, the dynamics of the particular animal product outputs

were high and even in 2018 were higher than in 2017. In the pre-pandemic year, milk and egg production still rose, although, at a lower speed, while meat production decreased slightly. In the first year of the pandemic, meat and milk production climbed by about 2 %, but egg production fell by 3.6 %. Due to the short period, it is difficult to tie the changes in 2020 to the pandemic; however, the shortages in labour or disturbances in international trade could influence eggs' production negatively. In the next year - 2021, egg production plummeted again. Although in 2020 meat production rose by a little, the fall in meat prices resulted in a decrease in meat production in 2021. The production of cow's milk was stable despite the drop in the milk price. The adjustments of meat and egg production to the changing production conditions are faster and easier than in milk production.

Conclusions

- 1) The past pandemic impacted the economy and agriculture through the decrease in the availability of labour due to massive deaths. In the pandemic COVID-19, this channel of transmission occurred as well, but not in the form of the physical reduction of the labour force but the restrictions on people's movement introduced by governments that generated complex consequences.
- 2) As can be expected, in the first year of the pandemic COVID-19, agriculture production in Poland did not decrease. It stemmed from the time gap between the production decisions and getting output. The production in 2020 resulted from the sowing decisions and the livestock in 2019. The scope of adjustment was very limited in a short time. Moreover, no one knew how long the pandemic would last and how severe it would be. But gradually, farmers tried to adjust to a new situation. There were no drastic changes but rather attempts to keep the previous level of output. Crop production was stabilized. The larger scope of changes occurred in sectors with higher sowing area fluctuations in the previous years.
- 3) The pandemic impacted the animal production sector more than the plant production sector. A distinctive high reaction took place in meat and egg production. The products are important for export and the same their prices and production are sensitive for the changes on international markets. Because of the plummet in egg prices, egg production decreased in 2020 and 2021. The fall in meat prices in 2020 resulted in a drop in the meat production in 2021. Despite the unfavourable changes in milk prices, milk production was stable.
- 4) The signal data on the 2022 agriculture output indicates that the restriction easing and other positive factors like vaccination stimulated agriculture to increase production.

Acknowledgements

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PRODUCTIVITY DIFFERENCE BETWEEN A FOREIGN DIRECT INVESTMENT AND DOMESTIC CAPITAL FIRMS IN LATVIA IN THE AGRICULTURAL, FORESTRY AND FISHING SECTOR: A FIRM-LEVEL ANALYSIS

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Abstract. This study examines firm-level panel data to determine the productivity level per employee between domestic capital firms and their foreign counterparts in the agricultural, forestry and fishing sector in Latvia during the 2014-2021 period. Two groups of firms were created. The first firm group represents firms in which at least 10% of the share capital belongs to foreign direct investors. While the second group represents firms whose share capital is fully owned by the residents of Latvia. Productivity indicators are calculated for both groups. To assess the productivity differences across domestic firms and firms with foreign capital in Latvia, the author has combined a rich firm-level dataset using ORBIS and Lursoft IT Ltd. data. Based on the results, it can be concluded that the firms with foreign capital are, on average, more productive than the firms whose share capital is only Latvian capital. The difference in productivity is especially visible in the forestry and logging sub-group in small size firms.

Key words: productivity, foreign direct investment, firm size, agricultural.

JEL code: D24, E24, F21, J24

Introduction

Labour productivity, along with capital and labour force, is a determining factor in the formation of a competitive economy. Given that Latvia's labour force is limited due to the demographic issues, and total investment levels remain low, a sustained increase in labour productivity is important for long-term economic growth. Although the agricultural, forestry and fishing sector is not one of the largest in the national economy of Latvia, it still plays a significant role. This sector accounts for 3.9% of Latvia's added value and employs 6.8% of the total number of people employed in Latvia. In addition, this sector plays a crucial role in the export of Latvian goods, especially in the export of wood and cereals, which have long been one of the main driving forces of the export of goods.

Even though productivity assessment methods and their influencing factors have been widely studied in the scientific literature both in Europe and in Latvia, productivity is still a topical research topic. This is due to the fact that even within the same industry, the level and dynamics of labour productivity are extremely heterogeneous. Studying the size and causes of this heterogeneity will help to understand the reserves and conditions for the acceleration of added value, as well as the role of capital volume in these processes. Moreover, with the development of new data processing tools and the availability of firms' data at the micro level, it shows new analysis possibilities and helps to solve issues related to uneven productivity levels and growth.

The impact of FDI (foreign direct investments) on productivity cannot be ignored given the trend of increasing FDI in Latvia in general and in the agricultural, forestry and fishing sector in particular. Foreign direct investment is perceived not only as a quantitative source of financing, but also as an opportunity for technology and knowledge transfer, which can potentially result in higher paid jobs, as well as more efficient management and operation of the firms. Based on International Monetary Fund definition, immediate direct investment relationships arise when a direct investor directly owns equity that entitles it to 10% or more of the voting power in the direct investment enterprise. Control is determined to exist if the direct investor owns more than 50% of the voting power (IMF, 2013).

The aim of this article is to determine which firms in agricultural, forestry and fishing sector in Latvia are more productive - firms with foreign capital or with local capital. The research subject is the firm

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productivity in the agricultural, forestry and fishing sector. The research object is labour productivity. The novelty of the research is that unique firm data were collected and analysed and the fact that to date, the firms' productivity with foreign capital and with local capital in agricultural, forestry and fishing sector in Latvia has not been sufficiently collected and analysed. Qualitative and quantitative methods of scientific research, including content analysis for theoretical and Internet sources, logical construction, analysis of dynamic indicators and generalization methods were applied when developing this article. The empirical method was based on the analysis of publicly available scientific and other articles, as well as publicly available statistical databases and data of specially selected firms. The theoretical and methodological basis of the research is economic literature and scientific articles, publications of the International Monetary Fund and Organization for Economic Co-operation and development, statistical data of the Bank of Latvia and Orbis, Lursoft IT Ltd. data.

Literature review

Historically, the concept of productivity has been associated with the use of agricultural products and generally characterized the effectiveness of the use of factors of production (labour, land, capital) in obtaining agricultural income (Dellmann K., Pedell K., 1994). Productivity, in a general sense, is determined by the ratio of the final product (output) to the input factor spent on its production (Yaisawarng S., 2007).

Traditionally, labour productivity is considered from the point of view of the efficiency of the use of labour resources and is determined through a system of various indicators. One of the methods for determining the level of labour productivity is the calculation of the intensity of production as the ratio of the volume of revenue of enterprises to the number of employees (OECD, 2001).

The direct impact of FDI on the host country productivity is uneven. Numerous studies have proven a positive relationship between FDI inflow and agricultural sector development. First of all, FDI provides a source of funds that are critical to the development of the food industry (Khan A. et al., 2021; Brambilla I. et al., 2009). Inflows of FDI in the agriculture industry help increase productivity by sharing advanced agro-technology, sharing modern production and management methodology (Zhao M., et al., 2020; Jin S., Tokunaga S., 2007). Moreover, domestic food firms may benefit from technology spillovers and global market information, and become more competitive in the international market (Jin S. et al., 2017). FDI in land by developed-country investors positively influence food security by expanding land used for crop production because of home institutional pressure for human rights respect and responsible farmland conduct, in addition to positive spillovers (Santangelo G., 2018). Adom (Adom P. et al., 2018) argues that leading technology with biodegradable properties allow to improve environmental degradation and increase productivity by reducing production costs. While Wen (Wen Z. et al., 2020) has found that innovative production process augments the possibilities of higher productivity, which is the result of R&D in agriculture.

According to Jiang (Jiang H. et al., 2021a, 2021b), two mechanisms link financial markets to economic development and investment activity. Firstly, it establishes financial markets and raises funds for high-return businesses. Secondly, it improves productivity. It illustrates that FDI increases liquidity, diversifies assets, and directs capital to the most lucrative firms.

Despite these advantages, there are widely discussed FDI negative spillovers on the host economy enterprises and the scale of crowd out effect (De Backer K., Sleuwaegen L., 2003; Kosova R., 2010). Jin (Jin S. et al., 2017) has proved that the negative impact of FDI on the domestic food industry is substantial.

While Cotula (Cotula L., 2016) argues that many large natural resource projects implemented by foreign investors have degraded the environment.

To conclude, foreign investment in agriculture can have both positive and negative social, environmental and economic outcomes in recipient countries. By contributing capital, know-how and market links, foreign investment can help to generate public revenues, develop infrastructure and create employment in countries with limited alternative options for development. However, foreign investment may fail to create enough positive linkages with the local economy, for instance in the form of employment and opportunities for local businesses (Cotula L., 2016). Given the potential for both positive and negative outcomes, the quality of investment, not just its quantity, matters a great deal (UNDP., UNEP, 2011).

Research methodology, results, and discussion

1. Methodology of the research

In the scientific environment, there is a widespread use of productivity analysis based on firm data or analysis at the micro level (Bartelsman E., Doms M., 2000; Syverson C., 2004; Bartelsman E. et al., 2009). Firm-level data can be used to establish stylized facts about the dispersion of productivity across firms, the uniformity of changes in productivity, the persistence of productivity differentials, the consequences of firm entry and exit, and the importance of changes in resource reallocation across firms to aggregate productivity growth (Ahmad S. et al., 2018). Analyses based on firm-level data have the potential to more credibly identify the effects of certain policies than studies using only aggregate (country or industry-level) data, and also to describe the mechanisms behind the policy effect in more detail (Gal P., 2013). A lot of OECD research has utilized harmonized cross-country firm level data from ORBIS to explore the contribution of public policies to cross-country differences in productivity, innovation and resource allocation (Andrews D., Cingano F., 2012; Andrews D. et al., 2014; Andrews D., Criscuolo C., 2013).

In this research, productivity is defined as value added per worker. While, the added value was calculated based on firm profits, taxes paid and personnel costs. In order to obtain real indicators (chain-linked reference year 2015) from nominal ORBIS and Lursoft database indicators, a gross domestic product deflator was applied. Such productivity calculation is widely used in scientific literature (Hadengue M., Warrin T., 2013; Barnett A. et al., 2014).

To assess the productivity differences in agricultural, forestry and fishing sector across domestic firms and firms with foreign capital in Latvia, the author combine a rich firm-level dataset.

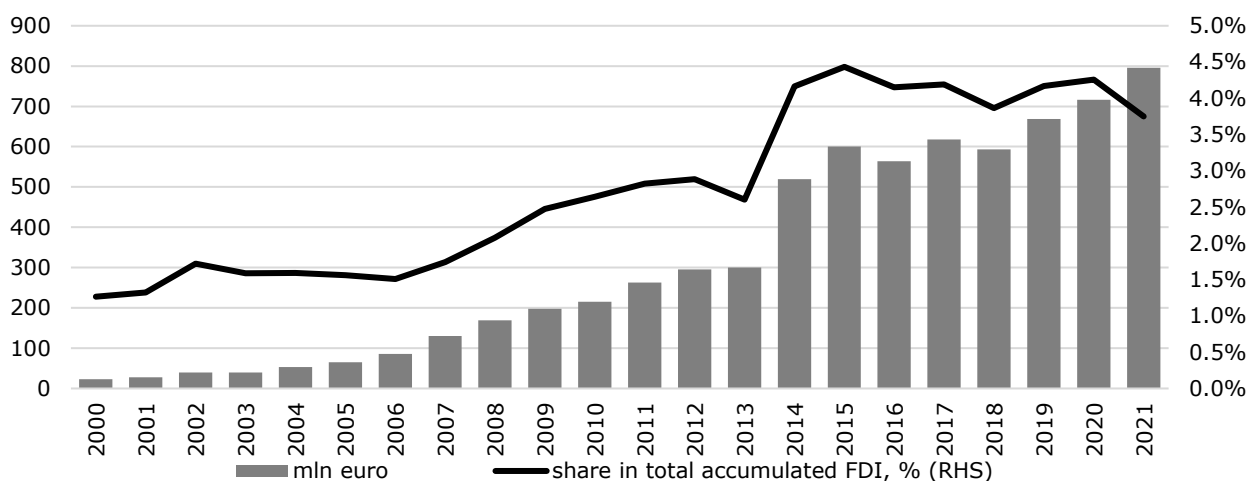
The data are obtained by matching two databases based on firm registration number, including the Orbis and Lursoft database. The matching of the databases allows to obtain important indicators to measure productivity. The data for this research is acquired from the Orbis database provided by Bureau van Dijk. Orbis provide access to precise and standardized information on around 400 million public and private firms. Thus, it is the largest database at the enterprise level in the world. The main advantage of the database is that it collects information on both large joint stock firms and small limited liability firms with only a few employees. ORBIS includes information on firms' financial indicators, number of employees, capital structure. Database consists of items from annual reports, and the coverage depends on the requirements and is country specific. Moreover, this database provides information on firm ownership, which enables to distinguish between domestic firms and foreign-owned affiliates serving a particular country and sector. Data on taxes paid by the firm, profit or loss, as well as the number of employees are selected from the Orbis database. However, the Orbis database did not have comprehensive information on personnel costs. Thus, Lursoft IT Ltd. data on the firm's administrative costs and personnel costs were

also used. In cases where information about the firm's wage fund was not available, it was considered that personnel costs make up 70% of the firm's administrative costs.

The analysis of this study is based on Orbis and Lursoft database data, which were available in March 2023. The sample period that author examining is between 2014 and 2021. Overall, the study covers 3485 firms that were registered and conducted economic activity in Latvia in agricultural, forestry and fishing sector. Several restrictions were imposed on the data selection process. First, only capital companies (joint stock companies and limited liability companies) have been analysed in this study, as information on the shareholder structure is available for these firms. Second, only those firms that perform economic activity were selected for analysis. If the firm is registered in the Latvian commercial register, but its turnover is 0, then such a firm is not selected. Third, only the firms employing at least one employee were selected. If the firm has one part-time employee, then in this case such a firm was not selected.

2. Research results

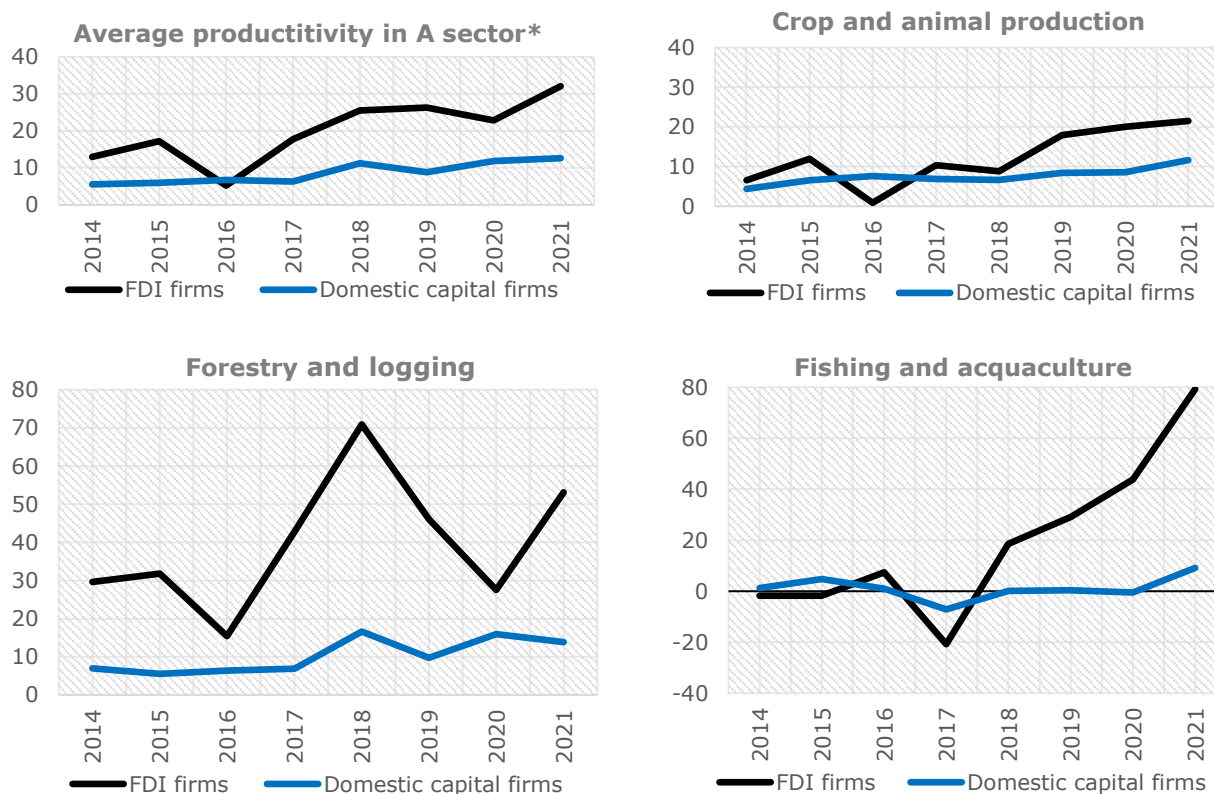
In terms of sectors, there are five leading economic sectors in Latvia, which attract high foreign investors' attention, agricultural, forestry and fishing sector is one of them. By the end of 2021, the volume of FDI in this sector amounted to 796 million euro or 3.7% of the total accumulated FDI in Latvia (Fig. 1). The amount of foreign direct investment in the agricultural sector shows the growing dynamics of several years, which was not affected by the global financial crisis in 2009, the export embargo of food products introduced by Russia in 2014, as well as the COVID-19 pandemic. A handful of counties provided the lion's share of the cumulative FDI in agricultural, forestry and fishing sector in Latvia. The major investors came from The Baltic Sea region and from countries with which Latvia had long-term and close trade cooperation. By the end of 2021 the largest amount of accumulated FDI in the agricultural, forestry and fishing sector came from Sweden, which is represented by such investors as *Sodra Skogsagarna ekonomisk forening*, *SILVESTICA GREEN FOREST AB*, *Skogsfond Baltikum AB (publ)*, *Latvian Forest Company AB*. A significant inflow of investments can also be observed from the Netherlands, which is represented by such firm as *Ingka Investments B.V.* While, the third country with significant investment in the agricultural, forestry and fishing sector is Denmark, which is represented by such investors as *Inleby Denmark 1 A/S*, *DDH FOREST BALTIC A/S*. The structure of the largest foreign direct investors in the agricultural, forestry and fishing sector corresponds to the "long tail" principle, as the 10 largest investors account for approximately 50% of the total accumulated FDI in this sector. It is worth noting that a larger inflow of investments, both in terms of volume and number of firms, can be observed in the forestry sector, while the volume of investments in the agricultural and fishing sector is significantly lower.



Source: the Bank of Latvia and author's calculations based on the Bank of Latvia data

Fig. 1. Accumulated foreign direct investments in Latvia's agricultural, forestry and fishing sector (mln euro) and share in total accumulated FDI (% (RHS))

Based on the developed methodology and data selection criteria, a total of 3485 firms were selected that perform economic activity in the agricultural, forestry and fishing sector. It is important to emphasize that only economically active capital firms with at least 1 full-time employee are selected. Of them, 265 firms in which at least 10% of the share capital belong to foreign investors.



Source: author's calculations

Fig. 2. Average productivity per employee in Latvia's agricultural, forestry and fishing sector (thsd euro) during 2014-2021²

According to the results, it should be concluded that firms with foreign capital are generally more productive compared to those firms with only local capital in their structure (Fig. 2). However, the dynamics

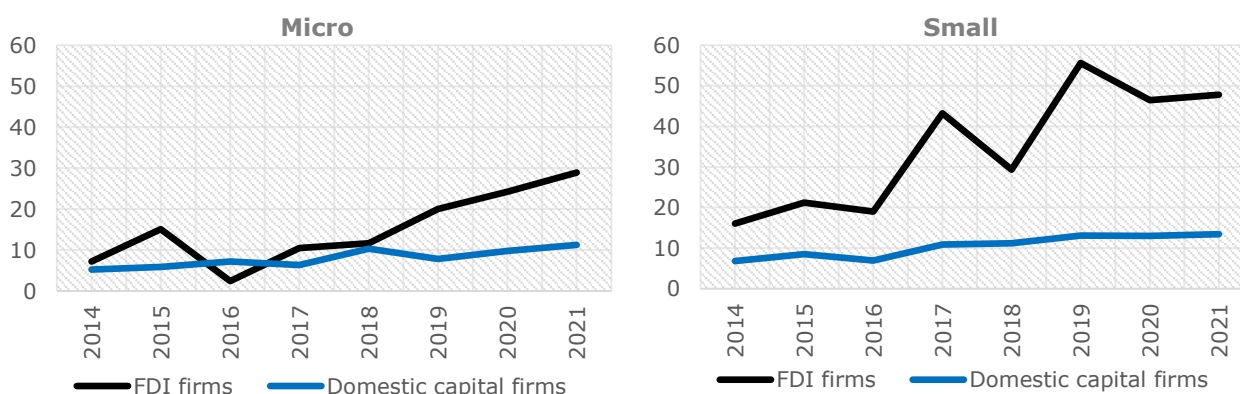
² * according to the statistical classification of economic activity NACE 2. red., the A sector consists of the agricultural, forestry and fishing sub-sectors

of productivity both over time and across sub-sectors is heterogeneous. Productivity in firms with foreign capital is more volatile in all sub-sectors. At the same time, when evaluating the average productivity in the agricultural, forestry and fishing sector since 2017, it must be concluded that productivity in firms with local capital began to significantly lag both in terms of volume and dynamics compared to firms with foreign capital.

Business conditions, such as tax burden, labour availability, institutional environment, are the same for both groups of firms, meaning that the difference in productivity was caused by internal factors of the firms. One such factor is the level of wage. During the analysed period, an employee working in a foreign direct investment firm earns on average 2.6 times more than an employee working in a firm with local capital. Even in 2016, when the productivity of foreign firms decreased, this proportion remains. In 2016, the decrease in the productivity of foreign direct investor firms was determined by the decrease in the amount of profit. On the other hand, in recent years, a rapid increase in average productivity in firms with foreign capital has been associated with significantly higher profits. Within the framework of this study, it is not possible to answer the question why foreign direct investor firms pay higher wages, but we can hypothesize that it is related to the export-oriented business model.

According to the collected data, both groups of firms are dominated by micro and small firms. Thus, in the group of firms with domestic capital, 88.5% are micro firms (up to 9 employees) and 9.7% are small (from 10 to 49 employees) firms. While, in the group of firms with foreign capital, the number of micro and small firms is 82.0% and 14.5%, respectively. Thus, it should be concluded that in both groups of firms, medium and large firms make up only a few percent of the total number of firms. In general, this situation is typical not only for the agricultural sector, but to a large extent for all sectors, which reflect the small size of Latvia's economy.

It can be concluded that there is a positive connection between the size of the firm and the level of productivity. However, an obvious correlation can be seen in firms with FDI capital, but in firms with domestic capital this correlation is rather moderate (Fig. 3). Analysing the average level of productivity in the group of micro and small firms, where a larger share of firms is concentrated, the average productivity in foreign investment firms is approximately twice as high in small firms compared to micro firms. In firms with domestic capital, such a pronounced difference does not exist, and the level of productivity is slightly higher in small firms compared to micro firms.

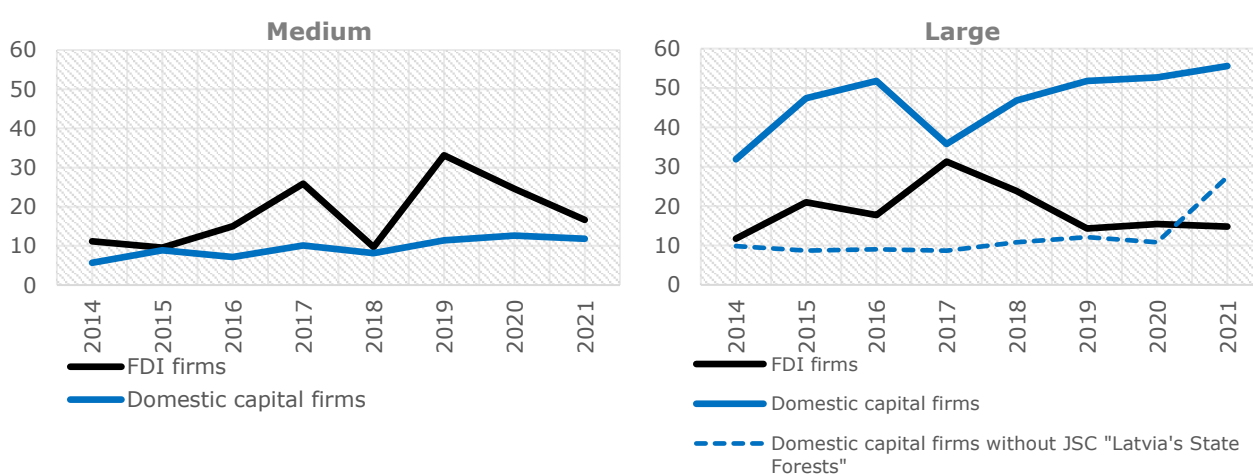


Source: author's calculations

Fig. 3. Average productivity per employee in Latvia's agricultural, forestry and fishing sector (thsd euro) in micro and small firms during 2014-2021³

³ Firms are divided into four groups according to the number of employees: micro (9 and fewer employees), small (10-49 employees), medium (50-249 employees), large (more than 250 employees)

Surprisingly, the level of productivity in medium and large firms with foreign capital is lower than in small firms. According to the author, this can be explained by several factors. First, with profit margins in various agricultural sub-sectors. Thus, in small firms with foreign capital, the largest contribution to average productivity is provided by firms in the forestry and logging sub-sector, which manage forest resources in Latvia and employ up to 40 employees. On the other hand, the group of large firms with foreign capital is represented only by a few firms that work in the crop and animal production sub-sector. In such firms, the amount of taxes paid is much higher, as well as the salary fund compared to micro or small firms, but the amount of profit is not high. Therefore, relatively small profit in relation to the size of the firms explains the relatively low productivity in the group of large firms. Second, given that the group of medium and large firms consists of limited number of firms, these groups are quite homogeneous, so one or more firms could have a large impact on the average productivity of the group, especially in cases where the firm could be making losses. This factor can be applied to both FDI firms and domestic capital firms.



Source: author's calculations

Fig. 3. Average productivity per employee in Latvia's agricultural, forestry and fishing sector (thsd euro) in medium and large firms during 2014-2021

The results that reflect the average productivity in the group of large firms with domestic capital attract special attention. On the one hand, the average productivity is very high, but such a high level is achieved thanks to the state-owned Joint Stock Company "Latvia's State Forests". Excluding this firm and summarize the average productivity of other large firms, then the level of productivity is significantly lower. It only confirms what was said above, that the productivity of large firms should be evaluated cautiously, since this group is represented by a limited number of firms. Depending on the chosen business model, business advantages and financial results, the average productivity of a specific firms could be significantly different.

It is important to point out that in each group of firms there is a significant variation in productivity both in firms with FDI capital and in firms with domestic capital. Thus, the level of productivity, for example, in some micro firms is higher than in most medium-sized firms. In addition, the productivity distribution of firms has a pronounced positive asymmetry. This describes the case where a small number of firms has very high productivity, which significantly increases the average productivity level in this group of firms. On the other hand, for a sufficiently large part of the firms, the productivity is lower than the average, that is, the median productivity is lower than the average productivity.

Conclusions, recommendations

- 1) Using the agricultural, forestry and fishing sector firm-level data from 2014-2021 that are registered in Latvia, this study attempts to determine the productivity level per employee. Two groups

of firms were created, namely firms with foreign capital and domestic capital. It must be concluded that the average productivity per employee is higher in firms with foreign capital.

2) Firms with foreign capital are more productive in all agricultural sectors, but there is a particularly large gap in the forestry and logging sub-sector, which is largely influenced by higher profit indicators compared to firms with local capital.

3) In firms with foreign capital, higher productivity per employee is recorded in small firms with 10 to 49 employees. Larger foreign investors, who represent mainly the forestry and logging sub-sector, have performed in this firm size group. In firms with local capital, there are no significant differences between the size of the firms. However, the data of the last year's show that the productivity of large firms is growing faster.

4) Evaluating productivity by firm size, it should be concluded that there is a significant variation in productivity both in firms with foreign capital and with domestic capital. Thus, productivity levels in some micro firms are higher than in most medium-sized firms. In addition, the productivity distribution of firms has a pronounced positive asymmetry.

5) Firm productivity is influenced not only by the country of origin of capital as such, but also by firm management, work organization, and employee motivation system. The impact of such factors on productivity is relatively difficult to quantify at the micro level. However, there are other factors that could affect productivity, such as age of firms, location, availability of finance. In future research, the above factors can be added as explanatory indicators of productivity.

6) The agricultural sector attracts significant attention from foreign investors. The inflow of foreign direct investment in this sector showed a steady increase in the last decade. By the end of 2021, the volume FDI in this sector amounted to 796 million euro or 3.7% of the total accumulated FDI in Latvia. The major investors came from the Baltic Sea region and from countries with which Latvia had strong trade cooperation, for example, Sweden, the Netherlands, Denmark.

7) The structure of the largest foreign direct investors in the agricultural, forestry and fishing sector corresponds to the "long tail" principle, as the 10 largest investors account for approximately 50% of the total accumulated FDI in this sector, concentrating mainly in the forestry and logging sector.

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AUDIT OF FINANCIAL REPORTING AS A TOOL FOR INVESTMENT ATTRACTIVENESS OF AGRICULTURAL BUSINESS ENTERPRISES

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Abstract. Development of financial statements audit as an effective practical tool for the investment attractiveness of agrarian business enterprises requires elaboration of its relevant theoretical positions with a detailed projection on the industry area to specify the content, tasks, information usefulness for investors, owners, and top managers of the enterprise. For this purpose, the role of the financial statements audits as a specific tool for improving the investment attractiveness of agrarian business enterprises is identified. The authors also substantiate the need to deepen its essential understanding, supplementing the audit components with various types of Due Diligence, which will provide users with complete information contained in the financial statements, the reliability of which is confirmed by the auditor. This will also enable a deeper use of analytical information to identify key risks and form an independent and objective opinion on the financial statements of a potential investment target.

Key words: audit, financial statements, agricultural enterprises, investments, agribusiness.

JEL code: M42, Q13

Introduction

The issue of ensuring the quality and content of financial reporting audits has long been and still is relevant. Especially since audit has proven itself as a tool for improving the financial stability and economic growth of enterprises, their investment attractiveness in conditions of increased risks and economic instability. Ukrainian companies, like most foreign ones, operate in an environment of uncertainty caused mainly by Russian aggression against Ukraine. In addition, it is well known that the spread of COVID-19 caused a global crisis in the world economy, the scale of which is still difficult to assess. Accordingly, not only the range of risks and threats has expanded, but those existing before having acquired a new content and manifestation, a different direction, and new trends. In addition, as before, we should not dismiss the industry-specific characteristics of enterprises. After all, the sectoral management system in agribusiness is a key factor in determining the content and quality of services in the field of auditing agricultural enterprises, consulting services for agricultural companies on taxation, investing in agribusiness and others.

The aim of the research is to substantiate the role of financial statements audit as a tool of investment attractiveness of agrarian business enterprises and the development of practical recommendations regarding the directions of its development. In accordance with this goal, the article formulates applied tasks aimed at studying the current practice of auditing of the financial reporting of agricultural enterprises and its substantive rethinking to provide potential investors with complete, reliable, and useful information.

The research methodology is based on general and specific research methods: system analysis; content analysis; abstraction, induction and deduction, analysis and synthesis, observations, formalization, and statistical methods.

Research results and discussion.

Audit companies are interested in developing a quality management system that would be adapted not only to the nature of the firm's activities. The list of services that the audit entity provides to its clients is also a determining factor. It is worth paying attention to the following. Until recently, many agribusiness

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enterprises were not active clients of auditing companies and did not show increased interest in existing auditing activities. For most Ukrainian agricultural enterprises, the audit of financial reporting had an initiative nature, because it is legally mandatory to conduct an audit of financial statements only of those that are subjects of public interest and fall under the provisions of the Law of Ukraine "On the Audit of Financial Reporting and Auditing Activities" in part conducting an annual mandatory audit of financial reporting (The Verkhovna Rada of Ukraine, 2017). In addition, there were unsubstantiated arguments of the owners and top managers of agrarian business enterprises regarding the high cost of the services offered by the auditors.

However, according to the official data of the Audit Public Oversight Body of Ukraine and according to the data of the Report on monitoring the quality of the audit services market and competition, in recent years there has been a decrease in the estimated average cost of performing a mandatory audit task (in particular, for medium-sized enterprises of public interest) and the number of estimated man-hours spent even by the "BIG FOUR" auditing companies, as well as by other network auditing firms in Ukraine (Table 1). In particular, the estimated cost of performing a mandatory audit task by the "Big Four" has decreased by UAH 369,000 (34%) in recent years. There is also a decrease in the time spent on performing a mandatory audit of financial statements by 340 man-hours (26%). Also, there is decrease in the estimated average cost of performing the mandatory audit of financial statements provided by other network audit firms (by 8%) and the estimated average number of man-hours for their implementation by 34% (Table 1).

Table 1

Estimated cost of implementing a mandatory audit of financial reports of medium-sized enterprises of public interest and time spent on its implementation.

Estimated average	«BIG FOUR» auditing firms				Other network audit companies in Ukraine			
	Years		Deviation		Years		Deviation	
	2019	2020	UAH	%	2019	2020	UAH	%
The cost of implementation of the mandatory audit of financial reports, thousand UAH.	1079	710	369	34	260	239	21	8
The number of man-hours spent by the SAA on tasks related to the implementation of the mandatory audit of the financial reports of medium-sized EPI	1315	975	340	26	676	446	230	34

Source: author's calculations based on official data Audit Public Oversight Body of Ukraine (the data for 2021 and 2022 are not publicly available due to the war situation in Ukraine)

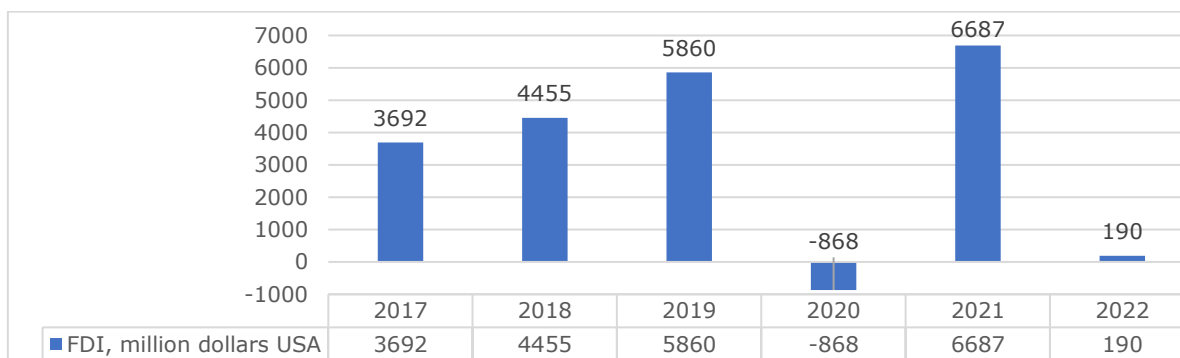
Nowadays, the increase in interest, understanding and perception of the need for quality audit has changed significantly and audit is already perceived in a new way, namely, as one of the tools of financial development of the enterprise. The main reasons for this change are: institutional and globalization changes; attractiveness of foreign investors; improvement of access of enterprises to external sources of financing, including grants from international financial organizations, state subsidies etc. Of course, the specified reasons are somewhat offset by Ukrainian military realities.

However, the owners and managers of agricultural enterprises have finally realized that auditors help companies quickly and easily to adapt to rapid changes, strengthen the trust of external investors, and thus increase the value of their business. The benefit of conducting an audit is, firstly necessary for top managers, especially when the request is required from inside, without waiting for initiatives to conduct an

audit from owners or even investors. Logical explanation for this assumption is at least the fact that with the help of professional auditors it becomes possible to simplify work and reduce costs and time for making and implementing strategic decisions for the enterprise, to quickly identify the reasons and places where profit and profitability are lost.

The results of the audit of financial reporting in the form of reasonable calculations and, if necessary, documentary evidence become a direct confirmation of the necessity and terms of payback of the planned investments (Gutsalenko L., Wasilewski M., Mulyk T., Marchuk U., Mulyk Ya., 2018). In the presence of an independent auditor's report, which contains not only an opinion on the reliability of these financial reporting indicators, but also evidence of the payback of the necessary investments, the confidence of the investor increases significantly, and his decisions will obviously be in favour of the business entity.

Analysing the data of Fig. 1, it is worth recognizing that, except for 2022, when the full-scale invasion of Russia on the territory of Ukraine began, and 2020, when there was a negative impact of the COVID-19 pandemic and the economic recession in 2020, the volume of foreign direct investment (FDI) was still growing (Advantage Ukraine, 2022). Availability of guarantees regarding the reliability of financial reporting is one of the reasons for accelerating the flow of foreign direct investment (FDI) into the national economy and, in particular, into the agricultural sector.

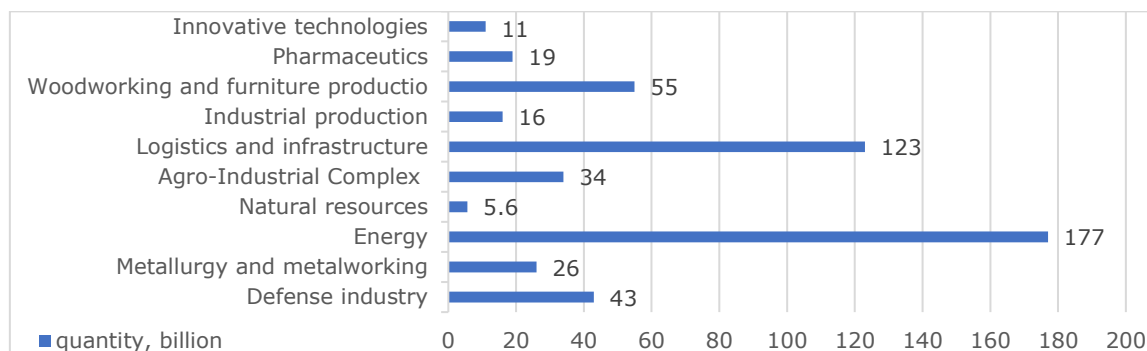


Source: created by the authors based on official data of the Ministry of Economy of Ukraine (Advantage Ukraine, 2022)

Fig. 1. Foreign direct investment (FDI) in Ukraine

Ukraine has identified industries (within the framework of the investment initiative of the Government of Ukraine "Advantage Ukraine", which created a special platform that collects investment projects and opportunities in 10 industries) that have significant investment potential (Advantage Ukraine, 2022). The agricultural sector is one of them and ranks 5th in terms of investment potential. According to the calculations of the Ukrainian government, the investment potential of the agricultural sector of Ukraine under the current difficult conditions is USD 34 billion (Fig. 2). This is explained by the fact that sectors that create high added value (production of meat, milk and dairy products, horticulture) are interesting for the investors (Advantage Ukraine, 2022), especially since agricultural products are competitive on the world markets.

In this context, the issue of owners and top managers fulfilling their obligations to various groups of information users, including investors, becomes important. It is important to find tools to ensure such guarantees. One of the main tools, in our opinion, is the provision of a qualitative audit of the activities of economic entities as participants in economic relations. So, once again, we focus on the need to audit financial reporting of agribusiness enterprises, regardless of the determination of mandatory conduct at the legislative level. To receive a long-term support from foreign investors and partners in the conditions of economic crisis and wartime, it is especially important for owners and top managers of Ukrainian agribusiness enterprises to ensure their trust in themselves thanks to cooperation with auditing companies.



**Source: author's calculations based on official data of attracting foreign investments
 ADVANTAGE UKRAINE (Ministry of Economy of Ukraine, 2023)**

Fig. 2. The volume of investment potential of Ukrainian industries, billion USD

Auditors, being aware of the existence of organizational and technological features and their impact on accounting, reporting, taxation, and, therefore, the scope of the audit, are cautious about accepting orders from agribusiness representatives. After all, the financial and economic activity of agro-industrial production enterprises is characterized by certain technologies, processes and terms and is significantly different from business entities of other industries (Homovij S., Tomilova N., Lytvynenko V., 2018). Among the determining factors, there should be mentioned industry conditions (competitive environment, specific relations with counterparties, as well as various technological processes), natural and biological factors, the specificity of intra-economic property and land ownership relations, significant use of human capital in the economic process, which determines the social orientation of agrarian business. Of course, this is an incomplete list of those features that must be considered at the stage of agreeing on the scale of audit process and concluding an agreement with the client company, and later - when applying the procedures for auditing financial statements of agricultural enterprises at all stages of the audit. In this context, the scientist Valery Zhuk rightly notes that only in the so-called "living agrarian economy" does the biological component of the economic process take place, and the technology of building accounting is determined by its components - fertile soil, plants and animals (Zhuk V., Zamula I., Liudvenko D., Popko Y., 2020). hereby the authors would like to note that the methodology of auditing financial statements of agricultural companies is also determined by these components. And therefore, in the field of conducting agricultural business, auditors should especially concentrate on the study and analysis of issues that arise in agricultural producers and the development of special, and perhaps even unique or innovative approaches to solving important strategic and operational problems.

Scientific identification and interpretation of objects of audit of financial statements of agrarian business enterprises and, accordingly, the specificity of the direction of the auditor's tasks are determined by the essence of technological processes of the fields of crop production, animal husbandry, and auxiliary industries. In this context, it is appropriate, once again, to emphasize the need for a proper competence approach to ensure the performance of the task of auditing the financial statements of agricultural enterprises in accordance with the current industry legislative and regulatory requirements, professional standards.

Analysis of the content of the Ukrainian websites of the "BIG 4" world leaders in consulting and auditing services (Price Waterhouse Coopers, Ernst&Young, KPMG, Deloitte Touche Tomatsu) indicates the allocation of services in the field of agrarian business into a separate category, which once again not only confirms the importance and perspective of the agrarian business itself in Ukraine, but also indicates the existence of demand from client enterprises of the agro-industrial sector.

In addition to the audit of financial reporting, there are audit services designed for the unique needs of agricultural enterprises. KPMG specialists offer agricultural companies support in solving various key problems specific to the industry (Agribusiness, 2022):

- fulfilment of reporting requirements and regulatory requirements.
- search and analysis of opportunities to enter the market and increase market share;
- search for opportunities in the field of investment and financing;
- definition of acceptable business management models;
- increasing the efficiency of processing and storage operations;
- response to changes in tax legislation;
- volatility of profitability indicators caused by changes in exchange rates and commodity prices;
- resolving customs issues and issues related to established quotas, as well as maximizing benefits from membership in the World Trade Organization (WTO);
- cost management and control, evaluation of trademarks on a national and international scale;
- support for acquisition operations;
- consultations on issues of control and management at enterprises of all sizes;
- providing advice and support to growing companies.

Table 2

Due Diligence for agricultural enterprises

Due Diligence	Content, tasks for agricultural enterprises
Financial	verification of the financial condition of the company, in particular assets and liabilities in terms of their assessment (availability of off-balance sheet liabilities, impairment of stocks: current biological assets, agricultural products, seeds, feed, fertilizers, plant protection products etc.)
Tax	identification of tax risks and an objective assessment of all tax aspects of doing business (taxation of agricultural commodity producers has peculiarities according to Ukrainian legislation)
Legal	analysis of the legal aspects of an agricultural business enterprise (e.g. registration of intellectual property rights, land lease agreements, assessment of the distribution of dividends and the organisation's property, registration of real estate rights, compliance with labour laws, registration of relationships with buyers and customers, suppliers and contractors, creation of an effective system of raid prevention in agribusiness etc.)
Operational	verification of operational activities the level of loading of production capacities, the possibility of changing and/or increasing the types of cultivated agricultural products, crop and animal husbandry, auxiliary productions
Technological	Checking the technological state, the technologies used, and the production capacities of agricultural companies of the agro-holding according to a set of certain criteria, which makes it possible to determine the strengths and weaknesses of the business, assess the development potential of the agricultural company, and check where there are losses of financial resources. Development of proposals for the improvement of technologies used by an agricultural enterprise in various branches of agriculture (for example, in crop production, animal husbandry, storage and processing of agricultural products)

Source: author's construction based on the study of the practice of auditing companies and their own observations

In our opinion, the due diligence procedure should be an integral part of the audit of their financial reporting for agrarian business enterprises, as an investment-attractive one. Usually, Due Diligence is interpreted as an independent review of a company that precedes a merger and acquisition (M&A), joint venture or collaboration (What is technical due diligence (TDD)? 2022). However, in terms of investment interest of agricultural business owners and to stimulate investment activity, it should be considered not just as a mandatory procedure, but as a component of the audit of financial reporting. Moreover, it is highly important for agribusiness enterprises, taking into account the specifics of their activity described above,

that comprehensiveness is necessary in conducting Due Diligence, taking into account its directions (Table 2).

We consider it necessary to emphasize the importance of Technological Due Diligence for the audit of financial reporting of agrarian business enterprises, as a component (and not a separate procedure) of such an audit. The sources of obtaining audit evidence are basically the same as in the case of a "pure" audit of financial reporting: accounting data, indicators of various forms of financial, tax, statistical reporting, oral and written information of senior management personnel, company employees, company assets etc. According to the results of Technological Due Diligence, as a rule, specific recommendations are provided for maximizing profits, improving technologies, improving production capacities, purchasing new equipment, or applying innovative technologies. Conducting Technological Due Diligence, whether for a large agricultural holding or for a small farming business, should provide an opportunity to fully understand the situation in which the enterprise is and, if necessary, develop the correct strategy aimed at increasing the efficiency of operations and obtaining additional benefits from implementation (application) of the auditor's proposed strategy. As we suggested above, due diligence should organically be either a part of the methodology or a part of mandatory financial statement audit procedures. After all, the owners and management of an enterprise of any industry, including an agricultural one, with all its risks, are interested not only in the presence of an unmodified opinion in a standardized independent auditor's report. It is important to know all the advantages and disadvantages that can be identified by independent professional auditors, to have a detailed idea of the situation and not only of existing facts and events, but also of possible circumstances or consequences of such circumstances. All this is necessary in order to best protect the interests of the enterprise itself and, in particular, its investors, customers, and employees. This will also make it possible to avoid problems with regulators at various levels (if any), and most importantly - to build and further maintain a proper reputation before investors, who should not have any doubts about the existence of any risks. In this context, we do not support the opinion of individual experts who point to a potential investor as the main initiator of Technological Due Diligence (What is technical due diligence (TDD), 2022). First, the owners and top managers of the company should act as initiators. Their interest is in identifying and quantifying risks or shortcomings that may affect investors' decisions to invest in the development of agribusiness enterprises. And only after eliminating such risks and shortcomings before forming a final judgment about the current situation can the independent auditor's report be handed over to the investor as a basis for consideration and assessment of cooperation prospects.

In addition, the division of the Due Diligence service by its types (Financial, Tax, Legal, Operational, Technological) is relatively conventional. After all, in practice, both internal and external users need reliable and complete information about the real financial state of the enterprise and all risks that may affect its financial state. Due Diligence is aimed at minimizing business risks in all components of the company's activities, which is the object of the audit. And if we talk about investors, it is obvious that they are interested not only in the issues of applied technologies. They expect to receive a full legal analysis of the company's financial and economic activities for a certain period detailing all possible risks. Analytical review and economic analysis of financial information to assess the real financial condition of the enterprise and existing risks will also be of interest to investors. In conditions of economic instability and uncertainty, investors also need an audit assessment and analysis of the most significant items of tax reporting in order to obtain a complete picture and reliable information about the current taxation system, the tax burden and an independent audit assessment of existing and probable tax risks.

Conclusions, proposals, recommendations

The obtained results of research on the substantiation of the role of the audit of financial statements as a tool of investment attractiveness of agrarian business enterprises and the development of practical recommendations regarding the directions of its development give grounds for drawing the following conclusions.

- 1) The audit of financial reporting must be considered as an important institutional category, which is the basis of information relations, on the basis of which the enterprise ensures the transparency of the business environment and business processes.
- 2) The audit of financial reporting of agrarian business enterprises is a practical tool in ensuring the investment attractiveness of agricultural enterprises, which requires taking into account the deep essence of the technological processes of the fields of crop production, animal husbandry, and auxiliary production, which determines the specificity of the direction of the auditor's procedures and determines the need for a proper competence approach to ensure the performance of tasks with audit of financial statements of agricultural enterprises in accordance with professional standards and applicable general and industry legislative and regulatory requirements.
- 3) The need to consider various types of Due Diligence as a component of the audit of financial statements of agribusiness enterprises, focused on investors, in the context of the implementation of the goal and tasks of providing them with reliable and complete information about financial and economic activities, which contain accounting data and financial reporting indicators, is proposed and substantiated, as well as in the context of providing an objective comprehensive analysis of the economic, financial and legal activities of the target business, including the technological level of production, existing and potential risks and threats.

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ANALYSIS OF TRENDS IN THE DEVELOPMENT OF FLORICULTURE IN UKRAINE

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Abstract. The article presents an overview of the current state of the flower market and the factors affecting the formation of the market in Ukraine, the study of the main trends and prospects for development. Given the demand for flower products, it has been proven that the floriculture in the local market has good opportunities for development thanks to the use of modern marketing support tools, including the use of online technologies.

In the conditions of European integration processes, increasing the competitiveness of floristic enterprises is gaining more and more importance.

The purpose of the article is to study the essence and content of floriculture and production features and factors of competitiveness of enterprises growing floriculture products in Ukraine and the world.

To achieve the goal of the article, the following tasks are identified: to characterize the development of the flower industry and the presence of demand for flower products on the world market and the market of Ukraine; carry out an assessment of the profitability of the floristic business and the possibility of expanding logistics routes using IT technologies; outline the influence of the terms of passing customs procedures and customs clearance on the effectiveness of the sale of floriculture products.

Information on domestic participants in the flower industry is provided and problems related to the development of flower growing in Ukraine and the sale of finished products are identified. The Ukrainian flower business cannot be considered a new industry for Ukraine, but it is highly profitable and has a steady growth trend.

Key words: floriculture, analysis, export, import, customs clearance.

JEL code: M48, M10, F01, Q13

Introduction

Floriculture is one of the aesthetically pleasing types of agriculture - the field of plant breeding, which deals with the selection, reproduction, growing of plants for decorative purposes: cutting plants for bouquets, growing potted plants. The introduction of the latest technologies makes it possible to obtain desired plants throughout the year, which makes it possible to supply finished products to the market throughout the year.

Floriculture is an important topic for research, so recently in theory and in practice, more and more attention is being paid to the complex solution of the problem of increasing the competitiveness of floristry enterprises and their effective functioning.

To study the researched problems, comparative research methods were used, as well as abstract-logical approaches to finding and justifying the methods of reflection in the accounting and the problems of customs clearance of transactions with products of the flower industry. Evaluation methods based on indicators and factors of the competitiveness of the enterprise can provide an understanding of the effectiveness of the sustainable development of the enterprise.

The first significant contributions to the study of the theoretical foundations and practical problems of the functioning and development of the flower market in Ukraine were made by such Ukrainian scientists as M. P. Butko, S. M. Kvasha, I. V. Pasichnichenko, P. T. Sabluk, V. A. Khodarchenko and others.

Among the foreign scientists, it is worth highlighting Kenneth Button (Kenneth Button, 2020), that mentioned that "Floriculture is an important employer, and earner of foreign exchange...", as well as

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Gelaye, Y. (2023) who researched the status and natural impact of floriculture production. Adherence to international standards and the creation of an opportunity to meet these standards were studied in their works by: Gebreeyesus, M. (2015), and Gutsalenko L. (2020). Chandel (2022) and Stephen Chandler & Yoshikazu Tanaka (2007) studied the influence of environmental signals on the production of floriculture products.

Research results and discussion

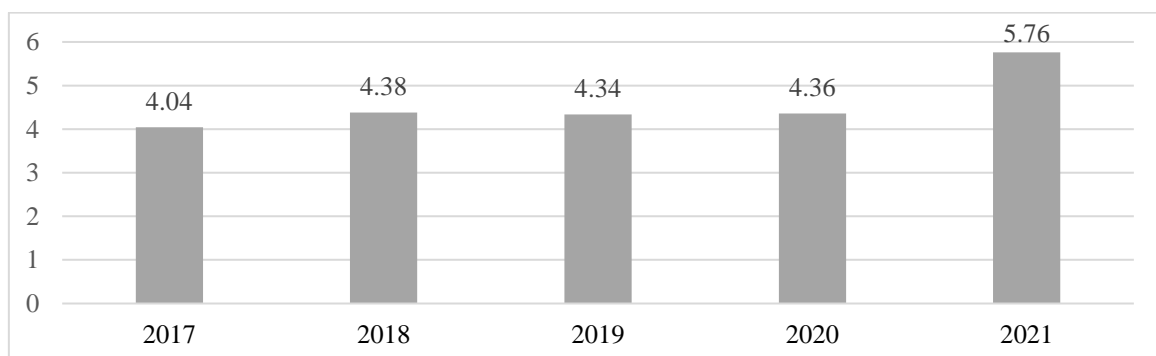
Floriculture, also known as flower farming, is a discipline of horticulture that is concerned with the cultivation of flowers. In other words, floriculture is concerned with growing and marketing ornamental flowers. The global floriculture market is segmented on the basis of type, end use, and region.

Floriculture crops include flower beds, indoor plants, indoor flowers, garden and pot plants, cut cultured greens and cut flowers. As a rule, flowers are used for decoration, aesthetics and to exchange greetings. Flowers are associated with prosperity and well-being, which benefits the floriculture market worldwide.

Floriculture products, have the highest profit per unit area among compared to other agricultural products (Adebayo, I. A., 2020).

The floristry market is the flower industry, one of the main industries in many developing countries, so it is a dynamic, global and fast-growing industry that has achieved significant growth rates over the past few decades.

The international trade in flowers and plants is the Netherlands (Figure 1), thus the Netherlands is Europe's flower market core due to its logistics position within Europe and established international trade relations within the flower business.



Source: ITC Trade, 2023

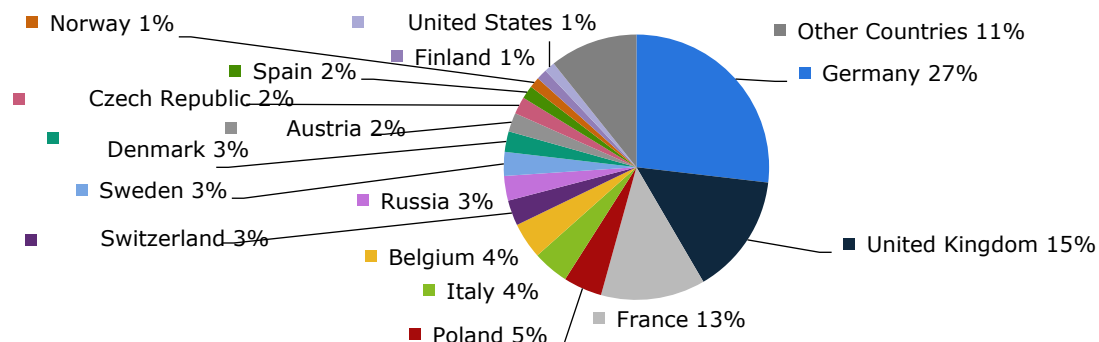
Fig. 1. Netherlands Floriculture Market: Value in USD Billion, Export, Cut Flowers, Netherland, 2017-2021

The Dutch company RoyalFloraHolland, is Europe's main marketplace for cut flowers, and has 6 places of auction, where auctions are held 5 times a week. Royal FloraHolland is a co-operative company founded in 2008 after a merger between FloraHolland and Bloemenveiling Aalsmeer. Today Royal FloraHolland is the largest international marketplace for the floriculture industry in the world, transporting thousands of different plant and flower varieties around the world through its global logistics systems.

RoyalFloraHolland exports to more than 140 countries around the world, including Germany, Great Britain, France, Belgium, Poland and Italy. According to the International Trade Center (ITC) trade map, in 2021, the Netherlands exported 680,090 metric tons of cut flowers valued at USD 5.7 billion (Netherlands floriculture market..., 2023).

The statistics (Figure 2) displays the distribution of total export of flowers and plants by Royal FloraHolland in 2020, by country.

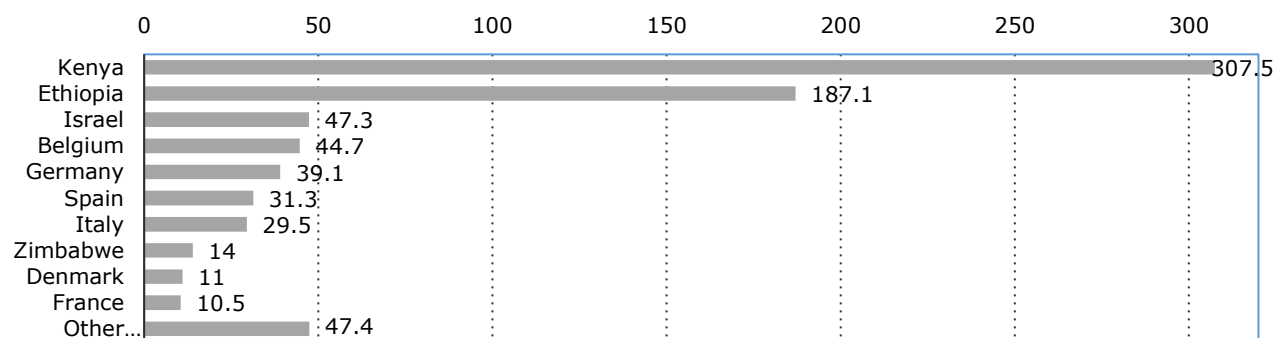
According to the experts, the ratio of imports and domestic production in general is 40% to 60% in favour of production in Ukraine. It is worth noting that the share of imported and domestic products differs depending on the types of ornamental plants. The basis of own production consists of such species as conifers, shrubs, and perennial grasses. There are more imports in the hardwood category.



Source: Flower market in the Netherlands - Statistics and Facts, 2021

Fig. 2. Distribution of total export of flowers and plants by Royal FloraHolland in 2020, by country

The main importers of flowers for auctions in RoyalFloraHolland (from 60 countries of the world) are the Netherlands, Kenya, Israel, Ecuador, Zambia and Germany (Figure 3). The largest sales markets are the USA, Russia and EU countries.



Source: Flower market in the Netherlands - Statistics and Facts, 2021

Fig. 3. Top 10 imported products of Royal FloraHolland in 2020, by revenue (in million euros)

The Netherlands is also the main importer of floriculture and decorative plant products to Ukraine, and cooperation with them will continue to deepen.

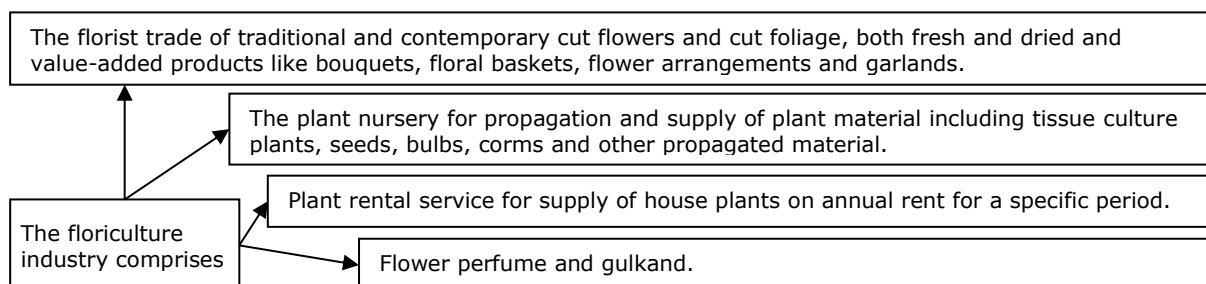
Ukrainian imports consisted mainly of flowers (75% of the value and 71% of the volume of imports). Ornamental plants (for landscaping, gardens and other outdoor uses) accounted for only 25% of the value of imports, but 29% of the volume (weight) of imports.

In the flower sector, Ukrainian importers bought the following categories from other countries:

- cut flowers (49% of import value). The main types of flowers are roses, chrysanthemums and carnations.
- potted / indoor plants (29% of import value);
- flower bulbs (29% of import value). Tulip bulbs dominate the import structure of bulbs.

According to the Prodanchuk M. A. and others (2021), the current state and outlook for the development of the global economic environment calls into question the ability of international and national institutions to regulate the activities of large multinational corporations.

The relatively stable demand among floral products, where on the one hand consumers are almost the entire population, and on the other, enterprises and organizations of all forms of ownership, since all categories of consumers of floral products have their own needs. The floriculture industry comprises the elements revealed in the Figure 4.



Source: formed by the authors on the basis of conducted research.

Fig. 4. **Composition of the floriculture industry**

The most widely accepted world standards for sustainability reporting allows businesses and governments all over the world to understand and convey their influence on essential sustainability problems such as climate change, governance, social well-being which promotes to establish social, environmental and economic advantages for everybody (Yevdokymova, 2019).

Manufacturers in developing economies cultivate high-quality flowers and export them to developed economies such as Europe, the US, Japan and others. But the COVID-19 outbreak, which began in Wuhan, China, in December 2019, has spread across the globe; and this pandemic has heavily impacted and disrupted the EU Flower and Live Plants sector and market since early March 2020 (EU-wide survey..., 2021). Consumer goods, horticulture, and floriculture are among the world's major industries suffering serious disruptions in the form of supply chain breaks as a result of this pandemic.

To promote the floristic business online during the pandemic, Ukrainian companies developed websites with their products, opened online boutiques and groups in social networks, where they actively advertised their products and provided profitable promotions and discounts. Moreover, with the help of the use of social networks in floristry, you can organize live broadcasts to show the products and the place of their storage, which will create a certain level of trust in the company among customers.

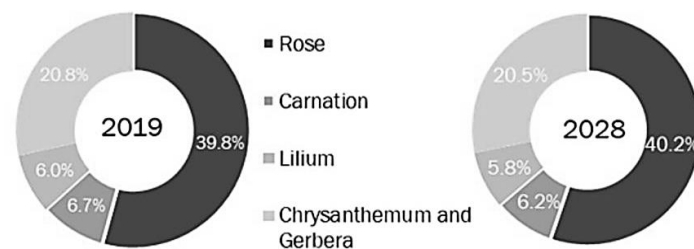
Floriculture can be divided into four products: flowers, cut foliage, plants and bulbs. The EU (hereafter, referring to the 27 members countries or EU-27) is the world's largest floriculture market, accounting for approximately two-thirds of the world's imports (Gebreyesus, M. (2015), The Cut Flowers segment held the largest market share accounting for 83% in 2021. The segment growth is attributed to the rising popularity of cut flowers among consumers, thanks to their sweet odor and beauty (Floriculture Market-Global Industry Analysis..., 2022).

The cut flower market in Europe is expected to grow at the highest CAGR of 4.5% during 2020-2028, and an increase in demand for cut flowers for decorative purposes is expected to boost the growth of the market (Figure 5) (Cut Flowers Market Trends..., 2021).

The market of floristic products is a system of relations between producers/sellers and buyers and intermediaries regarding the organization of production, distribution and exchange of floristic goods and provision of services, their consumption, as well as reproduction throughout the cycle of living and tangible labor. The production of floral products itself has its own characteristics:

- irregularity of production and corresponding fluctuation of demand and prices during the year;
- low level of flower processing;

- technological difficulties (tillage, care and protection of plants from pests and diseases, harvesting, storage, floristry and design etc.);
- organizational and economic measures (division of labor, forms of its organization and production, development of market infrastructure etc.).



Source: *Cut Flowers Market Trends...*, 2021

Fig. 5. **Cut flowers market by flower type – 2019 and 2028**

Besides the floristic market has a multifaceted structure, which is a collection of its individual interconnected parts elements, the structural integrity of product diversity, but in certain proportions and interdependence in a specific territory. In addition, as Hnylytska, L. (2021) pointed the current situation, domestic enterprises face many external threats caused by a high level of globalization, uncertainty of market conditions, unfair competition, imperfect commercial legislation, limited financial resources, corruption and fraud.

The modern world economic system is undergoing significant transformations and the transition to the digital economy (Ostapiuk N., 2022). And the growing e-commerce industry along with penetration of the internet and smartphone across the globe are driving the growth of the floriculture market. In addition, the shift to virtualized trade network aids in logistics coordination and information availability in the floriculture supply chain. It helps all participants in the supply chain management to access real-time information in the floriculture supply chain and ensures smooth, cost-effective, and faster distributions of floriculture products. These factors are also boosting market growth across the globe (Floriculture Market-Global Industry Analysis..., 2022).

Data Bridge Market Research estimates that the floriculture market will project a compound annual growth rate (CAGR) of 8.60% during the forecast period of 2021-2028. Growth and expansion of e-commerce industry, especially in the developing economies, rising inclination of population towards gardening, rising advancements in the biotechnology industry, are the major factors attributable to the growth of floriculture market. This means that the floriculture market value, which was USD 3.65 billion in 2020 will climb up to USD 7.062 billion by the year 2028 (Global Floriculture Market..., 2021).

So, increasing use of mobile phones, computers, and laptops has helped in the growth of digital channels with respect to strength and volume.

The floriculture market is estimated to grow at a CAGR of 8.6% between 2022 and 2027. The size of the market is forecast to increase by USD 44.88 billion. The growth of the market depends on several factors, including high profits associated with growing ornamental plants, the use of flowers and plants for decorative/aesthetic purposes, and growing prominence for online shopping (Floriculture Market by Product..., 2023).

The production of flower products is a traditional activity for Ukraine and all its regions without exception, and there are all the necessary conditions for this.

The market of ornamental plants in Ukraine is characterized by the fact that, in addition to technology, one of the important factors for the positive result of growing ornamental plants is the assortment of

products, and the majority of domestic enterprises in the cultivation of ornamental plants do not have a clear specialization, and the list of varieties and forms of plants grown by them consists of 100-200 items.

The next factor that had a significant impact on the results of the nurseries of decorative crops before the military invasion of Russia was the sale of products.

After all, in Ukraine, a multi-channel system of selling ornamental plants has developed, which involved modern garden centers, supermarkets, a small number of branded stores, specialized small shops, but there is also street trade, which accounts for up to 50% of the sale of cut flowers. Garden centers focused on the sale of trees and shrubs in the open ground (up to 80% of total sales in the retail chain) and potted plants (may reach 50%), while specialty stores sold cut flowers and, to a small extent, potted plants. The share of sales in supermarkets was extremely low, about 5% of all sales in the retail network, and is not of significant importance (Analysis of the market..., 2021).

Currently, the flower market is gradually trying to resume its work, but in wartime conditions, it is difficult to show better results than before the war.

Since flowers belong to agricultural crops, the organization of the production process generally has the same features as the cultivation of other crops in the field of crop production, however, during the cultivation and production of products, production costs arise: labour costs, seeds and planting material, fuel and lubricants, fertilizers, plant protection products, works and services, fixed asset repair costs, other fixed assets maintenance costs, other costs and general production costs.

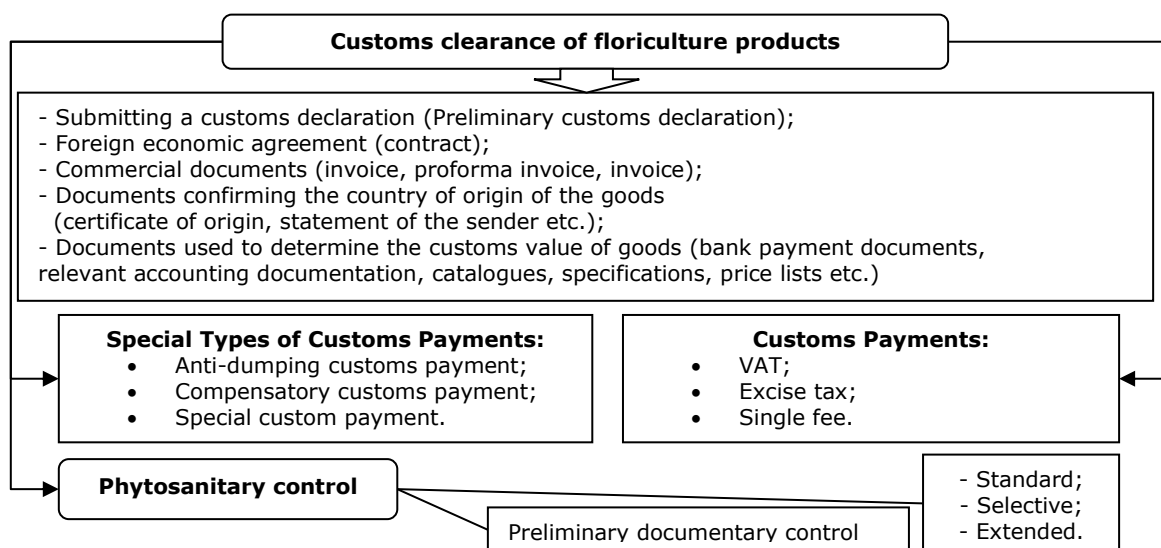
It is also worth mentioning the main problems that representatives of nurseries face in their work, which are listed below.

- Lack of personnel required for the work of the nursery. The reason is that many employees of various levels go to other countries, in particular to Poland, where salaries are higher. In addition, agricultural universities do not train agronomists for the cultivation of ornamental plants, the focus is more on agricultural crops.
- The problem of sale of grown products. It is difficult to predict the assortment of plants according to the tastes of the customers, because there are no marketing specialists who can predict the changes in demand for certain categories of plants, so often the plants are not sold according to the plan.
- Lack of developed infrastructure, which would allow quick and easy access to all consumables needed for growing plants, for example, it is difficult to find fertilizers, containers etc.
- Difficulties associated with updating the fleet of machinery necessary for nursery maintenance: lack of funds for the purchase of machinery, inflated prices including customs clearance, unfavorable conditions for renting machinery or lack of service for nurseries, lack of assistance from the state.
- The import dependence of nurseries, which, in combination with high prices for imported products and the cost of customs clearance, makes the production of ornamental plants less profitable.
- Potential risks when selling plants grown in nurseries, as most of the crops grown there are not included in the State Register of plant varieties suitable for distribution in Ukraine (Ministry of Agrarian Policy..., 2020).
- Impossibility of registering the land on which the nursery is located as private property, unsettled land market (land market problem). This deprives nurseries of guarantees of return on investment, endangers their existence in the future, and makes investment in nurseries risky.
- Lack of loans with low interest, banks currently have no offers for nurseries that would take into account their capabilities and an important feature in their work - seasonality of profits.

- The problem of maintenance of specialized equipment: service centers are either difficult to access or do not exist at all. Manufacturers and distributors of equipment are not interested in organizing the service, since the number of nurseries is not large; accordingly, there are not many potential customers. If there are problems with the equipment, nurseries are forced to call specialists from abroad, which is very expensive.
- Bureaucracy and time needed to collect the necessary documentation. It is difficult for Ukrainian business representatives, but it is especially difficult for foreigners, because they are used to the fact that bureaucratic issues are resolved much faster in other countries.
- Difficulties that arise when crossing the border, especially during customs clearance. Among the difficulties, some representatives of nurseries called the long time for which the products are delayed at customs, difficulties with processing documents as a reason for demanding bribes.
- Difficulties associated with climate and weather conditions that can cause plant losses. For example, the long and cold winter of 2018 caused significant plant losses in most nurseries, leading to losses (Market of flowers..., 2019).

Globalization processes have resulted in further challenges in the area of accounting and control. Particularly, a number of discrepancies in accounting regulations in different countries have emerged causing difficulties in communication processes between companies and investors in international agricultural business (Gutsalenko, 2018).

The order of customs procedures, in particular customs clearance, customs taxation and customs control, deserves special attention. Let's dwell on these procedures (Figure 6).



Source: formed by the authors based on conducted research

Fig. 6. Peculiarities of customs procedures for crossing the border of Ukraine for floriculture products

The import of goods to Ukraine requires the proper fulfilment of the conditions of the customs clearance procedure provided for by the Customs Code of Ukraine. Customs clearance begins from the moment the declarant submits the customs declaration to the revenue and duties authority. The declaration contains accurate information about the goods, the purpose of their movement across the customs border of Ukraine, as well as information necessary for their customs control and customs clearance. To simplify the customs clearance procedure, the declarant can also submit a Preliminary Customs Declaration, which simplifies the release of goods to the territory of Ukraine.

Foreign economic activity (FEA) related to import is carried out according to the Ukrainian classification of goods of foreign economic activity (UKTZED), which is compiled on the basis of the Harmonized system of description and coding of goods (international nomenclature of goods developed by the World Customs Organization).

Decorative plants according to UKTZED fall under group 06 "Live trees and other plants; bulbs, roots and other similar parts of plants; cut flowers and decorative greenery".

In addition to paying state duty, goods imported into the customs territory of Ukraine are subject to VAT.

The next stage of customs clearance for the import of goods to Ukraine is customs control, which includes phytosanitary control, preliminary documentary control, standard phytosanitary control, selective phytosanitary control, extended phytosanitary control.

According to Art. 36 of the Law of Ukraine "On Plant Quarantine" (Law of Ukraine on Plant Quarantine. (2022)) imported and transit cargo with regulated objects must meet the following requirements: be free of quarantine organisms; be accompanied by original phytosanitary certificates; not originate from the facility or production area or move through the quarantine zone, as confirmed by the foreign national plant protection organization of the exporting or transit country.

The phytosanitary certificate is issued by the relevant authorized body of the exporting country and certifies the compliance of the cargo with the phytosanitary requirements of Ukraine.

State phytosanitary inspectors at designated plant quarantine points at checkpoints on the state border of Ukraine carry out Phytosanitary control of cargo with regulated objects imported into the customs territory of Ukraine (including for the purpose of transit).

Customs authorities carry out preliminary documentary control. Seeds, planting material, flowers, and decorative plants are not subject to prior control in the presence of certificates that they have not been treated with pesticides and other chemical substances.

Standard phytosanitary border control is carried out by state phytosanitary inspectors by means of inspections to establish that: the object of regulation is accompanied by a valid phytosanitary certificate, if it is required according to the current phytosanitary measures; objects of regulation correspond to the documents that accompany it; there are no quarantine organisms and no signs of damage to the cargo.

Selective phytosanitary control is carried out by the State Production and Consumer Service, which establishes a specially determined percentage of cargo that is subject to mandatory extended phytosanitary control based on data on the detection of quarantine organisms in cargo with regulated objects of any origin that are imported, as well as on the basis of other factors, which may affect the life and health of plants, taking into account the results of the risk analysis (Market of flowers..., 2019).

The Ukrainian flower business can be considered a new industry, but promising, with great potential. Recently, there has been a trend towards an increase in the number of private entrepreneurs and large companies at the international level, which produce high-quality products in sufficient quantities to supply the domestic market.

However, taking into account the new realities of today (COVID-19, war with the Russian Federation etc.), Ukrainian flower growers have to adapt to new difficulties and new demands of consumers and fashion in order to keep the market.

Regarding imported products, Ukrainian floriculture should conduct direct purchases from auctions or via the Internet (electronic sales) to reduce intermediaries.

Conclusions, proposals, recommendations

- 1) The presence of demand for flower products on the world market and the Ukrainian market from the consumer's side has a growing tendency and demonstrates the modern development of the flower industry.
- 2) The flower industry (cut flowers) needs prompt customs clearance and customs procedures, as it is limited in terms of product sales and quickly loses its marketability.
- 3) Ensuring the profitability of the floristic business, especially in conditions of risks, requires the expansion of marketing activities with the formation and expansion of logistics routes provided by IT technologies.

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CHANGES IN VENISON QUALITY IMPORTANT TO THE CONSUMER DURING VENISON HARVESTING AND STORAGE

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Abstract. Food quality is a set of characteristics of the food product that can be evaluated for each kind of food. Several characteristics are identified for each of them: degree of freshness, energy value, amounts of protein, vitamins, micro- and macronutrients as well as various additives etc. However, the main characteristics of quality food of animal origin relate to its healthiness and safety for the consumer. From the perspective of a producer, quality represents specific characteristics to be achieved by the producer, and product quality is one of the basic elements of economic development to produce competitive products. Food production and processing, especially food of animal origin, is a complicated process that involves several stages and production process deviations affected by risk factors, and the elimination of the deviations is usually associated with significant financial expenses. Risk factors can appear at one or more stages and pass from one production stage to another, thereby negatively affecting the subsequent stages and the final product. In the production of venison, one of the groups of risk factors relates to venison harvesting, pre-processing and storage. Properly processed venison is usually clean and its microbiological contamination is not high, while non-compliance with venison storage requirements as well as bacterial contamination of venison in case of the non-compliance with storage requirements should be considered as a cause of possible materialization of some risks. Therefore, the present research aims to identify changes in venison quality important to the consumer during venison harvesting and storage. Microbiological control of venison is an important factor that affects the quality of the product, its shelf life and, in the long term, the competitiveness of the enterprise in the market. The research has found that venison could be stored for 45 to 50 days in vacuum packaging at a temperature of +3 to +4 °C, provided that all the hygiene requirements are met during venison processing, which makes it possible not only to sell the product in the domestic market but also export the fresh venison.

Key words: deer farming, venison, quality, venison storage.

JEL code: Q22

Introduction

Global competition challenges and the need to increase the level of prosperity of the rural population set new objectives for food producers regarding the production of high-quality food commodities of animal origin. Quality becomes important when it comes to the competitiveness of a particular good or service, an industry and the national economy as a whole. The ongoing processes in the economy allow us to state with absolute certainty that the growth of the food industry in Latvia, just like the food industry in the world, is affected by the change in consumer demand for food products – the demand for healthy food as well as organically produced food tends to increase –, which is facilitated by the growing concern of consumers for the environment and their health. Public health issues are also stressed in national policy documents stating that one of the priorities of agriculture in Latvia is providing consumers with safe and high-quality food, which is also consistent with the goals set by the EU food safety policy, emphasizing that human health is one of the basic values as well as the basis of life quality and personal and family prosperity. Therefore, one of the factors increasing the competitiveness of food production in the context of economic globalization is the production of high-quality food products.

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In the context of economic globalization, one of the factors increasing the competitiveness of livestock production is the production of high-quality food products. The need for research on it is determined by: the requirements of the common market of the European Union and the demand of the country's population for high-quality food that provides nutritional energy and guarantees human health preservation and improvement, as well as life extension. The population of the world continues to grow, currently exceeding 7 billion. This factor has contributed to the demand for animal products in human diets, as well as increasing the standard and quality of life in developing countries (Cawthorn, Hoffman, 2014). In 1961, meat consumption per capita did not exceed 23 kg, while in 2011 meat consumption had increased to 42 kg per capita (Sans et al., 2015). Since the demand for wild animal meat grew in the second half of the 20th century, the consumption of it increased worldwide to one million tonnes per year. As the demand continues to increase, today approximately 2 million tonnes of wild animal meat are sold for food every year (Costa et al., 2016).

Meat is considered to be the main source of fat in human diets. As health care evolves, there is an emphasis on the consumption of lean meats and products that are low in fat and cholesterol (Dahlan et al., 2008). An increasing focus is placed on food safety and animal diseases that can pose risks to human health and determine meat quality (Font-i-Furnols et al., 2014). Foods of this kind need to be stored for as long as possible and preserve high, consistent quality.

Quality is defined as the suitability of a good or service for use (Juran, 2010); however, from the perspective of a producer, quality represents specific characteristics. Food quality is understood as: 1) food safety or harmlessness, emphasizing that the quality characteristics of food must be such that it cannot cause damage to human health either in the short or long term, or even cause the death of a person; 2) expected properties of the food product, e.g. organoleptic, nutritional properties etc.; 3) desired characteristics of food, which meet consumer expectations regarding value added. It should be considered that there is increasing discussion on meat quality and the role of it, yet there is no consensus on the meaning of the term quality. It is generally considered to be a combination of two main elements. One of the characteristics is overall meat quality, which includes properties that can be measured, e.g. microbiological condition, tenderness, colour, juiciness, a shelf life, a pH value and toxin content. However, quality is also determined by immeasurable aspects: the consumer personal perception of meat and its quality value. According to research studies by the European Food Institute, the number of consumers in the European Union who consider food healthiness as the main criterion for choosing and purchasing food products and associate it directly with fresh, non-frozen meat tends to increase (Vaarst, Hovi, 2004). This means that food quality does not represent only organoleptic properties or other characteristics of food, the quality means the desired characteristics of food that could justify value added; e.g. the type of food production (organic farming, environmental protection, animal welfare), production areas (designations of origin) and the related traditions, a different demand for high-quality foods with low cholesterol and fat contents, e.g. for game meat, which differs in specific taste characteristics, as well as functional products with more physiologically active principles (Yamada et al., 2008).

Food safety criteria could be considered objective food quality evaluation criteria. The International Organization for Standardization (ISO) has defined quality (ISO 9000 series standards) as achieving long-term satisfaction, considering the wishes of consumers within the limits of their needs, stating that "quality is the degree to which a set of inherent characteristics of an object fulfils requirements". In fact, it represents compliance with the requirements set (e.g. international, national, sectoral etc.) or general conditions for the good or service produced and is able to satisfy the imagined needs of the consumer.

Therefore, from the perspective of a producer, quality represents specific characteristics to be achieved by the producer.

However, the organoleptic (e.g. colour, taste, consistency) and desirable properties of food (e.g. produced on an organic farm) are what each consumer understands by this concept individually; therefore, they can be considered as subjective evaluation criteria. American scientist J. Juran (2010) defines quality as the suitability of a good or service for use, i.e. if the good or service fully meets the needs of the consumer, it is suitable for use. The competitive advantages of deer farming are provided by food characteristics that are different from those of traditional food, such as the quality and organoleptic properties of venison (Rock, MacMillan, 2022); however, it is important to ensure the quality of venison in the long term as well. In food production, processing, packaging and distribution can increase or decrease the quality of agricultural products, and it should be especially emphasized that on many deer farms, the deer are harvested by being shot from a distance in the field. This requires additional pre-processing of the carcass on the farm and timely transportation of the carcass to a slaughterhouse for further processing, division and cooling. This stage is one of the most critical risk factors that can negatively affect the quality of the final venison product. Accordingly, external factors (e.g. an inaccurate shot) and errors in the technological process (e.g. during animal pre-processing) can negatively affect the quality characteristics of meat during the processing and storage thereof. This could create preconditions for the production of low-quality venison, resulting in economic losses, and the technological chain formed over a long period and the investments made in its creation would not bring the expected revenue. Thus, one can claim that in deer farming, harvesting conditions, deer pre-processing, carcass storage etc. technological aspects in the meat production process play a decisive role in the supply of high-quality, harmless and high-value venison products to consumers.

The mentioned factors make a significant impact on the competitiveness of deer farming both in the domestic and foreign markets. There are various techniques for storing venison: chilling, freezing and vacuum packing, which have different storage requirements and shelf lives. It is known that fresh meat has a higher market value; therefore, research on the possibilities of storing meat for as long as possible without freezing is particularly important. The research problem: fresh venison and its products that meet consumer requirements need to be stored fresh for as long as possible and preserve high, constant quality.

To achieve the longest period of storage of fresh venison and deliver the fresh venison to the domestic and foreign markets, the venison is cooled down and vacuum packaged. However, the technology of venison harvesting differs from farm to farm, which can affect the supply of safe fresh venison to consumers. Therefore, the research **aims** to identify changes in venison quality important to the consumer during venison harvesting and storage. The research focused on the most significant parameters that indicated technological risks that might arise as a result of human activity and significantly affect the economic performance of the farm, shorten the shelf life of the product and affect the consumer.

The present research tested venison samples obtained from four farms that were stored up to 50 days to identify the chemical and microbiological characteristics of the venison by employing laboratory testing methods. Before the carcass was divided and vacuum packaged, the carcasses of batches 1-4 were cooled in a refrigerator to a temperature of +2-+4 °C and stored for 1 to 2 days; the venison samples of batch 2 were rinsed with water before vacuuming. However, to achieve the recommended game meat maturation period, the carcasses of batch 5 were stored in the refrigerator for 8 days before being divided and packaged.

Research results and discussion

In Europe, deer farming has been practiced since ancient times, and it is a cultivated and strong tradition in many countries (Mirceta et al., 2016). Today, the most common deer species that are farmed in Europe (in captivity) are red deer (*Cervus elaphus*) and fallow deer (*Dama dama*) (Costa et al., 2016; Daszkiewicz et al., 2015; Florek, Drozd, 2013). Deer farms provide inputs for various industries, supplying not only meat and its products to the food industry but also deer skins, horns, teeth, hair, velvet horns to pharmaceutical and furniture factories etc. (Drew, 1992; Kuba et al., 2015).

Factors affecting the production of food are similar in all livestock industries, yet, there are certain differences in deer farming that, to a great extent, influence the quality of products and ensure its differentiation. In food production, the quality of a final product is largely affected by the technological processes of production, processing and sale, which determine preconditions for demand and supply in the food market. During production, all technological processes strongly relate to each other and therefore they affect each other because the positive and negative factors present at one stage pass to the next stages. An important factor affecting quality, the author believes, is associated with the production of meat in deer farming. In traditional livestock farming, the production of meat is related to the transportation of animals and an increased stress level during the pre-slaughtering period. According to researches (Jansons, 2010), stress negatively influences qualitative indicators of meat. In deer farming, animals are shot for meat in their natural environment without causing stress to animals, as they are not caught and transported. It reduces the stress hormone level in meat, ensuring a higher quality of meat. It has to be emphasised that shooting deer in a pasture requires additional pre-processing of their carcasses on the spot on a farm and timely transportation of their carcasses to a slaughter-house for further processing, cutting, and cooling. This stage is one of the most critical risk factors, which may negatively affect the quality of final products of venison.

The quality of venison is affected by various factors: environmental pollution, pathological changes, stress etc., which the deer has encountered during the life. It is important to cool the carcasses of game animals as quickly as possible to the maximum permissible temperature of +7 °C (Wiklund, Malmfors, 2004). The colour of meat is one of the most important parameters that determine the acceptability and choice of the product for the consumer. A dark colour is usually associated with firm and dry meat, in the case of venison, a strong red colour indicates good quality and is a typical sign of game meat (Font-i-Furnols, Guerrero, 2014; Ramanzin et al., 2010). Game meat, incl. venison, is characterized by a high proportion of muscle tissue; therefore, it is extremely important to mature the meat so that it becomes softer and meets consumer preferences. Therefore, one of the most important physical parameters that determine the quality of meat is an extreme pH value of the meat, which is identified approximately 24 h after the slaughter of the animal. Forty minutes after the deer was slaughtered, the pH value decreased to 5.4-5.7, which could be explained by the formation of lactic acid due to the breakdown of glycogen. This process is called meat maturation. It should be noted that rapid changes in the pH value affect the organoleptic properties of meat that are important for the consumer: colour, taste, aroma, juiciness and structure, as well as technological properties: water resistance. As glycogen reserves in muscle tissues decrease, the meat maturation process is disturbed, which gets longer and rapidly lowers the quality of the meat and shortens its shelf life due to the high pH value (6.0 - 6.2), which makes the meat tough (Atanassova et al., 2008). With increased stress in the pre-slaughter period, glycogen reserves are depleted in the animal's body during the stress, and, consequently, lactic acid

synthesis does not occur to a sufficient extent, resulting in dark-coloured, firm and dry meat (DFD) (Dikeman, Devine, 2014).

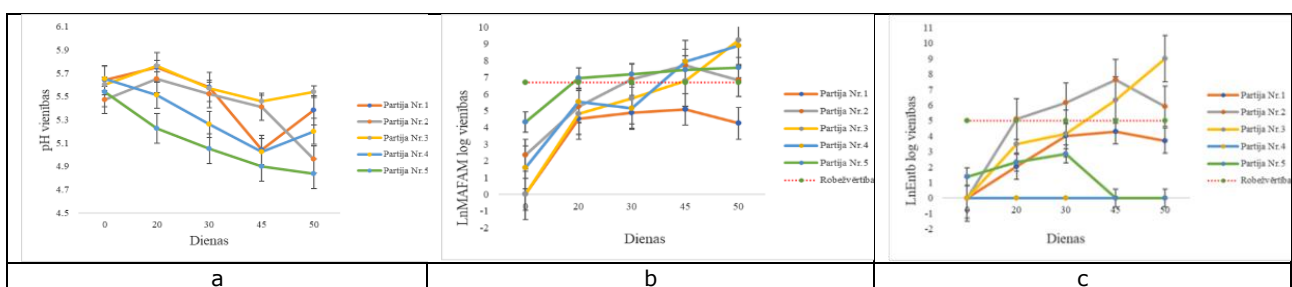
The pH value of high-quality game meat should be in the range of 5.5-5.7 (Wiklund et al., 2014). When storing game meat up to 14 days after slaughtering the animal, the pH value practically does not change (Hoffman, Wiklund, 2006). Meat with pH values in the range of 5.5-5.8 is packed in gas-tight packaging from which air is extracted, and the meat package is stored at a temperature of +2-+4 °C. The potential of free air and water release for the product in such packaging is reduced, resulting in a significant reduction in the potential for bacterial growth. The shelf life could be up to 3 months, yet provided that the meat meets a good microbiological standard before packaging (Collins and Huey, 2015), i.e. the hygiene requirements have been met during meat processing, which enables producers to gain competitive advantages and geographically wide markets. Meat spoilage at a pH value of <5.8 is caused by potentially hazardous bacteria, which multiply in muscle tissues (salmonella, listeria etc.) (Green, Nattress, 2004).

Based on the pH values identified on the first day of testing on the farms (Fig.1 (a)), it could be established that the deer carcasses were cooled immediately after the deer were harvested and processed in a slaughterhouse, and the deer were not subjected to stress that would contribute to the deterioration of venison quality.

In addition to the nutrients contained in meat, the suppliers of safe and high-quality food to consumers focus on the microbiological characteristics of meat. In the world, the most common foodborne infections relate to human enteric diseases caused by bacteria in foodstuffs (Newell et al., 2010). Meat contaminated with pathogenic microorganisms that are common to both humans and animals and parasites that cause various diseases is dangerous to human health. Fresh meat and fresh meat products can contain microorganisms such as *Escherichia coli* and *Salmonella*, which can pose a high risk of danger to human health. The pathogens are considered to be priorities for food safety control in the meat processing industry (Dikeman, Devine, 2014). Microorganisms get on meat during the processing, transportation and storage of it. For example, the producer incurs losses if the animal is unsuccessfully shot in the stomach, as this creates an increased risk of reproduction of microorganisms that are harmful to the health of the consumer. Often in such situations, game meat is washed with water; however, the meat rinsed with water begins to spoil faster and is not suitable for long-term storage. The regulations of the European Union Commission (No. 2073/2005 on microbiological criteria for foodstuffs etc.) (EU, 2005), the legislation and Cabinet regulations of the Republic of Latvia (Law on the Supervision of the Handling of Food etc.), as well as the Guidelines for Best Hygiene Practices must be complied with to ensure the quality and safety of meat. All market actors involved in the handling of food must ensure the identification of any supplier, and the supply of food commodities and products must be traceable in the territory of the EU (Gavriļenko, 2008). To produce high-quality meat, it should be ensured that the animals intended for slaughter are rested, the carcass must be well bled, special equipment for processing the carcass must be clean. The safety of fresh meat is determined by the organoleptic, physical and chemical as well as microbiological properties of the product. It is not always possible to identify the safety of meat by looking at the product and examining the organoleptic properties of it. Basically, it is necessary to make sure that there is no microbiological contamination in the meat, which is directly affected by the physical and chemical properties of the product. The growth and development of microorganisms in food is affected by a number of internal and external factors. The internal factors include: pH value, water activity (a_w), nutrients in meat, as well as natural protective barriers etc. The external factors include storage temperature, relative humidity, gases in the environment etc. (Gavriļenko, 2008). The way food is processed and stored affects the stability and safety of food and can also affect the nutritional value, sensory, technological and economic properties of it. From

a hygienic perspective, wild and captive (farmed) deer should be processed in slaughterhouses. An important step to prevent the carcass from being contaminated and polluted by various microorganisms is the removal of the skin, as hair from the skin often end up on the carcass, as well as the evisceration of the carcass. After being harvested, the carcasses of deer are transported to the slaughterhouse in cooling containers, the skin is not removed from carcasses, and the unskinned carcasses are transported to the slaughterhouse. The meat cooling and maturation period is also important when a dry crust forms on the carcass, which protects against the penetration of microorganisms.

The count of mesophilic aerobic and facultative anaerobic microorganisms (MAFAM) enables an assessment of the hygienic status of venison, as reported by Carter (1990). On the first day of testing venison samples in the laboratory, the total count of microorganisms was in the minimum range (Fig.1 (b)). The contamination of meat with microorganisms was inevitable, as the microflora of the animal's own digestive tract could get on it, as well as the environment, the hands, clothes and tools of the slaughterhouse worker could serve as a source of contamination (Reinken et al., 1980). An analysis of venison samples taken on the first day of storage revealed that the processing of venison samples and carcasses of batches 1 and 3 was done at the highest quality, complying with all hygiene requirements for slaughterhouses (Cabinet regulation No. 328). By increasing the storage period of fresh venison to 50 days, the total count of mesophilic aerobic and facultative anaerobic bacteria increased in all the sample batches, which could be explained by the active development of microorganisms; however, the samples of batch 1 maintained a low level of contamination until day 50, i.e. high-quality, according to the market requirements. The worst performance was found for the sample of batch 5, which could be explained by a long cooling period of the carcass, the carcass was stored at a temperature of +2-+4 °C for 8 days, and only after that the samples were vacuum packaged. In contrast, the second worst performance was found for the sample of batch 2, which was rinsed with drinking water before being vacuum packaged, which apparently contributed to the contamination with microorganisms and created a favourable environment for their development. It follows that the risk of infecting the lowest quality samples with any of the bacterial diseases is posed already soon after the carcass has been processed, reaching the critical period on the 20th day of storage.



Source: authors' calculations based on research data

Fig. 1. Changes in meat quality during storage

Enterobacteriaceae bacteria affect meat quality and serve as an indicator of poor hygiene, processing technology and post-processing problems regarding the product (Food Safety, 2016). According to Carter (1990), the presence of Enterobacteriaceae bacteria serves as an indicator for assessing the hygienic status of game meat, based on which it could be established that the technique of harvesting venison and the processing technology have been chosen correctly and could ensure high quality meat. Accordingly, complying with the hygiene requirements in the slaughterhouse and during meat processing provide a longer storage period for meat and meat products. As shown in Figure 1 (c), the critical period was reached on the 20th day of storage of venison samples (batch 2); after 30 days of storage, this level of

contamination with representatives of the Enterobacteriaceae group was found in the samples of batch 3. This means a low-quality venison production process can endanger the health and even life of consumers. It should be noted that the samples of batches 1, 4 and 5 did not reach the critical period during 50 days of storage.

At the same time, microorganisms dangerous to human health (causing foodborne pathogens) such as *Escherichia coli*, *Pseudomonas* spp. and *Salmonella* spp., were not found in the venison samples, which indicated that best hygiene practices were followed overall; however, technological errors made at certain stages did not allow us to reach a maximum long (up to 50 days) fresh venison storage period.

An analysis of the characteristics of the technological process of meat production on farms and of quality of meat, the need for special meat processing enterprises and game meat processing lines should be emphasized to cover a wider domestic market and enter foreign markets. Retailers consider venison quality and the regularity of supply as a limiting factor in selling venison products. When setting quality, supply regularity and quantity requirements for venison products, it often turns out that the production capacity of each individual enterprise is insufficient to meet the requirements. The principles of partnership based on long-term cooperation contracts etc. activities could serve as a basis for the establishment of a specialized game animal slaughterhouse and processing enterprise, which would provide the production of higher quality venison products. In view of the high fuel prices and long distances from slaughterhouses to deer farms, it is financially unprofitable to transport the deer to a specialized slaughterhouse, pay for slaughtering services and laboratory tests and then deliver the products to retailers. Therefore, it is necessary to find a possibility to ease the requirements for the construction and equipment of low-capacity slaughterhouses to foster the emergence of such slaughterhouses in the regions where specialized slaughterhouses are located too far from deer farms. This could be achieved through the establishment and certification of mobile and low-capacity slaughterhouses. The range of customers for mobile slaughterhouses would be allowed to be relatively wide if the deer farms are small, and there is no need for slaughterhouse services for several farms at the same time. By establishing low-capacity slaughterhouses in Latvia, the construction and equipment of which would comply with the eased requirements of legal acts, consumers would have an opportunity to purchase fresh venison harvested in Latvia, and the price of venison would be competitive in the domestic market.

Conclusions, proposals, recommendations

- 1) It is possible to store fresh venison for up to 50 days in vacuum packaging if the venison processing technology and hygiene requirements have been met, provided that all the hygiene requirements are met during venison processing, which makes it possible not only to sell the product in the domestic market but also export the fresh venison.
- 2) Enhancing the culinary properties of venison through a long maturation period (delayed vacuum packaging of fresh venison) as well as rinsing the venison with drinking water before packaging contributes to an increase in the count of microorganisms and reduces the shelf life of fresh venison; therefore, it cannot be used when planning the sale of fresh venison over a long period.
- 3) To make the production, processing and sale of venison continuous, it is necessary to increase the output of venison and its products and provide regular supplies to the market, which could be achieved by achieving a longer storage period for fresh venison.
- 4) The establishment of mobile and low-capacity slaughterhouses on farms can contribute to faster pre-processing of venison and, consequently, higher quality production, which would improve the regularity and continuity of venison supplies to retailers in the future.

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INTEGRATED AND SUSTAINABLE REGIONAL DEVELOPMENT

MODERN STATE OF INNOVATIVE DEVELOPMENT OF GEORGIA: CHALLENGES AND PROSPECTS

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Abstract. In order to ensure global competitiveness in modern conditions, the issue of the need for innovative development of the region's economy is widely recognized. In order to promote innovative activities in Georgia, several important steps have been taken from the legislative and institutional point of view. The level of innovative development of the economy is determined by globally recognized international data, for which the data of the "Global Innovation Index", its defining parameters and categories are analysed in the paper, and their dynamics are revealed. The effectiveness of the state innovation policy is demonstrated by the tendency of the financial and economic parameters of innovative development. The paper presents an analysis of gross domestic product and gross domestic product per capita as important indicators of innovative development, and it is determined that its structure is unfavourable, and growth rates are insufficient. Based on the study of the volume and structure of foreign direct investments, as the most important aspect promoting the innovativeness of the region, the degree of its impact on innovative development is determined.

Key words: innovative development, innovation policy, global innovation index, Georgia.

JEL code: O16, O30, O31, O32, O38

Introduction

The development of the region is determined by the qualitative changes of the economy and qualitative improvement, which is related to innovative activities. For the innovative development of the economy, it is necessary to quickly absorb scientific and technological progress and activate innovative processes, where knowledge is presented as an intellectual resource, which appears as the latest products, forms of production organization and modern means of business management.

The importance of innovations was indicated at the beginning of the twentieth century by the Austrian-American economist J. A. Schumpeter (2007), who considered the use of innovations as the basis of economic development and defined innovation as a source of higher profits at the micro level and the main means of obtaining economic effects at the macro level (Schumpeter, 2007).

Consequently, we must take into account both the advantages and disadvantages of these processes, as well as how they will change and affect the economic development in terms of both the innovation and creation of new opportunities. The European Union, the OECD, and the OSCE are a few of the international organizations that work in tandem with these procedures, as they do in the majority of industrialized nations like the US, Germany, Sweden, Spain, and others. These countries have started establishing the proper regulatory entities and establishing rules. Furthermore, the major emphasis is on the requirement for more financing for these fields of scientific study (Abuselidze & Mamaladze, 2021).

Georgia is not a country rich in significant natural resources, that's why the priority direction of economic development of the region is innovative development. Innovative development significantly affects the financial and economic parameters of the region, which in turn ensures the harmonization of social, political, cultural, religious and public relations of the region, which is the basis of sustainable economic development of the region. Care for promoting the formation of an innovative economy in Georgia began in the last years of the last century and is still in a fairly active phase, although observing the current situation reveals that the results are unsatisfactory.

The present scientific and technical advancement in the globe, as well as the emphasis on innovation by economic organizations, are directly tied to Georgia's competitiveness in economic domains, both in

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local and international markets (Zoidze & Abuselidze, 2023). Based on this, it is relevant to research the problematic issues of the innovative development of the economy and reveal the financial and economic trends of the innovative development of the region. The purpose of the research is to reveal the financial and economic trends of the innovative development of the Georgia, to determine the main problems and to prepare relevant conclusions. The tasks set in accordance with the goal are: determining the level of innovative development of the Georgia using an internationally recognized method; consideration of gross domestic product as an economic parameter of innovative development; analysis of structure and dynamics of foreign direct investments.

Literature review

While working on the issue, the study of the problem was carried out using qualitative and quantitative research methods. The works of local and foreign scientists were studied within the qualitative research. The research was based on K. Freeman (1987), Lundvall (1992), Nelson (1993), Patel and Pavit (1994), Metcalfe (1995), Ivanova (2001), Golichenko (2006), Zverev (2009), Abuselidze and Mamuladze (2020) works, which are dedicated to the problems of the formation and development of the innovative economy, and will cover such key issues as: national innovative systems and their models, innovation stimulation mechanisms, innovation classification features, artificial intelligence, innovative economic management methods and regulatory mechanisms. Several Georgian scientists are actively working on the problems of innovative development, namely, Mekvabishvili (2016), Kokiauri (2017; 2020), Abesadze (2014; 2017), Abzalava (2001; 2016), whose works have played an important role in the formation of the theoretical foundations of the research and in the formulation of relevant conclusions. Within the framework of quantitative research, we were mainly guided by statistical data, for the processing of which the methods of statistical analysis, correlation analysis and data comparison were used. In accordance with the purpose, the obtained data were processed and relevant conclusions were formed.

Research results and discussion

At the modern stage of public life, regional development is a necessary process for the balanced development of the country and its territories, which provides for the effective use of the financial, economic and social potential of the region in order to increase the well-being of society. It is important to highlight financial and economic aspects for regional development, because we believe that it is financial and economic development that ensures the harmonization of social, political, cultural and public relations of the region.

The innovative development of the region is significantly determined by the state innovation policy, which establishes the goals of the functioning of state and regional bodies in the field of innovative activity, the main directions of activity, management methods and regulatory tools (Abesadze, 2017). From the point of view of innovative development of the region, an important issue is the determination of the role of the state. The state should play the role of the main capitalizer of the creation of an innovative economy and promote the creation of a modern type of innovative-cognitive economy, which ensures integration into the global economic space (Mekvabishvili, 2016). The policy of state regulation of innovative processes should be focused on the commercialization of innovative projects, should deepen the connection of academic institutions with the private sector, should create a single chain between the state, private sector, academic institutions and society.

The innovative development of the region depends on various factors, which are grouped into organizational, social, economic and financial factors. Organizational factors refer to the consequences of

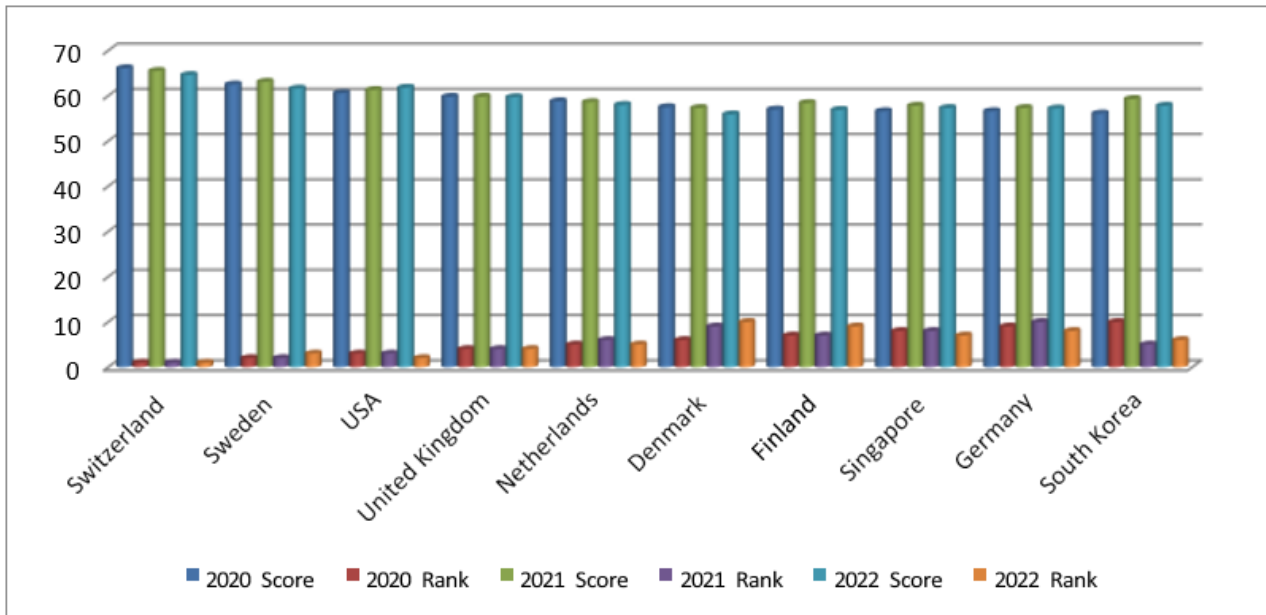
decisions made by state bodies on reorganization and institutional arrangements. Social factors include the standard of living in the region. Economic factors combine indicators of economic development and directions of the state's economic policy. Financial factors determine the rules of state financing of innovative processes, local and foreign investments, credit system, degree of influence of fiscal policy, issues of financial incentives and benefits.

Georgia is not a country with significant natural resources, therefore economic development should be based on the model of innovative development, towards which Georgia has been oriented since the first years of independence, when in 1994 the "Law of Georgia on Science, Technology and Their Development" was adopted. In the following periods, the following steps were taken in Georgia for the purpose of legislative and institutional promotion of the country's innovative development: in 2010, the "Shota Rustaveli National Science Foundation" was established; the innovative concept of Georgia was developed in 2012; in the same year, the Technology Transfer Center of Georgia (TTCG) was founded; in 2014, the Georgian Innovation and Technology Agency (GITA) was established; in 2014, the state program "Enterprise Georgia" was activated; in 2015, the Research and Innovation Council was established and the strategy of socio-economic development of Georgia - "Georgia 2020" was developed; in 2016, the "Law of Georgia on Innovations" was approved. Established and operating: science technology parks, industrial innovation laboratories, innovation laboratories and innovation centres.

The level of innovative development of the country on a global scale is determined by annual ratings published by international organizations. To determine the most innovative countries, the following international rankings are mainly used: Global Innovation Index - GII; Global Competitiveness Index - GCI; Knowledge economy index - KE; News Agency - Bloomberg; Organization for Economic Cooperation and Development - OECD; Standard and Poor's - S&P; Fitch; Moody's; Doing Business; Heritage Foundation etc.

When developing international ratings, different parameters and criteria are used, which is why the results may be slightly different from each other. Within the framework of the research, we will rely on the Global Innovation Index (GII) published by the World Intellectual Property Organization - WIPO, as we believe that its defining parameters are close to the nature of the constituent elements of the innovation system. Global Innovation Index (GII) studies are based on 80 parameters, which are grouped into 7 main categories, namely: 1. Institutions; 2. Human capital and research; 3. infrastructure; 4. Level of market development; 5. Level of business development; 6. Knowledge and technologies; 7. Creativity.

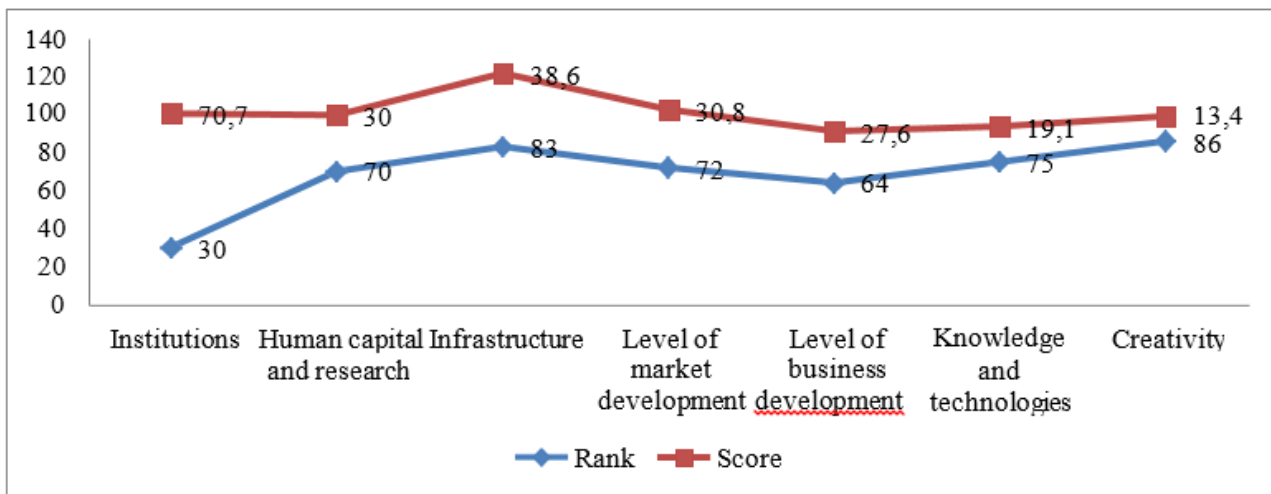
In order to create a general idea about the state of innovative development of countries on an international scale, Figure 1 is presented below, which shows the top ten ranking of innovative countries for the years 2020-2022.



Source: compiled by authors based on GII data

Fig. 1. Global Innovation Index (GII), Top 10 Countries (2020-2022)

According to GII's 2022 survey, Georgia ranks 74th with 27.9 points, ahead of neighbouring Armenia (80th) and Azerbaijan (93rd), but significantly behind the Baltic states, Russia, Ukraine and Turkey. Figure 2 shows the place of Georgia in the ranking according to each category defining the GII.



Source: compiled by authors based on GII data

Fig. 2. Georgia's rank and assessment score, by categories, GII - 2022

Figure 2 shows that among the categories determining the overall ranking, Georgia is the best, in the 30th place according to the "Institutes" category, which is determined by the political, regulatory and business environment. The categories of "infrastructure" and "creativity" are the most problematic for Georgia and occupy the 83rd and 86th places in the rating, respectively. Among the mentioned categories, "Institutes" were rated the most with 70.7 points, which led to its leading position in the ranking, while the lowest rating was in "Creativity" and "Knowledge and Technologies" categories, 13.4 and 19.1 points, respectively.

In order to evaluate the steps taken to form an innovative economy in Georgia and the results of the implemented innovation policy, it is important to use the data of the last years on the evaluation points of the defining categories of the global innovation index, which are given in Table 1.

Table 1

Global innovation index, ranking of Georgia - 2011-2022

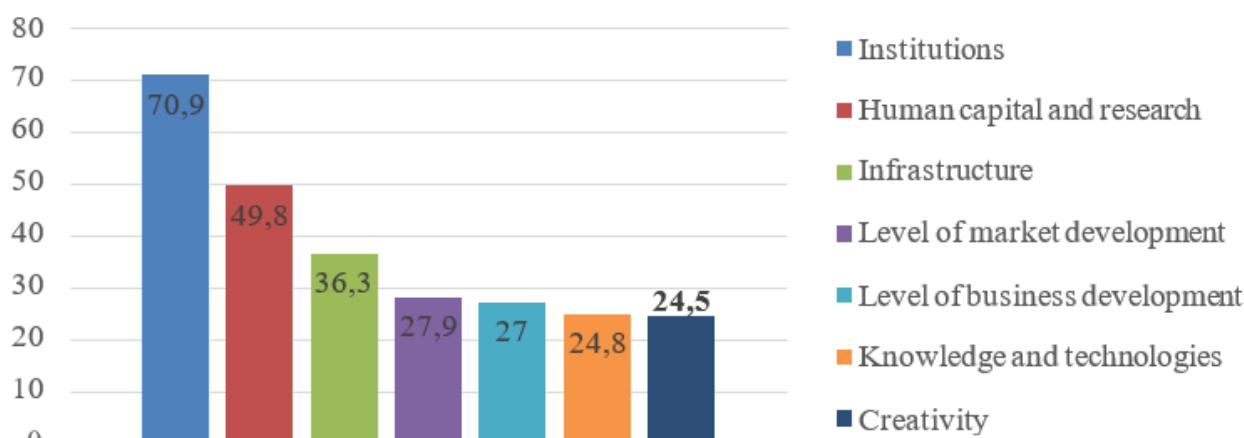
Year	Rank	Score	Institutions	Human capital and research	Infra-structure	Level of market development	Level of business development	Knowledge and technologies	Creativity
2022	74	27.91	70.7	30.0	38.6	30.8	27.6	19.1	13.4
2021	63	32.42	76.2	32.5	36.3	53.9	25.6	18.1	21.8
2020	63	31.78	75.1	31.6	37.4	51.8	23.5	19.0	20.3
2019	48	36.98	74.3	30.5	44.7	62.1	29.5	22.5	29.1
2018	59	35.05	71.7	30.0	42.5	52.2	25.7	24.5	26.8
2017	68	34.39	68.6	23.6	43.8	49.2	25.6	23.9	29.3
2016	64	33.86	69.2	23.2	41.7	44.3	26.5	26.8	26.6
2015	73	33.83	68.2	23.6	36.6	52.8	28.0	26.6	25.0
2014	74	34.53	69.7	23.5	33.3	55.2	23.9	30.0	25.9
2013	73	35.56	69.4	24.9	31.2	54.5	28.0	27.0	32.0
2012	71	34.30	65.2	29.6	29.4	50.3	34.0	29.5	24.2
2011	73	31.87	72.4	32.6	20.2	41.1	26.4	30.6	19.8

Source: compiled by authors based on GII data

Georgia took the best, 48th place in 2019, with 36.98 points, when it improved the result of the previous year by 11 positions, which was largely due to the positive situation in the "institutes" and partially "infrastructure" categories, which were evaluated with 74.3 and 44.7 points, respectively. The lowest, 74th place in the ranking is fixed in 2022, with 27.91 points. It was ranked 74th in 2014 as well, though with 34.53 points. In 2022, the weakest is the category of "creativity" (13.4 points), and the best is the category of "institutes" (70.7 points).

If we compare the results of the 2022 GII study with the initial results of the 2011 study, it is clear that the development trend is negative, because in 2011 Georgia was ranked 73rd, and in 2022 it is 74th. 2011 was evaluated for Georgia with 31.87 points, and 2022 - with 27.91 points. The highest score of Georgia was 36.98 points in 2019, and the lowest score was 27.91 points in 2022.

Figure 3 presents averages of GII survey results for 2011-2022 by category. The highest, 70.9 points is in the "Institutes" category, and the last one is "Creativity" - with 24.5 points.

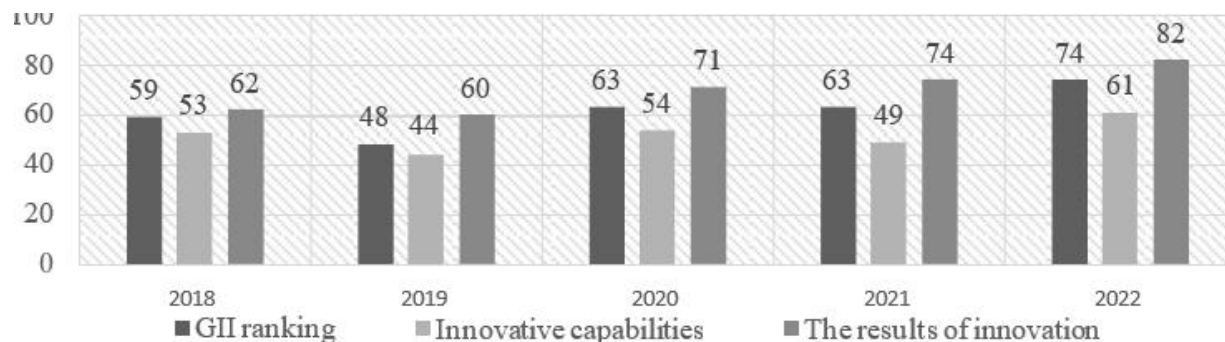


Source: compiled by authors based on GII data

Fig. 3. GII survey averages for 2011-2022 by category

In most categories, the 2022 assessment score does not exceed the initial assessment score obtained in the same category in 2011, which shows that the defining categories of the Global Innovation Index have not been characterized by a significant growth trend in the last 12 years.

The Global Innovation Index annually sets rankings based on overall innovation capabilities and innovation outcomes. The dynamics of the last 5 years are shown in Figure 4.



Source: compiled by authors based on GII data

Fig. 4. Georgia's place in the ranking according to innovation capabilities and innovation results, dynamics for 2018-2022

Figure 4 shows that over the last 5 years, Georgia's place in the ranking in terms of innovative capabilities is always better than the results of innovations, which indicates that the existing innovative capabilities are not effectively used to achieve the final results.

Thus, the analysis of GII data for the years 2011-2022 reveals that no positive trends can be observed in terms of innovative development in Georgia, if we do not include single categories and parameters, the improvement of which has a periodic character and can be considered insignificant, because they cannot have a significant impact on the innovative development of the country.

The level of innovative development of the country achieved as a result of the targeted state innovation policy and effective functioning of the innovation system, in addition to international ratings, is reflected on the financial and economic parameters of the country. We will separate the gross domestic product and investments from them.

Table 2 presents the absolute indicators of the gross domestic product of Georgia for the years 2010-2021, in base prices. In terms of GDP volume, the data of two large regions, Tbilisi and Adjara Autonomous Republic, are separated, and the trend of annual change is revealed.

Table 2

Gross domestic product at basic prices, million GEL, 2010-2021

Year	Georgia		Tbilisi		Adjara A/R	
	GDP	Annual growth, %	GDP	Annual growth, %	GDP	Annual growth, %
2010	19286.4	-	10326.5	-	1383.9	-
2011	22622.2	17.30%	12200.4	18.14%	1672.4	20.85%
2012	24251.6	7.20%	12820.5	5.08%	2147.3	28.40%
2013	25538.2	5.30%	13092.2	2.12%	2198.7	2.39%
2014	27661.3	8.31%	14157.8	8.14%	2282.5	3.81%
2015	30197.1	9.17%	15410.2	8.85%	2775.7	21.60%
2016	31555.8	4.50%	16585.9	7.63%	3000.4	8.10%
2017	35347.6	12.02%	18151.8	9.44%	3059.6	1.97%
2018	38778.5	9.71%	20063.7	10.53%	3491.5	14.11%
2019	43137.8	11.24%	22077.4	10.04%	4377.1	25.36%
2020	43136.6	-0.01%	21786.7	-0.01%	3832.4	-12.44%
2021	52412.4	21.50%	26288.7	20.66%	4857.5	26.75%

Source: compiled by the authors, based on the data of the National Statistical Service of Georgia

Analysing the data in Table 2, it is clear that in 2021, the GDP volume of Georgia increased by 171% compared to 2010, in Tbilisi - by 155%, and in the Autonomous Republic of Adjara, the increase amounted to 251%. In addition, the dynamics of GDP for the mentioned period is characterized by an increasing trend in almost every year, both for Georgia as a whole, as well as for Tbilisi and especially for the Adjara region. There is only one exception - 2020, when there is a downward trend in GDP, which can be explained by the negative impact of the COVID-19 pandemic on the economy. The average annual growth rate for the given period is 8.85% for Georgia as a whole, 8.38% for Tbilisi, and 11.74% for Adjara. If we take into account the GDP deflator, which is a measure of the price change of the final products created within the country over a certain period of time, then the growth rates mentioned above are insufficient.

As for the sectoral structure of GDP, more than 50% of GDP is created in 4-5 sectors of the economy, which indicates the low level of development of the country's economy. The leading industries are dominated by trade and real estate, the specific share of the product created by manufacturing industries is insufficient. Almost insignificant: values created as a result of scientific and technical activities in the field of education, which are directly related to the perspective of innovative development of the country's economy. Countries must have both high- and intermediate-level vocational credentials in order to attain increased production. One skill type is not more efficient than the other; both are required to increase production. A robust talent base may spur technical advancements or encourage the adoption of new technologies (Abuselidze & Beridze, 2019). While higher education can raise inventive ability, Krueger and Kumar (2004) discovered that investing in VET can improve a country's potential to adopt innovation.

The dynamics of data on GDP per capita in Georgia for the years 2010-2021 is presented in Table 3, both for Georgia as a whole, as well as for Tbilisi and Adjara regions.

Table 3

Gross domestic product per capita, in GEL, 2010-2021

Year	Georgia		Tbilisi		Adjara A/R	
	GDP per capita	growth, %	GDP per capita	growth, %	GDP per capita	growth, %
2010	5075.6	-	9387.7	-	4162.1	-
2011	5994.8	18.11%	11114.5	18.39%	5034.3	20.96%
2012	6485.9	8.19%	11749.0	5.70%	6469.7	28.51%
2013	6868.1	5.89%	11995.6	2.10%	6612.6	2.20%
2014	7442.0	8.36%	12856.7	7.18%	6850.2	3.59%
2015	8113.3	9.02%	13812.1	7.43%	8246.3	20.38%
2016	8463.2	4.31%	14651.8	6.08%	8819.5	6.95%
2017	9485.7	12.08%	15846.2	8.15%	8920.1	1.14%
2018	10397.5	9.61%	17315.7	9.27%	10082.3	13.03%
2019	11585.3	11.42%	18851.8	8.87%	12541.8	24.39%
2020	11605.5	0.17%	18388.5	-2.46%	10890.5	-13.16%
2021	14056.9	21.12%	21858.0	18.87%	12841.6	17.91%

Source: compiled by the authors, based on the data of the National Statistical Service of Georgia

The analysis of GDP per capita data shows that the Tbilisi region is on average 1.68 times higher than the average, while there is an almost absolute ratio between the Adjara region and Georgia. GDP per capita is growing almost every year, both as a whole and for the given regions. The only exception is the year 2020, when GDP per capita in the Adjara region decreased by 13.16%, in Tbilisi by 2.46%, although despite the above, GDP per capita for Georgia as a whole increased by 0.17%. With this indicator, the Adjara region is the second after Tbilisi, while the rest of the regions are significantly below the average indicator.

Innovative development largely depends on investments. Due to the lack of investment resources for developing countries, direct foreign investments play an important role, which in turn represents an important financial and economic parameter of the innovative development of the region. Foreign direct investments made in Georgia in 2010-2021 are given in Table 4.

Table 4

Foreign direct investments, million US dollars. 2010-2021 years

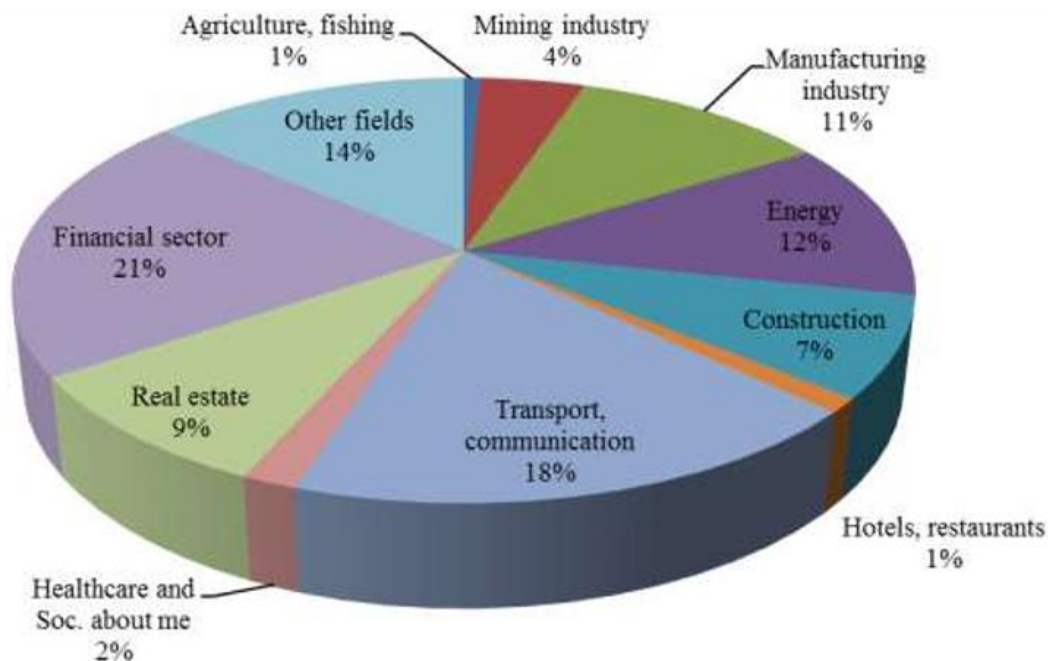
Year	GDP	growth	Tbilisi		Adjara		Kvemo Kartli	
			Absolute	Relative	Absolute	Relative	Absolute	Relative
2010	865.6	-	606.7	70.1%	58.9	6.8%	66.7	7.7%
2011	1134.0	31%	786.6	69.4%	95.8	8.4%	146.9	12.9%
2012	1048.2	-7.6%	772.7	73.7%	72.2	6.9%	41.6	4.0%
2013	1039.2	-0.8%	750.3	72.2%	83.1	8.0%	17.7	1.7%
2014	1837.0	76.7%	1343.2	73.1%	169.1	9.2%	55.7	3.0%
2015	1728.8	-5.9%	1382.9	80.0%	207.8	12.0%	21.2	1.2%
2016	1654.0	-4.3%	1416.0	85.6%	108.5	6.6%	29.1	1.8%
2017	1990.5	17.9%	1534.5	78.7%	212.9	10.9%	64.6	3.3%
2018	1351.5	-30.7%	1072.8	79.4%	85.0	6.3%	86.3	6.4%
2019	1352.2	0.1%	947.5	70.1%	193.3	14.3%	48.7	3.6%
2020	589.8	-56.4%	340.2	57.7%	78.5	13.3%	78.7	13.3%
2021	1241.8	110.5%	1043.4	84.0%	84.9	6.8%	21.3	1.7%

Source: compiled by the authors, based on the data of the National Statistical Service of Georgia

From the data in Table 4, it can be seen that foreign direct investments in Georgia increased by 43.5% in 2021 compared to 2010. We consider the mentioned norm of growth to be insufficient and does not correspond to the expected result of the state investment policy carried out during this period and the potential of the improved investment environment. If we take into account the annual change in the volume of foreign direct investments, in this case, out of 11 reporting periods, there was an increase in 5 cases, and a decrease in 6 cases. It is clear that the 56.4% decrease in 2020 is due to the severe economic consequences of the COVID-19 pandemic, in the rest of the period we consider the investment environment to be the main reason for the decrease, one of the determining factors of which is the innovativeness of the economy.

In Table 4, the three largest regions of Georgia are separated from the total foreign direct investments in terms of volume: Tbilisi, Adjara and Kvemo Kartli. According to the average specific share of regions, Tbilisi ranks first with 74.5%, where the highest 85.6% was recorded in 2016, and the lowest - 57.7% in 2020. Adjara region is in second place with 8.3%, where the highest rate was 14.3% in 2019, and the lowest - 6.3% in 2018. The third is Kvemo Kartli region with 5.1%, where the mentioned indicator ranges from 1.2% to 13.3%, respectively, in 2015 and 2020. It should be noted that the lowest rate for the Tbilisi region was recorded in the period when Adjara and Kvemo Kartli have the opposite situation, which means that the pandemic had a more negative effect on the Tbilisi region than on the Adjara and Kvemo Kartli regions. The dynamics indicating the percentage share of the regions may in some cases be caused by the implementation of single large investment projects and may not reflect the trends of economic development in the short term, however, it is a noteworthy circumstance for long-term analysis.

The specific share of investments made in the innovative sector of the economy in the total volume of investments is an important determining factor of the country's innovative development. The higher it is, the more developed the country's economy is, and vice versa (Chikava, 2006: 54- 55). That is why, when talking about foreign direct investment, it is always important to discuss its sectoral structure. In the years 2010-2021, the average relative indicators of direct foreign investments made in Georgia according to the sectors of the economy are given in Figure 5.



Source: compiled by the authors, based on the data of the National Statistical Service of Georgia

Fig. 5. Sectoral structure of foreign direct investments, 2010-2021

According to Figure 5, the first position is the financial sector (20.68%), the second is transport and communication (18.07%), it is followed by energy (12.13%), processing industry (11.00%), real estate (8.90%), construction (7.63%), mining industry (4.48%). The share of other industries is small or insignificant.

More than half (51%) of foreign direct investments made in Georgia in 2010-2021 come from three sectors of the economy: financial sector, transport and communication and energy. These sectors only guarantee a high rate of profit to foreign investors, which cannot ensure equal development of economic sectors. One of the tasks of the innovation policy is the equalization between sectors of economic development, which is achieved by increasing the role of innovations in the economy, which in itself implies the necessity and stimulation of investing in innovations.

Conclusions, proposals, recommendations

The innovative development of the region is a long and complex process, which largely depends on the effective functioning of the innovation system. National and regional innovation systems in Georgia are in the process of formation, its constituent elements are underdeveloped and there are no close business connections between them. Added to this is the inefficiency of the state innovation policy and the imperfection of legal norms. As a result of the research, the following financial and economic trends of the innovative development of the region were identified.

- 1) According to the Global Innovation Index, Georgia is in the 74th position in the ranking in 2022. It is ahead of neighbouring Armenia and Azerbaijan by this indicator, although it is significantly behind the Baltic countries, Ukraine, Russia and Turkey. The best result from 2011 to date was 48th place in 2019, and no significant positive trends can be observed in the dynamics, both according to the overall rating and its defining categories.
- 2) In Georgia, the gross domestic product is created unevenly according to regions and economic sectors, which means inter-regional and inter-sectoral inequality and indicates a low level of innovative development. In recent years, both GDP and GDP per capita have been characterized by an increasing

trend. In this regard, Adjara region stands out, where the average annual growth rate for 2010-2021 is almost 12%, while the average annual growth in Georgia is less than 9%. Considering the GDP deflator and other macroeconomic factors, the mentioned growth rates are insufficient for the innovative development of the economy.

3) The sectoral structure of foreign direct investments made in Georgia is unfavourable from the point of view of innovative development, those branches of the economy, which are represented by a high specific share in foreign direct investments, cannot provide innovative development of the economy. 74.5% of direct foreign investments come to Tbilisi, the specific share of the rest of the regions is small or insignificant, which is an obstacle to regional development, for which we consider a reasonable regional innovation-investment policy. The current growth rate of foreign direct investments cannot provide innovative development.

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THE FACTORS INFLUENCING LEGAL AND ETHICAL DIGITAL MARKETING COMMUNICATION

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Abstract. The scientific literature has extensively covered digital marketing communication and the advantages brought by it – interactivity, intelligence, individualisation, integration, independence of location etc. However, in the context of sustainable development, a key aspect in marketing communication is collective social responsibility, more specifically – legal and ethical digital marketing communication, one that does not pose threat to health, safety etc. or otherwise harm the society or its individual members. The increasing role of digitalised processes in the daily life of businesses, including the management of digital marketing and marketing communication, and the lack of legislation governing the digital commercial environment highlight several negative trends and risks for both businesses and the public. The goal of the study is to identify the factors that influence the use of legal and ethical digital marketing in entrepreneurship based on an analysis of the regulatory framework governing digital marketing and expert survey.

The study implements a cross-disciplinary approach by incorporating research methods characteristic of law, economics and management sciences in the methodology. The methods used in the research are the monographic method, expert survey, regulation and case law analysis, secondary data analysis. The main results show that important factors in putting the digital commercial environment in order and mitigating risks are the lack of competence and knowledge in digital marketing practice, responsibility sharing between the company and the communication stakeholders, conflicts of interest, the focus on immediate sales, the lack of awareness and knowledge of collective social responsibility, ethicality in the digital environment – marketing communication, and the lack of regulatory framework, especially in the fields of privacy protection, intellectual property, data and personal information security, influencer activity, and in the context of sustainability policy in the European Union.

Key words: business law, digital marketing, influencer marketing, marketing communication, sustainable business, sustainable development goals, risk factors.

JEL code: K20, M31

Introduction

With digital marketing playing an increasing role in economy, it is important for legislators to work towards eliminating legal uncertainties in this domain to ensure sustainable development. It matters not only nationally but also internationally in light of the development of technologies, international trade, and border-free services. In the European Union, one of the policy areas where changes should be made to stimulate transition to sustainable development is trade as a global facilitator of sustainable development. Given the rapid development of technologies, a key role in this context is also played by the legal and ethical management of digital marketing. Specifically, the new technologies implemented by enterprises in the digital environment increasingly affect both the choice of business models and online activities (incl. selling).

When it comes to regulatory framework in the European Union, it is important to highlight the Digital Markets Act and the Digital Services Act which represent a major step towards a fair development of digital economy and directly affect the development of digital marketing as well.

In order to attain the goal of the study – identify the factors that influence the use of legal and ethical digital marketing in entrepreneurship, a cross-disciplinary approach was pursued where the research methodology includes methods characteristic of law, economy and management sciences: regulation and case law analysis, secondary data analysis. In order to assess the identified risk factors that would affect the legal and ethical management of digital marketing, the maintenance of fair commercial practice, and the observance of the principles of collective social responsibility, the authors have been conducting an

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expert survey since January 2023. The participants of the expert survey are representatives of the academic environment, business and supervisory public authorities, organisations of marketing, advertising and legal service providers. The article covers only the risk factors associated with such risks as data protection and unfair commercial practice.

Research results and discussion

In the context of the European Union regulatory framework, it is important to highlight the Digital Markets Act and the Digital Services Act which represent a major step towards a fair development of digital economy and also directly affect the development of digital marketing in the European Union. For instance, the purpose of Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 or the Digital Markets Act (Regulation 2022/1925, 2022) includes a call to observe fair practices in the digital market. The new regulation will put an end to unfair practices by companies that act as gatekeepers in online platforms (such as Google). According to the European Commission, the *Digital Markets Act* will ensure a fairer digital commercial environment for those commercial users who depend on access controllers in offering their services in the digital single market and will enable start-ups to compete more effectively and roll out new features in online platforms without unfair restrictions. Consumers, too, will benefit from the Digital Markets Act, as they will be provided with a broader selection of services at fairer prices. This does not mean that access controllers, or gatekeepers, may not roll out new services but they, too, are under an obligation to observe fair practices without unjustified advantages.

An equally important role is played by the *Digital Services Act* (Proposal, 2020) which envisages the protection of consumer rights online and a requirement of safe and transparent content for online platforms to promote innovations and competitiveness in the common market. Importantly in the context of digital marketing, the Digital Services Act also prohibits advertisements targeted at minors, also providing for a simplified procedure of reporting harmful content online. The Digital Services Act covers intermediary services offering network infrastructure: Internet access providers, domain name registrars; hosting services (cloud computing infrastructure and web hosting services) and online platforms bringing together sellers and consumers (online marketplaces, app stores, collaborative economy platforms and social media platforms). When it comes to managing digital marketing, just as important is the Unfair Commercial Practices Directive (Directive 2005/29/EC, 2005). It is this directive that underlies the EU Court of Justice judgment in C 371/20 (Peek & Cloppenburg KG, 2021), which ruled an obligation for digital content creators to clearly indicate advertising when creating digital content.

It is the capabilities of online platforms in implementing digital marketing activities and communication that enhance the role of neuromarketing – for enterprises to gain a better understanding of their online users, improve their messages and communication, and facilitate the accomplishment of sustainable development goals (Saura, J., R., Palos-Sanchez, P., Rodríguez-Herráez, B., 2020). Measuring physiological and neuron signals to gain an insight into, for instance, online users' motivation, wishes and decisions can help inform about creative advertising, product development, pricing and other areas of marketing and represents the most widespread measurement method. The process consists of: 1) brain activity scanning, measuring nervous activity; and 2) physiological tracking, measuring eye movement to determine the effect of digital marketing activities and communication.

It is believed that by 2026, 25 % of the world's population will devote at least one hour per day to digital activities – shopping, social interaction, or entertainment (Crespo-Pereira, V., Sánchez-Amboage, E., Membiela-Pollán, M., 2023). The research done so far shows that an effective control or supervision is part of ensuring justice. The development of the legal environment of influencers, as a whole, requires a

comprehensive cooperation and an extensive social dialogue among stakeholders (Bormane, S., Urbane M., 2022).

The regulatory framework governing digital marketing in the European Union has been significantly influenced by the case-law of the EU Court of Justice. A review of the case-law of the EU Court of Justice in the aspect of digital marketing shows that judgments have mostly been delivered in preliminary ruling proceedings. This means that there have been situations of national courts requiring an interpretation of EU legal provisions as it falls under the competence of the EU Court of Justice. The prime case that spurred discussion over personal data protection in the digital environment is C-131/12 or the GoogleSpain case (Google Spain SL and Google Inc. v. Agencia Española de Protección de Datos (AEPD) and Mario Costeja González, 2014) where the EU Court of Justice ruled that the search engine constitutes a controller in respect of personal data "processing" through its information finding, indexing, storage and distribution. The court added that, in order to guarantee privacy rights and personal data protection, search engine operators may be obliged to erase the personal information published by third party websites. This judgment has substantially affected the development of regulatory framework as regards digital marketing in the EU digital market and has been frequently quoted in cases dealing with personal privacy rights in the digital environment.

The case-law of the EU Court of Justice can have a very direct impact on digital marketing. For instance, already back in 2013, in C-657/11 (Belgian Electronic Sorting Technology NV v Bert Peelaers and Visys NV, 2013), the EU Court of Justice looked into whether domain name registration constitutes advertising. The court found that the concept of advertising as defined in Directive 2006/114/EC of the European Parliament and of the Council (Directive 2006/114/EC, 2006) concerning misleading and comparative advertising, based on the actual situation of the case, covers the use of the domain name and metatags in the website metadata. However, this concept does not include domain name registration in itself.

On November 26, 2021, in C-102/20 (StWL Städtische Werke Lauf a.d. Pegnitz GmbH v eprimo GmbH, 2021), the EU Court of Justice found that displaying advertising messages in an electronic inbox similar to an actual e-mail constitutes direct marketing and is subject to an appropriate regulatory framework. In this case, the advertisement was shown in the user's private inbox and resembled an e-mail message even though marked with the word "advertisement". The EU Court of Justice argued that Directive 2002/58/EC (Directive 2002/58/EC, 2002) protects personal privacy in the aspect of unwanted communication in the form of direct marketing, especially using automated messages, regardless of technology used for communication. At the same time, the EU Court of Justice stressed that the use of e-mails in direct marketing is allowed if the recipient has consented to it beforehand.

The digital marketing strategy of an enterprise can also be affected by judgments of the EU Court of Justice delivered, for instance, in the context of competition or fundamental freedoms of common market. In the EU Court of Justice judgment in C-649/18 (A v Daniel B and Others, 2020) dated October 1, 2020, the factual circumstances deal with the digital marketing strategy for non-prescription medicinal products outside the company's country of registration. In this case, a company registered in the Netherlands ran an advertising campaign for online trading of non-prescription medicinal products targeted at consumers in France. The company published on its website promotional offers whereby discounts were applied to the total price of an order of medicinal products once a certain amount was exceeded, and purchased paid search engine referencing. The EU Court of Justice confirmed that such commercial practice is subject to the provisions of the Electronic Commerce Directive (Directive 2000/31/EC, 2001). The EU Court of Justice ruled that an EU Member State may not restrict a provider of online trading of non-prescription medicinal products registered in a different Member State by prohibiting the use of paid search engine referencing

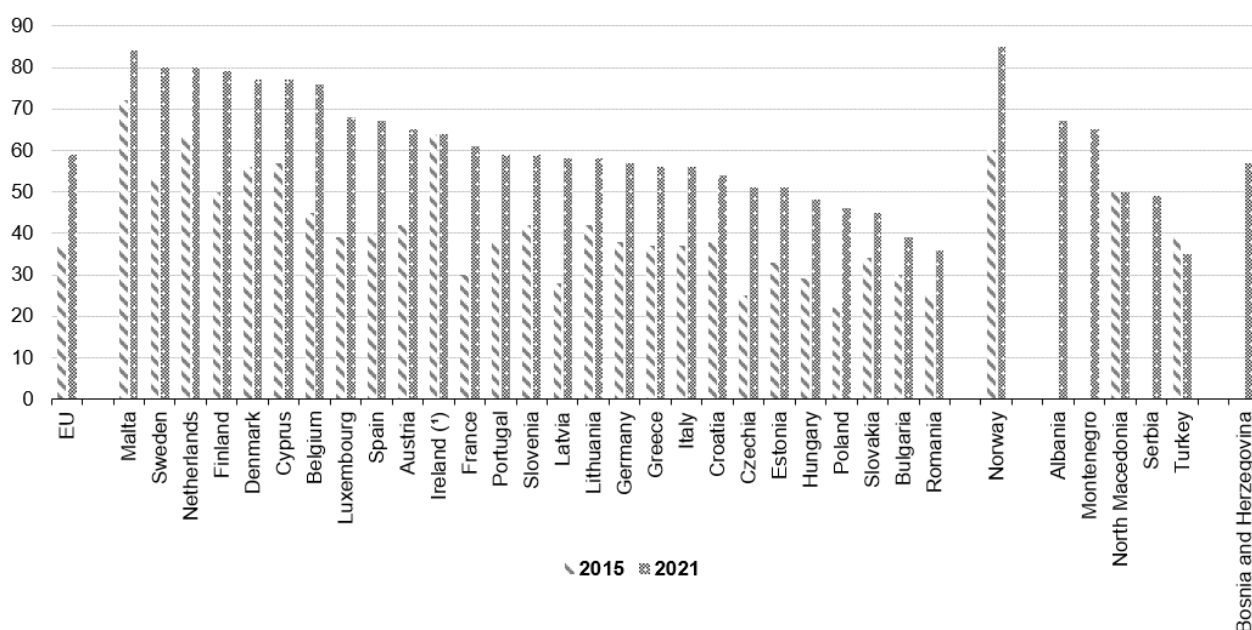
and price comparison websites, unless such regulatory framework has been applied to ensure that the objective of public health protection be accomplished and does not exceed what is required for this purpose. This means that the restriction has to be proportionate. In the court's view, such restriction by the French regulatory framework prevents the company from advertising itself and its online services. Having regard to the case-law of the EU Court of Justice, the authors conclude that EU Member States may not restrict marketing activities of such kind unless public health is under threat. For comparison, in Switzerland, which is not an EU Member State, online advertising of pharmacies is allowed but it is prohibited to run online advertising of pharmacy products targeted at Swiss consumers without permission from the national advertising supervisory authority.

In August 2022, in C-184/20 (OT v. Vyriausioji tarnybinės etikos komisija, 2022), the EU Court of Justice expanded the definition of sensitive personal data, ruling that personal data that implicitly disclose the special category of a natural person in the context of Article 9 of this directive constitutes special category personal data within the meaning of the General Data Protection Regulation (hereinafter – the GDPR) (Regulation 2016/679, 2016). In the authors' view, the EU Court of Justice has defined data protection rather broadly prior to that as well and this judgment was a predictable continuation of the previous case-law. This judgment will certainly affect companies that process data that may implicitly disclose the special category denoted in Article 9 of the GDPR, including digital marketing (online advertising), dating apps etc.

Brand safety in digital marketing refers to measures taken to ensure that information or an ad related to the brand not appear alongside content that might harm its reputation. As digital advertising increases, brand safety concerns become increasingly valid, especially in the digital single market of the European Union. Also applicable to brand safety in the EU digital space is the General Data Protection Regulation and Directive 2002/58/EC of the European Parliament and of the Council concerning the processing of personal data and the protection of privacy in the electronic communication sector (the Privacy and Electronic Communications Directive). These pieces of legislation lay down the data protection standard in the EU. Considering the scale of digitalisation, the Audiovisual Media Services Directive (Directive 2010/13/EU, 2010), too, is relevant to brand safety in the digital environment. Overall, when it comes to brand safety, the regulatory framework promotes responsible advertising in the digital environment.

The development of regulatory framework at the EU level means that EU Member States need to pay more attention in their national legislation to fair, transparent and predictable regulatory framework in the aspect of digital marketing because marketing activities and communication, if done correctly, have to essentially turn potential buyers into long-term (perpetual) consumers. In an ideal environment, marketing increases awareness of the product of service, thus leading to a mutually beneficial situation. However, the use of digital marketing increases adverse risks which are mostly triggered by lack of knowledge in digital marketing practice, responsibility sharing between the company and the communication stakeholders, conflicts of interest, focus on immediate sales, lack of awareness and knowledge of collective social responsibility (Bormane, S., Urbane, M., 2022). In this regard, the goal of the European Commission is to foster an environment where the use of online platforms in the business environment flourishes, with particular focus on the entrepreneurs' conduct that promotes fairness towards users to limit the spread of illegal content. This is because more than 1 million EU companies already sell goods and services using online platforms, and more than 50% of small and medium enterprises sell them on online markets (The European Commission, 2022). Figure 1 demonstrates the increased use of social media in entrepreneurship in the EU (Note: 2015 data for Albania, Montenegro, Serbia and Bosnia and Herzegovina: not available).

It follows from Figure 1 that the four most widely known categories of social media are: 1) social networks such as Facebook, LinkedIn, Xing, and others; 2) corporate blogs or microblogs such as Twitter and others; 3) multimedia content-sharing websites such as YouTube, Instagram, Flickr, SlideShare, and others; and 4) wiki-based knowledge-sharing tools. In 2021, 59 % of EU enterprises used at least one of these types of social media, an increase by 22 percentage points compared to 2015. Percentages do vary widely from country to country, ranging from 80 % and more in Malta (84 %), Sweden (80 %) and in the Netherlands (80 %) to less than 40 % in Bulgaria (39 %) and Romania (36 %). Between 2015 and 2021, the share of EU enterprises using social networks increased from 34 % to 56 %. Among the Member States, the highest increases were reported in Belgium and France (32 %), followed by Latvia (31 %) and Luxembourg (30 %) (the European Commission, 2022).



Source: Eurostat (isoc_cismt)

Fig. 1. Enterprises using social media, 2015 and 2021, % of enterprises

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However, the increasing use of social media in entrepreneurship can bring both positive and negative consequences. For instance, in the context of sustainable development, literature increasingly mentions ethical marketing which includes the principle of fairness (Chaffey, D., Ellis-Chadwick, F., 2019). In this respect, scholars highlight the role and influence of social exclusion on customer participation in innovation (Hui, Z., Yupeng, M. et al., 2021) and that social exclusion can cause negative changes on human beings in both the physiological and psychological aspect (Zong, L., Wu, S., Duan, S., 2022). The Use of Digitalization in Achieving Sustainable Development Goals 1, 2, 3, 4 and 5 is linked to social dimensions whereby more than 2 billion people are failing to enjoy digital services due to poverty and lack of education, knowledge and skills etc. In addition, this may affect smooth communication between institutions and individuals etc. (Vyas Doorgapersad, S., 2022).

Based on regulation and case law analysis, a number of data protection and unfair commercial practice risk factors were identified that influence the use of legal and ethical digital marketing in entrepreneurship (Table 1).

Based on the expert survey, a mid-term assessment of risk factors was conducted in respect of whether within the next 3 years their impact would increase / reduce the risks, thus also affecting the legal and ethical management of digital marketing, the provision of fair commercial practices, and the observance of the principles of collective social responsibility. Overall, the experts rated the risk factors associated with minor data processing and use for promotional purposes without parents' consent and the free market economy where an uncontrolled cross-border transfer and use of consumer data can take place as having the biggest impact on the materialisation of unfair commercial practice and data protection risks.

Although some countries have a regulatory framework in place, it is local. For global (incl. international) business activities, the regulatory framework varies. In respect of unfair commercial practice risk, the experts single out the absence (incl. disproportionality) of effective penal sanctions where the requirements of the Data Protection Regulation are not met in business or the regulatory framework preventing unfair commercial practices as regards publishing inappropriate content, spam etc. is violated. In such cases, lack of anonymity, conduct after establishing violation (incl. actions and process) are mentioned as a major problem. Although the Latvian regulatory framework envisages consequences for such violations, there are still no clear regulations regarding the enforcement of consumer rights, or the procedural framework of rights protection.

Table 1

Main risk factors in managing legal and ethical digital marketing, ensuring fair commercial practices, and adhering to the principles of collective social responsibility

No.	Risk factor	Information source
1.	Data protection risk	
1.1.	Data processing, aggregation and publication, implicitly disclosing an individual's belonging to a category (gender, age, race, political affiliation etc.)	EU Court of Justice judgment in C-184/20
1.2.	Right to be forgotten (request to erase data on individuals accumulated by third parties)	EU Court of Justice judgment in C-131/12 General Data Protection Regulation
1.3.	Ineffective, intransparent and insufficient cookie restrictions (formal consumer consent, or service use prohibition in the event of non-consent)	General Data Protection Regulation
1.4.	Minor data processing and use for promotional purposes (without parents' consent)	General Data Protection Regulation
1.5.	Cross-border transfer and use of consumer data (local regulations but global business, regulatory misalignments)	General Data Protection Regulation EU-US Privacy Shield
2.	Unfair commercial practice risk	
2.1.	Absence or disproportionality of penal sanctions (enforcement and/or upgrade) (unwanted communication – spam, inappropriate content etc.)	Directive 2010/13/EU General Data Protection Regulation
2.2.	Lack of option for consumers to opt out of marketing communication	Directive 2010/13/EU
2.3.	Misleading product or service information (appearance, design, functionality, price, ingredients, origin, use and disposal)	Directive 2005/29/EC
2.4.	Leaving false reviews and lack of supervision (non-existent, poor service and/or, with influencers, unproven service)	Directive 2005/29/EC
2.5.	Data manipulation (false number of followers, false reactions on social media platforms etc.)	EU Court of Justice judgment in C-371/20
2.6.	Conduct after establishing violation (by consumers, entrepreneurs, incl. competitors etc., and anonymity guarantee where the state is supervisor)	Directive 2005/29/EC General Data Protection Regulation
2.7.	Lack of transparency in influencer activity (in the content of cooperation – lack of control (incl. certification), oral agreement, risk of responsibility refusal and/or sharing)	Directive 2005/29/EC
2.8.	Absence of written agreement (form of cooperation – service or employment, tax amount to be transferred to state budget)	Directive 2005/29/EC

Source: identified by the authors based on a regulatory framework analysis

In addition to the risk factors listed in Table 1, the results of both the regulatory framework and case-law analysis and the expert survey pointed at the issues associated with implementing network marketing activities. Specifically, there is insufficient regulatory framework in this field as regards the fairness and transparency of such practices. The experience of EU Member States hints at the need to regulate network marketing. In Germany, for instance, considering the broad application of network marketing, there are regulations providing control over such activities. However, both theoreticians and practitioners are still looking for the ethics boundary in defining legal network marketing activities. As concerns EU Member States, the authors find that network marketing activities are mostly regulated within the legal framework governing advertising.

Overall, the legal and ethical angle of digital marketing plays a role in social, economic and environmental dimensions alike towards achieving the necessary political coordination for sustainable development.

The main results show that important factors in putting the digital commercial environment in order and mitigating risks are the lack of competence and knowledge in digital marketing practice, responsibility sharing between the company and the communication stakeholders. In order to mitigate data protection and unfair commercial practice risks, the following dissuasive actions should be taken: raising the entrepreneurs' awareness of the core principles of fair commercial practice, social responsibility and its public impact etc. Natural person, in turn, should develop their digital skills and critical thinking (in using various tools, comparing information in the context of buying, protecting their data, secure shopping and communication on the Internet). Furthermore, study and life-long learning programmes should offer more opportunities of learning the digital skills necessary for essential needs, such as healthcare etc.

Latvian Prohibition of Unfair Trading Practices Law (Prohibition of Unfair Trading Practices Law, 2007) is based on the Unfair Commercial Practices Directive (2005/29/EC, 2005), which states that the penalties laid down by the Member States in application of this directive have to be effective, proportionate and dissuasive (Article 13)). The authors conclude that it is necessary to focus not only on the amount of penalty but also on developing criteria by which to determine in what cases a natural and/or legal person may be punished. This would make it easier to monitor, control, educate and advise the responsible institutions (the Consumer Rights Protection Centre and the Health Inspectorate) and help enhance legitimate expectations and transparency.

Conclusions, proposals, recommendations

- 1) The important factors in putting the digital commercial environment in order and mitigating risks are the lack of competence and knowledge in digital marketing practice, responsibility sharing between the company and the communication stakeholders, conflicts of interest, the focus on immediate sales, the lack of awareness and knowledge of collective social responsibility, ethicality in the digital environment – marketing communication, and the lack of regulatory framework, especially in the fields of privacy protection, intellectual property, data and personal information security, influencer activity, and in the context of sustainability policy in the European Union.
- 2) The regulation of legal and ethical digital marketing is not only subject to EU and national law, but also heavily influenced by the jurisprudence of the European Court of Justice. A thorough analysis of this jurisprudence indicates a rather strict interpretation of legal issues related to digital marketing in order to protect consumer rights and data privacy.
- 3) The absence of fairness and transparency in affiliate marketing is indicative of insufficient regulation. Experiences from EU Member States point to the necessity of regulating network marketing to guarantee company equity and consumer protection. To balance the interests of all stakeholders, future study should prioritize the creation of efficient regulations for affiliate marketing.

Author contributions:

Conceptualization and methodology, S.B.; regulatory framework analysis M.U.; investigation, S.B. and M.U.; data curation and visualization, S.B.; expert survey preparation, S.B.; risk assessment matrix and scale development S.B.; writing—original draft preparation, S.B. and M.U.; writing—review and editing, S.B. and M.U.; All authors have read and agreed to the published version of the manuscript.

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PRECONDITIONS FOR THE DEVELOPMENT OF NEW JOBS IN RURAL AREAS: CASE STUDY OF LATVIA

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Abstract. The availability of well-paid jobs in the regions plays a crucial role in today's regional development, as it provides employment opportunities, prosperity and stimulates the population to stay in the regions. In view of the ever-shrinking population in rural areas, it is essential to create instruments to support the creation of new jobs that are directly aimed at attracting human resources to the regions. The aim of the study is to conduct a research on job opportunities in the regions of Latvia. It evaluates job opportunities in the regions of Latvia. The study analyses the dynamics of available jobs in the regions of Latvia, wages, municipal support tools, influencing factors and analysis of best practices. Various economic instruments are being considered that could contribute to the creation of new well-paid jobs in the regions. The study included feasibility study interviews, statistical data analysis, focus groups and expert survey. The result of the study is an assessment of the current situation regarding job opportunities in the regions of Latvia. The study finds solutions for creating new jobs and attracting labour force to the regions ability to create well-paid jobs. Business support is recommended for companies with the potential to transform from small to medium-sized enterprises, resulting in a greater positive impact on the number and quality of jobs. More substantial support should be provided to companies whose growth is based on export or import substitution, as well as to companies investing in machine-based innovations.

Key words: rural development, new jobs, labor markets.

JEL code: R23

Introduction

In today's regional development, the creation of new, well-paid jobs in the regions plays a crucial role, as it provides employment opportunities, prosperity and stimulates the population to stay in their places of residence. It is essential for public administrations to develop regional job creation support instruments that are directly aimed at attracting human resources to the regions by providing opportunities for well-paid work. The concept of competitiveness and job creation is increasingly being extended to the regional level. In the past, regional policy tried to make regions more competitive by attracting internationally competitive companies, but these initiatives have had little success (Storper, 2018; Lagendijk et al., 2000). The search for a new approach to regional development and job creation is now mainly aimed at making local businesses more competitive and able to provide high-paying jobs. Without new, well-paid jobs, the outflow of the population from rural to urban areas will continue, which, in a downward spiral, reduces the opportunities for enterprises to develop productive businesses in rural areas due to quality human resources.

The hypothesis of the research is that one of the main reasons for the loss of human resources from rural areas is not a lack of jobs, but a lack of well-paid jobs.

The aim of the study is to carry out an assessment of job and remuneration opportunities in the regions of Latvia, including by looking at the support services available in local governments and related regional development challenges.

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Tasks of the research are as follows: (1) to compile information on work and wages in the regions of Latvia in the context of population migration; (2) to evaluate at municipal support instruments that provide job opportunities to improve in the regions; (3) to explore and identify opportunities for the creation and attraction of new, well-paid jobs in the regions; (4) to develop proposals for the introduction of instruments to support the creation of new jobs in municipalities and regions.

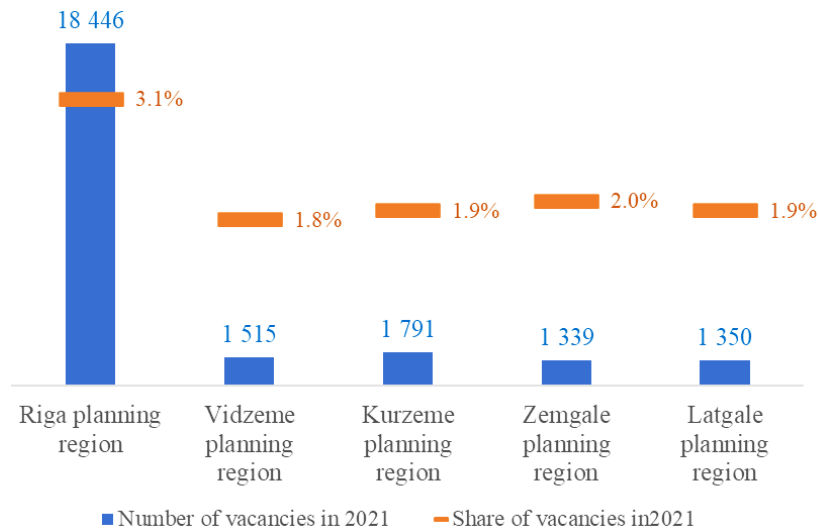
The following methods were used in the study: 7 feasibility studies with experts from public administration, private and civic sectors; analysis of statistical data; focus groups with representatives of each region (5 in total); expert survey, obtaining the opinions of 41 experts from municipalities, entrepreneurs, civil sector and 95 in-depth interviews with representatives of local governments, private and civic sectors. The study's methodological considerations are driven by data-driven theory (Levy, 2006), where the exact number of respondents-experts to be invited is not determined by the initial researchers' considerations but is determined dynamically based on the principle of information saturation. Methods of information processing used in the study include monographic document analysis method, counter-analysis method, grouping method, case studies, graphical analysis method, rapid method of evaluating evidence, methods for processing statistical datasets.

Research presents novelty and topicality. The novelty and topicality of the research lie in the search for a more targeted support specifically for well-paid jobs, rather just supporting new jobs in the region, and identification of ways to provide more effective support in this regard.

There are certain problematic questions covered in the research. On the part of employers, there is a demand for new worker competences, while state aid for upskilling and lifelong learning is already available. The question remains how to motivate people in the regions more effectively for professional development.

Research results and discussion

When evaluating job opportunities in the territories of Latvia, the number and share of job vacancies is the primary indicator. The data on job vacancies available in Latvia in the CSB database currently covers only the breakdown of planning regions. The number of vacancies registered in the State Employment Agency is also compiled at the level of planning regions. From the perspective of the attractiveness of the workforce, the Riga Planning Region has the greatest potential to get a job, since this region has both absolute and relatively the highest number of vacancies. In 2021, the Riga Planning Region had 18 446 job vacancies or 3.1% of all jobs.

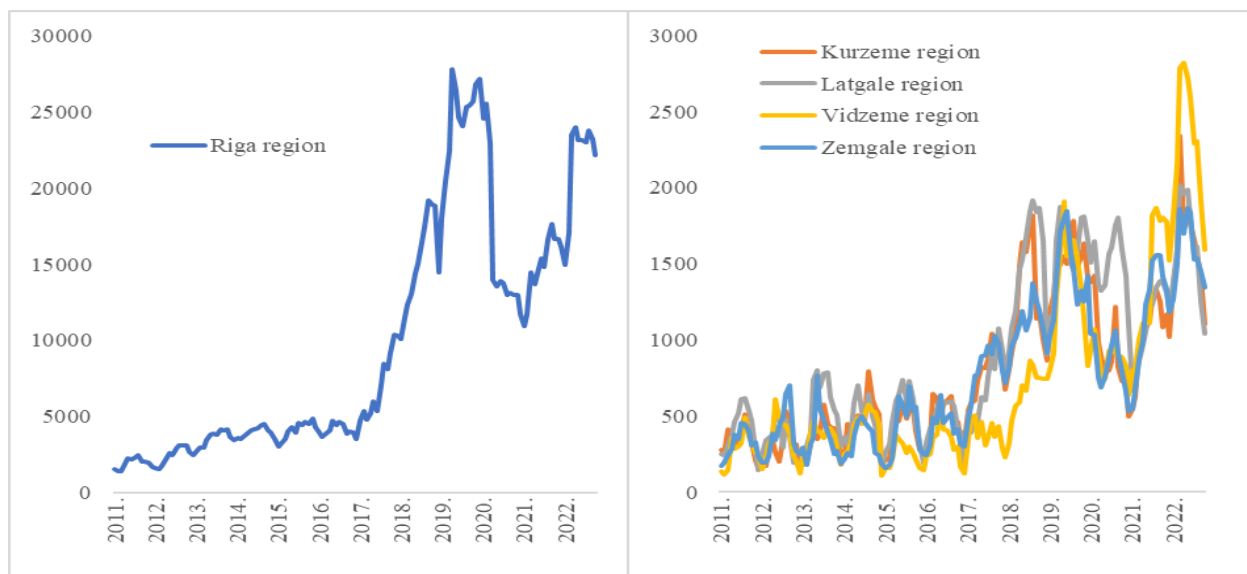


Source: author's calculations based on Central Statistical Bureau data

Fig. 1. Number and share of job vacancies in planning regions of Latvia in 2021

In general, significant differences in the regional breakdown of Latvia cannot be identified outside the Riga planning region. The number of job vacancies varies by two percentage points and in absolute terms the number of job vacancies varies by 452 jobs, which is not a significant difference. In general, it can be estimated that the Kurzeme region has a higher demand for labour than Vidzeme, Zemgale and Latgale regions.

Looking at the situation in dynamics, the total number of job vacancies in the period from 2011 to 2017 was relatively stable in the Riga region, where an increase in the number of job vacancies was observed on average by 58.8 jobs per month, and from 1551 vacancies in 2011 to 10 265 job vacancies at the end of 2017. As of 2018, there has been a significant increase in the number of job vacancies, which peaked in April 2019 with 27,770 job vacancies. The latest available data shows 22,120 job vacancies in October 2022. Thus, in general terms, there are very wide job opportunities in the Riga region and the demand for labour significantly exceeds the labour supply.



Source: author's calculations based on State Employment Agency data

Fig. 2. Dynamics of the number of job vacancies by region 2011-2022

Looking at the other regions, except for the Riga region, the situation is fundamentally different. One of the observations is about ten times lower the number of job vacancies on average in the regions. Looking

at the number of job vacancies by region in October 2022, there were 1103 job vacancies in Kurzeme region, 1041 in Latgale region, 1594 in Vidzeme region and 1343 in Zemgale region. Thus, in the overall assessment, the largest job opportunities outside the Riga region are in Vidzeme region, followed by Zemgale region. The overall development trend in these regions is positive and in the period from 2018 to 2022, Kurzeme and Zemgale regions have the fastest average growth, while the Vidzeme region has minimal changes. During the period considered, the number of vacancies in Kurzeme region has increased on average by 5.3 vacancies per month, in Latgale region – by 3.3 vacancies per month, in Vidzeme region – by 0.5 vacancies per month and in Zemgale region – by 5.0 vacancies per month. Thus, in the overall assessment, the Kurzeme region provides the greatest job opportunities outside the Riga region and the trend is growing in nature. According to the data of the SEA branches, the smallest job opportunities are in three branches of Latgale region – Kraslava, Preili and Ludza, which have approximately 400-600 job vacancies.

In assessing job opportunities, not only the absolute number of available vacancies plays a role, but also the demand in the labor market for representatives of certain occupational groups. Looking at the situation as of 30 September 2022, the greatest demand in most regional areas is for skilled workers and craftsmen, as well as for ordinary professions, which are relatively low-paid professions.

A characteristic factor of the available jobs is the potential income generated by vacancies. One of the indicators is the average monthly wages and salaries in municipalities of Latvia (Table 1). The obtained data on municipalities are grouped into three groups according to wage levels – up to 700 euro, from 700 to 800 euro and above 800 euro. Based on this breakdown and actual data, it can be judged that the largest opportunities for well-paid work for the population according to average indicators are in Pieriga.

Table 1

Breakdown of average monthly wages and salaries by administrative territory at the beginning of 2022, net in euro

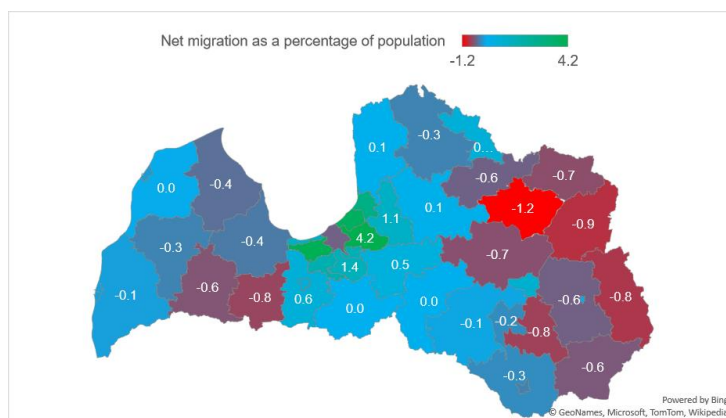
Administrative territory	Average monthly wages, net	Administrative territory	Average monthly wages, net	Administrative territory	Average monthly wages, net
Above 800		700 to 800		Below 800	
Marupe county	1271	Jelgava county	788	Valka county	697
Adazi county	1117	Valmiera county	783	Rezekne city	689
Ropazi county	1067	Cesis county	758	Gulbene county	687
Kekava county	1055	Aizkraukle county	752	Kuldiga county	679
Riga city	941	Dobele county	752	Aluksne county	673
Saulkrasti county	927	Liepaja city	751	Preili county	673
Jurmala city	924	Tukums county	748	Daugavpils city	670
Salaspils county	920	Bauska county	738	Varaklani county	659
Ogre county	879	Smiltene county	734	Balvi county	643
Sigulda county	871	Livani county	733	Ludza county	641
Olaine county	853	Ventspils county	729	Augsdaugava county	636
Jelgava city	827	Saldus county	728	Rezekne county	624
Ventspils city	802	Limazi county	725	Kraslava county	621

Source: author's calculations based on Central Statistical Bureau data

The average monthly salary in Marupe county is 1271 euro per month net, in Adazi county – 1117 euro per month net, in Ropazi county – 1067 euro per month net and in Kekava county – 1055 euro per month

net. These four municipalities are the only ones with a net income above 1000 euro net. The average is also significantly high in Riga, Saulkrasti, Jurmala and Salaspils with an average salary between 900 and 1000 euro net.

It can be observed that the highest positive net migration in proportion to the number of populations in 2021 was observed in **Ropazi, Marupe** and Adazi counties. In these three counties, net migration accounted for more than 3%. In Ropazi county net migration comprised 1336 persons per year, in Marupe county – 1320 persons per year and in Adazi county – 812 people per year. These three counties were both the highest absolute and relative net migration (Figure 3).



Source: author's calculations based on Central Statistical Bureau data

Fig. 3. Net migration as a percentage of population at the beginning of 2021 in municipalities of Latvia

The largest relative negative net migration was observed in Gulbene, Balvi, Ludza, Preili and Dobele counties. In Gulbene county, net migration was equivalent to 1.2% of the population in 2021 or 245 inhabitants. In absolute terms, the most negative net migration was in Riga State City – 3394 people, however, in relative terms they constituted only 0.6% of the population. These indicators positioned Riga in 11th place according to relative net migration, sorted by the most negative balance. When evaluating the obtained data on a regional basis, individual common denominators can be observed. In general, the highest emigration was observed in Latgale region and eastern municipalities of Vidzeme region with a higher level of emigration closer to the external borders of Latvia. In the Riga region, it is possible to observe simultaneously high emigration in the city of Riga and high immigration in the counties adjacent to Riga. Such observations could indicate an intensive change of residence of residents from Riga to the nearest territories.

The conclusion is that residents move to municipalities that are more likely to get high pay. To estimate this indicator, the distribution of the number of employees by monthly gross income in the interval above 1500 euro was used (Table 2).

Table 2

Share of employees with monthly gross wages and salaries above 1500 euro in cities under state jurisdiction and counties (percent)

Riga planning region		Latgale planning region		Kurzeme planning region	
Riga city	28.8	Daugavpils city	9.1	Liepaja city	19.3
Jurmala city	16.7	Rezekne city	9.8	Ventspils city	20.3
Adazi county	15–15.8	Augsdaugava county	4.5–11.1	Dienvidkurzeme county	3.9–14.9
Kekava county	9.5–30.6	Balvi county	2.7–6.6	Kuldiga county	7.5–16.8
Marupe county	20.2–29.3	Kraslava county	4.8–5.5	Saldus county	12.8–14
Olaine county	21.8	Livani county	14.3	Talsi county	6.2–12.1
Ropazi county	18.7–27.7	Ludza county	4.1–6.8	Tukums county	7.6–14.7
Salaspils county	22.9	Preili county	4.2–8.5	Ventspils county	18.1
Sigulda county	8.3–23.4	Rezekne county	5.6–6.3		
Vidzeme planning region		Zemgale planning region			
Valmiera city	21.3	Jelgava city	17.9		
Aluksne county	7.2	Jekabpils city	12.3		
Cesis county	5–15.7	Aizkraukle county	5.5–16.1		
Gulbene county	11.6	Bauska county	10.1–16.8		
Limbazi county	6.8–12.8	Dobele county	10.5–20.1		
Madona county	5.8–11.8	Jelgava county	13.8–19.4		
Ogre county	11.9–18.2	Jekabpils county	6–27.1		
Saulkrasti county	12.4–24.6				
Smiltene county	5.2–13.3				
Valka county	7.8				
Valmiera county	5.2–21.1				
Varaklani county	6.6				

Note: In the administrative-territorial reform, the merged counties indicate the range between the lowest and highest indicators in the old counties merged into the new ones.

Source: author's calculations based on Central Statistical Bureau data

Riga Planning Region has the highest share of population with gross income exceeding EUR 1500 per month – 28.8%. High indicators are also observed in Kekava, Marupe and Ropazi counties, which were merged during the Administrative Territorial Reform process, about 27-30% of employees had a working income above 1500 euro per month gross. In Vidzeme Planning Region, the highest share of employees with employment income above 1500 euro per month gross is in Saulkrasti and Valmiera counties. Latgale Planning Region has relatively lower indicators, and only Livani county has a high share of 14.3% for employees with gross income above 1500 euro per month. In other counties, this indicator is below the 10% limit, except for Augsdaugava county, which has the former Ilukste county with an indicator of 11.1%; but in general, the county on average would be rather below the 10% limit, for which data are not available in the new county breakdown. During the Zemgale planning period, the highest job opportunities for remigrants striving for higher incomes are in Jekabpils county. Although this county has a high internal variation, the former Akniste county included in it has the same high proportion of wealthier population as Ropazi county. In the Kurzeme Planning Region, the highest attractiveness from the perspective of labour income is in the cities of Ventspils and Liepaja with an indicator of 19.3% and 20.3% and in Ventspils region.

1. State and municipal support for the creation of new jobs

Latvia has a wide and constantly changing set of support measures aimed at promoting the creation of new jobs. One of the most important business support providers is LIAA (Investment and Development Agency of Latvia), which offers an extensive program with support activities for current and future entrepreneurs. LIAA support is available in several programs: Innovation Motivation Program, Business Incubators, Start-up Support Programs, Evaluation of Innovative Ideas of Start-ups (Application for a Start-up Visa), Innovation Voucher Support Services and Support for Attracting Highly Qualified Employees, Support for Commercialization of Research Results, Promotion of International Competitiveness, Support for Employee Training, LIAA Technology Business Center, Investment of Large and Medium-sized Enterprises capital rebate loans for competitiveness, Norwegian Financial Mechanism, Green Corridor Initiative and Others. Voucher support services and promotion of international competitiveness are two of the most used supports for current and future entrepreneurs from the relatively wide range of support to stimulate the innovation offer, which includes competence centres, support for the development/purchase of experimental equipment, cluster support, business incubators, innovation incentive programmes, the Norwegian Financial Instrument, ALTUM financial instruments and other.

The offer of support under the programmes is mainly variable, but constant support is also available, such as the voucher support services already mentioned and the promotion of international competitiveness. The Ministry of Defence introduced a grant project programme, the aim of which is to increase the competitiveness, export capacity and innovation abilities of merchants in the field of defence and security of Latvia, as well as cooperation with research institutions in the development of military or dual-use products and technologies.

In the theoretical study of the factors contributing to job creation, it was identified that an effective solution for job creation is state subsidies for wages. In Latvia, a similar mechanism has been partially established and is operating in the project "Subsidized Jobs for the Unemployed". This programme targets the unemployed, who have reduced opportunities to enter the labour market, so their hiring is subsidised.

One of the tools that can facilitate the suitability of the workforce for market needs is the possibility of conducting training with the employer himself. For the most part, refresher and retraining programs offered by the State Employment Agency are in the form of courses. Such training is considered to be to some extent useful, but is not able to prepare employees for the fully expected demands of the labor market. In turn, this need is met by the State Employment Agency program "Training at the employer with the involvement of industry associations". The purpose of this program is to organize the practical preparation of the unemployed for work in enterprises in the industry. The training is organised based on the sector's demand for labour and industry specificities, which justifies the requirement for cooperation with industry associations.

2. Views of regional authorities, entrepreneurs and representatives of the civic sector

In the discussions of the focus groups of Latvian regions, it is pointed out that the creation of new jobs in the regions often cannot develop nowadays due to the lack of a quality workforce, which also explains the relatively large number of vacancies in all regions. Entrepreneurs point out that it is difficult to find a reliable employee in the regions and that the business environment and attracting new jobs in the region largely depend on the head of the municipality. As an example, the case of Marupe is cited. It is stated that if a worker has a good education and knows how to work, he can also earn accordingly. To attract employees, it is emphasized that it is necessary to provide the entrepreneur himself with a higher salary and entrepreneurs need to change their thinking. Representatives point out that the actual unemployment

rate is very low, for example, experts from the Vidzeme region estimate that it should be measured around 3% in Vidzeme. Representatives of all regions in the discussion point out that the biggest challenges in creating new jobs are the environment and the housing stock. During the year 2022, the strategy of Latvian companies has often been directed towards consolidation, reducing the number of employees, but increasing wages for existing ones. It is emphasized that the pandemic has introduced changes in the organization of work - office workers work outside offices, and, according to representatives, this is irreversible. If there are orderly systems, then working remotely and creating new jobs for entrepreneurs is easier. It has been observed that the biggest problems with finding a workforce are in lower-paid occupations. It is emphasized that the demand on the labor market does not always coincide with skills and experience. Mobility challenges are also pointed out - if an employee lives in the countryside and works in the city, there is a mobility problem, because often buses do not go, while private transport is very expensive at the existing fuel prices. An example is given: if there is a salary above 1000 EUR and 250 EUR is needed for the road plus taxes, little is left over to meet the needs of life. The existing State Employment Agency mobility benefit is paid to the unemployed person for four months, and it is intended more in situations where it is necessary to cover immediate costs before the first salary if the workplace is not adjacent to the place of residence. This is not a long-term solution. Representatives of the Latgalian EU stress that the region has a demand for new competencies. The State Employment Agency offers courses in the region, but the motivation and desire of a person is important. Experts point out that a lot can also be learned remotely. A more important question is how to motivate these people to retrain, to which there is currently no answer.

3. Factors for creating new, well-paid jobs

One of the best-known elements in the context of job creation is public subsidies for job creation (Girma et al., 2008), proving that government grants affect the demand for labor in the industrial sector. It has been shown that the introduction of subsidies for producing companies makes it possible to achieve a higher and better-paid level of employment than if they did not exist. An important conclusion is that a large part of the subsidies is recovered due to increased wages, which contributed to the return of funds to the state budget.

Another factor shaping new jobs is the activity of small and medium-sized enterprises, where it has been shown that small and medium-sized enterprises are as effective job creators as large enterprises. Although small businesses account for a small share of total employment, they generate the most new well-paying jobs (Ayyagari et al., 2014), which is achieved with a higher growth potential of the company. Problems in accessing finance, the need for training, the tax burden and bureaucratic barriers are cited as barriers that arise for small and medium-sized enterprises (Sloka et al., 2017). An important prerequisite for growth is the desire of small businesses to develop into medium-sized businesses, which is not always the case, since small businesses can only be created to meet the basic needs of its founders (Braslina et al., 2021). Consequently, it is important for policymakers to motivate small entrepreneurs to strive for growth and increase in staffing.

Digitalisation is an important factor in the development of a well-paid labour market with a high potential for job opportunities. Digitalisation has been identified as both a high-wage workplace creation and a process that destroys low-skilled jobs (Balsmeier et al., 2019). Innovations based on machine technologies (robotisation, 3D printing, smart equipment etc.) generate much more significant economic and social benefits than service-based innovations (e-commerce, support, business management systems etc.) (Batra et al., 2018).

The OECD study on job creation and regional economic development (2014) highlights four key-guidelines. The first guidelines call for an increase in the supply of and demand for job skills, thereby stimulating the creation of high-quality jobs. This task is implemented in Latvia by the SEA with its activities, at the same time the barriers that arise for entrepreneurs to receive this service have been identified. The most significant obstacles relate to the quality of training and the need for the company to hire an employee before carrying out training, which entails risks if the employee abuses this position. In regions and municipalities that have fallen into low skill levels, low-skilled labour has been offered and demanded in the labour market, which does not motivate the attraction of higher-skilled labour and contributes to its outflow (Sloka et al, 2022). The second OECD Guidelines provide support for business development and growth that would ensure job creation. In this context, it is essential to create the conditions for the creation of fast-growing enterprises. The development of such enterprises is facilitated by being located in more densely populated areas with a high level of education, and an important support mechanism is business catalysts, which in the case of Latvia is a well-developed network of business incubators. There are 11 regional business incubators operating in Latvia, however, many of them cannot be linked to higher education institutions, which would be able to create synergies between the educational institution and the incubator. For example, such synergy is not actively possible in the regional business incubators of Kuldīga, Ogre, Sigulda and Madona. The recommendation would be the integrated development of business incubators with higher education institutions, which would create an opportunity for the commercialization of inventions, the employment of graduates in a nearby area and the development of cooperation projects. State Employment Agency also offers refresher programs for managers, but it would be important to actively develop the expansion of entrepreneurship education.

The third OECD guidelines are the development of easily adaptable local economic strategies and systems. Regions need to look for new approaches to economic development – how to use new strategies for attracting markets and investments. Considering that growth is determined by knowledge-based capital, it is important to establish partnerships with higher education institutions, which also indicates in the Latvian context a greater potential for creating jobs in municipalities where universities and higher education institutions are located (Rīga, Rezekne, Valmiera, Ventspils, Jelgava, Liepāja, Daugavpils). Other municipalities also have higher education institutions, but universities and universities can make a more significant contribution to the development of innovations (Stephenberg et al., 2022). Local governments should adapt to demographic challenges and the rise in the average age by supporting flexible working hours and jobs that are adapted for older workers. In the light of the EU Green Deal, flexibility of education systems is needed to help workers reskill to niches in the green economy.

The fourth OECD Guidelines are the use of local data for policy making. It is necessary to systemically use more detailed and larger amounts of data by municipality to gain insight into the current situation and, when making tactical decisions, to understand the current availability and perspective of high-quality jobs.

One of the most relevant and modern approaches to the region's ability to attract well-paid jobs is the region's focus on smart specialisation, which is the transformation of the economy towards higher added value, productivity, and more efficient use of resources (Brašlina et al., 2020). The basic idea behind each region's smart specialisation strategy is the need to concentrate scarce resources on ensuring an increase in innovation capacity in the areas of knowledge and innovation where each region has the greatest potential for growth. The smart specialisation strategy component is included in the development strategies of all regions of Latvia, while a separate document has been developed for the Vidzeme Planning Region, as well as work is underway on the development of a strategy for attracting investments. Studies indicate that currently a very important issue in strengthening the regional productivity is the region's capacity to

absorb the aid provided, which according to the researchers viewpoint is insufficient (Braslina et al., 2020), and one of the main barriers is the lack of access to educated and innovative human capital, which can perceive this support and turn it into new jobs.

Conclusions, proposals, recommendations

- 1) There is no shortage of new jobs in the regions of Latvia, there is rather a shortage of well-paid jobs in the regions of Latvia as residents move to municipalities where there is a greater chance of obtaining high wages. A close link has been observed between the average wage of a job in the municipality and population migration.
- 2) The demand on the labor market does not coincide with skills and experience. At present, the creation of new, well-paid jobs in the regions cannot develop in part due to the lack of a quality workforce, which also explains the relatively high number of vacancies in all the regions.
- 3) Entrepreneurs face the highest labour supply challenges in lower-paid occupations.
- 4) Latvia has a wide and constantly changing set of support measures aimed at promoting the creation of new jobs. The strengths of the existing mechanisms rather result from the dynamic activity of the State Employment Agency, offering vacancies and a wide range of refresher opportunities corresponding to the labor market. The potential for development would be possible by promoting the coordination of the geographical network of incubators and universities and the provision of grants to enterprises not on a small scale and to a larger number, but by targeting grants for the improvement of enterprises, which contributes to higher productivity, the introduction of innovations and the production of products intended for export or import substitution.
- 5) There are several enabling factors for the creation and attraction of new, well-paid jobs: subsidies, promotion of entrepreneurial activity, digitalisation, professional development - business catalysation, creation of easily adaptable economic systems and strategies, focus on smart strategy in a regional context and systemic availability of local data to ensure the necessary regular intervention.
- 6) One of the biggest challenges in creating new jobs is the environment and the housing stock. The study has identified employee mobility challenges.
- 7) The creation and attraction of jobs is facilitated by the general growth of economic activity, subject to certain conditions. A positive effect of job creation can be observed in the growth of small and medium-sized enterprises, but especially in the transformation of small enterprises into medium-sized ones.
- 8) The development of innovative and digital sectors can contribute to the creation of high-paying new jobs. A greater effect can be achieved by developing machine-based innovations rather than service-based innovations.
- 9) Following the trends in labour markets, it is necessary to promote remote work opportunities both in the central and local government sector and in the private sector. Such a solution would make it easier for workers to choose territorially different places to live and work. The maintenance and development of mobility programmes to financially support the ability of workers to choose to remigrate to an area not directly close to the workplace is also supported by similar reasoning.
- 10) The creation and attraction of new jobs depend on overall economic development and entrepreneurship, which requires continuing support for growth-oriented entrepreneurs, especially small and medium-sized enterprises. These measures would include a predictable tax system, tax incentives in case of hiring remigrants, support programmes for remigrants to start or transfer a business to Latvia,

introduction of co-creation spaces in municipally owned premises and organisation of networking activities for faster integration of remigrants into the local business environment.

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URBAN AGRICULTURE – POPULATION'S ATTITUDE TOWARDS PRACTICE AND PRODUCTS IN LATVIA

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Abstract. The food growing practice is connected with Latvia's cultural-historical heritage and traditions, due to which agriculture, especially in the form of micro-farming for household self-consumption, is a developed practice in Latvia, including in cities. Trends of urban agriculture, which are characterised by inclusion in dimensions of the sustainability, develop the practice of community gardens that in Latvia are currently in the development stage. This highlights the need to evaluate the population's attitude and views on the aspects of urban agriculture in Latvia. The agricultural sector in Latvia is developed and rural regions are relatively close to urban areas, therefore, agricultural practices in cities for the realization of production can create a different, even negative attitude of society towards urban agriculture and its relevance in Latvia. Therefore, the aim of this study is the assessment of the attitude of the population in Latvia towards practices and products of urban agriculture. In order to achieve the aim, two tasks have been set: 1) to analyse the attitude of Latvia's population towards the practice of urban agriculture; 2) to analyse the population's attitude towards urban agricultural products, in the context of their food choice criteria. To fulfil the tasks, a survey of Latvia's population was conducted. In general, the population's attitude creates supportive aspects for urban agriculture in Latvia, but challenging are aspects of the attitude regarding the potential pollution of food in the urban environment, its role and performance in cities, which population do not associate with agricultural practices.

Key words: urban agriculture, population attitude, population survey, Latvia.

JEL code: A10, E20, O13, Q01, R00

Introduction

Research on urban agriculture is constantly growing, and not only the number of scientific publications is expanding, but also the variations of topics - from conceptualization issues to studies of focused aspects of practice. The analysis of different cases is also increasing in terms of scale, topics and methods. However, there are still only few studies on urban agriculture in Latvia. The traditions of growing food in Latvia are cultural and historical; however, agricultural practices in cities have been little studied. The relatively small number of studies on urban agriculture in Latvia creates both broad research opportunities in the context of the topic and challenges in data acquisition and processing. There are practically no statistics on urban agriculture in Latvia - there is only the number of enterprises registered in the agricultural sector, which often operate outside the city borders, and the number of registered livestock and poultry. Community gardens also register their activities in various ways, mostly as associations for educational and cultural purposes (Dobele, 2022), which makes it difficult to identify them. Therefore, primary data acquisition is important for urban agriculture research in Latvia.

Urban agriculture is able to create links between urban and rural environments, food production and consumption, nature and culture, people and place both at the macro level through community and social initiatives and at the micro level in individual habits and households (Wittenberg et al., 2022). Therefore, in the analysis of urban agriculture practices, it is essential to evaluate not only commercial practices and community activities, but also individual, household activities that ensure social sustainability at the individual, household level (Yumin, Shin, 2022). In 2021, the results of a population survey on motivational aspects of food growing practices in Latvian cities have been published (Dobele et al., 2021). But in order to evaluate urban agriculture in Latvia, in the context of the analysis of the population survey, it is essential to understand and evaluate not only the habits of the population in growing food, but also the attitudes

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and opinions about food grown in cities. Therefore, the aim of this study is the assessment of the attitude of the population in Latvia towards the practices and products of urban agriculture. In order to achieve the aim, two tasks have been set: 1) to analyse the attitude of Latvia's population towards the practice of urban agriculture; 2) to analyse the population's attitude towards urban agricultural products, in the context of their food choice criteria. To fulfil the tasks, a survey of Latvia's population was conducted in March-October 2021, in which 884 respondents participated.

Research results and discussion

The conceptual distinction between agriculture and the urban environment has been formed historically (Dobeļe, Zvirbule, 2020). Due to both this historically formed distinction and the negative consequences of the environmental impact caused by urbanization, agricultural activities in the city are often associated with the problem of quality food production due to air and soil pollution in the urban environment (Bourque, 1999), thus creating an additional challenge for the development of urban agriculture - the attitudes and perceptions of the population in urban food. In order to gather the perceptions and attitudes of Latvia's population towards the practices and products of urban agriculture, a survey was developed as part of the study. The survey was conducted in March-October 2021, therefore data on the population of Latvia at the beginning of 2021 were used to determine the sample size. According to the data of the Central Statistical Bureau, at the beginning of 2021, there were 1,893,223 inhabitants in Latvia (Iedzīvotāju skaits gada..., (n.d.)). With a confidence level of 95% and a margin of error of 5%, 385 respondents are required for the determined general population. 884 respondents took part in the population survey, which reduces the margin of error to 3.3% under the conditions of the general population. This shows that by using the survey data, the analysis of the population's attitude is feasible and the results are representative of the general population. Demographic information of the respondents is summarized in Table 1.

Table 1

Demographic information of respondents (n=884)

Gender		Age, years		Education received		Average household income*, EUR		Share of household food expenses on average per month, %	
category	resp., %	category	resp., %	category	resp., %	category	resp., %	category	resp., %
women	67	18-24	41	primary	1	up to 500	19	up to 15	7
		25-34	25	secondary	40	501-700	21	16-25	27
		35-44	18	college	5	701-1000	28	26-35	35
men	33	45-54	11	undergraduate	21	1001-1200	12	35-50	21
		55-64	4	master's	28	1201-1500	9	51-65	8
		over 64	1	PhD	5	over 1500	11	over 65	2

* - per 1 household member per month

Source: authors' calculations

46% of respondents live in Latvia's 10 state-cities, which are the largest in terms of population. Of them, 66% are engaged in growing at least one type of food product in their households, which indicates the high interest of urban residents in growing food even when they are in the urban environment. In order to analyse whether opinions about urban agriculture and its products are influenced by the place of residence (in or outside of the city) and involvement in urban agriculture practices, the respondents were divided into three groups:

- residents of state-cities, engaged in food production;
- residents of state-cities, not engaged in food production;
- residents who live outside state-cities.

The performance of urban agriculture practice, especially in economic aspects, is significantly influenced by not only the scale and type of the practice and price competitiveness, but also by consumers' perception and attitude towards urban agriculture products and their value (Yuan et al., 2022). Studies on the attitude of the population towards food grown in cities show several specific aspects. A 2019 study in Spain (Ercilla-Montserrat et al., 2019) on the population's attitude towards urban food grown on the roofs of buildings indicates that most respondents (94%) consider such food local and fresh, and 69% of respondents indicated that tomatoes grown in zero-soil technology are considered as greener agricultural practice than the traditional approach. The results of the study also indicate that residents with a higher level of income and higher education better accept the price of urban roof garden production, associating it with quality. With food quality, urban agriculture practitioners identify taste, freshness and sanitary aspects (Pourias et al., 2016). A different consumer assessment has been published in connection with a study in the Mexican city of Mérida, which indicates that residents are not interested in the production of urban agriculture, although they recognize the potential of urban agriculture in improving a balanced diet (Nadal et al., 2018). Differences in research results indicate that public opinions differ and cannot unify the experience of one country or city by applying it to a wider part of society. Therefore, it is necessary to develop studies of population's attitudes, analysing the experiences of different countries.

Urban agriculture in Latvia is characterized by several aspects - both the factors affecting the practice, functions, motivation, operating principles, etc. In addition, although urban agriculture in Latvia is also a multifunctional practice (Dobele et al., 2022a), its main activity and function is food production. Therefore, the study of urban agriculture in Latvia includes an analysis of the attitude and evaluation of population in two directions:

- 1) food selection criteria and factors affecting them;
- 2) assessment of attitudes towards food grown in the city.

For the analysis of factors affecting food choice, the citizens' survey questionnaire includes 10 criteria characterizing food products, which respondents rated on a 5-level Likert scale from 1 – not important to 5 – important. The average evaluation of selection criteria of food products is summarized in Table 2.

Table 2

Evaluation of selection criteria of food products (n=884)

Criterion	Residents of state-cities		Other residents	All residents, average
	grow food	do not grow food		
Freshness	4.63	4.67	4.77	4.68
Quality	4.52	4.52	4.57	4.54
Tested taste	4.10	3.92	3.86	4.00
Local Latvian product	3.61	3.39	3.31	3.47
Low price	3.21	3.22	3.35	3.26
Promotional product	3.22	2.95	3.14	3.13
Long lead period	3.21	2.96	3.13	3.12
Organically or biologically grown	3.21	3.05	3.01	3.11
A well-known farmer	3.19	2.59	2.89	2.95
Local product of the region, city	3.12	2.60	2.72	2.87
<i>Average for all criteria</i>	<i>3.60</i>	<i>3.39</i>	<i>3.48</i>	<i>3.51</i>

Source: created by the authors based on the respondents' assessment

In the evaluation of all respondent groups, the most important criteria when choosing food products are food quality, freshness and proven taste. They are also the primary selection criteria in the results of population surveys in other countries (McClintock et al., 2016; Ercilla-Montserrat et al., 2019; Gauder et al., 2019). The importance of these criteria can be assessed as contributing to the development of urban agriculture in Latvia, because the residents state-cities who are engaged in urban agriculture rate their food, grown in the city, as fresher, healthier and safer than what is bought in a store (the average assessment of the importance of aspects within the range of 0-1 is 0.89). Therefore, in the assessment of the population, self-grown urban food meets the most important criteria for choosing food products. Beliefs that home-grown food is fresher and healthier can also be identified in other countries' survey results on urban agricultural products (Degefa et al., 2021; McClintock et al., 2016; Ruggeri et al., 2016; Kirby et al., 2021), which shows that these perceptions are characteristic not only in the context of the motivation of the practice, but also in the perception of society in general.

The results of the survey show that urban agriculture practitioners have higher requirements in the selection of food products, as: 1) the average of all criteria is higher; 2) compared to the other groups of respondents, the average ratings of the importance of criteria for those involved in the practice of urban agriculture are higher in 7 out of 10 criteria: promotional product, long lead period, tested taste, organically or biologically grown product, local product and well-known farmer. Compared to other groups of respondents, urban agriculture practitioners have lower requirements regarding freshness, quality and low price of food products, although when comparing the criteria, freshness and quality are the most important choice criteria for all groups of respondents. However, for all criteria, the differences between the population groups are relatively small, which indicates relatively equal requirements in food choices, regardless of the place of residence (in the state-cities or outside them) and the involvement in the practice of urban agriculture.

In the context of the development of urban agriculture, the value of such criteria in the choice of residents as freshness, local product, well-known farmer can be positively evaluated, as these are criteria typical of urban agriculture products (Foodmetres. Food planning..., 2015; Opitz et al., 2016). As urbanization increases, the role of urban agriculture as a factor in providing healthy, fresh, local food also

increases, thus reducing the pressure of urbanization on the ecosystem and reducing the risk of creating food deserts (Boneta et al., 2019).

Analysing the relationship between the assessment of the significance of the criteria and aspects characterizing respondents (gender, age, level of education, average amount of income per 1 household member, proportion of expenses spent on food), an average positive statistical relationship (using B.Ratner's (2019) division that the average relationship is within 0.30-0.69) is found only among some indicators:

- 1) the importance of the local Latvian product and the age of the respondent (correlation coefficient: 0.35);
- 2) the relationship of the importance of the local region, city product with the age of the respondent (correlation coefficient: 0.30).

No statistically significant statistical relationship was found between other food selection criteria and aspects of respondents' characteristics. This shows that the population's food choice criteria are constant and without significant influence of the socio-economic aspects of the respondent.

More significant differences in the opinion of different groups of respondents are in the questions about the assessment of urban agricultural practices and products (Table 3).

In the evaluation of the population, the highest average rating in the range of 1-5 is for the aspects of urban agriculture attitudes and beliefs related to the social functions of the practice, as a complementary aspect of school education programs and experiences (average rating: 4.16) and the aspect of providing additional knowledge and education (average rating: 4.08). The promotion of education as the most realized function of urban agriculture has also been identified in a study on the multi-functionality of practice in Latvia (Dobele et al., 2022a). In addition, the opportunity to learn something new is also one of the biggest motivators for growing food in the city in the opinion of city dwellers of Latvia (Dobele et al., 2021). That emphasizes that urban agriculture in Latvia has a basis for development in terms of education, including the practice of growing food both in the educational process and realizing the function in community gardens. The attitude of the population towards urban agriculture in the context of this function is strongly positive.

However, the opinion of the social aspect, that urban agriculture contributes to collective and community formation is moderately important (average rating: 3.51), which can be influenced by the relatively small number of community gardens and, therefore, experience in Latvia's state-cities.

Table 3

Evaluation of urban agriculture practices and products in Latvia (n=884)

Aspect	Residents of state-cities		Other residents	All residents, average
	grow food	do not grow food		
Agricultural practice in schools complements the educational program and experience	3.98	4.30	4.32	4.16
Practicing agriculture in the city (in schools, social care homes, yards and elsewhere) provides education, additional knowledge	3.88	4.21	4.27	4.08
Agriculture in cities diversify and create a greener urban landscape	3.96	4.07	4.25	4.07
Growing food in the city is trendy	3.61	3.46	3.53	3.55
Home-city grown food is healthier than store bought food	3.78	3.07	3.59	3.55
Urban agriculture is a way to minimize adverse climate change	3.52	3.47	3.58	3.52
Growing food in the city promotes collective, community action (for example, gardens in schools, nursing homes, hospitals, courtyards of apartment buildings)	3.48	3.53	3.54	3.51
Food grown in cities is more expensive than store-bought	3.36	3.21	3.19	3.27
Due to urban pollution, food grown in cities is more polluted than food grown in the countryside	3.04	3.54	3.39	3.27
Growing food in the city is not agriculture	3.06	3.21	3.38	3.19
I am willing to support urban food growers by buying the food they grow	3.29	3.05	3.14	3.19
Growing food in the city is possible only as a hobby	2.98	2.98	2.81	2.93
Growing food in the city is not a business	2.73	2.56	2.42	2.60
Due to the use of agrochemicals (including plant protection products) used in agriculture, food grown in the countryside is unhealthier than food grown in the city	2.62	2.63	2.46	2.57

Source: created by the authors based on the respondents' assessment

In the context of environmental aspects, the opinion that urban agriculture diversifies and creates a greener urban landscape is also highly rated among Latvian population (average rating: 4.07). The concept of "green cities" is also included in the United Nation's publication on the role of urban agriculture (The place of..., 2011). The idea of green cities is also related to urban sustainability, which is one of the UN Sustainable Development Goals. It includes balancing consumed and produced resources, including food, improving environmental quality and developing green public areas (Goal 11: Make..., (n.d.)). Agricultural practices in cities not only make the urban environment literally greener, but also ensure environmental and ecosystem diversity (WinklerPrins, 2017; Simon, 2023). One of the conditions for the sustainability of cities is the development of "green infrastructure", which includes the creation of landscapes characteristic of agriculture, such as agricultural parks, small gardens, community gardens, etc. forms of urban agriculture (Tóth, Timpe, 2017). The high assessment of Latvian population in this aspect shows that the idea of urban sustainability in the greening of the urban environment is relevant in the public's attitude, which indicates potential public support for the development of urban agriculture practices. However, views on urban agriculture as greening of cities are higher among the part of the population that does not live in state-cities, which indicates a different evaluation of the urban environment. The opinion that urban agriculture mitigates the adverse effects of climate change is relatively lower rated

(average: 3.52), which shows that residents primarily value urban agriculture as a practice of greening and environmental diversification, but not as an ecosystem service.

Urban agriculture in Latvia is mostly practiced in the form of micro-agriculture - in small quantities, food is mostly grown in households for self-consumption (Dobele et al., 2021). The aspects in which the opinions of urban agriculture practitioners are higher, are directly related to the specifics and trends of the practice of urban agriculture in Latvia, which are characterized by trendiness (urban food growers believe that the practice is modern), the small volumes of urban agriculture (the practice is only a hobby and not entrepreneurship) and process specifics of practice (food is healthier, more expensive; willingness to support local growers). Similarly, the relatively lower rating of this group of respondents in social functions (socialization, education) may be influenced by existing practice trends, considering that the majority of respondents engage in food growing in their private property areas, within the household.

Analysing the attitude towards the produce of urban agriculture, it can be concluded that Latvian residents value such criteria as healthiness (inhabitants believe that food grown in the city is healthier than that bought in stores - average rating: 3.55) and expensiveness (inhabitants believe that urban agricultural products are more expensive - average rating: 3.27). Taking into account that freshness is an important criterion for selecting food for the people of Latvia, then the opinion about the healthiness of urban agricultural products can be conducive to the practice. However, the price aspect, taking into account that the respondents rate the importance of the low price criterion at an average of 3.26, can be a hindering aspect, evaluating it in the relation to the public's opinion about the expensiveness of the urban agriculture products. The high importance of the quality criterion can also be an obstacle to the development of urban agriculture, because Latvian residents do not believe that the products grown in the countryside due to the agrochemicals used could be more harmful than the products of urban agriculture. However, the opinion that food grown in cities is more polluted than food grown in the countryside has an average endorsement (average rating: 3.27) and is significantly lower among practitioners themselves (3.04). This shows a potential that with the additional research and public awareness the intensity of this belief could be easily changed, thereby promoting the development and public acceptance of urban agriculture.

Respondents disagree (average rating below 3.00) with statements such as "growing food in cities is possible only as a hobby" (average: 2.93) and "growing food in the city is not a business" (average: 2.60). Although urban agriculture is currently little practiced commercially in Latvia, public opinion shows a potential interest in its development. However, the factors negatively affecting the development of commercial practice are the cost of land resources and labour costs (Dobele et al., 2022b).

In analysing the relationship between the importance of opinions and aspects characterizing the respondents (gender, age, level of education, average amount of income per household member, proportion of expenses spent on food), no strong or moderate statistical relationship was found. Small tendencies of the statistical relationship (correlation coefficient in the range of 0.20-0.29) can be found between the age of respondents and beliefs such as: urban agriculture can minimize adverse climate changes (correlation coefficient: 0.25); agriculture in cities is possible only as a hobby (correlation coefficient: 0.27); horticultural practice complements the educational program (correlation coefficient: 0.21). No statistically significant relationship was found between other evaluations of urban agriculture practices and products and aspects of the respondents' characteristics, which allows concluding that the population's views on urban agriculture are persistent and generalizable, regardless of the socio-economic aspects characterizing the respondents.

Conclusions, proposals, recommendations

- 1) Urban agriculture in Latvia is a practice that has been little researched, therefore primary data collection on various aspects characterizing the practice is relevant for characterization and analysis. In the research, a population survey was conducted on opinions about practices and products of urban agriculture in order to assess the attitude of the Latvian population.
- 2) Urban agriculture in the context of the population's attitude has a high potential in realizing the functions of promoting and improving education. Opinions that urban agriculture diversifies and greens the urban environment are also relatively highly valued, although Latvian population value the functionality of the practice in mitigating the negative consequences of climate change lower than aspects of education.
- 3) The population of Latvia has a very positive assessment and views regarding the healthiness of food grown in cities, comparing it with what can be bought in stores. That interacts positively with the importance of food selection criteria such as food freshness. However, taking into account how important the quality criterion is for Latvian citizens in choosing food, it is necessary to develop research on the quality of food products in Latvia, especially comparing food grown in urban and rural areas.
- 4) The intensity of opinions and attitudes is relatively similar both among the residents of state-cities and among the residents of other territories. However, the attitude of the practitioners of the urban agriculture is relatively the most different, which can be influenced by experience and knowledge of the specifics of the practice in the urban environment. This shows that the aspect of informing the public about the specifics and possibilities of the practice is essential in the development of urban agriculture, especially in the implementation of social and environmental aspects.

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ATTITUDES TOWARDS AND READINESS TO INVOLVE IN PROTECTION OF NATURAL RESOURCES: THE CASE OF GAUJA NATIONAL PARK INHABITANTS

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Abstract. The protection of natural resources during an ongoing climate crisis can be viewed not only as a precondition for natural ecosystems but for social and economic ecosystems as well. At the same time, localization of natural resource protection within rural development issues includes the involvement of local inhabitants both in terms of attitude and practical involvement as an important precondition for sustainable regional development. Based on quantitative data gathered from the project "Ready for change? "Sustainable management of common natural resources" this article aims to reveal attitudes towards protection and readiness to involve in the protection of natural resources of Gauja National Park inhabitants. Data from a representative quantitative survey reveal that local inhabitants of Gauja National Park have high expected responsibility from various actors for the preservation and protection of natural resources. Expected responsibility can also be well explained by the concept of shared responsibility. It can also be concluded that there is broad agreement on the representation of interests of local inhabitants in the Nature conservation plan regardless of civic engagement or involvement in the protection of natural resources – either operationalized as involvement intensity in various dimensions of nature protection or in embedded readiness to involve or involvement in nature protection.

Key words: Protection of natural resources; attitudes; local inhabitants; representation; shared responsibility.

JEL code: Q01

Introduction

The ever-rising grave concerns are confirmed in the previous IPCC reports (IPCC 2018, 2019, 2021, 2022). The assessment of the draft report that will be published in 2023 allows us to assume that many climate-related risks are higher than assessed in previous reports. We need to deal with disproportionately high and non-linear long-term risks. As this draft report is not currently available for quoting or citing, the report of 2022 states that the 'rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt [...], the extent and magnitude of climate change impacts are larger than estimated in previous assessments' (IPCC, 2022: 8-9) and 'climate change impacts and risks are becoming increasingly complex and more difficult to manage. Multiple climate hazards will occur simultaneously, and multiple climatic and non-climatic risks will interact, resulting in compounding overall risks and risks cascading across sectors and regions (IPCC, 2022: 19). Compounding or converging risks include further transgression of planetary boundaries (Steffen et al., 2015a), biodiversity loss, resource, and overall environmental degradation (Steffen et al., 2015b; Ripple et al., 2017; Ceballos et al., 2017; IPBES, 2019; Dasgupta, 2021).

The idea of risks cascading across sectors and regions means that the protection of natural resources can be viewed not only as a precondition for natural ecosystems but as such or viewing them as externalities of economic and social processes. Protection of natural resources in a certain way (conservation, preservation, designing protected areas, etc.) is crucial for social and economic ecosystems, and externalities in economic terms need to be internalized in economic models and standard economic models have been criticized for lack of this (Butler & Higgs, 2018; Costanza et al. 1997; Dasgupta, 2007), particularly for vulnerable communities, whose impact on climate change has been lower, but who are affected by that more. Ignorance of the protection of natural resources as a precondition for economies can also be explained by the term social and ecological metabolic rift, suggested by John Bellamy Foster and others (Foster, Clark & York, 2010).

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Protection of natural resources in this article is seen as a wide and inclusive interpretation of the position of modern conservation (Berkes, 2012, p. 247) and various activities that serves nature protection. I need to stress that there is also a problem to look at conservation from an anthropocentric point of view as "externalizing people from nature by fencing off reserves, wilderness zones or national parks" (Brierley, 2020, p. 75). This view of conversation has been shifted from eliminating human impact to regulating human use, thus we talk about the preservation approach to conservation (Bhagwat, 2018, p. 992-994). It should be noted that the question "what to preserve?" (Attfield, 2018, p. 49) is open to debate – either some previous state of things or ecosystems with certain human impact. We can incorporate nature conservation principles and practices into everyday activities, living with adjusting and emergent ecosystems instead (Brierley, 2020, p.75). This implies also combining the so-called Western view on conservation (Redford & Stearman 1993 as cited in Berkes 2012) with indigenous conservation (Alcorn 1993 as cited in Berkes 2012; Roberts et al. 1995 as cited in Berkes 2012). The main point there is an acknowledgment of revising the Western concept of a human-nature dichotomy that further alienates all humans (Berkes, 2012, p.249) as well as the Western view of society-nature separation. There is also a scepticism within Western societies that people are tended to pursue selfish interests, thus the conservation needs to be carried out by professionals that "know" how to do that. It is important to note in this regard that resource-dependent rural communities rely on "characteristics that favor conservation: close personal relationships and inter-dependence, social control of cheating, land use practices informed by many generations of collective experience living within the resources of an area" (Hunn et al., 2003 as cited in Berkes 2012, p.251). Local inter-dependence also implies attitudes and involvement of inhabitants of a certain place – in our case – Gauja National Park (*further in text – GNP*).

Localizing natural resource protection within rural development issues, it is important to note that "spaces for postproductivism and rural development are being defined and defended in the public interest and public good terms but where there are few opportunities to question the enforced segregation and commodification of rural space and environmental provision that this implies" (Potter & Tilzey, 2005) Various focus can be seen in the literature regarding the cases of implementation of a National Park Plans – from discussions of Weberian concept of authority (Blackstock, Dinnie & Dilley, 2017) to National Parks as critical sites of struggle, where meanings of nature, landscape, and nature-society relations are debated (Walsh, 2021). In the case of GNP, the certain role of local municipalities is important in the deliberation of National park plans. The legitimacy of territorial local authorities has been debated in the context of governance environment (Welch, 2002), and legitimacy appropriate to representative democratic government (Connelly et al., 2006).

Focusing on various stakeholders' role in the management of natural resources, Robins and Southern identifies problems of state or corporative management and conclude that they are not designed to fit the goals of sustainable development (2018, p.422). They offer the idea of ecological localism as a concept to describe that the action and making choices for nature is made in the places, that reflect overlapping natural systems (Robins & Southern, 2018, p.432). Place-based attitudes and involvement thus are conceptually reasonable focus. Baker & Durance indicate the importance of resilient social systems and various orders of influence (2018, 366-367). Baker & Durance also emphasize that ecosystems and society are inextricably linked, and thus local communities' perceptions of natural resources and resource management regimes are also important for conservation planning. At the same time, socio-ecological projects for developing responsibility towards nature might be achieved by sharing responsibility for the natural world in certain places (FitzSimmons 2004 as cited in Jones, 2006, p.193-194). Those ideas allow operationalizing various levels of influence from the viewpoint of local inhabitants, where their attitudes of

responsibility of actors (me myself, local community, volunteers, NGO's, municipality, state institutions) for the preservation of natural and cultural heritage values in the place they live is an important indicator for give an account of action.

We can focus on the important implications of applying the term co-production in rural areas, where different positions and roles that take local inhabitants might bring interests and views (van der Ploeg, 2018, p.1438). And the same person might relate in more than one way to rural nature (ibid). Multi-relation implies a possible variety of readiness to involve or involvement in the protection of natural resources. It is also the question of representation of interests in democratic societies (Woods, 2006, p.468) and a crisis of representation already starting in the 21st century (Bonanno, 2000).

Territorial features are also important, because "the specific ecosystem, the landscape, biodiversity, and natural resources, and it critically depends on the many interrelations between these elements – relations that are shaped and reshaped within and through co-production" (van der Ploeg, 2018, p.1438). We can also apply the idea of milieu, where a particular combination of cultural values and practices, beliefs, identity, social relations, collective knowledge, and shared social and economic history constitute a particular locality and consciousness (Malecki, 1994 as cited in Lewis et al., 2002)". All these features are visible in the case of this article - inhabitants of GNP region. Distinct configurations for GNP inhabitants might include practices (actual or potential involvement in activities) as well as the identity of this territory and involvement in civic activities as a sign of social relations. Shared social history might differ in various age groups. This also reflects a "sense of place" as suggested by Robins and Southern (2018, p.426-428) that connects the people and communities that live, work, and interact.

In summary, based on case of GNP inhabitants this article aims to reveal attitudes toward protection and readiness to involve in the protection of natural resources of GNP inhabitants.

Attitudes as cultural stances and they imply experience and certain firmness of interest and value (Tuan, 1990), but combine both instrumental and intrinsic values of nature for people and despite people (Curry, 2011). Attitudes towards the protection of natural resources need to be also combined with a readiness to involve or involvement in the protection of natural resources, because studies have shown discrepancies between attitudes and behaviour, and attitudes may not overcome barriers to change (Harper, 2017, p.156).

Materials and methods

A series of representative quantitative surveys and focus-group discussions have been carried out within the research project "Ready for change? "Sustainable management of common natural resources"". In this paper particularly, quantitative data from representative telephone-interview survey from GNP inhabitants (N=202) have been analysed to reach the aim of article. Survey have been conducted from a random digit sample of inhabitants and have been gathered by the social research agency Latvijas Fakti in April 2022. Thus, the approach provides representativity of inhabitants in rather small community like GNP region, where general population estimates are around 45 thousand inhabitants living in region. Questions in a survey have been either adapted from other surveys (identity of the territory, belonging to territory) or adjusted from conceptualization for this article.

Two hypothetical interconnections conceptualizing dimensions of actors' contribution and embedded return to actors for the local common good are proposed to test in this article. These dimensions reflect combinations of attitudes and involvement (or readiness to involve) in the protection of natural resources, where actors' contributions to the common good (1st dimension in Table 1) and embedded return to actors from the common good (2nd dimension in Table 1) have been distinguished.

Attitudes towards the protection of natural resources are operationalized by a few dimensions:

1) Attitudes of responsibility of actors for the preservation of natural and cultural heritage values in the place they live (attitudes of responsibility of actors).

Internal consistency for attitudes scale (attitudes of responsibility of actors for the preservation of natural and cultural heritage) to test the homogeneity of the items in this scale (as suggested by Abrami, Cholmsky & Gordon, 2001, p.44) have been measured by Cronbach's Alpha coefficient and Cronbach's Alpha if Item Deleted coefficients.

2) Agreement with statements related to the Nature conservation plan of GNP:

- a. My municipality must be involved in the development of the Nature conservation plan;
- b. Citizens' opinions are taken into account during the development of the Nature conservation plan;
- c. I believe that my municipality ensures the protection of natural resources.

Table 1

Conceptualization and operationalization of attitudes towards and readiness to involve in protection of natural resources

Dimensions	Conceptualization	Research question
1	Shared or combined responsibility of actors and readiness to involve or involvement in the protection of natural resources in indexed dimensions	How involvement intensity in various dimensions is related to views on shared responsibility?
2	View on the representation of interests in Nature conservation plan and embedded readiness to involve or involvement in the protection of natural resources	How a variety of embedded readiness to involve or involvement in the protection of natural resources is related to view on representation? Does civic involvement in environmental activities particularly related to the Nature conservation plan of GNP have an impact on views on representation of people's interests in the deliberation of the Nature conservation plan?

Source: author's scheme

Readiness to involve or involvement in the protection of natural resources is operationalized by:

- 1) Actual or potential involvement in environmental activities in the place they live (answer scale – would not be ready / would be ready / already involved):
 - a. Travel by non-motorized vehicles as much as possible;
 - b. Sorting all kinds of waste;
 - c. Regularly participate in clean-ups, and nature clean-up activities;
 - d. Donate to organizations that care about the protection of natural resources;
 - e. Get involved in NGO/volunteer work focused on the protection of natural resources of the GNP;
 - f. Participation in a clean-up organized by someone else (binary scale yes/no);
 - g. Participation in clean-up on their initiative (binary scale yes/no).

Outcome: Index of actual or potential involvement in activities. Index has been computed on a scale from -5 to +7, where the sum of answers is computed from types of activities and where "would not be ready" coded by -1, "would be ready" 0, but "already involved" + 1. Binary participation in clean-ups has been additionally summed up.

2) Involvement in civic activities includes involvement in such activities during last year as involvement (operationalized by yes/no): a. in non-governmental organizations; b. in voluntary work; c. in a political party; d. in civic activities (protests, marches, clean-ups, donations to charities, etc.).

Outcome: Index of civic activities, based on the sum of involvement in civic activities, adjusted to outliers (sum ≥ 3).

3) Variables that characterise the identity of GNP territory – agreement or disagreement with the following statements: *I am proud to be a resident of GNP; Life in GNP is better than anywhere else; I want to live most of my life in GNP.*

Outcome: Average identity, based on average rate of identity of GNP territory.

4) Involvement intensity in the nature protection plan of GNP during last year, including such activities as (operationalized by yes/no):

- a. Participated in the informational meeting of the nature protection plan;
- b. Attended the event "Nature with an expert";
- c. Contacted the developers of the GNP nature protection plan;
- d. Proposed proposals to optimize the preservation of natural or landscape values.

Outcome: Index of involvement intensity in nature protection plan of GNP, based on the sum of involvement in activities, adjusted to outliers (sum ≥ 2).

All outcomes can be considered as operationalized involvement intensity in various dimensions. **Embedded readiness** to involve or involvement in the protection of natural resources has been done by hierarchical and two-step cluster analysis (Bickman & Rog, 2009, p.452-453; Uprichard, 2009), where local inhabitants have been grouped by their actual or potential involvement in environmental activities - involvement intensity in various dimensions and age in interval scale.

The range of nonparametric statistics (Spearman rank correlation) (Brase & Brase, 2009) and multidimensional analysis methods, including regression models for ordinal and nominal outcomes (Long, 2015), logistic regression (Best & Wolf, 2015), principal component analysis (Mertler & Vannatta, 2017, p.247-278; Agresti & Finlay, 2009, p.532-536) and cluster analysis (Hair et al., 2014) have been applied in this paper. Ordinal and logistic regression models were applied mainly due to outcome variables (in our case representation of citizens' interests in the Nature conservation plan) is not measured as a continuous or quantitative variable, but in categorical (degrees of agreement in forced Likert type scale) or as discrete variables (agree/disagree with statement).

Research results and discussion for readiness to involve or involvement in protection of natural resources

The highest average rate for responsibility was for personal, state institutions, and local community responsibility (3.7), with slightly lower averages for municipalities' responsibility (3.6) and volunteer or NGO responsibility (3.3). Nonetheless, predominantly high responsibility has been expected from various actors (more than 48% of respondents on each actor's responsibility agrees with that fully), especially personal responsibility that local inhabitants put on themselves (fully agree 72% of respondents).

There is a moderate, but statistically significant association among all actors regarding respondents' attitudes towards their responsibility, ranging from Spearman's rho coefficient 0.29 ($p < .01$) (between state and NGO's) to 0.57 ($p < .01$) (local community and NGO's). Also scale reliability tests suggest that the responsibility of various actors can be treated as one dimension of **shared responsibility**

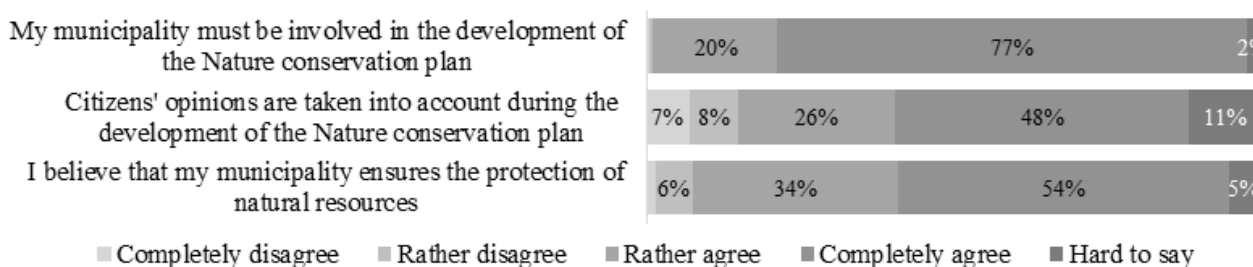
(Cronbach's Alpha coefficient 0.70 and Cronbach's Alpha if Item Deleted coefficients are lower, suggesting that exclusion of any of the variables would improve scale).

Reducing shared responsibility on most influential principal components (applying Principal Component Analysis as a type of explorative factor analysis), we can see that one component describes 46% of solutions, where one dimension of shared responsibility can be extracted. Among the impact of attitude on particular actors' responsibilities, factor loadings for the local community is the highest (0.79), for volunteers, NGO's 0.69, myself 0.67, but formal institutions – the municipality and state institutions – are lower (0.63 and 0.60 respectively).

Due to relatively high correlations among various actors' responsibility assessments, a simple rate of combined responsibility can be calculated by a simple average of answers. Whereas the rate of combined responsibility can be combined as a weighted average using factor loadings from Table 2 as weights. **The rate of shared responsibility and the rate of combined responsibility** has been normalized on a 0 to 100 scale, where 0 means "not responsible at all" for none of the actors, but 100 – "fully responsible" for all of the actors. The highest actual value of the rate of shared responsibility is relatively the highest share of full responsibility, although the sum of answers multiplied by factor loadings in Table 1 cannot reach the maximum as it is in the rate of combined responsibility. Additionally, for both scales, the lower bound has not been normalized to 0 as there are no respondents, which have an absolute feeling of "not responsible at all" towards most of the actors.

As both rates of responsibilities have the same distribution of values (identical covariations), we can use the rate that has the more nuanced distribution of particular responsibility assessments (that is higher standard deviation). The rate of shared responsibility can be considered as more nuanced measure of attitudes due to measures of value distribution.

Local inhabitants predominantly agree with the municipality's obligation to be involved in the development of the Nature conservation plan. Most local inhabitants also agree on the representation of opinions during the development of the Nature conservation plan (83% of exact answers) and agree that the municipality ensures the conservation of natural resources (even 92% of exact answers) (Figure 1).



Source: RfC survey data. For further figures and tables – inhabitants of GNP. Weighted data. Base: n=202 (exact answers depicted, year 2022)

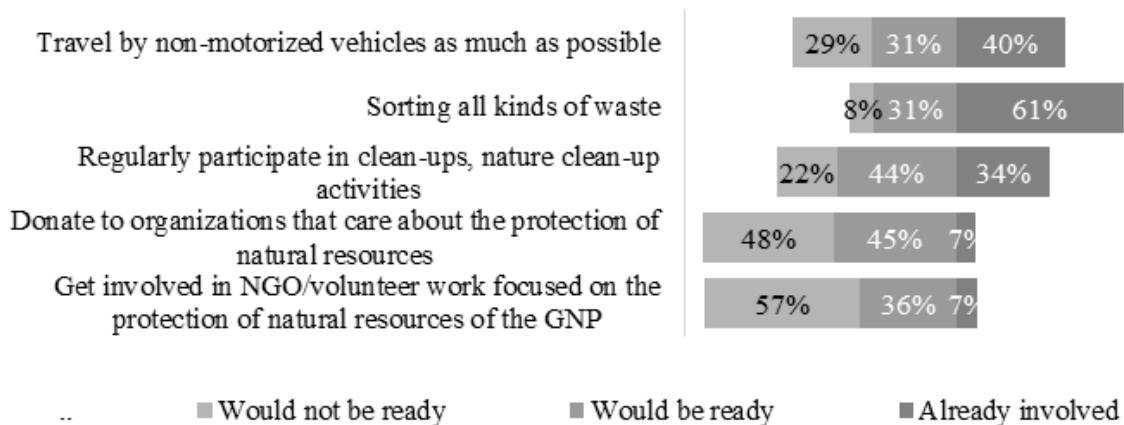
Fig. 1. Agreement with statements related to the Nature conservation plan of GNP

We can conclude that there is already broad agreement on the representation of interests of local inhabitants in the Nature conservation plan and continue with testing factors that have a significant impact on the agreement or disagreement with the statement "Citizens' opinions are taken into account during the development of the Nature conservation plan".

There is an even higher level of reliance on the municipality's role in the protection of natural resources (92% of exact answers, with a majority of those, who completely agree with the statement).

Although the majority of GNP inhabitants claim that they are already sorting waste (61%) and many inhabitants claim that they travel by non-motorized vehicles as much as possible (40%) and regularly

participate in clean-ups, nature clean-up activities (34%), only 7% are involved in NGO's or donate to protection of natural resources. More than 1/3 of inhabitants, who are not already involved, would be ready to involve, particularly – 45% would be ready to donate (Figure 2).



Source: RfC survey data, 2022

Fig. 2. Actual or potential involvement in environmental activities

The structure of actual or potential involvement in environmental activities suggests that status "already involved" rather involves more than one type of activity, the same applies to readiness to involve and unreadiness to involve, where unreadiness to involve applies to few of activities.

Due to the nature of the dataset and what is already known about the inter-structure of the cases themselves (Uprichard, 2009, p.136-137) index of actual or potential **involvement in environmental activities** is computed from actual or potential involvement in environmental activities, where mean value is 0.64 with rather high standard deviation (2.27) in the scale from -5 to +7 (see the methodology of computing the index). The average value in the index of **civic activities** is 0.99, where 34% of respondents have not participated in any of them during last year, but 42% - in 1 of 4. **Average identity** for GNP territory – very high – 3.43 on a scale from 1 to 4. The index of **involvement intensity in the nature protection plan** of GNP is rather low as involvement in four separate activities has been no higher than 10%, but combined – 19% of inhabitants took part in at least one of the four activities (see the methodology of computing the index).

We can see involvement intensity in various dimensions and try to answer to 1st research question: *how involvement intensity in various dimensions is related to views on shared responsibility?*

One way to answer is by applying a linear regression model. The parameters of the linear regression model suggest that the link is not linear. Only an index of actual or potential involvement in environmental activities increases the sense of shared responsibility or combined responsibility. For both models, they are statistically significant, but with low R squared values, thus beta coefficients for the exact impact are not important. Intercepts (when independent variables are 0) are already 76 of 100 for both types of responsibility.

Another way to answer is to apply Pearson's' correlation as variables are measured in interval scales. Index of actual or potential involvement in environmental activities and average identity correlate with views on shared and combined responsibilities. High actual involvement is weakly related to high shared responsibility. Also, high agreement with statements for locally embedded identity is related to high shared responsibility (Table 2).

We can conclude involvement intensity in various dimensions of nature protection, environmental activities, and civic engagement does not significantly increase the already high sense of shared

responsibility. At the same time, high personal involvement in environmental activities in everyday life and a sense of belonging to the place reflect higher expectations for responsibilities regarding nature protection.

Table 2

Involvement intensity and rates of responsibilities

		Index of actual or potential involvement in environmental activities	Index of civic activities	Average identity	Index of involvement intensity in nature protection plan of GNP
Rate of combined responsibility	Pearson Correlation	.242**	.000	.184*	.092
	N	194	194	191	194
Rate of shared responsibility	Pearson Correlation	.243**	.001	.178*	.094
	N	194	194	191	194
** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).					

Source: RfC survey data, 2022

At first embedded readiness to involve have been clustered to answer to 2nd research question in the article - - *how the variety of embedded readiness to involve or involvement in the protection of natural resources is related to the view on representation?*

Similar solutions have been acquired, applying hierarchical and two-step cluster analysis. Log-likelihood method for variables has been applied in two-step cluster analysis, but the Ward method by squared Euclidean distance measure for standardized variables by z-scores has been applied in hierarchical cluster analysis. 84% of cluster solutions are overlapping (the same cluster membership), thus it is possible to choose those solutions, where a more distinct description is apparent. The decision was for the results from hierarchical cluster analysis, where four cluster solutions for embedded readiness to involve or involvement in the protection of natural resources can be extracted (Table 3). Four clusters form two distinct clusters, where 1st and 3rd clusters combine members with all rates below average – actual or potential involvement in environmental activities, civic activities, the identity of place and age as well, but 2nd and 4th – members with rates above average. We can call members of 1st cluster less active local inhabitants, but 2nd – more active local inhabitants.

Table 3

Four cluster solution for embedded readiness to involve or involvement in protection of natural resources

	Cluster name	Detailed description of cluster profiles	N	% of respondents
1	Younger civically inactive with solid local identity	Civic inactive, young age, medium high identity, average environmental activities (wider range)	69	35%
2	Older with high local identity and moderate civic and environmental involvement	Rather inactive, old age, high identity, medium environmental activities (consistently few)	72	36%
3	Civically rather active with lower local identity and environmental involvement	Rather active, average age (wider range), low identity (very wide range), below average environmental activities	32	16%
4	Civically active environmental localists	Civic active, average age, high identity (close range), very high environmental activities	25	13%

Source: RfC survey data, 2022

Nonparametric tests such as Mann–Whitney U test can be applied to answer 2nd research question in the article.

More active local inhabitants are more demanding for the involvement of local municipality regarding the development of the Nature conservation plan (statistically higher agreement with the statement "My municipality must be involved in the development of the Nature conservation plan", moderate effect $r = -0.17$). But there is no statistically significant correlation between the activities of local inhabitants (more active or less active) and agreement with statements about the representation of interests. Other factors have an impact on the representation of interests in the case of GNP inhabitants. Neither there are statistically significant correlations among GNP inhabitants in the four cluster solution.

We can also analyse does civic involvement in environmental activities particularly related to the Nature conservation plan of GNP has an impact on views on the representation of people's interests in the deliberation of the Nature conservation plan.

Ordinal regression results suggest that neither the fact nor the amount of civic involvement in environmental activities related to the Nature conservation plan of GNP (from 0 – none to all 4 activities) does not increase already broad agreement on the representation of interests of local inhabitants in the Nature conservation plan. No other involvement status of nature protection activities in GNP increases the level of agreement on the representation of interests of local inhabitants in the Nature conservation plan. Involvement in civic activities also does not increase this level.

Logistic regression results of the impact on the status of with statement on the representation of interests of local inhabitants in the Nature conservation plan shows that it is not affected by the fact of widespread involvement in clean-ups or the fact of civic involvement in environmental activities related to Nature conservation plan of GNP. Involvement in civic activities also is not related to the status of the agreement with that statement.

Conclusions, proposals, recommendations

The protection of natural resources in a certain way (conservation, preservation, designing protected areas, etc.) is crucial for social and economic ecosystems. Nature conservation principles and practices could be incorporated into everyday activities, living with adjusting and emergent ecosystems. Nature conservation as a precondition for social and economic ecosystems implies certain local and territorial embeddedness, particularly in resource-dependent rural communities or communities living in a certain regime of natural resource protection. That is the case of this article - inhabitants of GNP and their attitudes towards and involvement in the protection of natural resources.

Local communities' perceptions of natural resources and resource management regimes are also important features of conservation planning. Those perceptions also include views on the responsibility of various actors for the natural world in certain places, particularly in GNP.

Actors' contribution to the local common good from one side and embedded return to actors for the local common good from the other side reflect combinations of attitudes and involvement (or readiness to involve) in the protection of natural resources.

Data from a representative quantitative survey allows us to conclude and propose a certain thesis:

- inhabitants of GNP have high expected responsibility from various actors for the preservation of natural and cultural heritage values;
- those expectations of responsibility from various actors for the preservation of natural and cultural heritage values also can be combined and described as a shared responsibility;

- agreement with a representation of the interests of local inhabitants in the Nature conservation plan regardless of civic engagement is already widespread;
- civic involvement in environmental activities related to the Nature conservation plan of GNP does not have an impact on supporting the representation of the interests of local inhabitants in the Nature conservation plan.

Further, the concept of shared responsibility can be linked also to involvement intensity in various dimensions, which allows us to conclude that:

- actual or potential involvement in environmental activities varies depending on a particular activity, but combined as an index allows one to conclude that current involvement in one of the activities is related to involvement in another;
- the average identity for GNP territory is high - people are proud to be residents, agree that life in GNP is better, and want to live there.

Involvement intensity in various dimensions can also be conceptualized as embedded readiness to involve or involvement itself in the protection of natural resources. Cluster analysis offers four groups of embedded involvement of GNP inhabitants/

Answering the research questions, the authors came to the following conclusions.

- 1) High personal involvement in environmental activities in everyday life and a sense of belonging to the place reflect higher expectations for responsibilities regarding nature protection. But in the case of GNP inhabitants, there is also a high sense of shared responsibility disregarding the involvement intensity in various dimensions of nature protection.
- 2) More active local inhabitants are more demanding of the involvement of local municipality regarding the development of the Nature conservation plan and we can say that there is a need for further studies for other factors that have an impact on the representation of interests in certain local communities.

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EXTERNAL AND INTERNAL FACTORS FOR INCREASING THE USE OF ELECTRONIC COMMERCE IN THE SME SECTOR IN LATVIA

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Abstract. Several studies have found that e-commerce can have a positive impact on any type of business. Some surveys show that the use of e-commerce in Latvia is a problem for most companies in the SME sector; however, there is still a lack of in-depth research to justify the directions of action contained in strategic policy documents. The purpose of the article is to provide analysis of external and internal factors that affect the use of electronic commerce in the SME sector. The Analytic Hierarchy Process (AHP) was used to identify the factors that most positively and negatively affect the e-commerce development of companies. Data from the expert survey were used to conduct the analysis with the AHP method. 17 experts from the state administration, academia and the business environment participated in the survey, who assessed the impact of various internal and external factors on the use of e-commerce in companies. Since the application of e-commerce in companies is one of the measures for faster recovery of the state of the national economy, including developing the export of the SME sector in the post-COVID-19 pandemic period, recommendations have been prepared for public and commercial organizations to have a positive impact on the use of e-commerce in SMEs.

Key words: digitalization, e-Commerce, SMEs, support policy.

JEL code: E32, L20, L50, L81, O33

Introduction

Research indicates that the use of digitization in companies is an important factor of sustainable development and promotes national competitiveness (Boikova, T. et al., 2021; Stankovic, J. J. et al., 2021). For companies, this means the need for digital transformation, especially in the post-COVID-19 period, which exposed business bottlenecks and led to the transformation of business models (Beizitere I. et al., 2022; Belitski M. et al. 2022; Corvello V. et al., 2022; Fjellström et al., 2020; Zeverte-Rivza S. & Gudele I., 2021). Companies are advised to evaluate their business processes and identify what can be improved in them by using digitization solutions, for example, remote communication in the internet environment, usage of e-signature, big data, data storage in cloud infrastructure, service provision and e-commerce, etc. For many trade and service providers, e-commerce is a way to maintain their competitiveness in the market and reach business partners and customers (Rivza S. & Gudele I., 2021; Sheng J. et al., 2021).

The existence and sustainable development of entrepreneurship is vital for the economy of Latvia, since the number of SMEs has reduced during the COVID-19 pandemic. The decrease in the number of SMEs at the end of 2021 was 7.4% compared to the end of 2019 (Official Statistics Portal..., 2022). Thus, it is important to identify the factors that contribute to the development of the SME sector. Since e-commerce has great potential for positive impact on business (e.g. Andonov A. et al., 2021; Iuga I.C., 2021), the purpose of the article is to provide analysis of external and internal factors that affect the use of electronic commerce in the SME sector.

E-commerce is generally understood as the sale or purchase of goods or services between businesses, households, individuals or private organizations using electronic transactions conducted over the Internet or other computerized (online communication) networks. According to these characteristics, data about e-

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commerce is gathered, e.g. Eurostat (2019). In the scientific environment, the term "e-commerce" is broader, because e-commerce began to cover more and more functions in internet and contributed to the digital transformation in business. Consequently, the understanding of the term was supplemented. For example, Chaffey D. (2003) defined e-commerce simply and according to the processes currently taking place in the digital environment: "Any information transaction in the electronic environment is e-commerce". Taking into account the understanding of the term "e-commerce" mentioned in various sources, the authors of this article did not always separate the narrowly understood classification of e-commerce from the broader understanding, characterized by the term "digitalization" in many sources.

The following research methods were used: discussions on the creation of e-commerce, monographic and descriptive methods, analysis and synthesis methods were used to study the elements of the problem, the induction method was used to identify causal relationships and make scientific assumptions based on for individual facts or elements, the deduction method was used to systematize and use empirical data, statistical analysis (central tendencies and location indicators) was used. EU and national statistical data on digitization and including electronic commerce, the Analytical Hierarchy Process (AHP) was used to identify the factors that most positively and negatively affect the development of e-commerce in Latvia. The expert survey data was used to perform the analysis with the AHP method. 17 experts from different Latvia regions and sectors of IT industry participated in the survey. The survey started at the beginning of 2022 and finished in three months. The experts were chosen to represent the leading associations dealing with internet communication (Latvian Internet association, Information and communication technology association), regional business sector, specialists of higher education institutions preparing IT students and companies dealing with digital transformation, representatives of public government.

Data from Central Statistical Bureau, the Register of Enterprises and several ministries, and data collected during the projects implemented by the State Research Program reCOVeRY.LV for the period from 2020 to 2022 were used to characterize the use of e-commerce in Latvia. All collected data analysis was compared with DESI Index provided by Eurostat. Timely and state-adaptive national strategic planning as an important external factor for SMEs plays a vital role in the digital transformation of the state (Alam K. et al., 2018; Kääriäinen J. et al., 2021). The findings of the survey could serve policy makers for making strategic decisions, specifically in the field of e-commerce, which aims to improve the country's digital competitiveness.

Theoretical Background

Summarizing the findings of several previous studies SMEs, it is necessary to highlight groups of more frequently mentioned factors that have influenced digitalization and e-commerce in SMEs. The group of technological factors (Corvello V. et al., 2022) is the most important because without them the development of the digital environment is not possible at all. The next most important group of factors influencing the development of the digital environment and the development of e-commerce is economic factors (Audretsch D. B. & Belitski M., 2021). The group of organizational factors is important for the development of the digital environment and e-commerce (Choshin M. & Ghaffari A., 2017). In order to make e-commerce more sustainable, decisions and actions need to consider social, environmental and economic aspects as a core element in the group, not separately (Olah, J. et al., 2019; Vide, R. K. et al., 2022). The factors group of public policies could make a positive or negative impact on the development of the digital environment and e-commerce. These, in turn, are related to regulatory factors that regulate digital processes in the company. The group of social factors determines how and to what extent members of society can use the advantages of the digital environment and e-commerce.

Psychological factors that explain consumer and stakeholder acceptance of e-commerce should also be considered (Gudele I. & Jekabsone I., 2020).

Regarding the factors that significantly influence the use of electronic commerce in the SME sector, the researchers emphasize the diversity of factors depending on the characteristics of enterprises. For example, firm size and financial health matter, the brick-and-click strategy favours survival of company (Cuellar-Fernández B. et al., 2021). The lack of budget, skills and resources that would significantly affect the company's sustainability are mentioned most often (Corvello, V. et al., 2022; Costa, J. & Castro, R., 2021). The richness of social commerce features positively affects the website stickiness (Friedrich T. et al., 2019). Research reveals that human factors such as lack the necessary skills, technological factors such as cybersecurity are among the main barriers to SME for e-Commerce development (D'Adamo I. et al., 2021).

The implementation of digital technologies in the organization causes changes in work methods and business offer. In-depth research reveals the nuances of e-commerce. For example, the brick-and-click strategy favours survival of company (Cuellar-Fernández, B. et al., 2021). In order to introduce an e-commerce model suitable for its business in the enterprise, an assessment of the level of digitization and the relevant business objectives is initially required (Kääriäinen J. et al., 2021; Kilimis P. et al., 2019; Li L., 2018). The benefits of e-commerce in terms of increased sales are more pronounced when businesses use commercial websites and online marketplaces. On the other hand, the interaction between e-commerce and search engines has a negligible effect on the company's performance (Sakovic Jovanovic J. et al., 2020).

There is a need for the involvement of public institutions, research guidelines, tools and case examples to help SMEs better understand and use the opportunities provided by the improved ecosystem and platform (Kääriäinen et al., 2021). Also, other authors (Rupeika-Apoga R. et al., 2022) believe that the creation of a company's digital readiness assessment model should become the first step towards effective support for digital transformation of SMEs.

According to the EU strategy for a sustainable and digital Europe, relevant policy documents have also been prepared in Latvia and the transformation of digital business ecosystems is promoted. Latvia's Digital Transformation Guidelines 2021-2027 define a comprehensive national digital transformation strategy (Ministry of Environmental Protection..., 2021). The guidelines cover the following areas: Internet access, ICT education and skills, modern and efficient public administration, e-services and digital content for the public. The guidelines established the development of digital skills as a national priority, aiming to achieve the Digital Decade aims. The guidelines state that for the full use of the opportunities of the digital economy, it is necessary to promote awareness and understanding of the use of digital opportunities by merchants, to provide consultative support to merchants for the practical use of digital opportunities, incl. to promote the use of e-commerce.

Support directions and measures are dedicated to digital transformation in other policy documents. The Education Development Guidelines 2021–2027 aim to promote human digital skills and modernise science, technology, engineering and maths (STEM) studies, to use ICT in the learning process, and to develop teachers' digital skills (Ministry of Education..., 2021). Recognizing that Latvian companies lag behind in the field of digitization, the Latvian National Industrial Policy Guidelines 2021–2027 prioritises the promotion of innovation and digital transformation of businesses (Ministry of Economics..., 2021).

Research results and discussion

1. The main trends in e-Commerce of SMEs in Latvia

The achievements of countries in the field of digitization are evaluated with various international indices. The aim of introducing the Digital Economy and Society Index (DESI) is to help the EU member states identify areas where priority investment and action is needed to create a Digital Single Market. In 2022, the DESI reflects four main policy areas (Connectivity, Human Capital, Integration of Digital Technology, Digital Public Services) to be assessed, representing a total of more than 30 indicators, including the digital transformation of SMEs (European Commission, 2022d). In 2022, Latvia showed a drop in the overall DESI rating and got 17th rank out of 27 EU Member States compared to 2021, when it was in 15th place (European Commission, 2022a).

Another index that shows the state of e-government development of United Nations member states is the E-Government Development Index (EGDI). It provides an assessment of website development patterns in a country and includes access characteristics such as infrastructure and education levels to reflect how a country uses information technology to promote access and inclusion. The EGDI is a composite index of three important dimensions of e-government, namely: online service delivery, telecommunications connectivity and human capabilities. In 2022, Latvia showed a significant improvement in the EGDI evaluation, reaching 29th place compared to the 49th place obtained in 2020 (UN E-Government Knowledgebase, 2022).

A comparison of the ranks of the indices obtained by Latvia in the field of digitization with neighbouring countries from Northern Europe is given in Table 1.

Table 1

The place of Northern Europe countries in the international indices of the degree of digitization, 2022

Country Index	Denmark	Estonia	Finland	Latvia	Lithuania	Netherlands	Sweden
DESI	2	9	1	17	14	3	4
EGDI	1	8	2	29	24	9	5

Source: authors' construction based on data of reports (European Commission, 2022d; UN E-Government Knowledgebase, 2022)

In 2022, Latvia's very low DESI rating among EU Member states was influenced by the ranking of the "E-commerce" sub-index (Table 2).

Table 2

Latvian DESI sub-index "eCommerce" ranking in 2022

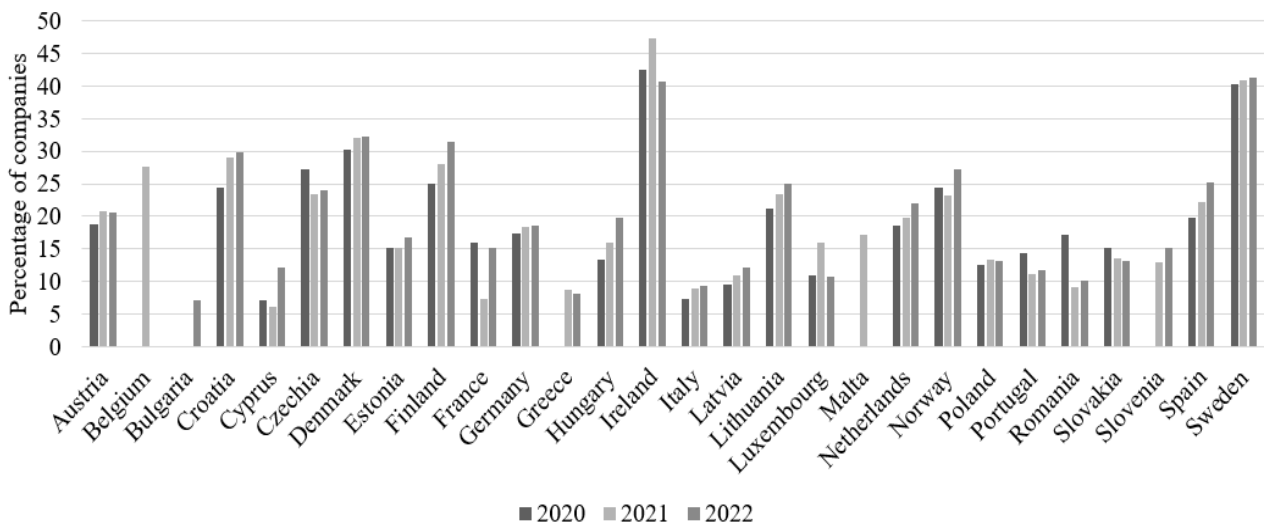
No	Indicator	Breakdown	Unit	Rank
1.	Ordering goods or services online	All individuals	% of internet users (last 12 months)	22
2.	Selling online (e.g. via auctions)	All individuals	% of internet users (last 3 months)	23
3.	Turnover from e-Commerce	Large enterprises	% of turnover	21
4.	Turnover from e-Commerce	SMEs (10-249 persons employed)	% of turnover	18
5.	Enterprises exploiting B2C opportunities of web sales	SMEs (10-249 persons employed)	% of enterprises	17
6.	Enterprises selling online	Large enterprises	% of enterprises	22
7.	Ordering goods or services online	All individuals	% of individuals	19
8.	Enterprises selling online	SMEs (10-249 persons employed)	% of enterprises	20

Source: authors' construction based on DESI data (European Commission, 2022c)

The COVID-19 pandemic significantly changed shopping habits, and as a result, entrepreneurs had to rethink their sales channels, developing and investing in e-commerce platforms as well. Data from the business register in Latvia showed that the number of e-commerce structural units increased significantly starting in 2016, and due to the COVID-19 pandemic, their number grew even faster. However, during 2021, their number decreased again. The data show that in October 2021, less than 18.6 thousand such structural units were registered, while in October 2022, their number decreased to 15.7 thousand (Lursoft, Ltd, 2022).

The transition to digital technologies in companies can improve their performance in the provision of services and products, as well as increase their competitiveness. In 2021, a total of 56% of EU companies reached the basic level of digital intensity. The basic level is characterized by the fact that the company must use at least four of the twelve selected digital technologies (for example, using any AI technology; e-commerce sales make up at least 1% of the total turnover etc.). Among SMEs, 55% achieved a basic level of digital intensity, compared to 88% of large companies in 2021. In accordance with the objective of the digital transformation of companies of the EU Digital Decade policy program, more than 90% of EU SMEs should achieve at least a basic level of digital intensity by 2030 (European Commission, 2022b). The majority of SMEs in the EU had a low (34%) or very low (45%) level of digital intensity. SMEs in Latvia had a low (around 23%) or very low (around 64%) level of digital intensity, and only around 12% had a high or very high level (Eurostat, 2022a). In Latvia, in 2022, the number of companies with a high or very high level of digital density has significantly increased, reaching 21.7%, compared to the average number of companies in the EU that reached this level - 32.3% (Eurostat, 2023b).

The percentage of companies whose e-commerce sales amount to at least 1% of turnover is given in Figure 1. On average, the proportion of such companies in the EU in 2022 was 17%, as opposed to 12.2% in Latvia. Latvia lags behind its neighbouring countries Lithuania and Estonia, where the share of e-commerce companies was 25.1% and 16.7%, respectively in 2022.



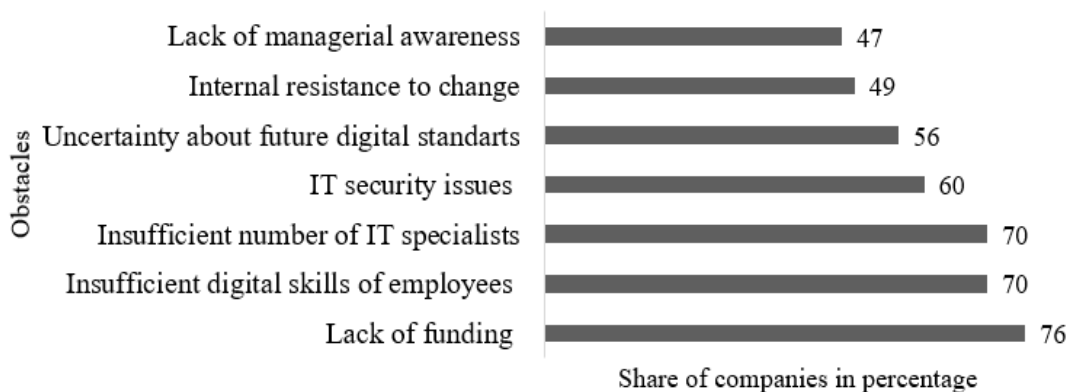
Source: authors' construction based on data of Eurostat (2023c)

Fig. 1. Share of companies with e-commerce sales of at least 1% of turnover in Europe, 2020-2022

The frequency of usage of e-commerce by Latvian SMEs in 2021 is characterized by the following data: 20% of SMEs were not involved in the electronic purchase or sale of goods in online services or on the Internet, approximately 50% of SMEs engaged in e-commerce and only 6% fully participated in e-commerce (Rupeika-Apoga, R. & Bule, L., 2021).

Regarding the Internet usage habits and e-commerce in Latvia, the situation is characterized by the data: 98.7% of all registered and active companies in Latvia use the Internet, and 62.9% of companies have their own website. In 2022, 79% of Internet users have made purchases on the Internet, most often buying tickets for entertainment events on Latvian e-commerce sites, and clothes and accessories in foreign Internet stores. On average, only 12% of Latvian companies use websites to sell goods and services (Kebbe, E., 2023). Thus, Latvian SMEs do not take advantage of the potential provided by the digitalization of business processes and citizens' online habits.

In the 2021 survey, Latvian SMEs mentioned a number of obstacles for the company to carry out digital transformation, including the implementation of e-commerce, see Figure 2. SMEs considered insufficient financial resources, the availability of qualified IT specialists, as well as insufficient digital skills of employees as the biggest barrier.



Source: authors' construction based on survey data, Rupeika-Apoga, R. & Bule, L. (2021)

Fig. 2. The main obstacles perceived by companies to the digital transformation in Latvia, 2021

The obstacles to digitization mentioned in the surveys and the necessary support to overcome them allow to identify factors that also affect electronic commerce. Internal factors include: insufficient digital competences of employees, lack of IT specialists, insufficient resources. External factors are related to state support for staff training, investments in the company, ensuring the safety of internet environment and clarity of legislation on business digitalization (Rupeika-Apoga, R. & Bule, L., 2021).

2. Data from the expert survey

To identify the strengths and weaknesses as well as opportunities and threats of e-commerce for the SME sector in Latvia, the author, based on the surveys of businesspersons and 16 experts (businesspersons from various regions of Latvia, academics and NGOs) as well as in-depth interviews with 17 experts (IT companies engaged in the development of e-commerce services and systems), performed a SWOT analysis (Table 1).

Table 1

SWOT analysis of the use of e-commerce by the SME sector in Latvia

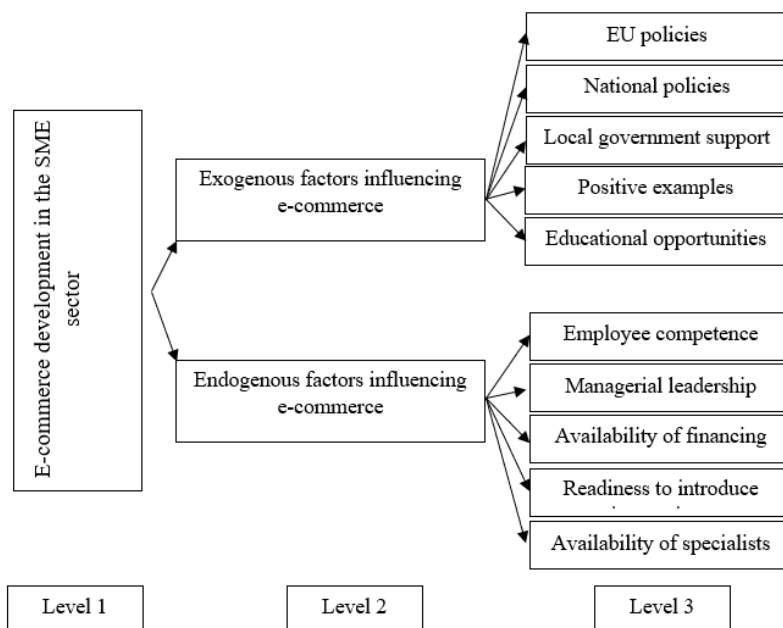
Strengths	Weaknesses
<ul style="list-style-type: none"> Well-developed data transmission infrastructure Well-developed use of technologies in general There are some success stories of using e-commerce in the SME sector Provided resources for training of company employees 	<ul style="list-style-type: none"> In Latvia, only a small segment of SMEs uses e-commerce in their operation Insufficient competence of employees in the development of e-commerce Latvia has not designed a state policy for the development of e-commerce in companies No financial and marketing programs to promote the use of e-commerce
Opportunities	Threats
<ul style="list-style-type: none"> E-commerce development programs elaboration for the SME sector Co-funding from the EU Structural Funds and EC programmes Incorporation of e-commerce courses in training programs to improve the competencies of company managers and employees 	<ul style="list-style-type: none"> Bureaucratic barriers Lack of administrative capacity for e-commerce implementation Problems with acquiring financing Lack of IT specialists in Latvia

Source: authors' construction based on the survey of experts, number of respondents – 17; survey period: January 2022 - March 2022

In view of the strengths and weaknesses there are wide opportunities for the development of e-commerce. For example, it would be necessary to develop an e-commerce development programme for SMEs. The implementation of the opportunities would facilitate creation of new jobs, optimization of business processes, competitiveness of enterprises, development of the export capacity of enterprises, entrepreneurial activity.

However, it should also be considered that the development of e-commerce in the SME sector in Latvia could be threatened by various bureaucratic barriers for businesspersons to use e-commerce, a lack of ICT specialists and poor opportunities to acquire financing.

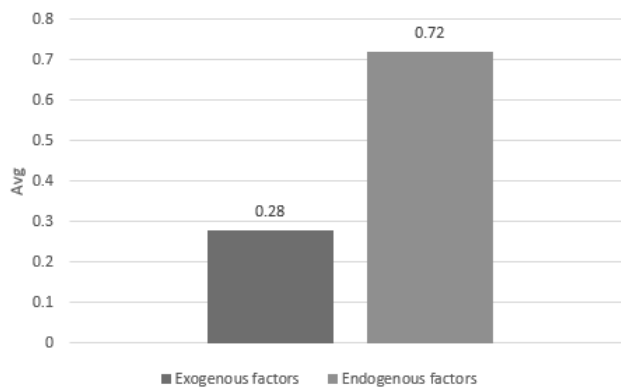
The expert survey data were used to perform an analysis by employing the AHP method. As prescribed by the AHP method, the authors first created a hierarchy (Figure 3.), with the main goal being defined at level 1, namely, the development of e-commerce in the SME sector. Next, the author defined groups of criteria, which represented level 2 of the hierarchy. In this case, there were two groups of criteria: exogenous factors influencing e-commerce and endogenous factors influencing e-commerce.



Source: authors' calculations based on the survey of experts, number of respondents – 17; survey period: January 2022 - March 2022

Fig. 3. Hierarchy scheme for e-commerce development in the SME sector

According to the experts' opinions and studies of literature, the following exogenous factors were identified – EU policies and national policies, since they provide the overall framework of the e-commerce development. Local government support is of additional importance, since the e-commerce development among the SMEs in different regions is different. Positive examples are a very important factor, as it allows learning the success stories from other companies. Finally, the education opportunities are of a great significance. The following endogenous factors have been defined – employee competence that can be one of the most crucial factors for developing the e-commerce in SMEs, however the management leadership is of a similar importance, taking into account the openness to innovations. Readiness to introduce new measures, availability of financing and availability of specialist were also defined as very important factors, since introduction of e-commerce requests digital solutions. The ratings by the experts were processed by calculating the arithmetic mean and standard deviation for each rating. For example, the experts rated the group of endogenous factors much higher than that of exogenous factors. However, the opinions of the experts on both groups of criteria differed, which was shown by the relatively high dispersion (Figure 4).



Source: authors' calculations based on the survey of experts; number of respondents – 17; survey period: January 2022 - March 2022

Fig. 4. Expert rankings of criteria groups for e-commerce development scenarios in the SME sector

An analysis of the expert assessment on the impact of exogenous and endogenous factors on the development of e-commerce highlights very clearly that endogenous factors in companies are more relevant to enabling to take advantage of all the benefits of e-commerce than factors that affect companies from outside.

Conclusions, proposals, recommendations

- 1) The main external factors that affect the use of e-commerce in the SME sector: EU policies, national policies, local government support, educational opportunities.
- 2) The main internal factors that affect the use of e-commerce in the SME sector: employee competence, managerial leadership, availability of financing, readiness to introduce, availability of specialists. Endogenous factors in SMEs are more relevant to enabling to take advantage of all the benefits of e-commerce than factors that affect companies from outside.
- 3) Overall, the regulatory and policy regulatory framework is well defined and conducive to e-commerce and digitalization. However, it is important that SME managers take advantage of the opportunities offered.

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THE ROLE OF CIRCULAR CUMULATIVE CAUSATION AND ECONOMIC GEOGRAPHY APPROACH IN THE DEVELOPMENT OF NEW INDUSTRIES: EXAMPLE OF GREEN HYDROGEN INDUSTRY EVOLUTION IN LATVIA AND ESTONIA

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Abstract. The unbalanced development of regions within the European Union (EU) faces challenges for sustainable economic growth opportunities in the future. Uneven scattering of industrial capacities across the EU determines the unequal distribution of wealth among the member states. The EU economy's Green Deal strategy determines the necessity of developing new technologies in both existing industries and developing new ones.

The research emphasises two theories concerning territorial development issues. Circular cumulative causation theory and economic geography distinguish the development of industry, especially the manufacturing sector, as a crucial aspect of the economic development of a particular area. The symbiosis of both theories provides guidelines for a balanced approach to territory economic development capabilities in light of industry sustainability requirements in the present-day economy. The purpose of the study is to evaluate the combined circular cumulative causation and economic geography theory analysis approach by comparing the potential for the development of the green hydrogen industry in Latvia and Estonia. Hydrogen is one of the most likely energy sources to replace fossil fuels in the coming decades, and it possesses high potential for transportation, manufacturing, energy supply, and other sectors of the economy.

The study established the research pattern within theoretical bases and identified general trends concerning an assessment framework, which can lead to unbalanced values in the industry's potential evaluation process. The findings of the evaluation of the green hydrogen industry indicate Estonia's slight advantage over Latvia.

Key words: economic geography, regional economics, industry development, green hydrogen, industry linkages.

JEL code: R00

Introduction

Unbalanced industry capacity across the Latvian regions is leading to an uneven distribution of wealth among the population in different parts of the country. The Green Deal approach in the EU economy determines the necessity for the evolution of new techniques in existing industries and the development of new industries. It offers an opportunity for the EU countries to employ a new economic paradigm for more balanced regional development. Along these lines, an appropriate theoretical background for the new initiatives in industry development must be identified and tested.

The hypothesis of the study suggests that circular cumulative causation theory and an economic geography approach can provide a fitting analytical framework for the development of new industries in a particular territory. The object of the study is the unified circular cumulative causation and economic geography theoretical framework in the industry evolution process. The subject of this research is a study approach for a particular industry's potential assessment within the selected theoretical frame.

The aim of the research is to evaluate the unified circular cumulative causation and economic geography theory analysis approach by comparing green hydrogen industry development possibilities in Latvia and Estonia. The specified aim is accompanied by the following tasks: to review the scientific literature on circular cumulative causation and economic geography theory; to describe the new approach for new industry development assessment; to compare the acquired results from established techniques regarding Latvia and Estonia in the light of green hydrogen industry development; and to evaluate the durability and applicability of the assessment framework.

For the accomplishment of the presented tasks of the study, the authors employed the monographic or descriptive study method and the modelling method. The information sources for the study consist of

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scientific publications and monographies on selected theories, industries, and regional development. Secondary data on statistical indicators concerning Latvia, Estonia, and average values of the EU economic development and industry sectors are presented and analysed.

The combination of circular cumulative causation theory and an economic geography approach for establishing an assessment framework for industry development is the new perspective for regional policy analysis. Notwithstanding, the utilisation of this economic approach can be only one of the many tools to identify industry development possibilities in a particular territory. The proposed economic technique must be examined in other wide-ranging studies on the subjects of industry and regional development.

Research results and discussion

The discussion about the study and its results is divided into two parts. The first part represents the debate concerning the theoretical framework of the research. The second part deals with the assessment technique and its results regarding green hydrogen industry analysis in Latvia and Estonia.

1. Circular cumulative causation, economic geography, regional development and industry

According to circular cumulative causation theory thinkers like Gunnar Myrdal and Nicholas Kaldor, one of the most important aspects of economic development for a particular society is the growth of the industry, which is measured by productivity gains in this sector. Growth in the manufacturing sector contributes to productivity increases in other sectors of the economy (Berger, 2009; Thirlwall, 2002). Within this perspective, the dominant role of industry in territorial development is undeniable.

A broad consensus within economic philosophy determines a set of activities and processes that contribute to industry development in a certain territory. These contributors are urbanisation, market size, industry linkages, investments, transportation costs, etc. Furthermore, the starting position between neighbouring regions regarding socioeconomic development indicators and government policy initiatives influences the economic growth perspectives of these territories (Knaap, 2004; Krugman, 1991; Myrdal, 1957).

Circular cumulative causation theory contributes to economic geography by describing a cycle of economic growth in regions with monopolistic competition. A region with a large population will be an attractive territory for production localization because of the sizeable local market and the availability of other local goods and services. This course of events will contribute to the inflow of a larger number of people from other neighbouring regions with less developed industries. This process will continue until the population is concentrated in a few of the most industrialised territories (Krugman, 1991). From this perspective, the circular cumulative causation is considered as a frame for geography-relevant economic processes, industry and territorial development.

Population concentration in one region of the country contributes to uneven development because it leads to a larger movement of labour, capital, goods, and services in this territory. Migration, capital movements and trade are channels where the cumulative process develops with a positive trend in successful regions and a negative development scenario in disadvantaged regions. When investments, purchasing power and demand are increasing in a specified region, it contributes to the attractiveness of new investments, which, through the industrialization process, leads to higher rates of purchasing power and demand, and this cycle tends to continue. Furthermore, a region without investment inflow within a specified timeframe will not be able to afford the proper maintenance of infrastructure and the provision of the necessary services of an appropriate quality to the community, which will lower the competitiveness level of this area in terms of capital attraction (Myrdal, 1957). Population concentration provides an

additional cumulative effect for economic growth since the potential market for different industries and services is increasing. According to a positive feedback perspective, manufacturing tends to condense where a large market exists, but a substantial market emerges where manufacturing production is concentrated (Krugman, 1991). The size of the population in a region increases as more job and business opportunities are created. Investment and industrial activity are major forces for developing and sustaining the centralising forces of a regional population (Nakamura, 2013). In accordance with the highlighted premises, market size is tightly linked with population concentration in certain territories.

Population concentration and market size are only part of the whole picture in regional development. Connections between firms and industries are a decisive element for further economic growth possibilities. In the economic development process, linkages among different firms in a region exist. These linkages are closely related to input-output analysis patterns. They cover the input and output processes of production concerning relations between firms. There are backward linkages when a firm needs inputs from other firms for producing processes and forward linkages when the firm produces inputs for other firms (Hirshman, 1958). If a manufacturer sells goods primarily to export markets and relies on imported inputs, then there would be less incentive to localise near a country's regional centre. Because most production output is sold abroad, there will be little backward linkage and little forward linkage since most inputs derive from abroad (Krugman, Livas, 1996). Linkages among firms and industries facilitate the evolution of territories with certain kinds of industry concentration. Investment inflows can facilitate spatially constrained external economies in a region. For instance, the high technology industry in Silicon Valley employs localization of the economy, where the closeness of related firms within the same industry empowers high and cost-effective economic activity (Nakamura, 2013). The number of linkages that new industries can provide for the local economy is another topic of interest for understanding the economic ecosystem and the possibilities of economic growth. New linkages provide additional capabilities for economic activity and lead to multiplier effects in connected firms and sectors of the economy.

Spatial agglomeration or dispersion of economic activity is closely linked to the issue of uneven regional development. Agglomeration is understood as a territory where more monopolistically competitive firms are located than in other territories. Increasing returns to scale at the firm level suggest that each firm is a lone producer of its own good variety and can choose to produce it in one region or another. Manufacturing location in one or a few territories is determined by pecuniary externalities derived from the interlinkage of increasing returns with transportation costs between regions (Meardon, 2001).

There is an obvious connection between regional development perspectives, the industrial development of territories, and economic geography. Population proportions between neighbouring regions on a large scale are determined by which region will gain population in the case of decreasing transportation costs and manufacturing development. The regions with larger initial population rates will gain population at the expense of neighbouring territories (Krugman, 1991). It is presumed that low costs of transportation for intermediate goods will be beneficial for linkages between firms and could facilitate agglomeration stability (Hirshman, 1958). The distance between manufacturing location and market has the power to define patterns of territorial development and urbanisation level in a particular territory. The genesis of manufacturing and consumption in the same territory is leading to a large urbanisation rate supported by additional manufacturing and service firms (Krugman, Livas, 1996). Samuelson's Iceberg model suggests that transportation costs are linearly connected with distance. The longer the transportation route, the more substantial value is extracted from the arriving volume of goods, and vice versa (Krugman, 1991).

Since distance from manufacturing location to market is highly relevant for the industry development of a particular territory, the transportation infrastructure and transportation costs must be examined in the

case of remote markets within a region, country, or other part of the globe. Physical distance to the market and geographical characteristics is only one way to assess the transportation costs of hypothetical industry localization. There are tools and practises for overcoming physical distance. For instance, the larger the amount of goods transported at one time, the lower the transportation costs per unit of merchandise, and the more sustainability is ensured. Furthermore, the technical complexity of transportation for a particular good or material must be rigorously considered because it generates additional expenses. As well, the capability of infrastructure for sustainable transportation of large amounts of goods or materials must be taken into account. For operation durability, a multimodal approach to the transportation chain must be ensured. Switching from one type of transport to another in cases of unpredictable disruptions or challenges is highly beneficial.

Uneven regional development is rooted not only in previously described socioeconomic assumptions but is additionally determined by timeframe perspective and industry evolution starting point. The initial advantages in industrial development and capital inflow of a certain region determine that it is more beneficial from a mutual market perspective than neighbouring territories, and this phenomenon tends to increase, contrary to the assumptions of classical economic theory (King, 2009). The major issue is not how large the population concentration or industry size in a particular region is according to the global scale, but what its position is between neighbouring regions. Regions with a larger capital stock will provide larger profits for firms. According to this assumption, regions with more developed industries will benefit on a larger scale, and economic growth will be faster than in adjacent territories (Krugman, 1981).

According to previously analysed theoretical guidelines, regions need to maximise their dedication to attract investment flows as soon as possible. A country, region, or municipality must act as an agent who promotes its territory and competes with other agents to attract investments. Furthermore, the government has an important role in territorial development issues concerning many factors of economic growth. Patterns of economic geography may be influenced by government policy and the increasing complexity of the economic growth framework (Rickard, 2020). In accordance with French economist Francis Perroux, a vision for employing government action to transform a territorial agglomeration into a growth pole exists. This pole is characterised by major industries around which linked industries evolve (Higgins, Savoie, 1988). The government must promote selected individuals and commercial units of the agglomeration that interact with multinational firms into a growth pole that provides gains for these units that were not originally intended to benefit from its activities. The government's action could be as straightforward as developing or enhancing communication and transportation infrastructure. Moreover, large companies must take part in the transformation process from growth pole to development pole (Meardon, 2001). In this theoretical perspective, individual economic agents existing in a monopolistic competition model become interconnected through the backward and forward linkages of manufacturing.

The dominance of one industry is transforming the forms of relations between economic units. These actors are starting to behave as different parts of a whole growth pole. Core industries create multiplying effects on other firms that enhance their dependent position regarding the central industry's economic success. The underpinning foundation of the development pole is industries that generate profit opportunities in other fields of the economy as they expand (Meardon, 2001). Therefore, the emergence of an industry must be the product of some prior demand. There must be tools for encouraging this demand for the purpose of further development. (Hirshman, 1958).

Territory planning and the economic development of a certain territory are closely related. Economic growth consists of a continuous system of relations between the centre and the periphery concerning their transformation due to the development and diffusion of innovations. Diffusion of innovations occurs in three

directions: from the leading economic regions to the areas of the periphery; from the higher-level centres to the lesser centres; and from the major cities to the neighbouring territories. A growth pole is an area with potential for economic development. For this purpose, the most favourable location with the most appropriate combination of resources and location is chosen, and with the establishment of infrastructure facilities and manufacturing businesses, the growth pole becomes the development centre (Friedmann, 1967). The evolution of industries contributes to the emergence of development poles and the diffusion of economic growth.

2. Framework for evaluation of green hydrogen industry development in Estonia and Latvia

Latvia and Estonia have many similar geographical, economic, political, and demographic characteristics, and the evolution of new industries is likely in both countries. To a large extent, both territories have matching transportation infrastructure and are physically close to the main markets for goods produced in other regions.

Under the EU Green Deal, member states are expected to reduce greenhouse gas emissions by 55% by 2030 compared to 1990 while achieving net zero greenhouse gas emissions by 2050. Further economic development should be based on climate-neutral energy sources (European Council, 2022).

Hydrogen retrieved from renewable energy sources, known as green hydrogen, is one of the most likely energy sources to replace fossil fuels. According to data from the International Energy Agency, the use of hydrogen in the global economy increased from 18 Mt to 94 Mt per year between 1975 and 2021 (International Energy Agency, 2019, 2022). According to World Bank estimates, by 2050, the market demand for hydrogen will be around 600 Mt per year. At present, only 5% of the hydrogen produced is processed through renewable resources (mostly wind and solar) (World Bank, 2022).

Despite high fuel prices and the EU's focus on the green economy, Latvia and Estonia are only now making the first steps towards green hydrogen industry development. The first phase pilot projects for hydrogen use in public transportation, exploring wind farm connectivity capacities with hydrogen production, and creating a framework for a hydrogen valley in Estonia and around the Baltic Sea are under way (Vesinikuorg, 2022, Invest in Estonia, 2022, Labs of Latvia, 2023). Within this framework, a broad list of actions concerning testing various hydrogen technology solutions, investigating production potential, prototyping technologies, developing fundamental infrastructure, and encouraging systematic intersectoral cooperation must be implemented.

The role of government is obvious in the advancement of the green hydrogen industry. By applying EU Green Deal strategy guidelines, state institutions provide a stronger foundation and financial motivation for nature-neutral energy use. EU-founded projects are milestones for starting hydrogen production and application in different areas of the economy. Furthermore, strategies and roadmaps for hydrogen introduction and usage are essential signs of government inclination regarding this issue.

For further analysis, according to the previous theoretical premises, a number of ingredients necessary for industry localization and development have been determined. Six elements can be identified: population concentration, investment inflow, industry linkages, transportation costs, transportation infrastructure, and particular industry evolution in the neighbouring regions.

Indicators of population concentration include changes in population over a given time period and migration data. Investment flow is expressed in foreign direct investments per capita, investments in specific industries, and rating indexes. Estimates of the length and capacity of highway, train, pipeline, airport, and port infrastructure in relation to specific industrial demands can be used to evaluate

transportation infrastructure. Transportation costs are the most volatile indicator due to particular industry transportation requirements, different freight rates, and fuel prices in a certain region. Industry linkages can be identified by industries input and output compositions and related indexes. Finally, a certain industry evolution in neighbouring regions can be conducted by analysing existing bases for new industries or associated production or service sectors of the economy and by conducting a policy agenda assessment in the particular field.

For the testing of an established industry development assessment framework, the situation in Latvia is compared to tendencies in Estonia regarding green hydrogen industry evolution potential. Within the analysis, both relatively compact countries are perceived as two neighbouring regions. For description and background knowledge, some of the six criteria values are compared to average values in the EU.

For the purpose of industry potential assessment, the approach values of established criteria are set from 1 to 2 based on their particular closeness and importance to the green hydrogen industry. Further, the difference between two regions' data is divided into five ranks with values from 1 to 3. The more successful region receives one of the difference coefficients multiplied by the criteria value. The region with inferior results in certain criteria acquires only the base value of the analysed criteria; the same path is applied when both regions have identical values in the same indicator (Table 1).

Table 1

Criteria and difference coefficient values for industry potential assessment in a certain territory

Criteria concerning the green hydrogen industry (A)	Value	Difference between regions in statistical data (B)	Value
Overall situation describing industry potential	1	No	1
Adjacent fields for industry	1.5	Minor	1.5
Directly connected fields with industry	2	Average	2
		Major	2.5
		Huge	3

Source: author's framework for the analysis of gathered data

The gathered data represents six areas of analysis with 28 criteria concerning the green hydrogen industry or describing the overall situation in certain points of interest. Data concerning average EU indicators are included in numerous sections of the table to illustrate the situation at the European level (Table 2).

Table 2

Criteria and difference coefficient values for green hydrogen industry potential assessment in Latvia and Estonia (2017-2022)

Criteria	Criteria value (A)	Latvia	Estonia	European Union	Difference coefficient (B)	Latvia (A*B)	Estonia (A*B)
People concentration							
Population 2021	1.5	1 893 223	1 330 068	16 563 240	1.5	2.25	1.50
Population dynamics 2017-2021, %	1.5	-3.0	1.1	0.4	2.5	1.50	3.75
Net migration 2017-2021, EU 2020, %	1.5	-2.0	4.3	2.5	2.5	1.50	3.75
Workforce from population 2021, %	1.5	50.4	53.0	48.5	1.5	1.50	2.25
Total						6.75	11.25
Investment							
FDI per capita average 2017-2021, USD	1.5	929	2 525	669	3	1.50	4.50
FDI per capita average by energy sector 2017-2021, USD million	1.5	19.4	2.4	*	3	4.50	1.50
Credit rating, S&P Global, Moody's, Fitch 2022	1	A-	AA-	*	1.5	1.00	1.50
Doing business rating 2020, score	1	80.3	80.6	76.1	1.5	1.00	1.50
PPP Total, National currency units/USD, 2021	1.5	0.509	0.544	0.693	2	1.50	3.00
Total						9.50	12.00
Transportation infrastructure							
Road network density, km by km ² 2020	1.5	0.9	1.4	1.8	2	1.50	3.00
Railroad density, km by 1000 km ² 2021	1.5	28.8	25.8	55.27	1.5	2.25	1.50
Logistic performance index	1	2.81	3.31	3.52	2	1.00	2.00
Gas transmission network density, km by 1000 km ² 2022	2	18.4	21.6	*	1.5	2.00	3.00
Gross weight of seaborne freight handled in ports t per capita 2021	1.5	29.6	21.1	7.7	2	3.00	1.50
Total						9.75	11.00
Transportation costs							
Transmission share in cost of natural gas 2021, %	1.5	29.0	47.0	30.7	2.5	3.75	1.50
Average diesel price in 2022, EUR	1.5	1.78	1.77	*	1.5	1.50	2.25
CPI for transportation, 2022	1	132	242	124	3	1.00	3.00
Total						6.25	6.75
Industry linkages							
Large scale mineral fertilizer production	2	0	0	*	2	2	2
Steel industry	2	0	0	*	1	2	2
Transport	2	1	2	*	1.5	2	3
Renewables share in energy balance 2021, %	2	42.1	37.6	21.8	1.5	3	2
Wind energy in electricity produced 2021, %	2	2.0	7.0	14.0	2	2	4
Economy complexity rating 2020	1	0.71	0.99	1.15	2	1	2
Global Innovation Index	1	36.5	50.2	45.6	2.5	1	2.5
R&D from GDP 2020, %	1	0.71	1.79	2.32	2.5	1	2.5
Level of productivity 2021, USD constant prices	1	41.4	42.9	55.3	1.5	1	1.5
Total						15.0	21.5
Hydrogen industry evolution							
Policy roadmap	2	0	0	*	1	2	2
Large and midsize projects on low-carbon hydrogen	2	1	2	*	1.5	1	3
Total						3	5

Source: author's calculations based on gathered data

Conducted analysis regarding green hydrogen industry development opportunities indicates Estonia has a significant overall lead over Latvia. From the 28 criteria used in the assessment, Estonia has a higher score in 19 of them. Latvia has a higher rating in six criteria, but in three criteria, the neighbouring countries have an equal score. The major gap between these two regions is determined by population concentration criteria and industry linkage indicators.

Nine of the 19 criteria representing the average values concerning the EU are greater than in Estonia and Latvia. The major difference applies to people's concentration, road and railroad transport density, the complexity of the economy, and productivity. Though there isn't a dominance of average EU values in any of the six indicator groups.

People concentration and industry linkages are fundamental deal breakers for industry development potential between Latvia and Estonia. Despite a 30 percent larger population size in Latvia and, to this extent, related workforce numbers, the population dynamics are more favourable to Estonia. According to current demographic patterns, after 40 years, both regions will have equal population sizes. Along with the purchasing power of society, it is a fundamental factor in long-term investment attractiveness. Wealthy societies can afford to pay extra money for nature's neutral energy. Apart from Estonia, the other EU regions have an advantage in demographic dynamics and purchasing power compared to Latvia. Furthermore, the larger foreign direct investment flow to Estonia in contrast to neighbouring territories is an additional beneficial factor to support further investment inflows and new industry evolution. People's concentration and financial resources complement each other in light of the analysis conducted.

The discussion about industry linkages leads to the assumption that a more complex economy has extra linkages between different fields of economic activity within a region. Connections between the hydrogen sector and local industries that use hydrogen in their manufacturing processes are essential for long-term market security. Producing hydrogen only for export places this industry in uncharted waters of intense competition with the regions of the EU employing a more developed hydrogen industry, as well as making it more dependent on transportation costs. Until the last decade, Latvia had the potential to use hydrogen in the steel plant and Estonia in mineral fertiliser production; presently, both production sites are closed. Today, Estonia is more reluctant to use hydrogen public transportation in the largest cities, despite similar project failures in Riga public transportation.

Basic indexes describing a country's economy in terms of innovation, productivity, and complexity show that Estonia outperforms Latvia in these fields and possesses an advantage to attract investments; its claim is supported by foreign direct investment data. Moreover, Latvia's neighbour has an edge in other basic statistical indicators describing the overall situation of the country's economy, which creates a framework for a successful industry-building process.

Regarding transportation costs and infrastructure, both regions have similar situations. The main consideration in the research framework is the opportunity for transportation of produced hydrogen via natural gas pipeline infrastructure, railways, and ports. Both regions employ similar infrastructure for hydrogen transportation in gas or liquid form. Hence, transportation costs must be comparable, but a more accurate measurement is not feasible at this point in the industry's potential studies.

In addition to the results reflecting industry development opportunities in the analysed countries, there are a wide range of factors concerning the approach of the analysis itself. Firstly, while 28 criteria cannot offer a thorough assessment of patterns and initiative conditions for specific industries' development in a particular region, they can offer a detailed initial glance at the issue. Secondly, every industry has a list of individual criteria directly linked to or related only to it.

These circumstances complicate the construction of a universal assessment approach due to the requirement for ongoing modifications to the list of criteria and the harmonisation of difference coefficient values with regard to particular industry preferences. Essentially, the six basic elements of the research framework – people concentration, investments, industry linkages, transportation infrastructure, transportation costs, and particular industry evolution – have universal application capacity, but criteria within these elements need to be modified accordingly. Apart from good general economic circumstances in a particular territory, the conditions for certain industries can be unsupportive. Therefore, special criteria directly linked to the reviewed industry must have appropriate weight in the overall assessment.

Uneven distribution of 28 criteria within six indicator groups increases the value of one particular indicator over another; for example, in this assessment, industry linkages. In these circumstances, the development of a mathematically correct model is challenging. Further work must be conducted to develop a more balanced criteria distribution among the six fields of analysis.

Conclusions

- 1) The applied approach within the cumulative circular causation and economic geography theoretical framework in the research confirms the key assumptions about Latvia and Estonia's economic situation and industry development opportunities, reflecting Estonia's leading position with a higher score in 19 indicators out of 28. Nine of the 19 criteria representing average values in the EU were greater than in Estonia and Latvia. The major difference between both neighbouring regions represents population concentration criteria and industry linkages. Overall, in all six indicator groups, Estonia received more points than Latvia.
- 2) At the time of the study, both countries have similar starting positions regarding the evolution of the green hydrogen industry, and it's too early to identify whether one or the other has a massive advantage. Nevertheless, Estonia is leading in public transportation projects and possesses some edge concerning green hydrogen industry pilot projects. The main weakness for Latvia and Estonia is a lack of large-scale production that may be linked to the green hydrogen industry for mutual benefit. Furthermore, the governments of both countries need to prepare a roadmap for hydrogen industry development and utilisation in their local economies.
- 3) The examined data of 28 criteria is not sufficient to investigate all patterns and initiative conditions for particular industry development in a certain location, but it provides a detailed first glance at the industry's evolution potential. Additionally, more effort must be pursued to develop a better balanced criteria distribution between the six fields of analysis to prevent increases in the value of one particular indicator. Uneven value dispersion restricts the construction of a more sufficient mathematical framework for industry development assessment.
- 4) The value distribution between general criteria describing the overall situation in the economy and specific criteria for particular industry evaluation in the matrix is another area of concern. In an excellent general economic situation in a definite region, the conditions for a particular industry can be unsupportive. Therefore, these special criteria must have appropriate weight in assessment.

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MUNICIPAL ENVIRONMENTAL GOVERNANCE IN LATVIA: GOVERNANCE INSTRUMENTS' FRAMING PRACTICE

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Abstract. There is a certain positive development in Latvia, especially in particular cases, but, in general, not all environmental governance issues are regularly and sufficiently integrated into Latvian municipal development governance/planning system, since being neither substantially supported by national governance level nor everywhere taking place at the municipal planning and management self-designed practice, particularly, as instant public pressure and requirements are often limited. After governance landscape changing administrative-territorial reform (2021) in the country, researchers now were aiming to study governance dimensions' framework in municipal practice – studying governance triple dimensions as content, stakeholders, and governance instruments. Research-and-development framework has been applied, using case study research methodology, based on the analysis of documents, general municipal practice structural overview, additional expert interviews/consultations, and, three chosen detailed municipal best practice case studies in Ventspils, Kekava and Valmiera municipalities with complementary governance approaches. Based on these studies, as well as on national previous studies and international best practice comparisons, there are emphasised the two core preconditions for the improvement of municipal environmental governance in Latvia. Since there is to be seen, that municipal environmental governance comprehensive integration approach, being theoretically well thought, but is having only limited success in current pragmatic municipal practice, there is to be secured municipal task-related vertical institutional environmental governance system, covering all four inner municipal administration levels. In parallel with statutory organized ground level environmental sector municipal companies, so-called communal services (drinking/sewage water, energy/heating, sanitary etc. basic environmental sub-sectors), other and newly growing environmental governance content issues are to be also institutionalised, but at the higher local government administration and decision-making levels. Next core precondition - municipal environmental communication complementary instrumentalisation and structural development, including environmental information, education/training, involvement/participation, and pro-environmental behaviour. These improvements would provide the necessary systemic overview and co-management of the whole complexity of environmental governance processes and procedures.

Key words: environment, municipalities, institutional and communication governance instruments.

JEL code: O18, O21, Q56

Introduction

In recent years, the governance of socio-ecological systems has developed, as well as the study of the management of such systems has become popular – there is a great diversity of governance systems, as well as an increasing emphasis on less frequently discussed governance principles, including adaptability, collaboration between different governance bodies, as well as diversity of knowledge and enhanced learning (Karpouzoglou et al., 2016). There could be developed even theoretical toolbox (Partelow S. et al., 2020), and author is mentioning a list of known theories, e.g. polycentricity, network governance, multi-level governance, collective action, governmentality (power/knowledge), adaptive governance, interactive governance theory etc. Adaptive governance requires the perception of environmental governance as a complex, socio-ecological system, based on close links between different elements, stakeholders, and actors or the organisations involved, as well as processes and events affecting governance, including climate change (Olsson et al., 2007).

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Authors analysed literature and identified 3 basic elements: environmental governance management; environment and innovative designs, being further on divided into 14 detailed elements (Pivo G. et al., 2020); and, for example, elements of management: processes (cooperation and experimentation); power (coalitions and regimes); actors (management, change agents, technical attitude, government agencies); organisational culture (norms and institutions, learning); organisational capacity (financial, adaptive, institutional); policy and legislation (ambiguities, mandates); forms of government (functional and electorate fragmentation). Authors (Bennett N. et al., 2018), studying the governance scholarship, have proposed that environmental governance has four general aims or objectives – to be effective, to be equitable, to be responsive, and to be robust, but each of these four objectives need to be considered simultaneously across the institutional, structural, and procedural elements of environmental governance.

Comprehensive list of good municipal practices is summarised and produced by the European Commission in the report "Best Environmental Management Practice for the Public Administration Sector" (Canfora P., 2015), covering many fields or sectors under responsibility of local municipalities: sustainable energy and climate change, mobility, local ambient air quality, reducing and optimising land use, noise pollution, green urban areas, environmental education, and dissemination of information to citizens and businesses.

There are various approaches to environmental governance and its definitions. The following definition of environmental governance could be formulated and applied to this study (Nesbit M., 2019): it is an inclusive system of actors, institutions and norms that establishes responsibility and accountability, and builds trust and capacity to cooperate in policymaking, decision-making, implementation and enforcement in the field of environment. In this report, there are listed several dimensions or spheres, constituting the basis for the assessment of environment governance: transparency, public participation, access to justice, compliance assurance and accountability, effectiveness and efficiency.

Regarding mentioned environmental spheres in the Environmental Governance Assessment Report for Latvia (Brizga J., 2019), there are many positive features and trends throughout all five of them in Latvia. However, at the same time, there is still a lot of space for substantial improvement by taking into consideration good practices from other Member States. It is already shown in the previously mentioned project report that there is no single cure for all possible environmental governance shortcomings, lacks and misuses, but there are also many good practices available. These practices can be adapted either by central government, or regional, or local government, respecting current situation, needs, local traditions, financial opportunities etc. Also, in regard of Latvia, there is the EU Environmental Implementation Review 2019 Country Report – LATVIA (European Commission, 2019). According to this report, Latvia has a centralised environmental management system with stable institutions and a strong emphasis on public participation. The legal framework has been strengthened by harmonising national environmental legislation with the EU directives. However, the adoption of good practices for the implementation of environmental legislation has not been uniform, and coordination in public administration has not been enough to properly integrate environmental considerations into sectoral policy. Institutional stability is sufficient, but there is a lack of effective coordination. Regulatory requirements have been improved, but a better impact assessment is needed. Compliance monitoring, enforcement, and the elimination of the consequences of injury should be strengthened. The public opening is high, but awareness raising is insufficient.

High-quality living environment and environmental protection as a precondition for such a living environment is a priority for Latvia and, accordingly, for policies of local municipalities. The implementation

of policy priorities and legislation at all administration levels requires appropriate governance instruments, whose availability and level of use are determined by actual current problems locations, and, also environmental governance approaches and capacities are different for different type, level and location of municipalities throughout Latvia. Such different approaches were planned to make optimal use of all available type of local resources. However, it makes it also problematic not only to access and compare environmental governance in municipalities, but, importantly, to increase experience exchange and cooperation between municipalities in the region. There are much less differences in traditional, statutory environmental governance sectors in communal management (water, wastewater, waste, energy, and other sectors), whereas in other, less traditional environmental management sectors and issues they vary significantly and are instantly growing. The formal setting of any type of environmental governance institutionalisation in municipalities in Latvia was optional and close to optimal, as per pragmatic views of most municipalities, neither national environmental nor administration legislation or law on municipalities (last since 2022) determine necessary existence of the environmental administration/enforcement body/-ies.

As a result of the administrative-territorial reform and related local government elections in 2021, there are 43 local administrative territories in Latvia instead of the previous 119 (9 urban and 110 rural/mixed municipalities). At the end of the reform, the municipal administrative structures for the merging municipalities are more similar now, but not so in environmental administration organisation, often still not having a single environmental enforcement body model. The reform resulted in bigger municipal area, bigger population, and increased diversity of environmental problems for the newly-formed joint municipalities, having also a new level of their combined budgets that now need to be planned and divided. Also, now there are more options and capacities for real environmental management staffing development, which were very limited or not existent at municipal administration/planning level for most of municipalities before reform. Besides that, there is now a ground environmental staff, employed by municipal communal companies (company limited status introduced in 2009) for basic environmental services in the field of any municipality. Local government expenditures on environmental issues could increase now, but there will be a possibility for optimal use (even not in all municipal cases) of the common environmental infrastructure, following the merger of municipalities. Inner/outside investment opportunities, such as investment in energy efficiency improvement and the extension of the public service networks etc., are also increasing.

Also, considering that municipal environmental governance has been rarely studied, researchers were aiming to renew former studies, after governance landscape changing administrative-territorial reform in the country, by employing governance dimensions' framework – studying **environmental governance content, stakeholders and governance instruments dimensions** (Ernsteins R., 2017a). Particularly, in this post-reform case there could be introduced the two-task orientations for current research-and-development framework studies, based on two eventually decisive governance instruments – additional environmental governance institutional instruments, as it is already now newly-decided in the several former/new municipalities, and wider emphasis on environmental communication instruments developments and usage – as both instruments are especially relevant for the introduction of any whole municipal environmental management systemisation and towards the better achievement of the main objectives, set out in the statutory local level municipal development planning documents, which also shall be theoretically based on socio-ecological system (SES) approach and sustainability principle.

Methodology

Overall, projected studies have been done within research-and-development framework, including action policies design, with eventual local approbation, as well as according to the local conditions, as the main emphasis is on municipal governance. There are various diverse environmental governance instruments to be studied, and the **model of six groups of environmental governance instruments** (Ernsteins R., 2017a) has been applied – political and legal instruments; planning instruments; economic and financial instruments; administrative and institutional instruments; infrastructure and technology instruments; and communication instruments, which altogether are to be seen as complementary set of instruments that need to be designed and implemented. **The set of the environmental communication instruments**, consisting of information, education/training, involvement/participation and pro-environmental behaviour groups of instruments (Ernsteins R., 2017b) is also to be recognised.

This framework of governance instruments has been applied for current study for the both interdependent administration levels in Latvia – national and local/municipal. There is also the third level, placed in-between the mentioned ones – there are five planning regions in Latvia, having small administrative capacity and limited number of prescribed regional level duties to be done, being represented by the Regional Council, automatically build by the elected leaders (mayors) of the local municipalities in each particular region. Besides the instrumental frame of the governance as one of the governance dimensions, two other complementary governance dimensions also need to be taken into account – governance content dimension and governance stakeholders' segments dimension – altogether these **three governance dimensions are framing environmental governance system** (Ernsteins R., 2017a).

Research-and-development framework has been applied, using **case study research methodology**, based on the analysis of documents, including general municipal practice overview. There were expert interviews/consultations conducted, and, particularly, three chosen detailed municipal case studies performed in Ventspils, Kekava and Valmiera municipalities, approaching the set of tasks-orientation of the research programme. Those three and theoretically complementary case studies at the local municipal level, each representing specific environmental governance institutionalisation approach (branch/integration approaches), have been emphasised and studied:

- Kekava Municipality – environmental governance integration approach;
- Ventspils Municipality – environmental governance branch (department) approach;
- Valmiera Municipality – environmental communication governance integration approach.

After studying national documents, by applying governance instruments framework and pre-scribing municipal environmental governance developments, the local municipal document on studies of environmental governance institutionalisation situation was also performed. It contains information about availability of environmental administrative units/divisions and/or other environmental staffing options, environmental committees/commissions etc. in 32 municipalities out of 43 recently (re)established. Acknowledgement goes for University of Latvia Environmental Science bachelor's/master's students, realising project works as part of Environmental governance study course. Besides this general local document studies, also detailed document studies in the three case territories were taking place, as well as expert/specialist evaluations and judgements, using participatory research application elements, as most of this research co-authors are also working as environmental governance experts in the municipalities. Further studies, using stakeholder interviews and surveys, are planned for the second studies stage.

1. National framework for municipal governance instruments' development

There are many environment governance instruments, provided at the national level, for which the model of six groups of environmental governance instruments could be used – political and legal instruments; planning instruments; economic and financial instruments; administrative and institutional instruments; infrastructure and technology instruments; and communication instruments (Ernststeins R., 2017a). Local governments as entities in the field of public law, may rely solely on regulatory enactments, which define the functions, rights and duties of local governments in detail. There is less political influence at the local municipal level in comparison with national level. Economical aspects and strong personalities prevail at the local level, irrespective of their political "homeland".

The legislative framework is exhaustive and detailed, but it is too fragmented in relation to the environment protection. In terms of the planning framework, documents at national level are detached from the local level. The ambitious targets set lack a clear identification of implementation mechanisms and financing (amount of waste disposed, CO₂ reduction etc.). The economic and financial framework at national level defines the source of municipal finances – real estate tax, population income tax, natural resources tax, but there is no financial mechanism for local governments of municipalities to stimulate business development in their territory, to promote sustainable forms of business, to promote the use of renewable energy sources (e.g. wind parks). Regarding the institutional and administrative framework and the framework of communication instruments, there are separate restrictions, imposed by regulatory enactments (e.g. the need for public consultations in certain cases, restrictions on the handling of municipal property etc.), leaving the local government level with a relatively large freedom of choice within the financial resources, available for activities. The development of infrastructure framework at national level is mainly linked to existing standards, regulations and procedures for construction, exploitation, etc., as well as the distribution of available EU funds, monitoring and control of use.

Legislative framework instruments. As regards environmental protection and environmental management, the following mandatory requirements, regulatory enactments, voluntary initiatives and standards may be applied to municipalities as one of the levels of public administration. Key regulatory enactments, governing the development process, procedures and general content of municipal planning documents, are: Law on Municipalities; Law on Spatial Development Planning; Regulations regarding local government development planning documents; Methodical Recommendations for the Development Programmes at regional and local level (integrated approach). According to the Environmental Protection Law (02.11.2006), the local government shall carry out environmental controls. The legislation framework should include binding rules for local governments, which are in force in a specific area, and apply to environmental management, such as waste management, waste water discharge, management of public areas, as well as incentives for energy efficiency measures taken, works to combat invasive plant species etc. Article 4 of the new Law on Local Governments, entered in force from 2023, states that local governments have the following autonomous functions in the nature/environmental fields:

- to organise water, heating, and municipal waste management services for the population, regardless of the ownership of the housing stock;
- to take care of the improvement and sanitary cleanliness of the administrative territory of the municipality (lighting and maintenance of areas, intended for public use; establishment and maintenance of parks, squares and green areas; flood prevention measures; establishment and maintenance of cemeteries and burial grounds for dead animals), as well as to establish requirements

for the maintenance of areas and structures, as this is related to public safety, maintenance of sanitary cleanliness and preservation of the urban landscape;

- to promote sustainable management and stewardship of natural capital, and to determine the use of municipal property, held for public use;
- contribute to climate change mitigation and adaptation.

The latter function – to contribute to climate change mitigation and adaptation – is brand new, as it was included in the newly-approved Law on Local Governments in 2022, comparing to the old, even regularly updated version of this law from 1994, which until now was the main piece of legislation, regulating the activities of municipalities. While most of the legal municipal functions, prescribed by this law, could be considered universal/traditional, this law does not include a number of activities or functions that municipalities carry out on a voluntary basis, depending on their actual needs, for instance: protecting and improving air quality, remediating polluted sites, monitoring and ensuring water quality in bathing areas, combating poachers etc.

Planning framework instruments. The municipal environmental governance in general, being in practice understood as nature and environmental protection sectorial components that are to be necessarily provided, has actually integrated into the three statutory municipal development planning documents: Sustainable Development Strategies (strategic planning for 25 years' period), Development Programmes (mid-term planning for 7 years' period), and Spatial Plans, the general/overall content of which is governed by national regulatory enactments and planning documents. The main planning documents at national level to be considered are: Latvia's Strategy for Sustainable Development by 2030; National Development Plan for 2021–2027; Regional Policy Guidelines for 2021–2027; Environmental Policy Guidelines 2021–2027; Strategic Plan for the Common Agricultural Policy of Latvia 2023–2027 etc. Local governments may adopt voluntary additional planning documents at local level, e.g. sectoral development plans and programmes in regard of mobility development, sustainable energy and climate change impact mitigation, solid household waste management, communication, territory improvement plan etc.

Economic and financial framework instruments. Local governments shall act at the level of the budget, available to themselves, including the so-called special budget, consisting of contributions from the Natural Resources Tax, which can only be used (spent) to finance measures and projects, related to environmental protection, such as education and awareness raising in the field of environmental protection, environmental monitoring, preservation of biodiversity and protection, air protection, climate change, environmental and natural resources research, assessment, recovery, water protection, soil protection and rehabilitation, strengthening the performance of environmental authorities and public environmental inspectors, waste management, and radioactive waste management. The European Union has committed itself to becoming the first climate-neutral part of the world by 2050. This requires significant investments from the EU, the national public sector, and the private sector. The proposed European Green Investment Plan – Sustainable Europe Investment Plan – will stimulate public investment and give access to private funds through the EU financial instrument. The European Investment Bank's lending mechanism to the public sector, supported by EU budget funds, could raise EUR 25–30 billion in investments. This will be used for loans to public sectors, such as investments in district heating networks and building renovation. The European Union Recovery and Resilience Mechanism Plan is available from June 2022, with investments to be made by 31 August 2026. The maximum amount of funding, available to Latvia, is projected at EUR 2.02 billion. The main priority of the plan is climate change and sustainability, through which financing will be available for: (1) reducing emissions in the transport sector, including greening measures of the Riga

metropolitan area transport system, road and public transport, as well as Rail Baltica multimodal points (small stations); (2) improving energy efficiency, including energy efficiency in multi-apartment houses, business, municipal buildings and the public sector – warming, refurbishment; (3) adaptation to climate change, including adaptation of the disaster management system to climate change, flood risk mitigation, forest growing.

New Law on Local Governments introduces new financial tool at the local level – **participatory budgeting**, amounting to at least 0.5 % of the total municipality budget and provided for grassroots initiatives from local communities. It will be mandatory for all municipalities from 2025.

Institutional and administrative framework instruments. Besides statutory responsibility on municipal utilities, being institutionalised in every municipality – water/waste water, heating, municipal waste, sanitation, and other statutory issues – and being organised as Environmental Utilities and Services departments, and/or most often as related municipal capital companies, there is need and space for various other environmental sector/issues responsibilities and everyday duties at the administration/planning/decision making levels of municipality. In opposite to the more or less similar structure of disciplinary/branch/sector-based governmental institutions at the national level (e.g. Environmental and Regional Development Ministry), the administrative structures, responsible bodies vary widely and differently in the fields of nature and environmental protection and resources management in municipalities. In Latvia, there is no any uniform pattern of such executive body, which in municipal practice may be either:

- a separate Environmental Governance/management department/division;
- Environmental Governance Division within another department;
- an individual/several environmental specialist/-s within one/another general departments;
- also, there could be the case of having neither separate Environmental department/division nor particular environmental specialist. It was the case in most of municipalities (particularly rural and small size municipalities), where general environmental responsibilities (mandatory and voluntary as decided by municipality, e.g. coastal issues for coastal municipalities, etc.) are to be shared between several other general sector employees and departments (e.g. Development, Planning, Project Management, Building, Municipal Property Management etc.).

There shall also be more powers in the environment management to be delegated to the Planning Regions, that are presently suffering from insufficient financial means and, accordingly, lack of administrative (human) resources. This could be especially important after the administrative territorial reform.

There are only several self-governments in Latvia, that during the last years have introduced an individual position in their administrations, regarding energy management. Most of the municipalities have elaborated different energy management plans (especially those of the European Mayors Pact), that are of great importance in the light of national objectives towards energy resources saving, use of renewable energy resources, and reduction of greenhouse gas emissions in atmosphere. However, these plans are far from good management and implementation, if there are no persons, responsible for monitoring of the plan implementation. Energy management is really cross-sectoral issue with involvement of different stakeholders and consisting of a wide spectrum of activities – insulation of heating pipelines, change towards sustainable fuel (wood pellets for boiler houses, electricity or biomethane for vehicles, wind parks, solar energy use etc.), reconstruction and insulation of public buildings and dwelling houses, change of existing street lighting and room lighting towards smart LED lighting systems, building of bike roads, thus

reducing transport intensity by cars and emissions thereof, awareness raising of general public, and many others.

Infrastructure and technology framework instruments. The environmental management system includes, of course, infrastructure and technology components: centralised water supply, waste water collection pipeline networks, waste water treatment plants, landfill sites, bathing sites, and other components. When designing, constructing and installing infrastructure and technology frameworks, it is essential to include elements of innovation and energy savings, which are almost always a necessary prerequisite for external financing. The involvement of private companies, private-public partnership projects could, on the one hand, reduce the number of financial resources to be invested on the part of the municipality for infrastructure and technological development, and, on the other, promote public involvement, co-responsibility for the decisions taken, careful and responsible maintenance results of projects carried out, such as bathing sites, waste collection sites etc.

Communication framework instruments. Citizens' rights to receive correct environment information are set in the Article 115 of the Constitution of the Republic of Latvia (Satversme) in the following way: *The State shall protect the right of everyone to live in a benevolent environment by providing information about environmental conditions and by promoting the preservation and improvement of the environment.* Furthermore, this requirement is described more detailed in the Law on Environment protection and Regulations on Elaboration of Development Programmes and Spatial Planning, requiring a minimum set of public consultation before approval of the planning documents.

Communication shall include all possible means, used by the local government for communication with citizens, natural persons and legal persons. The inclusion of citizens in decision-making shall be implemented through printed and electronic media, meetings with citizens, public consultations, etc. Cooperation between municipality and non-governmental sector, which can also take part of the responsibility for good environmental management for the municipality, should also be added here. At least, non-governmental sector shall participate in the development of public opinion on the implementation of a specific approach to one of the above instruments.

2. Municipal environmental governance instruments framing the practice – case studies

Cases studies, performed in three comparatively diverse municipalities, could be seen also as complementary examples in relation to their environmental institutions based instrumental, as well as other practices at the local level environmental governance. To ensure the successful implementation of the environmental governance framework, certain resources and the whole selection of governance instruments are needed. They may vary from one municipality to another and the most important environmental governance instruments in the municipality are examined below.

2.1. Kekava Municipality with Municipal Property Management department: environmental governance integration approach

Kekava Municipality is situated next to the capital city of Riga. The area of municipality is 443.91 km², the number of inhabitants – around 32000. The main natural resources are: forest, taking approximately half of the whole territory of the municipality, rivers – Daugava River along the coast of the whole municipality, including the Riga Hydroelectric power station dam and many smaller rivers, used for boating, and lake Titurga. The main challenges of Environment management in the Kekava Municipality are linked to preservation of natural quality of surrounding environment for good living and working conditions,

availability of places – forests, parks, river banks – for public use and development of local tourism, also avoiding large polluting industries and development of local handicraft and agriculture.

In the implementation of environmental management, the Kekava Municipality actively forms cooperation with all target groups (stakeholders governance dimension) – State institutions (ministries, Lielrīga Regional Environmental Board), private companies (Business Council, Real Estate Tax Discounts, Support of Local Home Producers, Brand "Made in Kekava"), co-financing of non-governmental organisations (NGO projects, co-projects, joint projects with associations and participation in associations – Daugava Union, Daugavkrasts Partnership), society as a whole, and neighbouring municipalities (Rīga, Marupe, Olaine, Salaspils, Baldone).

The local government's work in sectoral terms (content governance dimension) on environmental management is not limited to classical sectors – water management, waste collection, district heating – but is also implemented in the direction of improving energy efficiency, promoting micro-mobility, planning of landscapes, e.g. the municipality's unified territorial and thematic/sectorial signs branding system was elaborated. Campaigning, where all political parties are stressing, inter alia, the necessity of energy transition from fossil fuels to renewable sources, mobility improvement, greening of public areas, and other measures for improving of living quality and environment in the municipality as part of their political declarations, may be mentioned as sectorial governance perspectives and also as political instrument, one of those to be studied.

Legislative and planning instruments in the Kekava Municipality correspond to the national and regional priorities, that are complemented at local level, starting with compulsory planning documents – Sustainable Development Strategy 2030, Development Programme 2021–2027, Spatial Plan – and complemented by voluntary initiatives, such as the Local Regulations on "Prohibition of the Growing of Genetically Modified Plants in the Administrative Territory of the Kekava Municipality", the Kekava Municipality Improvement Plan, Kekava Municipality Energy and Climate Action Plan, the organisational plan for measures to limit the spread of hogweed for the period 2021–2025.

Within the limits of the economic and financial instruments, the local government of Kekava Municipality is acting basically on the local government budget, but also stressing outside funded projects developments. Payments of the Natural Resources Tax for extraction/use of natural resources or environmental pollution are to be transferred in proportion of 40 % to the basic budget of the local self-government, in the territory of which the activity is carried out. The funds of the municipality's basic budget, derived from tax payments and the funds of the environmental protection fund, established by the municipality, shall be used only for financing activities and projects, related to environmental protection, such as environmental education; environmental monitoring; biodiversity conservation and protection; air protection and climate change; environmental and natural resource research, assessment, restoration; water protection; soil and ground protection and remediation; capacity building of environmental authorities and public environmental inspectors; waste management; radioactive waste management.

The institutional and administrative instruments is characterised by the division of the local government administration into 5 departments, established in the Central administration. There are **several environment management specialists** in the **Municipal Property Management Department**: Chief Environmental Manager, Landscape Specialist, Forestry Specialist, Environmental and Melioration Engineer. The main aspects of its work are participation in development, implementation and coordination of environmental protection documents of the local government; participation in development and implementation of local government development planning documents (Development Strategy, Development Plan, Investment Plan, Spatial Plan); development of projects, related to green structures

and natural sites, etc. It is complemented with some specific aspects of activities in sectors of waste management (including communication with stakeholders regarding the sorting of waste), water supply and wastewater collection (including registering of decentralised wastewater treatment individual solutions). Activities also include consulting inhabitants and companies, preparing documentation for tree falling outside territories of town, implementing of activities in the field of land melioration, drainage of rainwater.

One of several Committees (elected councillors) of the Council of Kekava Municipality – the Development Committee – reviews environmental issues. Also, several Council Commissions (councillors and invited municipal representatives, experts from outside institutions), taking care of related environmental issues, have been established at the Council: Civil Protection; Wood Felling Outside the Forest Land; Hunting Coordination, and after the administrative reform also **Environmental commission**. Working groups are set up to manage projects and to address certain topical issues by inviting specialists from other institutions (not just municipality administration).

Environmental management-related municipal companies are taking care of environmental infrastructure functioning – companies being 100 % owned by municipalities (limited liability companies/LLC), provide district water management centralised services, centralised heating, territory improvement and development.

The infrastructure instruments of the Kekava Municipality are best characterised by cooperation with neighbouring municipalities for the provision of environmental services. For example, collected waste water has been pumped from Kekava to Riga, and directed for treatment in the waste water treatment plant in Riga. In the closest villages to Riga – Valdlauci, Ramava and Katlakalns – centralised drinking water supply is provided from two sides, including from Riga. Also, collected municipal waste is delivered for disposal at the municipal landfill "Getlini" in the Stopini Municipality. Riga city residents are using municipal forests, parks, infrastructure for recreational purposes, swimming, walks, fishing etc.

One of the tasks of the municipality in the field of communication instruments framework is informing population about the work of the municipality administration and the Council, explaining the decisions taken, and the topical issues to implement them. The Kekava Municipality uses different information channels according to the needs of each audience. In the light of developments in communication, there is an increase in communication between citizens and the municipality through social media – Facebook and Instagram. The local government actively uses public consultations; residents can also watch the Council meetings live on the website of Kekava Municipality.

Summing-up, the governance of the environment in the Kekava Municipality is generally considered to be very good and continues to develop based on the planning documents. Environmental specialists, as local government employees, are part of the integrated municipal Property Management Department, and all environmental issues are integrated into different areas of local government activity, since the long-term vision of the municipality is to create the best environment for people, families, young families, based on a good natural and social environment. Example from the Kekava Municipality shows that complementary supportive collaboration between all three dimensions of environmental governance is necessary to achieve the best results. Of course, there are still many challenging issues to be addressed in the nearest future, e.g. improved sustainable mobility; energy transition from fossil fuels to renewable energy sources, i.e. in sector of private households and industries; reduction of produced waste amount, etc. This can be achieved by wider communication and involvement of stakeholders like researchers, private companies, government institutions, neighbouring municipalities, establishment of active local communities. Many of these activities most likely are wider than one area of one local municipality, and

require regional approach with involvement of several municipalities, forming a cluster of similar grouped and structured activities for better environmental governance in regional perspective.

2.2. Ventspils Municipality with Environment Supervision division: environmental governance branch approach

Ventspils state city is located in north-western part of Latvia, at the mouth of the Venta River to the Baltic Sea. Ventspils is the 6th largest city in Latvia having around 37 000 inhabitants, covering 58 km², 38 % of which is forests, parks and waters. The Freeport of Ventspils is providing business infrastructure and favorable environment for investment, and, the growth rate of the manufacturing industry in Ventspils is currently the highest in Latvia.

The environmental governance system in the municipality is organized with the aim of balancing the interests of businesses and citizens. Therefore, Ventspils City Council has adopted a decision that requires all operators of category B polluting activities to inform the public about the planned activities and their possible impact on the environment before obtaining a permit from the State Environmental Service. In cases of particular significance, a public consultation should be organized by means of a meeting with the residents. This ensures that the basic principles of informing the public, creating a dialogue and involving the public in environmental decision-making are respected. Other political and legal instruments, used in Ventspils Municipality, range from international and national to specific rules, binding on local government fields. For example, in the field of water management, these are the "Regulations on use of Ventspils City Water Pipeline and Sewer Networks", while in the field of coastal management there are the Regulations for the Management of the Beach etc.

Planning instruments, that are used in the development of local government development documents, are the most relevant in the main work of the local government environmental specialists. There are strategic environmental impact assessments (EIA) and the specific planning document's Environmental Report, the nature conservation plans of the specially protected areas, the development and implementation of which are closely linked to the cooperation with the national authority – the Nature Protection Board. Such plans are developed in Ventspils for geological and geomorphological nature monuments "Staldzene Stand Bank" and "Dampeli Outcrop", as well as the nature conservation area "Shore of the Lake Busnieki", included in the European network of specially protected nature sites Natura 2000.

Economic and financial instruments determine the way, in which the funds are placed at the disposal of the local government (tax on natural resources), and the use of such funds for environmental protection purposes. It is not only the annual environmental budget as a separate section in the municipal budget, but also the cash flow for the longer term, as municipal funds are planned for a period of 5 years.

The most important institutional and administrative instruments are the **Environment Supervision Division** of the Ventspils state city administration as a separate unit under the authority of the Executive Director, as are all the city departments. There is established the **Environment Protection Commission** of Ventspils state city Council, which includes representatives of the elected City Council, municipal departments and invited experts from outside the municipal administration. The Commission's decision is of a recommending nature.

The Environment Supervision Division of the state city Council of Ventspils is an essential instrument for ensuring municipal environmental management, the main tasks of which are to follow that projects, investments, plans do not have an adverse effect on the quality of the city environment, and to find solutions to mitigate the negative impact. The main aspects of its work are:

- participation in the development, implementation and coordination of environmental protection documents of the local government;
- participation in the development and implementation of local government development planning documents (Development Strategy, Development Plan, Investment Plan, Spatial Plan);
- development of projects, related to urban green structures and natural sites;
- preparation and processing of orders, necessary for the performance of studies, related to nature objects and their protection;
- essential work in preparation of documents of the national authorities by preparing the opinion of the local government regarding the Permits for polluting activities to be issued by the Regional environment authority of Kurzeme;
- representing the local government in the Risk Commission of the State Environmental Impact Assessment Bureau, assessing the safety reports of potentially dangerous undertakings and the programmes for the prevention of industrial accidents;
- development and coordination of the International Environmental Education Fund in Latvia (NGO), essential for the local government. Both management and communications instruments of "Blue Flags" and "Eco-Schools" are used.

Other main environmental communication aspects in the operation of the Division are:

- internal cooperation with all staff members of the Division and specialists in other institutions/businesses of the Council departments;
- external cooperation with the employees of the Ministry of Environment, State Environmental Impact Assessment Bureau, State Environment Service, Kurzeme Regional Environment Administration, Latvian Environment, Geology and Meteorology Centre, Health Inspectorate, State Labour Inspection, Food and Veterinary Service, State Fire and Rescue Service, representatives of public organisations, and employees of other institutions.

There are multiple infrastructure instruments in Ventspils, starting with the city's green areas, outdoor traversers, and, finally, the Baltic Sea coast (it is almost 12 km long in Ventspils). Major local government departments (authorities/companies) are involved in the environmental management implementation, with which the Environment Supervision Division has the closest cooperation as they are realising infrastructure and technological instrumentation in Ventspils.

The local government authority "Communal administration" performs the functions of the local government by organising the autonomous functions of the local government, specified in Section 15(2) of the Law "On Local Governments": improvement and sanitary cleanliness of the administrative territory (construction, reconstruction and maintenance of streets, roads and areas; lighting of streets, squares and other areas intended for public use; improvement and maintenance of squares and green zones; control of the collection and transport of municipal solid waste; anti-flood measures; establishment and maintenance of burial sites for cemeteries and dead animals; management public forests and waters).

Local government established and 100 % owned companies, being bond with the City Council by the function delegation agreements:

- Municipal LLC "Udeka" – organises the supply of drinking water and the collection of municipal waste water, operation of waste water treatment plant;
- Municipal LLC "Ventspils labiekartosanas kombinats" – municipal solid waste management (collection, delivery to the municipal landfill, maintenance of waste sorting places, etc.); road maintenance; road

- construction and/or repairs; greening; grooming of plants and lawns; transportation services (not secured by the local government, participating in procurement in the same way as private operators);
- Municipal LLC "Ventspils Siltums" – performs an economically justified provision of thermal energy – production, transmission, distribution and selling of thermal energy, ensuring environmentally friendly and efficient production and supply of thermal energy to the residents chosen centralised district heating connections.

All the set of four environmental communication instruments are present in the Ventspils Municipality (Ernstens R., 2017b) – environmental information and education, public participation, environmentally friendly behaviour, and all of them are worth of mentioning. Twice a year, the municipality local government organises sociological surveys of the population, including issues, related to the quality of the environment, its importance and the sources of information (present and desired). For example, in the field of environmental development and education, the following communication instruments should be mentioned: various information booklets; participation of the municipality in the "Blue Flag", "Green Key" and "Eco-Schools" movements of the International Environmental Education Foundation; information stands in protected areas and nature trails. It is worth mentioning that there is a continued dialogue with citizens on the www.ventspils.lv portal. It contains permanent environmental information, publishing the results of weekly bathing water testing, answers to citizens' questions, and weekly reports on topical environmental issues.

To sum-up, Ventspils city municipality have established separate Environmental division (incl. necessities of coordinating work with other divisions/departments) and elaborated (first in Latvia) municipal Environmental Policy Plan as particular voluntary sectorial planning document already straight after Latvia regaining independence in early 90-ties. After the Environmental Commission was established, also actively developed Blue Flag tradition, what created also Green Flag schools movement, and etc. activities could be mentioned, altogether clearly emphasizing the indispensable role of Environmental division and the whole vertical environmental governance system.

2.3. Valmiera Municipality with Public Relations department: environmental communication governance integration approach

After municipal reform, the Valmiera Municipality consists of Valmiera city (around 25 000 inhabitants, covering the area of 19.35 km², being the 8th biggest city in Latvia), several towns and parishes. Valmiera is an economically active city, being the economic and social centre of Vidzeme planning region, but around 30 % of the territory is covered by plantings and nature areas and 25 % are forest areas. Valmiera's slogan is *Evergreen City*. It includes well-being, joy of life, preservation of nature values, and developing pro-environmental industrial activities. Further in the text the three environmental governance dimensions will be shortly introduced.

Environmental sectors in Valmiera city are best characterised by the following facts: 99 % of heat-networks in Valmiera city are reconstructed and energy efficient. The unsorted Valmiera municipal waste is being deposit in the regional landfill "Daibe", where the nature education centre "Urda" is also operating. To support those Valmiera's inhabitants, who perform in an environmentally sound manner, Valmiera city is annually financing special waste management campaigns for dealing with spring green waste (tree branches and bushes), autumn leaves and bulky waste. Up to 84 % of Valmiera city central heating energy is produced by using wood chips as a renewable energy source. In order to battle climate change in 2020, Valmiera city was implementing smart energy efficiency street-lightning project, exchanging and implementing street reconstruction projects, as well as building cycling and pedestrian paths. Energy

efficiency measures in multi-apartment dwelling houses, as well as in industrial and municipal buildings, are being performed.

Stakeholder segments is another environmental governance dimension. Environmental governance at municipal level before the administrative reform was performed, using the integrative approach – having only a public relations specialist in environmental communication. Nevertheless, environmental issues are a part of agenda in all segments of environmental governance, cooperating and interacting upon need. Depending on the environmental sector, cooperation is taking either a pre-regulated form (e.g. the municipal quality management standard regulates the process of environmental communication) or a free development, reacting to up-to-date needs and spotlights (e.g. the organisation of the course "Balanced life" in cooperation between library and municipality). Environmental governance is performed using all governance instrument groups, described above.

Political and legislative instruments. Valmiera Municipality council has adopted a good-will act – the Environmental Declaration. Its energy management is performed with an Energy policy and ISO 50001 standard. The Declaration has environmental impact assessments for its spatial planning documents. Also, it has adopted several binding regulations for the management of the communal environmental sectors (waste management, water management, trees cutting, as well as management of degraded areas and buildings as legislative environmental governance instruments). The political governance instruments are: the municipal council, development committees and expert commission on the management of issues like evaluation of trees, degraded areas, public procurements.

Planning instruments. Moreover, Valmiera Municipality has developed three integrated statutory planning documents (instruments). Previously, before the municipal reform, the thematic Valmiera City Transport Infrastructure Development Conception and the Environmental Communication programmes for each calendar year were developed as disciplinary planning instruments for environmental governance.

Economic and financial instruments. There is a certain number of financial resources foreseen for environmental projects, related to environmental protection, environmental communication and promotion of participation within the annual municipal budget. Outer resources are being obtained for the implementation of environmental protection related projects.

Administrative and institutional instruments. Before administrative reform, environmental governance was the integrated performance duty of the municipal Real Estate Management and also City's Development departments. For last decade already, Valmiera Municipality has a separate **public relations specialist in environmental communication**, belonging to the municipal Branding and Public Relations department. Operational Information Centre is a useful support in coordinating environmental governance issues, offering the united phone number 8484 for dialling, if needed. Municipal police office is another environmental governance instrument that is worth mentioning. It serves as an instrument of direct information and mediation, as well as a coercive instrument. Since the administrative-territorial reform with seven rural municipalities joining, Valmiera Municipality has established the new **Natural Resource Management Division**, employing four environmental/nature and forest resource specialists, who ensure the implementation of the legal requirements for the management of environment and natural resources.

Infrastructure instruments. Valmiera Municipality has two large waste sorting areas for the collection of separately collected waste, and 61 Eco-points – smaller units for collection of the basic separately collected waste. Sorting infrastructure for biodegradable waste is in the process of development. Separate waste collection is available in individual containers at private dwelling houses. 84 of total 169 multiapartment dwelling houses have gone through complete renovation, improving their energy efficiency. There is the 99% availability for Valmiera city households to use centralised water supply service, and 98% availability

for Valmiera city households to use the centralised sewage. About 500 households in total are not connected to centralised sewage. Valmiera city is steadily improving its cycling infrastructure and taking care of its green areas. The following social environmental infrastructure is available in Valmiera city: educational nature trail of the river Gime, and nature and amusement park "Sajutu parks" ("Park of Senses").

Communication instruments. Municipal homepage and its social networks, publications in local media (newspaper "Liesma", portal "Valmieras Ziņas"), non-formal educational programmes ("Balanced life" as a cooperation programme between library and municipality), as well as information stands in city environment are being used for environmental information and education. The public hearings, population surveys and participation promoting events are being organised for the promotion of public participation. The following initiatives, promoting pro-environmental behaviour, are regularly taking place: municipal participation and the promotion of environmentally friendly lifestyle, promotion of fairs with local producers' products, performance of energy efficiency measures in public municipal buildings, tap-water drinking, duplex paper printing, use of electric cars and bikes in municipal mobility.

Collaboration instruments. Due to the perceptible size of municipality and its personal familiarities, cooperation in the environmental governance is taking place naturally. Still those collaboration instruments like a non-formal eco-board, consisting of the coordinators of Eco-Schools and municipal environmental cooperation, or involvement of municipal representative within the eco-board of each Eco-school, are to be highlighted.

To sum up, there in those communal environmental sectors, where municipal companies are active service providers (water, waste etc. management), the governance was reaching higher governance consistency of the sector, but before the administrative reform, the lack of highly disciplinary environmental approach (missing environmental unit) brought a certain disorder and unsystematic development of the field, and only the already existent environmental communication officer could also assist interdepartmental environmental information flow and coordination. After the establishment of the separate Environmental division, the process of environmental governance in Valmiera Municipality is performing well in all environmental governance sectors, step-wise involving more stakeholder segments and using/developing whole range of governance instruments.

Discussion

The introduction of the environmental management institutional systemisation in Latvian municipalities is still optional, besides communal management sectors statutory developments, and local governments are free to choose, which institutional management components should be introduced in a specific location to address specific needs and problems. In general, not all environmental governance topics/issues are still sufficiently integrated into Latvian municipal development governance/planning system, neither by top-down (national governance) nor bottom-up (local decision-makers and/or local public) approaches, also because of limited instant public pressure, but there are to be seen certain positive developments in Latvia, especially in particular municipalities after administrative reform (2021).

Not only legal requirements, but also national governance, supporting methodological documentation and training, are still limited, particularly for environmental governance integration statutory approach realisation. Self-deciding environmental practice of local governments is bound by very pragmatic necessary socio-economic budgetary expenditures, and subsequent environmental budgetary limitations, comparing to the growing needs and limited staffing capacities. There is also no clear requirement at least to monitor and review environmental governance situation as an integral part of the overall development

planning/monitoring, in order to overview the implementation of environmental governance and sustainability integration principle as requested for municipal environmental practice development.

During the studies performed, it could be recognised that after reducing number of municipalities during administrative-territorial reform in the country in 2021, now there can be seen a growth of certain environmental governance capacities and qualities in several municipalities. However, there is still space for important improvement. Related developments depend, of course, on the budget availability, the public attitude/support, on the extent of environmental problems, and climate change adaption needs in the municipalities. Given that the complexity and importance of environmental issues are increasing as well as the administrative area of municipalities, number of inhabitants and budgetary resources of the municipality increased after administrative-territorial reform, it is likely that in the future the creation of the particular municipal Environment Division will be indispensable.

The involvement of private companies and non-governmental organisations, associations and, in general, the development of cooperation and adaptive management, the introduction of innovative and complementary instruments, public education and involvement in environmental management are also further preconditions for effective development of environmental governance. In order to work successfully, it is necessary to be able to integrate environmental governance instruments into different areas and to attract public interest, since without a clear shared vision and public participation it is difficult to carry out any kind of environmental projects and further developments.

Conclusions and recommendations

Based on the studies, as well as on national and international best practice evaluations, there are also emphasised several main action-oriented development proposals in order to speed-up the quality of solving, preventing and predicting of environmental and climate change issues at the municipal level and, traditionally, there is prescribed use of diverse and possibly complementary environmental governance instruments, existing and innovative ones.

In the case of municipal development in Latvia, the main core precondition for the qualitative and also quantitative improvement of municipal environmental governance practice is to secure **municipal tasks-related vertical institutional environmental governance system**, since municipal environmental governance comprehensive integration approach, being theoretically well thought, but having only limited success in current pragmatic municipal practice. In parallel with statutory organized **ground level environmental sector municipal companies**, so-called communal services (drinking/sewage water, energy/heating, sanitary etc. basic environmental sub-sectors), other and newly growing environmental governance content issues are to be also institutionalised, but at the higher local government administration and decision-making levels. First, as the **separate or integrative administrative units/departments** - as a separate unit at local government administration level, or, at least, to expand existing Development, Planning, Project and/or Property management and other departments in order to include a separate environmental specialist/manager.

Further on, as additionally established and to be then **statutory municipal environmental committees or/and commissions** at decision-making level. Also, various existing municipal institutions, usually not or just occasionally involved for environmental activities could be further developed as **non-environmental institutions with additional environmental assignments** – municipal police, tourism information centres, libraries, eco-schools etc. Subsequently, in the perspective, there is to be seen **environmental or/and related institutions complementary at the all four municipal governance**

levels, as well as, in eventual partnership with public/NGO, business, also various content based consultative councils at municipal decision-making level and outside stakeholder groups.

Another core precondition that should also be mentioned is **inner/outer municipal environmental communication development** (information, education/training, participation and pro-environmental behaviour). Implementation of both instruments would improve the better overview and, subsequently, better co-management of the whole complexity of environmental governance process steps and components, which are now spread between various environmental sectors, diversity of already participating stakeholders and those who are still to be involved, and, finally, also multitude of environmental instruments. That altogether means the supervision and collaborative coordination of all three environmental governance dimensions mentioned.

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ANALYSIS OF THE DIFFERENCE IN OCCUPANCY AND PROFITABILITY IN INTERNATIONAL BRAND HOTELS BEFORE AND AFTER THE PANDEMIC CAUSED BY COVID-19

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Abstract. Adjara is a distinguished tourist region in Georgia. Based on statistical data, the growth of tourists and visitors in the last decade is characterized by high rates. However, both in the world and in Adjara, the COVID-19 pandemic caused significant damage to the tourism sector, drastically reducing the number of visitors. Based on the fact that Batumi has become a place of operation for international branded hotels, it attracts visitors from different countries. The Russia-Ukraine war had a certain influence on the recovery of tourism, in particular, the exchange rate of the national currency strengthened, real estate prices increased, and apartment hotels were distinctly busy. The aim of this research was to study the occupancy and profitability indicators of branded hotels operating in Adjara before and after the pandemic (2019 and 2022). In this study, the authors have identified difference in hotel occupancy and profit indicators in the corresponding months of 2019-2022; characterized differences in financial indicators concerning national and foreign currency; found out is there a disproportionate change in occupancy and profit in surveyed hotels. Qualitative and quantitative research methods were used during the research. As a result of the survey, significant changes in hotel occupancy and profit ratio were revealed, which are related to exchange rate changes and other important factors.

Key words: tourism, hotel, occupancy, revenue, COVID-19.

JEL code: Z33

Introduction

The pandemic (officially declared by the World Health Organization on 12 March 2020) caused by the COVID-19 infection has affected life all over the world. Countless publications confirm the impact of the COVID-19 pandemic on every field, starting with healthcare, ending with social and economic processes (World Health Organization, 2023). The pandemic has affected public health in general as well its consequences in global economic, political, socio-cultural systems will be observed for a long time both in Europe, and globally throughout the world (World Health Organization, 2023; European Observatory on Health Systems and Policies, 2021; Sigala, 2020). Public health strategies and measures, like social distancing, travel and mobility bans, community lockdowns, stay at home campaigns, self and mandatory quarantine, have heavily affected tourism, travel and leisure (Fernandez et al., 2022; Sigala, 2020).

In Georgia, with its warm weather, resort places, rich natural and cultural resources, and biodiversity (Arghutashvili et al., 2018), tourism is one of the priority sectors of the national economy and one of the fastest-growing industries in Georgia (at least before COVID-19 pandemic) (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2021). However, travel restrictions during the global pandemic have made tourism as one of the most affected economic sectors in Georgia.

One of the indicators that can be used for showing and analysing economic consequences of COVID-19 pandemic on tourism sector is hotel occupancy. This indicator is crucial in the hotel business and it depends on many factors - price policy, marketing strategy (e.g. correct promotion and gaining customer loyalty), accurate competitive strategies, and macro-environmental factors. Another indicator that reveals economic consequences of COVID-19 pandemic on tourism sector is revenues, that is more short-term oriented indicators (Wang, Bowie, 2009). These indicators were used for formulating research question for this study

- whether and to what extent there has been a decrease in occupancy and revenues in hotel industry in one of the most popular tourist destinations in Georgia - the Adjara region? Research question set the **aim of this study** - to analyse the load and profit ratio of branded hotels operating in Adjara in 2019 and 2022. Based on the aim of this research, the following research tasks were identified: 1. to identify difference in hotel occupancy and profit indicators in the corresponding months of 2019-2022; 2. to characterize differences in financial indicators concerning national and foreign currency; 3. to find out is there a disproportionate change in occupancy and profit in surveyed hotels.

In order to carry out this study three international brand hotels operating in Adjara were determined for survey, based on the selective method, whose financial data were acquired through maximum confidentiality disclosed anonymously as much as possible. The study was conducted using a cross-sectional study method based on data from only 2019 and 2022. The selection of 2019 is because this year is considered as the best year of tourism development in Georgia before the pandemic (International Trade Administration, 2022). Therefore, for this period, all hotels tried to maximize the load in different ways. In this study authors have collected and analysed such data as:

- number of hotel rooms;
- daily percentage of hotel occupancy;
- daily prices of hotel rooms considering seasonality and discounts;
- percentage share of the cost of rooms in the monthly average price of hotel rooms.

This information was collected from the hotels based on the respective hotel management programs of bookings and occupancy. Survey data were processed using special tables created in Microsoft Office Microsoft Excel. Based on the collected data, authors calculated the number of available hotel rooms every month, using the average monthly occupancy rate; the average number of occupied hotel rooms every month; the average rate of income obtained from the occupancy of hotel rooms every month.

In addition to the survey data, in this study authors used also secondary information – data from the Ministry of Finance and Economy of Adjara, the reports published by the Department of Tourism and Resorts of Adjara, the portal of the payers of the Revenue Service of the Ministry of Finance of Georgia, the financial statements posted on the official website of hotels and others.

Research results and discussion

1. Role of Adjara region in Georgia tourism sector

Georgia is a tourist country, and tourism is a highly crucial sector of the country's economy. According to the data for the third quarter of 2022 (Georgian National Tourism Administration, 2023), the share of tourism in the country's GDP is 7.2%. In 2022, revenues from international tourism reached 3.5 mln. USD, if we compare this indicator with the indicator before the pandemic caused by COVID-19, in 2019, the income from international tourism was 3.3 mln. USD. This proves that in terms of income, tourism in Georgia was able to fully recover. The picture is different in terms of the number of visitors in 2022. The number of international visitors in 2022 was 4.7 million. Compared to 2019 this number has decreased (-39.1%), but compared to 2021, there is a significant increase (+137.3%).

The majority of visitors to Georgia come from Russia, Turkey, Armenia, Ukraine, Israel, Ukraine, Azerbaijan, Belarus, Kazakhstan, Saudi Arabia, and Iran. In 2021, compared to 2020, international visits increased from the following countries: Russia (+2.1%), Ukraine (+241.6%), Israel (+291.3%), Kazakhstan (+384.7%), Belarus (+ 274.5), Saudi Arabia (+1179.0%).

According to STR Global, the occupancy rate of hotels in Georgia in 2021 was 45.7%. The increase compared to previous years amounted to +106.8%. Occupancy rate has seasonal character were the highest occupancy can be observed in July (73.1%), August (65%) and June (58.4%), but the lowest occupancy can be observed in January (16.1%), February (18.8%) and March (23.9%).

According to the data of TBC Capital, in July 2022 compared to July 2019, hotel occupancy increased significantly, i.e. by 11%. The average occupancy of large branded hotels in 2022 were higher by 12% if compared with 2019.

According to the popularity of regions visited by foreign visitors in Georgia, Adjara region ranks second after the capital (Georgian National Tourism Administration, 2023). As of 2021, 424 hotels were operating in the Autonomous Republic of Adjara. Compared to 2010, the number of hotels increased by 289%. In general, the number of accommodation facilities is 1058, which, in addition to hotels, includes apart-hotels, family houses, cottages, hostels, and campsites. According to the data for 2021, the number of accommodations in Adjara reached 81 thousand - 30% of them are hotels, and 51% are apartment hotels. 73% of accommodation facilities are situated in Batumi.

In 2019, before the COVID-19 pandemic, the number of visitors officially registered with accommodations in Adjara exceeded one million, while the share of foreign tourists was much higher than domestic tourists. However, this picture has been changed a lot by the COVID-19 pandemic, visits from abroad have decreased and domestic tourism has increased. At the end of the pandemic, in 2021, the situation improved and recorded 585 000 visitors, where the ratio of domestic and foreign visitors was almost 50/50, while in 2020 this ratio was 80/20. Adjara is a region distinguished by its tourist and recreational potential, and the government is actively working on diversifying tourism products and markets. Tourists in Adjara have the opportunity to be interested in marine, cultural, mountain, mountain-ski, adventure, eco and rural tourism. According to official statistics, the main purpose of the arrival of tourists in Adjara is recreation and relaxation (90%), and a small part comes from a business visit and treatment.

The city of Batumi stands out for the number of hotels in Adjara. The entry of such brands as the Sheraton, the Radisson-Blue, the Hilton, and the Marriott contributed to the positioning of Batumi in the international tourist market. The first of the above-mentioned hotels was Sheraton, which opened in 2011 and was followed by other international brands. 58% of the hotels operating in Adjara are situated in Batumi. In the next section of this study authors have analysed the most important indicators that characterizes performance of branded hotels in Adjara region before and after COVID-19 pandemics.

2. Analysis of the load and profit ratio of branded hotels operating in Adjara

In this study authors have analysed data representing performance of three international brand hotels – Hotel "A", Hotel "B" and Hotel "C" – operating in Adjara region. Based on the survey results, the difference in occupancy and profit were analysed in the monthly section, where January was selected as the most inactive month in the tourism season, and August – as the most active month in tourism season. According to the survey data in all three hotels, the number of rooms in each hotel is within 150-250, which are classified in different hotels with different types and prices: Standard Room, Sea View Room, City View Room, Premium Room, Deluxe Room, Presidential Room, Family Room, Terrace Room, Penthouse Room, Luxury Room, etc. Therefore, for the purpose of this study, authors used the total number of hotel rooms, the number of which was unchanged in 2019-2022, and authors calculated the price per unit room using the weighted average method.

In Table 1 authors have summarized different indicators characterizing performance of surveyed hotels in January in 2019 and 2022. Obtained results show that Hotel „A” occupancy during surveyed period has increased by 1%, Hotel „B” occupancy has reduced by 3%, but Hotel „C” occupancy has increased by 7%. Slight differences can be observed when analysing profit of surveyed hotels - the profit of Hotel „A” has decreased by 3%, the profit of Hotel „B” has increased by 7%, the profit of Hotel „C” has decreased by 14%.

Table 1

Occupancy and profit analysis of international branded hotels operating in Adjara in January, 2019 and 2022

Indicator	HOTEL „A”			HOTEL „B”			HOTEL „C”		
	2019	2022	Difference	2019	2022	Difference	2019	2022	Difference
Occupancy	30%	31%	1%	48%	45%	-3%	33%	40%	7%
Total occupied rooms	2297	2374	77	2500	2344	-156	2092	2500	408
ADR	180	180	0	176	211	35	224	256	32
Room cost, %	32%	35%	3%	27%	20%	-7%	26%	40%	14%
Total rooms operating profit, %	68%	65%	-3%	73%	80%	7%	74%	60%	-14%

Source: author’s calculations based on survey results

The indicator – Total rooms operating profit, % - in January 2019 and 2022 turned out to be especially negative in the case of Hotel „C” (-14%). The factors affecting the mentioned financial result were studied and authors have discovered that Hotel „C” increased its operating expenses to attract customers after the removal of regulations due to the COVID-19 pandemic, which was reflected in the occupancy rate, which in the case of Hotel „C” was the highest (7%).

The determining factor of a 7% increase in profit in Hotel „B” was also investigated. The analysis of this case showed that the 3% occupancy reduction compared to 2019 is partly due to the impact of the pandemic, as the recovery process was proceeding at a corresponding pace, however, the increase in prices by 35 GEL played a certain role, and in the end, January was reflected by a 3% decrease in occupancy and a 7% profit.

In addition to the price policy, branded hotels are very sensitive to the national currency exchange rate and inflation. In 2022, compared to 2019, the average exchange rate of the dollar for January against the national currency - GEL depreciated by 0.22 GEL, which in general had an immense impact on the formation of revenues, while the rate of growth of expenses due to inflation did not slow down.

This analysis was based on the so-called most passive period of January 2019-2022 and the initial period of the end of the pandemic, so the research figures are heterogeneous and sharply different and characterized by sharp differences.

As for the peak period of the season, August, the data is calculated concerning both national (GEL) and foreign currency (USD) (see Table 2). The purpose of this calculation was to see the impact of exchange rates on profits. Authors highlights some interesting findings from this analysis:

- For Hotel „A” in August 2022 compared to the corresponding month of 2019, the profit rate did not increase, and its share in the price was equal to 90%. The reason for this was the maintenance of the current price for August 2019 and the drop in the dollar exchange rate. Although inflation in the cost part is still relevant because the part of the costs tied to the dollar did not decrease, considering the drop in the exchange rate. (August 2019: 1 dollar = 3.12 GEL; August 2022: 1 dollar = 2.76 GEL)

- For Hotel „B” in August 2022, compared to the corresponding month of 2019, the profit rate decreased by 2% in the conditions of a 4% increase in occupancy. Although the average price of hotel rooms has increased from 400 to 479 GEL, which cannot be compensated for increased costs due to inflation.
- For Hotel „C” similarly increased the load compared to August 2019, increasing the prices from 397 to 503 GEL. However, the rate of profit also decreased in this case.

Here it is seen that the decisions of the hotel management do not coincide with a single strategy for occupancy growth. Therefore, this study reveals that in surveyed hotels there can be observed uneven, disproportionate, and different changes in load and profit.

Table 2

Occupancy and profit analysis of international branded hotels operating in Adjara in August, 2019 and 2022

Indicator		In national currency (GEL)			In foreign currency (USD)		
		2019	2022	Difference	2019	2022	Difference
					2,93*	2,78*	
HOTEL „A”	Total occupied rooms	90%	95%	5%	90%	95%	5%
		6 891	7 274	383	6 891	7 274	383
	ADR	420	420	-	143	151	8
	REVENUE FROM total occupied rooms	2 604 911	2 749 629	144 717	889 048	989 075	100 027
	Room cost	10%	10%	-	10%	10%	-
		260 491	274 963	14 472	88 905	98 908	10 003
PROFIT	90%	90%	-	90%	90%	-	
	2 344 420	2 474 666	130 246	800 143	890 168	90 024	
HOTEL „B”	Total occupied rooms	87%	91%	4%	87%	91%	4%
		4 531	4 739	208	4 531	4 739	208
	ADR	400	479	79	137	172	36
	REVENUE FROM total occupied rooms	1 522 403	1 952 299	429 896	519 591	702 266	182 675
	Room cost	14%	16%	2%	14%	16%	2%
		213 136	312 368	99 231	72 743	112 363	39 620
PROFIT	86%	84%	-2%	86%	84%	-2%	
	1 309 266	1 639 931	330 665	446 849	589 903	143 055	
HOTEL „C”	Total occupied rooms	90%	92%	2%	90%	92%	2%
		5 621	5 730	109	5 621	5 730	109
	ADR	397	504	107	135	181	46
	REVENUE FROM total occupied rooms	2 030 616	2 596 427	565 811	693 043	933 967	240 924
	Room cost %	9%	10%	1%	9%	10%	1%
		182 755	259 643	76 887	97 026	149 435	52 409
PROFIT	91%	90%	-1%	91%	90%	-1%	
	1 847 861	2 336 784	488 924	596 017	784 532	188 515	

* USD exchange rate in certain year

Source: Author's created based on the results of the survey

For the overall analysis of the load and profit ratio of branded hotels, authors did not limit themselves to the study of seasonal and non-seasonal load and its results, so it was calculated the annual average indicators of load and profit for 2019 and 2022 (see Table 3).

For Hotel „A” in 2022 compared to 2019, the occupancy difference was -4% and the profit difference was -1.2%. For Hotel „B” in 2022 compared to 2019, the occupancy difference was -1%, which is directly proportional to the decrease in profit. Despite a 4% increase in occupancy in 2022 compared to 2019, the annual profit for Hotel „C” was 2% lower.

Forecasting is a key stage in the revenue management process as forecasts feed and determine the decision-making process. Hotel revenue management bases on two main topics: forecasting demand (Lim, Chan, 2011; Song et al., 2009) and forecasting revenue management (RM) metrics and operational data (El Gayar et al., 2011; Haensel, Koole, 2011). This is justified since volume, structure and characteristics of demand and forecasts for occupancy rate, number of arrivals, cancellations, no shows, RevPAR, ADR and other operational statistics are of most importance to a hotel.

Table 3

The difference in monthly occupancy and profit of international branded hotels operating in Adjara, 2019 and 2022

Indicator	HOTEL „A”			HOTEL „B”			HOTEL „C”		
	2019	2022	Difference	2019	2022	Difference	2019	2022	Difference
Occupancy	66%	62%	-4%	71%	70%	-1%	66%	70%	4%
Total occupied rooms	4984	4691	-293	3650	3574	-76	4064	4320	255
ADR	244	243	0	238	280	42	268	316	49
Room cost %	19%	20%	1%	19%	18%	-1%	15%	17%	2%
Total rooms operating profit	81%	80%	-1%	81%	82%	1%	83%	81%	-2%

Source: author’s calculations based on survey results

The calculations allowed authors to determine the break-even level to calculate the minimum number of guest rooms at which revenues and expenses are equal. When determining the level of break-even, the income received from the occupancy of hotel rooms during the year and the expenses caused by their occupancy should be calculated. For this, authors used the Formula 1:

$$\frac{TR \times 365 \times O \times ADR}{RC \times (TR \times 365) \times O} = 1 \quad (1)$$

Where:

TR (Total Rooms) - the total number of rooms in the hotel;

O (Occupancy) - occupancy during the year %;

ADR - average daily room rate;

RC (Room Cost) - room cost.

The ratio is equal to 1 when the price is equal to the cost, therefore, when the ratio is greater than 1, it shows an increase in profit, and when it is less, it shows a loss.

Using the mentioned formula, Hotel „B” can conditionally calculate the minimum rate of „occupancy” or „price” for the year 2023, based on the data of 2022, considering which it will be at zero profit. Under the conditions of the same annual occupancy rate, 61 320 rooms (70% of the hotel room fund) will be

required to be occupied, at a price of at least 51 GEL, if we convert the percentage of the cost into GEL, so as not to have a loss, ($168 \times 365 \times 70\% \times 51 = 2\,189\,124$), that is, each additional room occupancy is an indicator of profit.

The 2 189 124 GEL costs under the average price of 2022 will be distributed according to the price of 280 GEL, i.e., $2\,189\,124/280 = 7\,818$ hotel rooms. That is, by maintaining the average price of a hotel room in 2022, the load of 7818 rooms will be enough to break even.

Based on all the above, it can be said that when developing an optimal strategy for revenue growth, it is important to make the right decision whether to increase the load or the price.

Conclusions, proposals, recommendations

Throughout the analysis of the difference in the occupancy and profit of international branded hotels operating in Adjara in 2019 and 2022, the hypotheses outlined in the research were confirmed, and the factors affecting the difference in the occupancy and profit were studied:

- During the analysis, it was established that based on the data of 2019-2022, the strategy of hotel revenue growth is not uniform, and on average, the change in their annual occupancy figures ranges from -4% to +4%, and the average monthly load difference ranges from -27% to +18% in the respective years.
- The difference between the monthly average profit rates of 2019 and 2022 ranges from -14% to +7% in the respective years, while the same rate varies from -1.2% to +2% on an average annual basis.
- In fact, the expectations regarding the recovery of tourism development in 2022 compared to 2019, in terms of occupancy, the average occupancy of all three hotels is characterized by a 7% increase.
- 2022 profit rate compared to 2019, the average profit rate for all three hotels has decreased by 4%.

Thus, uneven and disproportionate changes in profit and occupancy indicators are affected by the following main factors:

- In the conditions of the regulations of the pandemic caused by COVID-19, the hotels suffered from incorrect forecasting in the process, which harmed the pricing policy and load. The wrong strategy of the hotel in terms of revenue and load growth.
- Compared to 2019, the strengthening of the national currency against the US dollar in 2022 and a high rate of inflation.

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ECONOMIC CRISES AND FACTORS FOSTERING SMALLER ECONOMIC DOWNTURN AND SPEEDIER RECOVERY

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Abstract. COVID-19 pandemic caught the world by surprise. On March 11th, 2020, World Health Organization (WHO) announced the global pandemic, and governments started to initiate various kinds of non-pharmaceutical interventions (NPI) and disease containment measures. These NPI measures reduced the mobility of the population and slowed down business activities. State governments had to come up with viable fiscal support packages for the health and economic sectors. It created a unique opportunity for economists and academia to compare the effectiveness of different state governments and policies vis-a-vis the consequences of suddenly imposed health and economic challenges. It raised the issue of why in some countries the depth of the crisis (GDP % change) and speed of recovery from the crisis (attaining the level of 2019 GDP) was different. In order to comprehend the complexity of various factors influencing economic developments, this article aims to research economic and other social-economic factors defining the depth of the crisis and speed of recovery. The article will also try to establish whether these factors could be associated with more financial and fiscal resources needed in the due course and further increase of the outstanding public debt and debt service costs in the future. The author will be using the regression method to compare various economic variables. Results prove that stringency and NPI measures were not the only factors influencing the depth of the crisis. Research findings indicate that public debt plays a crucial role in precluding the recovery and efficient use of fiscal resources. However, the quality of institutions, governance, and confidence in government are clear contributors to the efficient use of limited fiscal resources and shallower economic crisis and speedier recovery, too.

Key words: COVID-19 crisis, economic recovery, fiscal policy, institutional quality, public debt.

JEL code: E44, E62, H62, H63, O43

Introduction

COVID-19 caught the world by surprise. On March 11th, 2020, World Health Organization (WHO) announced the global pandemic. Thus, in fact, initiating the imposition of various kinds of non-pharmaceutical intervention (NPI) and containment measures and reduction of mobility of population and slowed down business activities in order to reduce the spread of lethal disease.

COVID-19 pandemic provided once in a life time opportunity to compare actions and policy measures of various governments in the time of the crisis, when states were borrowing substantial financial resources in order to support economies with vast amount of fiscal resources. Great Financial Crisis (GFC) had substantially increased the debt of almost all countries. Fiscal space has been substantially reduced. COVID-19 required an additional borrowing to tackle the emergency. Some countries experienced more pronounced negative GDP change and slower recovery than others. COVID-19 pandemic provided new grounds and data for economists and academia to analyse the preconditions and factors safeguarding speedier recovery and return to the pre-crisis GDP levels, thus allowing in the future for more efficient use of the limited fiscal resources and precluding governments from further increase of the public debt.

The author with multi factor linear regression analysis will research why in some countries the depth of crisis (GDP % change) was shallower and the recovery to the pre-crisis level of GDP was sooner or speedier than in the others. The author also will study why there are countries experiencing more severe economic downturn, slower recovery and are forced to use more sizable fiscal packages than others. In the light of these questions, the author embarks on the analysis of the efficiency of the use of the limited fiscal resources and the study of the other factors defining the efficiency of the use of these precious fiscal resources, especially in the times of crises.

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Through comprehensive analysis of the sample of OECD countries, the author concludes that besides the public debt, institutional quality, government effectiveness and confidence in government play crucial role in the overall process of managing the crisis and conducting the day to day macroeconomic management of the country's fiscal and financial situation.

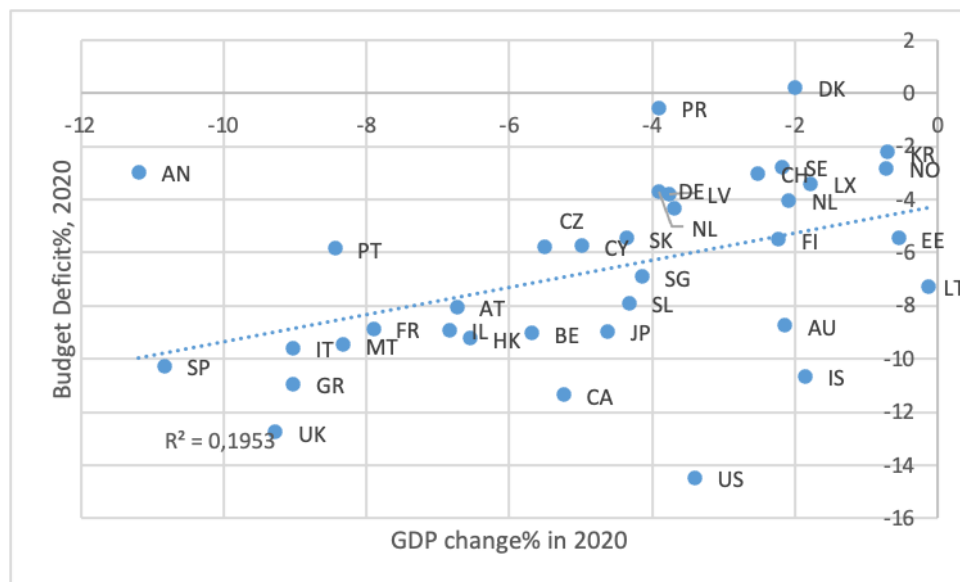
In the light of currently high inflationary environment and increasing service costs of the rising and outstanding debt, the author alleges that the paper will serve as an inspiration to review the current macroeconomic policies and to make necessary adjustments.

Research results and discussion

1. Raising debt levels reduce potential GDP growth

Governments implemented non-pharmaceutical intervention (NPI) measures in order to reduce spread of COVID-19 pandemic, thus substantially impairing economic activity, GDP growth, fiscal revenues and increasing budget deficits and outstanding public debts. Some countries in 2020 witnessed even double-digit GDP decrease, encountering even larger budget deficits.

Additional borrowing was immediately needed and had to be financed immediately in the financial markets.



Source: author's calculations based on IMF, WEO database, October 2022

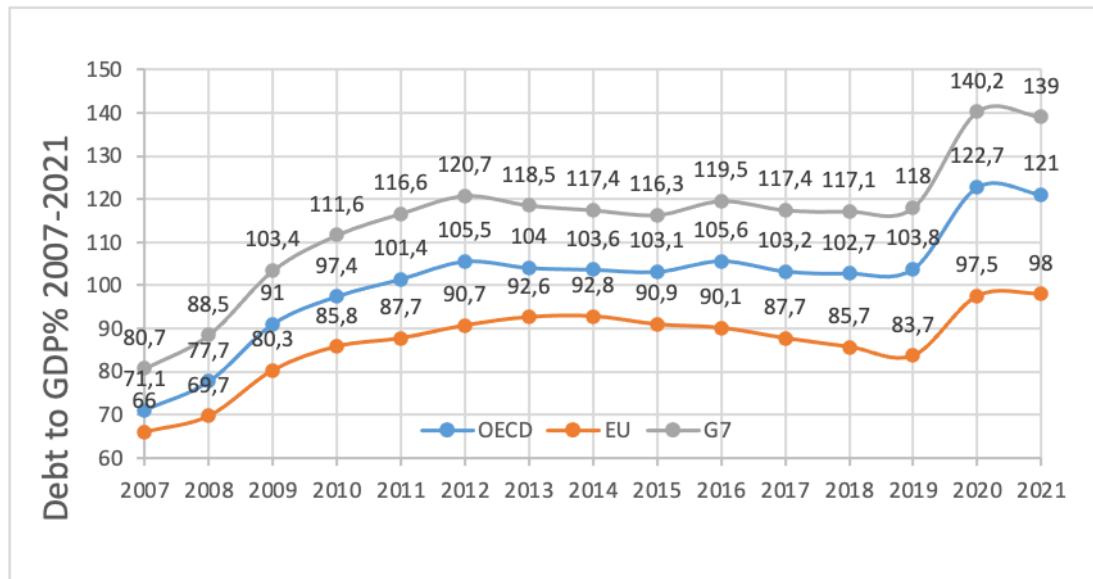
Fig. 1 GDP and budget deficit change in 2020

Fiscal support to health system and economy required substantial additional borrowing in the financial markets and increased budget deficits even further. Figure 1 reflects the situation in OECD countries, where in addition to the decreasing budget revenues, large fiscal spending and borrowing was needed to support economic activity and aggregate demand. Nevertheless, additional borrowing and increasing of the debt did not secure GDP from falling in 2020 in the majority of the countries.

It has been established that NPI measures played certain role in slowing down economic activity. However, stringency of NPI measures and mobility reduction of population was not the only factor of slowing down economic activity and reducing GDP growth (Sapir, 2020) and further increase of the budget deficit.

Great Financial Crisis (GFC) had substantially elevated the outstanding debt levels of many countries around the world. In the "peacetime", when GFC was over, from 2011 to 2020 only few countries e.g. Malta, Israel, Norway, Sweden and Switzerland (IMF, 2022) had returned to their pre-crisis debt levels to

GDP of 2007. Thus, fiscal space was not freed for the future crises and challenges continued to mount and COVID-19 economic crisis increased debt levels further to new elevated levels Figure 2.



Source: author's calculations based on IMF, WEO Database October, 2021

Fig. 2. Debt to GDP% in 2007-2021

Ghosh, et.al. in 2013 came up with data and methodology for 23 advanced economies over 1970–2007 defining the "fiscal space," as the difference between forecasted future debt ratios to GDP and debt limits. In 2007, there were no signs of serious risks associated with serious challenges of shrinking fiscal space. Fifteen years later after two major crises (GFC and COVID-19) the situation has changed and requires to revisit this study again. Especially under the circumstances of rapidly increasing interest rates and surging debt servicing costs, which have serious implications for future fiscal space.

Since fiscal space is limited and governments had used substantial resources in the previous GFC crisis (Botev, et.al., 2016), it is important to reflect on the respective financial position and initial financial stance of the respective governments during COVID-19 crisis in order to better capture the whole picture of the financial and fiscal positions. Although countries had different levels of outstanding financial obligations or debt levels at the beginning of the COVID-19 crisis, OECD economies were able swiftly borrow and finance crisis needs, thus making it possible to compare and analyse the policies of the respective countries and find the factors which made one group of the countries using limited fiscal resources more efficient and recovering to the pre-crisis GDP level sooner than the others, which after all allowed them to save precious fiscal resources and to preserve the fiscal space.

After (GFC) of 2008-2010, Reinhart and Rogoff (Reinhart and Rogoff, 2010a) claimed that there is certain threshold of debt to GDP and after reaching 90% debt to GDP level growth will be impaired and prospects become gloomier. The study produced series of an additional research from various angles and certain critique also made (Reinhart and Rogoff, 2010b) to revisit their original paper.

GFC ended and economists and analysts did not arrive at the firm conclusions. Consensus among economists and researchers was not reached. One camp of economists (Afonso and Alves, 2014; Baum, et.al., 2012; Cecchetti, et.al., 2011; Chudik, et.al., 2017; Woo and Kumar, 2015) came to the conclusion clearly demonstrating the role of public debt in the future growth once it reaches certain threshold. The other camp (Ash, et.al., 2017; Herndon, et.al., 2013; Pescatori, et.al., 2014) adamantly refused to accept that notion and presented different evidence not approving high debt to GDP level negative influence on the future GDP growth. (Herndon, et.al., 2013) accused Reinhart and Rogoff for poor quality of data analysis

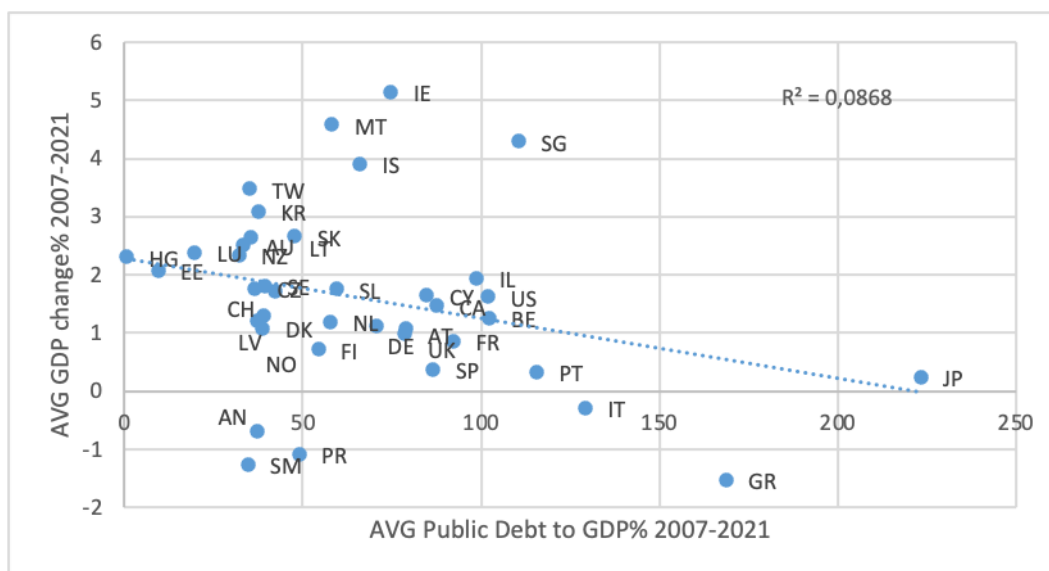
and misleading final conclusions. Some other economists and researchers also did not agree with those conclusions. However, (Panizza and Presbitero, 2012) were less adamant and careful with strict conclusions and only admitted that: "it seems that advanced economies in our sample are still below the country-specific threshold at which debt starts having negative effect on growth".

Additional studies analysed the permanent and transitory effects of the public debt on the economic growth (Abubakar and Mamman, 2020) acknowledging negative effect of the debt effects on GDP growth, but emphasizing that short term rise of the debt would not be harmful. Heimberger's study (Heimberger, P., 2021) claimed that there is no universal threshold when debt is detrimental to the future growth for all the countries, and the 90% is not a "magic" number.

The discussion whether elevated debt levels to GDP impair future growth remained unresolved. COVID-19 economic crisis provided unique opportunity to bring the research about debt to GDP level and future growth impairment further. Therefore, the concept that when debt to GDP reaches certain threshold level, GDP grows slows, the usage of the borrowed financial resources becomes less efficient. Instead of safeguarding fast and steady recovery and stimulating GDP growth, GDP growth and recovery slows down. Thus, further deteriorating financial conditions for the refinancing of the outstanding debt obligations and creates uncertainty and instability, worsening credit rating of the country and creating the speculative grounds in the financial markets. Therefore, it is important to analyse what are the reasons.

2. Factors influencing the depth and length of crisis

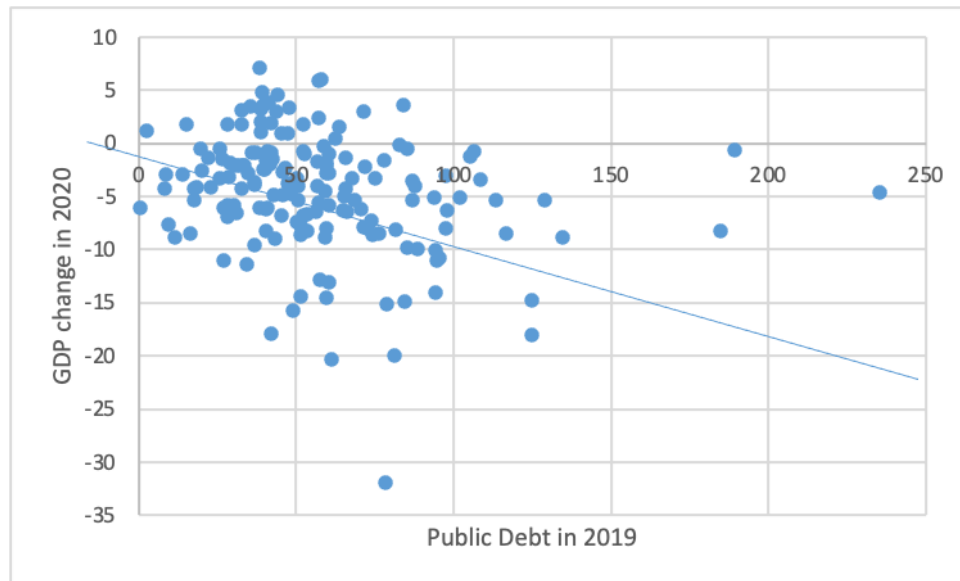
Figure 3 reflects the development of public debt and GDP growth over the period of fifteen years (2007-2021) in advanced economies and approves the hypothesis that larger public debt correlates with smaller GDP growth.



Source: author's calculations based on IMF, WEO database, October 2022

Fig. 3. **AVG Public debt to GDP% and GDP change% in OECD countries in 2007-2021**

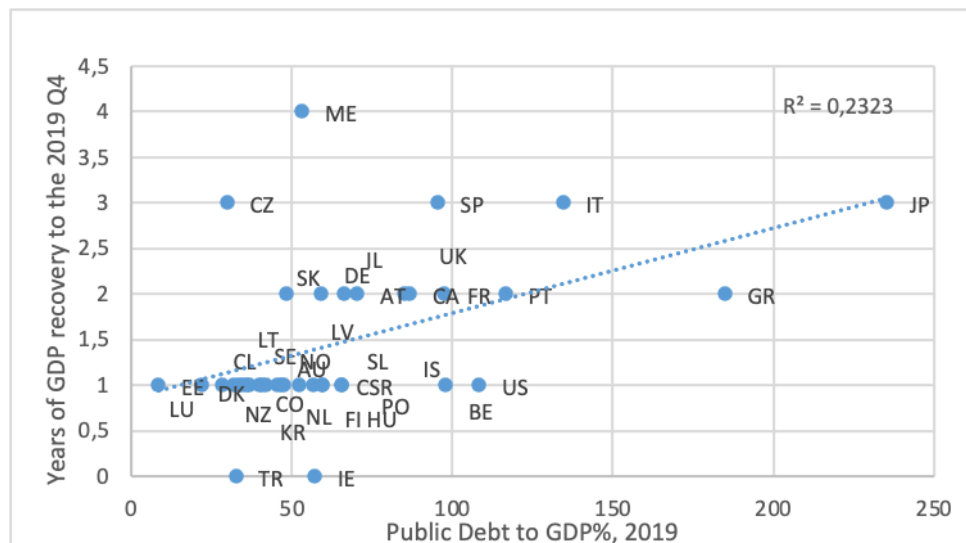
COVID-19 economic crisis provided economists with new data and allowed to continue the research. Reinhart's and Rogoff's hypothesis became more and more evident and easier to justify. New analysis of the GDP % change in 2020 or the depth of the crisis was conducted by the author, comparing 152 countries using the latest data from World Economic Outlook (WEO), (IMF, 2022b), which in Figure 4 demonstrates that the crisis is deeper in the countries with larger outstanding public debt.



Source: author's calculations based on IMF, WEO database, October 2022

Fig. 4. **Public debt in 2019 and GDP change% in 2020 (152 countries)**

The overall conclusion that level of the public debt to GDP has negative effect on the future economic growth raises further question whether it is justifiable to continue to increase debt level further, knowing that future growth will be impeded and the recovery or the time required to reach pre-crisis GDP levels will be lengthier and costlier as pictured in Figure 4.



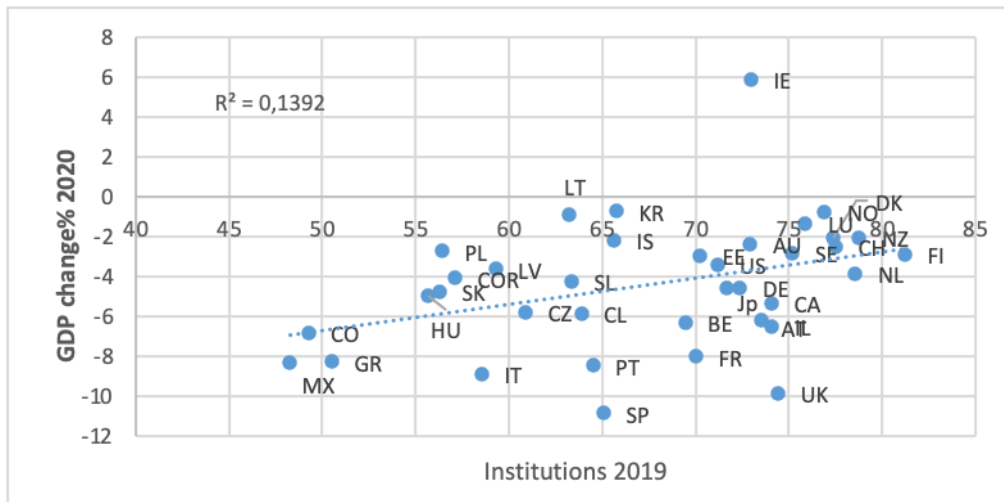
Source: author's calculations based on IMF, WEO database, October 2022

Fig. 5. **Years of GDP recovery to 2019 Q4 level**

Figure 5 reflects close correlation between size of the public debt and time needed to reach pre-pandemic GDP level of 2019Q4. GFC aftermath studies did not allowed to state with certainty that debt, once it reaches particular threshold is detrimental for the faster recovery. COVID-19 economic crisis provides an additional evidence in supporting Reinhart's and Rogoff's arguments back in 2010.

3. Quality of Institutions, Governance and Confidence in Government

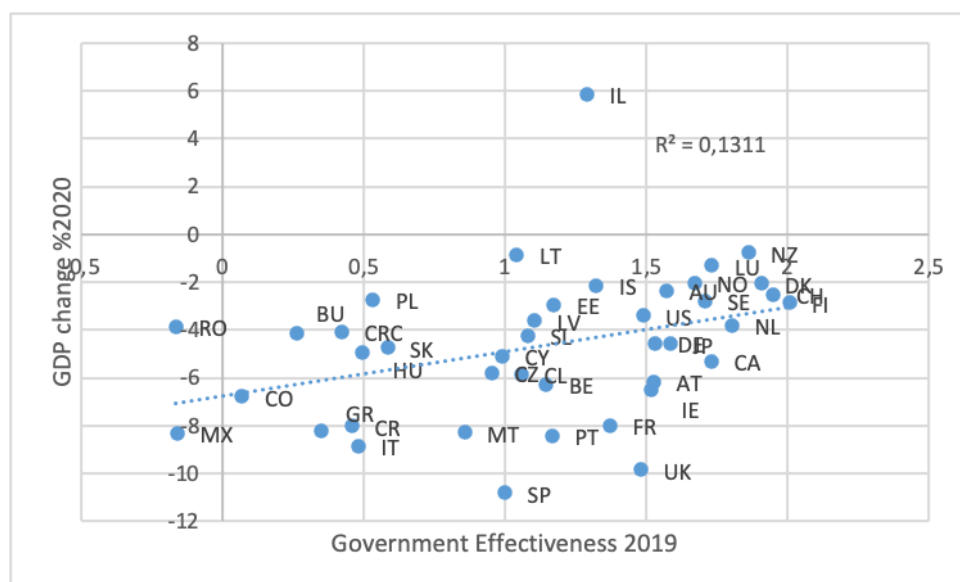
Are mobility reduction and public debt only factors influencing the depth of the crisis and speed of recovery? World Economic Forum (WEF) database provides data for the Quality of Institutions.



Source: author's calculations based on WEF database, 2019

Fig. 6. Institutions and GDP % change in 2020 or the depth of crisis

Quality of Institutions, Governance, Confidence in Government policies are important set of factors, which have been analysed in various circumstances. Acemoglu and Robinson in their world famous book *Why Nations Fail: The Origins of Power, Prosperity and Poverty (2012)*, concluded that institutional quality is one of the key factors of economic growth. The author reveals that quality of Institutions is not only increasing the income, and especially increasing the income per capita (Rodrik and Subramanian, 2003; Rodrik, et.al., 2002), but also cushions the depth or severity of the economic crisis. Analysis of various factors of the severity of COVID-19 economic crisis demonstrates that countries with better institutional quality score better and have smaller negative size of GDP % change in 2020 (Figure 6) than other countries.



Source: author's calculations based on IMF, WEO database, October 2022; Worldwide Governance Indicators, 2019

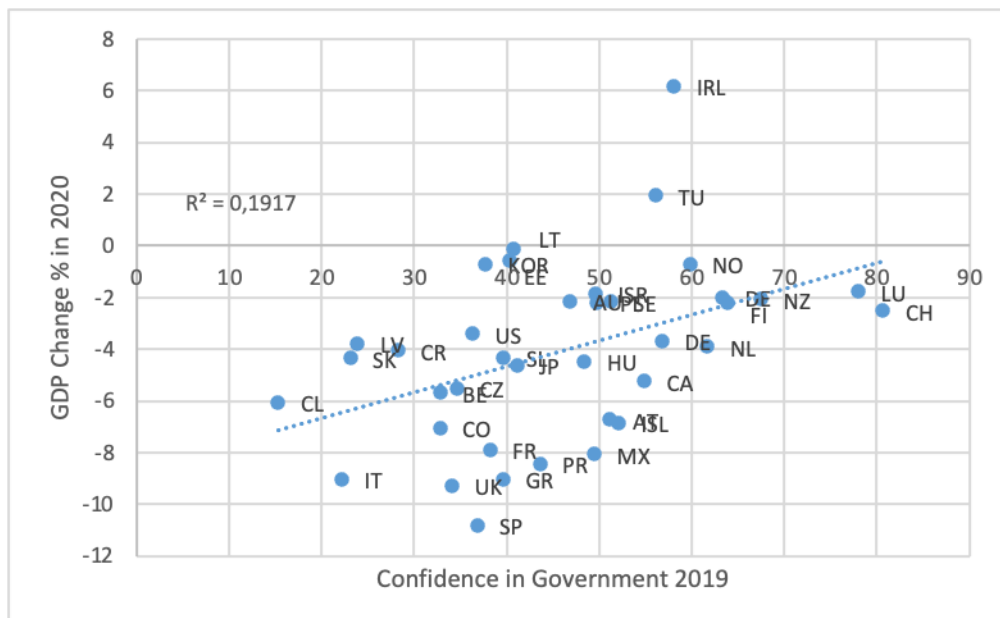
Fig. 7. Government effectiveness and GDP % change in 2020 (the depth of crisis)

The Worldwide Governance Indicators consists of six key indicators: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. The names of indicators are self-explanatory, indicating the strength or respective weaknesses of particular branch of the government. Strength in setting up, creating, regulating, stabilizing,

legitimizing functioning of the respective market and protecting property rights and ensure contract enforcement of the market economy (Kaufmann, et.al., 2005).

"If you cannot measure it", Lord Kelvin once famously exclaimed, "you cannot improve it" (World Bank Institute, 2009). By offering the tools to gauge the governance and monitor changes of its quality, the World Bank's Worldwide Governance Indicators (WGI) present the framework of Institutional Quality measurement design and evaluation. WGI provide an information regarding the states' ability to govern and to safeguard necessary environment for the state's market economy to function and to carry out the duties and the tasks. Figure 7 demonstrates that negative GDP % change in 2020 or depth of the crisis was smaller in countries with better or higher government effectiveness in 2019.

Trust in Government and government policies is another important indicator reflecting the behaviour of the public and readiness to follow and to execute the decisions, orders and invitations of the government in turbulent times, like COVID-19 crisis. Figure 8 reflects that countries with higher Confidence in Government had less deep economic crisis and less negative GDP growth in 2020. It correlates with an assumption that people having more Confidence in Government, had to had less strict stringency or containment measures and thus, smaller mobility decrease and decrease of economic activity.



Source: author's calculations based on OECD Data base 2021; IMF, WEO database October, 2022

Fig. 8. Confidence in Government and GDP change % or the depth of crisis

Summing up Quality of Institutions, Government Effectiveness and Trust in Government indicators of 2019 in Table 1, provides a new set of data, allowing to carry out analysis how these factors influence or help to facilitate the crisis and whether lower borrowing stems from higher Quality of Institutions, Government Effectiveness and Trust in Government. Table 1 also includes the initial debt level of 2020 (end 2019), thus providing comprehensive information about the debt level and the respective Institutional, Government effectiveness and Trust in Government factors and allowing to rank the OECD countries according to the all four indicators in column Total Rating. Out of that Total Rating, the author builds further the analysis whether countries with better Total Rating have more appetite to borrow in order to tackle the problems and whether they borrowing more than countries with lower Total Ranking.

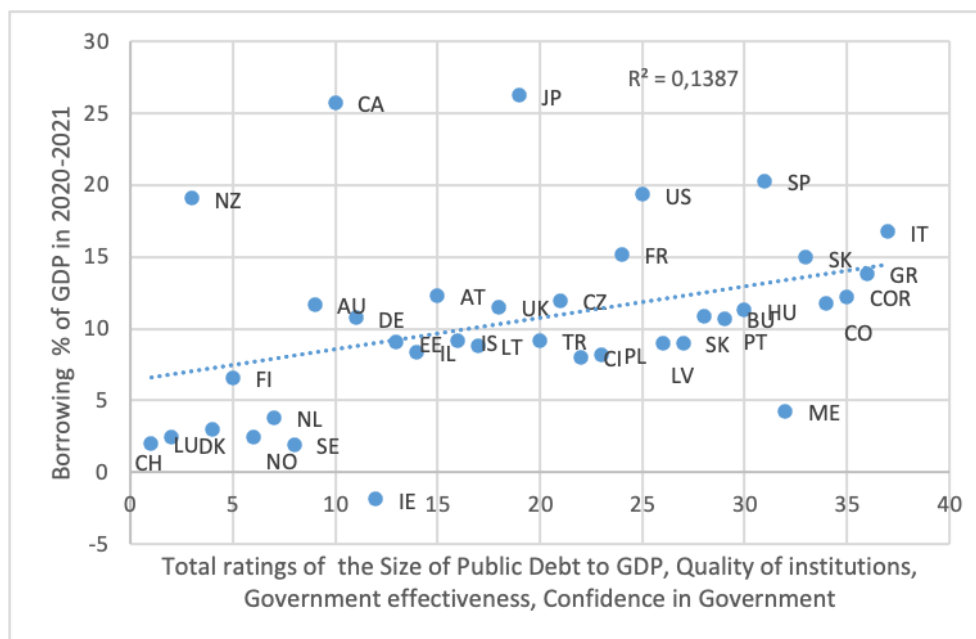
Table 1

Ratings of Size of Debt, Government Effectiveness, Quality of Institutions and Confidence in Government in 2019

Country	Debt 2019	Rating	Government effectiveness_2019	Rating	Institutions 2019	Rating	Confidence in Government	Rating	Total Rating
Luxembourg	22.3	2	1.73	6	75.9	7	78	2	17
Switzerland	39.6	11	1.95	2	77.5	4	80.7	1	18
New Zealand	31.8	5	1.67	9	78.8	2	67.5	3	19
Denmark	33.7	7	1.91	3	77.4	5	63.3	5	20
Finland	59.6	23	2.01	1	81.2	1	63.9	4	29
Norway	40.9	12	1.86	4	76.9	6	59.8	7	29
Netherlands	48.5	16	1.80	5	78.6	3	61.7	6	30
Sweden	34.9	8	1.71	8	75.2	8	51.3	13	37
Australia	46.7	14	1.57	11	72.9	14	46.9	19	58
Canada	87.2	29	1.73	7	74.1	11	54.9	11	58
Germany	58.9	22	1.53	12	72.4	15	56.8	9	58
Ireland	57.2	20	1.29	19	73.0	13	58.1	8	60
Estonia	8.5	1	1.17	20	70.2	18	40.3	23	62
Iceland	66.2	26	1.52	14	74.1	10	52.1	12	62
Austria	70.6	27	1.53	13	73.5	12	51.2	14	66
Israel	58.8	21	1.33	18	65.6	21	49.6	16	76
Lithuania	35.9	9	1.04	26	63.3	26	40.7	22	83
UK	83.9	28	1.48	16	74.4	9	34.1	30	83
Japan	236.3	37	1.59	10	71.7	16	41.1	21	84
Turkey	32.6	6	0.05	36	53.9	34	56.1	10	86
Czech Rep	30.0	4	0.96	28	60.9	27	34.67	29	88
Chile	28.3	3	1.06	25	63.9	24	15.3	37	89
Poland	45.6	13	0.53	30	56.4	31	49.8	15	89
France	97.4	30	1.37	17	70.0	19	38.2	26	92
USA	108.8	33	1.49	15	71.2	17	36.3	28	93
Latvia	36.7	10	1.10	23	59.3	28	23.9	34	95
Slovenia	65.4	24	1.08	24	63.4	25	39.7	24	97
Portugal	116.6	34	1.17	21	64.5	23	43.6	20	98
Belgium	97.7	31	1.15	22	69.5	20	32.8	31	104
Hungary	65.5	25	0.50	31	55.7	33	48.4	18	107
Spain	98.3	32	1.00	27	65.1	22	36.8	27	108
Mexico	53.3	18	-0.16	37	48.3	37	49.5	17	109
Slovak Rep	48.1	15	0.59	29	56.3	32	23.1	35	111
Costa Rica	56.4	19	0.42	33	57.1	30	28.3	33	115
Colombia	52.4	17	0.07	35	49.3	36	32.8	32	120
Greece	185.6	36	0.35	34	50.5	35	39.6	25	130
Italy	134.1	35	0.48	32	58.6	29	22.2	36	132

Source: author's calculations based on IMF, WEO October database 2022, and OECD Data base 2021

Anglo-Saxonian countries and Japan clearly stand out as the separate group of aggressive borrowers during pandemic, hoping to provide huge fiscal stimulus at the outset of the crisis to facilitate arising problems. However, rest of the OECD countries except Spain, Italy and France had modest appetite to borrow. Figure 9 allows to draw a conclusion that countries with better Quality of Institutions, Government Effectiveness and Trust in Government and lower initial 2020 debt to GDP level, were borrowing less in 2020 and 2021. Thus, approving the hypothesis that these countries used less new financial resources, used fiscal resources more efficiently and managed to have less negative GDP growth and shallower crisis in 2020.



Source: author's calculations based on IMF, WEO 2022, OECD Data base 2021; WGI, 2019

Fig. 9. OECD Country's Ratings of Size of the Public Debt to GDP, Quality of institutions, Government effectiveness and Confidence in Government in 2019

Countries with better Quality of institutions, Government effectiveness and Confidence in Government and lower initial 2020 debt to GDP level not only had less negative GDP numbers and economic crisis, but also recovered sooner reaching pre-crisis 2019 GDP level, than the countries with larger debt level at the beginning of the 2020 and lower Institutional Quality, Government effectiveness and Confidence in Government and as the result deeper crisis.

Preliminary studies also approve the hypothesis that countries with better institutional quality, government effectiveness and trust in government policies not only recover sooner to the pre-crisis 2019 level GDP, but also are capable to reach the envisaged and projected GDP level of 2020, which was forecasted before COVID-19 pandemic.

Conclusions, proposals, recommendations

Every economy from time to time witnesses smaller or larger economic turbulences. COVID-19 crisis provided opportunity to compare how the countries tackled economic crisis associated with COVID-19 imposed problems. The paper provides an answer why some countries in 2020 experienced less negative GDP % change and which countries had deeper crisis. Based on COVID-19 twin (health and economic) crisis analysis results, the author concludes:

- 1) countries with smaller debt burden, better institutional quality, especially government effectiveness, more confidence in government, had smaller GDP % change in 2020;

- 2) countries with smaller debt burden, better institutional quality, especially government effectiveness, more confidence in government had shallower economic crisis in 2020 and recovered to the pre-crisis 2019 GDP level sooner than the others;
- 3) countries with smaller debt burden, better institutional quality, especially government effectiveness, more confidence in government, borrowed less, spent available fiscal resources more efficiently and increased less the outstanding debt obligations;
- 4) based on COVID-19 twin (health and economic) crisis analysis results, the author concludes that countries with larger outstanding Public Debt levels recovered later.

Efficient use of limited fiscal resources is reflected in smaller use of the discretionary fiscal resources and smaller borrowing in the markets in order to minimize negative GDP growth and secure economic recovery.

Periods after financial or economic crisis always must be used to renew the fiscal space and to rebuild the fiscal buffers in order to be able to act in the next crisis, which will definitely will come uninvited. Period after Great Financial Crisis was not wholeheartedly used to renew initial fiscal and debt positions. Only few countries managed to restore the 2007 debt to GDP level and therefore safeguarded speedier recovery.

The next discussion is awaiting whether higher Quality of Institutions, Government effectiveness and Confidence in government provides an additional clout also to provide speedier overall recovery and reaching the GDP levels in the upcoming years planned before COVID-19 crisis. Preliminary studies approve the hypothesis that countries with better institutional quality, government effectiveness and confidence in government not only recover sooner to the pre-crisis 2019 level of GDP, but also are capable to reach the envisaged and projected GDP level of 2020 in 2019, which was forecasted before COVID-19 pandemic.

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SUSTAINABLE DEVELOPMENT DESIGN AND MANAGEMENT METHODOLOGY USING NATURAL SCIENCE UNITS

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Abstract. The design and management of social and economic systems, which are not coordinated with the possibilities of the natural environment, its reproductive capacity and the laws of nature, have created such trends, the effects of which neither the planet nor its inhabitants can withstand for a long time. Without management and outside of management, it is fundamentally impossible to move into a new quality and ensure sustainable development in the long term, covering the system of cycles - crises of modern world civilization. The purpose of this article is to describe a multi-level model for designing (planning) and managing the sustainable development of socioeconomic objects in the invariant coordinates' system using power (energy) units of measures. The novelty of the approach lies in the fact that, based on the analysis of socioeconomic, technical and environmental factors that determine the sustainable development, natural science meters are determined, reduced to universal power unit of measurement in systems that are open at the input and output in terms of energy. Within the framework of the proposed design model, the data of the Central Statistical Office of the EU, the World Bank and the United Nations Organization database were used for calculations. The main results presented in the article were calculated and primarily interpreted for Latvia. Latvia's situation in the period 2008-2019 can be characterized as unsustainable development, and if it continues, it would mean long-term stagnation and further degradation.

Key words: sustainable development, system "nature-society-human", parameters of design and management, natural science units.

JEL code: E19, F69, Q59, R10

Introduction

Nowadays, many regions of the world face the risk of permanent destruction of existing systems and environments. The design and management of social and economic systems, which is not coordinated with the possibilities of the natural environment, its reproductive capacity and the laws of nature, has created such trends, the effects of which neither the planet nor its inhabitants can withstand for a long time. This is not about individual crises, but about a single systemic crisis of the global system "nature-society-human". Without management and outside of management, it is fundamentally impossible to move into a new quality and ensure sustainable development in the long term, covering the system of cycles - crises of modern world civilization. Development is sustainable for a certain cycle of the existence of the Living System (Bauer, 2002), if during this period there is a continuous increase in the efficiency of using the consumed power. In the transitions between cycles, the chronointegrity of development is destroyed, dimensional spatial-temporal gaps arise - crises that require breakthrough management technologies, where sustainable development becomes the strategic goal of managing the way out of the crisis. Sustainable development is achieved when management (i.e. decisions, plans, programs, projects and specific activities) is consistent with the law of conservation development of life. The resolution of contradiction in pair "opportunity - need" and the solution of the problem, is carried out through the design (planning), development and implementation of sustainable development tasks (Kuznetsov, 2004).

The purpose of this article is to describe a multi-level model for designing (planning) and managing the sustainable development of socioeconomic objects in the invariant coordinates' system using power

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(energy) units of measures. The design procedure includes solving the following tasks: assessment of the existing condition; target selection; assessment of the required condition; projected efficiency estimates. Within the framework of the concept of ecological economics (Capra, Jakobsen, 2017) and taking into account the conclusions of the energy theory of cost (Costanza, 2004), in order to formalize the tasks of sustainable development, a sustainable development designing model was developed with the method of power and energy flows' changes analysing in open dynamic socioeconomic systems (Trusina, Jermolajeva, 2021).

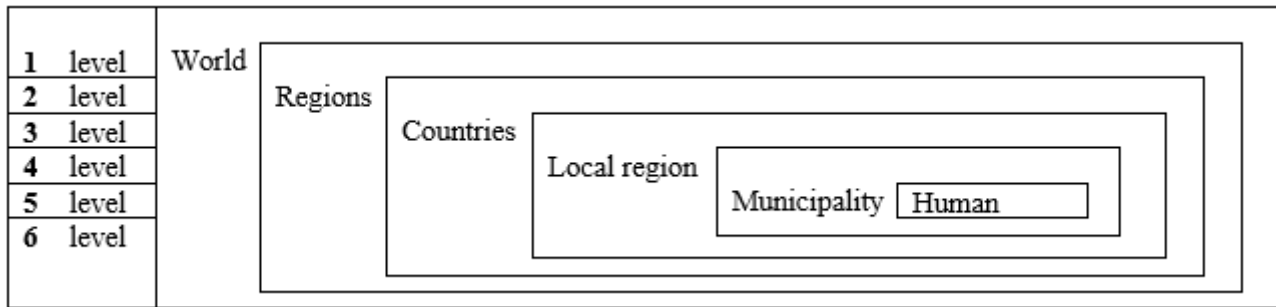
The novelty of the approach lies in the fact that based on the analysis of socioeconomic, technical and environmental factors that determine the sustainable development, natural science meters are determined, reduced to one unit of measurement in systems that are open at the input and output in terms of energy. This approach makes it possible to compensate for existing limitations in sustainable development design and management methods, as well as to formulate the relationship between the principle of sustainable development and the patterns of changes in the socioeconomic environment.

Within the framework of the proposed design model, the data of the Central Statistical Office of the EU (Eurostat), the World Bank (World Bank) and the United Nations Organization (UNDATA) were used for calculations. The main results presented in the article were calculated and primary interpreted for Latvia.

Theoretical discussion

Sustainable development design is an ideal image or a plan of purposeful changes for an Object limited in time and space with certain sustainable development requirements for the quality of results, possible resource spending frameworks and special organization. The reason for designing a sustainable development is a problem situation (negative changes) or an unsatisfied need, which gives rise to the idea of removing dissatisfaction, solving the problem situation, preventing or reducing negative changes in the "nature-society-human" system. Society should take into account several research methods in its interaction with nature: the "society-nature" system is an integral part of the "Life" system (Vernadsky, 2006) and cannot exist in isolation from the laws of its conservation and change; the system in a discrete-continuous mode exchanges flows with the surrounding natural and social environment - the system is open; the system is a dynamic complex network of flows interacting in time and space (energy, material, information and cost); connections and interactions of flows circulating in the system are generally non-linear; the system as a whole (and all its subsystems) has a certain positive value of free energy, essentially different from zero, which enables it to perform useful external work; the system of social production is developing steadily if there is a non-decreasing rate of growth in the efficiency of using its power, the measure of which is the growth rate of useful power; the system of social production degrades if there is a steady decrease in the growth rate of useful power (Shamaeva, 2019).

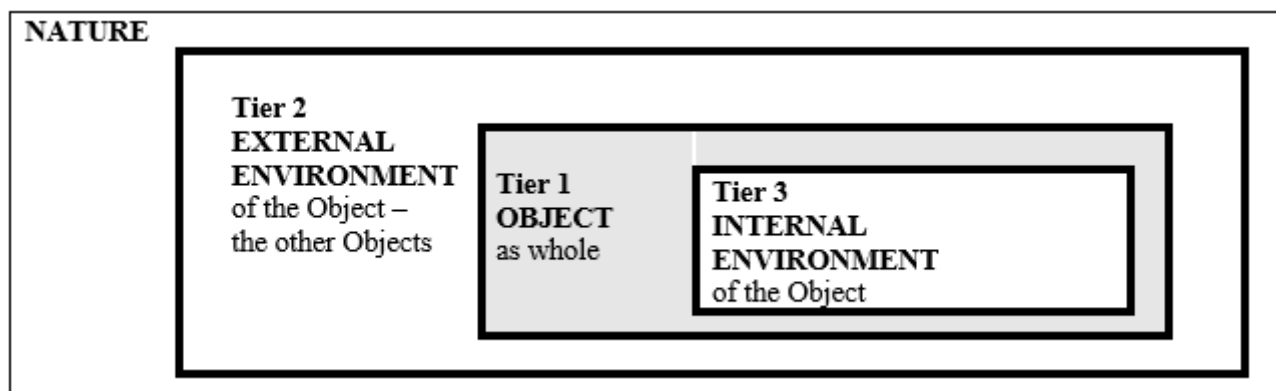
Sustainable development of the system is ensured by the following main factors: increase the efficiency of technologies; increase in the resource return coefficient; increasing the quality of flow control; increase in the density of useful power flows. If the increase in the system capacity (increase in free energy flow) is not provided by these factors, but by the increase in total energy consumption, then the development of the social production system does not take place, but rather its extensive growth. In the context of sustainable development design, the Object is a spatially limited part (subsystem) of the "nature-society-human" system, which has natural resources, population and a management system that conducts activities for life support and development management. Six levels of socioeconomic objects in the system "nature-society-human" are identified (Fig. 1): World, Region, Country, Local region, Municipality, Human. It can be defined as a nested system (Bolshakov, et.al, 2019).



Source: authors' construction

Fig. 1. The designed object as the nested systems

The description of the Object of one or the other level, as well as the mutual interaction of the Objects of different tiers is shown in Figure 2. Each Object (Tier 1) has an external environment (Tier 2) and its internal environment (Tier 3). At all tiers there is an interaction with the natural environment.



Source: authors' construction

Fig. 2. Effect on the Object and mutual interaction at three different tiers

In accordance with this classification, three methodological tasks are solved for each tier: 1) introduction of the concept of power or energy flows in the definition of sustainable development; 2) introduction invariant coordinate system in natural scientific units of power; 3) formalization of design process, using the power change analysis method. The solution of these tasks allows to perform: selection of integral criteria and counters; systematic evaluation of the existing and necessary condition; assessment of medium and long-term consequences of different solutions; predictive assessments of parametric dynamics of objects; selection of development goals of socioeconomic objects; calculation of effectiveness and value of proposals; development of medium and long-term plans for achieving the set sustainable development goals. All tasks to be solved are grouped into system blocks (Trusina, Jermolajeva, 2021) that determine the functional structure of the model. Designing the current state of the Object as a socioeconomic system according to the definition of the Object and Fig. 2 at three tiers is described below.

Tier 1: The designed Object as a whole

The Object as a whole is considered in relation to nature. In accordance with the law of conservation of power, the total power of an open system N is defined as the sum of useful (active) power P and loss power G . In accordance with the scheme of S.A. Podolinsky (Podolinsky, 2004), based on the law of conservation of power and having the form of a dual structure that connects an object with the natural environment, it is possible to define three basic equations of a socioeconomic object in its relationship with nature.

- 1) The power equation at the "input" or the total power N , which expresses the potential ability of the object to perform work per unit time (formula 1):

$$N(t + 1) = \alpha(t)N(t) \quad (1)$$

where $\alpha(t)$ - integrated power pass factor per cycle.

2) The power equation at the "output" or useful power P, expressing the ability of an object to perform external work per unit time (formula 2):

$$P(t + 1) = \varepsilon(t)\varphi(t)N(t) \quad (2)$$

where $\varepsilon(t)$ -management and planning coefficient, $\varphi(t)$ – technological excellence coefficient.

3) The power loss equation as the difference between the apparent and useful power (formula 3):

$$G(t) = N(t - 1) - P(t) \quad (3)$$

The principle (criterion) of sustainable development asserts that the development of the socioeconomic system is supported sustainably in the long term, subject to conditions that are formalized in the form of a system of second-order differential equations for changes (Jermolajeva et al., 2022).

Next, it is possible to consider the model of integral assessment of the current state of the country. For this purpose, on the basis of equations, a system of integral social, economic and environmental indicators is introduced. In accordance with the model of system's power changes analysis (Trusina et al.,2022), the basic framework of universal indicators for determination and monitoring of sustainable development for designed object are presented in Table 1 and Table 2.

Table 1

Socioeconomic indicators

N	Indicators	Designations	Units	Source
1	Population	M(t)	capita	Official Database
2	Life expectancy	TA(t)	years	Official Database
3	GDP	GDP	Euro	Official Database
4	GDP per capita	PX	Euro	Official Database

Source: authors' construction

Table 1 and 2 are represented based on the data of official databases: the Central Statistical Office of the EU (Eurostat), the World Bank (World Bank) and the United Nations Organization (UNDATA).

Based on the proposed indicators, in order to better understand the state of the Object, indicators of the second and third level can be formed.

Table 2

Indicators of sustainable development model

N	Indicators	Design.	Units	Formulae
1	Full power (final consumption)	N(t)	GWt	Official Database
2	Power losses	G(t)	GWt	Formula (3)
3	Useful power (production)	P(t)	GWt	Formulae (2)
4	Standard of life	U(t)	kWt/cap	$U(t) = P(t) / M(t)$
5	Quality of environment	q(t)	x	$q(t) = G(t-1) / G(t)$
6	Quality of life	QoL	kWt/cap	$QoL(t)=U(t)*q(t)* (TA(t)/100)$
7	Technological efficiency	f	%	$f(t)= P(t)/N (t)* 100$
8	Electricity part in full power	E	%	$E= N-Elec/ N*100$
9	Productivity	PHP	kWt/cap	$PHP=P(t) / LM(t)$

Source: authors' construction

All entered indicators have certain properties: all key social, economic and environmental indicators are interconnected and can be formalized using universal quantities; there are indicators that, in principle, should not be expressed in monetary units, they include: the life of any socio-natural system, the generalized technology perfection coefficient, the quality of the environment; all key indicators have a common legal basis and are a projection of the law of permanence of power in one or another specific coordinate system (social, economic, environmental).

Tier 2: The designed Object in relation with the external environment

In order to assess the Object in relation to the external environment, an integral assessment of the country's position on the world scale is introduced, introducing the following additional indicators.

- 1) Energy imports (EIMP) as part (%) of energy use in the Object
- 2) Relative weight (WM) of a country in useful power and world population: (formulae 4)

$$WM_i = p_i/m_i \quad (4)$$

- 3) Relative weight (WP) of a country in useful power and world gross domestic product (GDP) (formulae 5):

$$WP_i = p_i/gdp_i \quad (5)$$

The main definitions of elements in formulas 4 and 5:

- the share of the country's population in the total world population $m_i = M_i/M$
 where: M_i - population of the i country, M - population of the world;
- the share of the country's useful power in the total world: $p_i = P_i/P$
 where: P_i - useful power of the i country; P - useful power of the world;
- the share of the GDP of the country in the GDP of the world as a whole: $gdp_i = GDP_i/GDP$
 where: GDP_i – GDP of the i country, GDP – GDP in the world.

Tier 3: The designed Object in relation to the internal environment

For the purpose of assessing the Object in relation to the internal environment, there are several additional parameters explained in Table 3.

Table 3

Parameters of the internal environment of the designed Object

N	Indicators	Designations	Units	Source
1	Industry (including construction) part of GDP	IND	%	Official Database
2	Agriculture, forestry, and fishing part of GDP	AG	%	Official Database
3	Services and transport part of GDP	ST	%	Official Database
4	Population employed in the economy	LM	capita	Official Database
5	Population unemployed in the economy	ALM	capita	Official Database

Source: authors' construction.

It follows from the theory of sustainable development that a correctly formulated goal must link the dynamics of the main social, economic and environmental parameters that determine the sustainability of changes in the capabilities of socioeconomic systems. These parameters mainly include six parameters (Table 4). The analysis and recognition of the situation of the object (country) takes place in the period of time from the 1st level and further up to the 6th level.

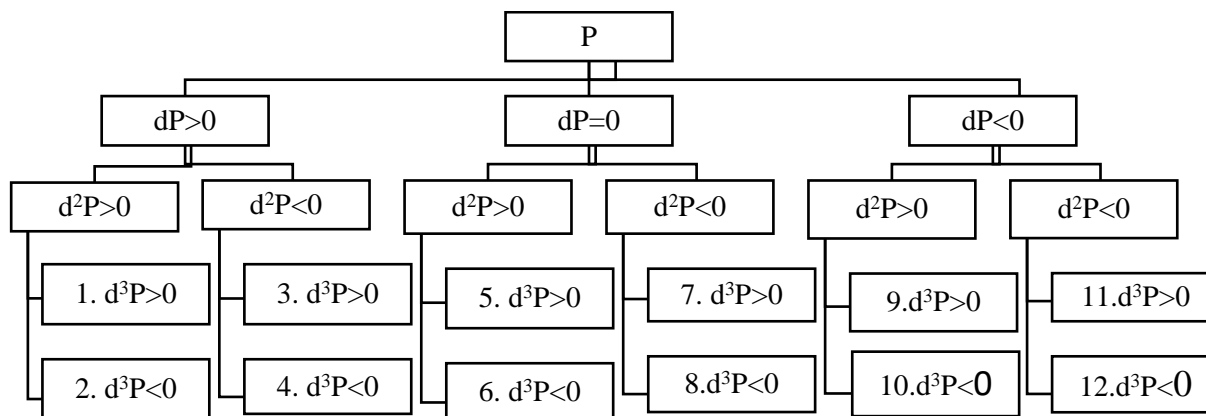
Table 4

Main parameters for building a classifier of logically possible types of goals

N	level	Indicators	Designations	changes	velocity of changes	acceleration of changes
1	level	Population	M	dM	d ² M	d ³ M
2	level	Useful power	P	dP	d ² P	d ³ P
3	level	Full power	N	dN	d ² N	d ³ N
4	level	Standard of life	U	dU	d ² U	d ³ U
5	level	Quality of environment	q	dq	d ² q	d ³ q
6	level	Technological excellence	f	df	d ² f	d ³ f

Source: authors' construction

In the first iteration, the selected parameter change can take one of three values: 1) "+" does not decrease; 2) "-" decreases; 3) "0" constant value. In the second iteration, the rate of change of the parameter is additionally analysed and the position of the system is refined.



Source: authors' construction

Fig. 3. Object's useful power changes diagram

Each type of useful power change in accordance with the Figure 3 defines a certain change in the opportunities of the system and influence the development scenario.

Table 5

Description of opportunities of the system in accordance with Figure 3

N	Opportunities of system	N	Opportunities of system
1	sustainable growth over time	2	rapidly growth, but unsustainable
3	growth with a sustainably decrease in the growth rate	4	growth with a decrease in speed and stability
5	opportunity remains with the prospect of transition to sustainably growth	6	opportunity remains with the prospect of accelerated but unsustainable growth
7	opportunity remains with the prospect of growth with a sustainable decrease in speed	8	opportunity remains, but an accelerated and sustainable decline is expected in the future
9	opportunity is currently decreasing, but there is a prospect of moving towards accelerated and sustainable growth	10	opportunity is decreasing, but accelerated but unstable growth is expected in the future
11	opportunity is decreasing, but growth is expected in the future with a sustainably decrease in speed	12	ability sustainably and rapidly decreases - degrades

Source: authors' construction

In a similar way, changes are decomposed in all parameters of sustainable development management M, N, U, q, f (Table 4). Thus, we have a system of indicators of sustainable development with the invariant

power, which characterizes the technological, economic, environmental, social and other opportunities and needs of the regional socioeconomic system. The obtained values of the parameters make it possible to identify the target state and then calculate the required state and needs of the regional object. The description of various development scenarios (submitted selectively) are presented in Table 6.

Table 6

Formalized description of various scenarios (submitted selectively)

N	trends	dM	dP	dN	dU	dq	df	d2N	d2P
1	Extensive growth	< 0	> 0	> 0	≥ 0	> 0	= 0	> 0	> 0
2	Development (intensive growth)	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0
3	Sustainable development	> 0	> 0	= 0	> 0	< 0	> 0	= 0	> 0
4	Degradation	< 0	< 0	< 0	< 0	> 0	= 0	< 0	< 0
5	Stagnation	< 0	= 0	< 0	≤ 0	> 0	< 0	= 0	= 0

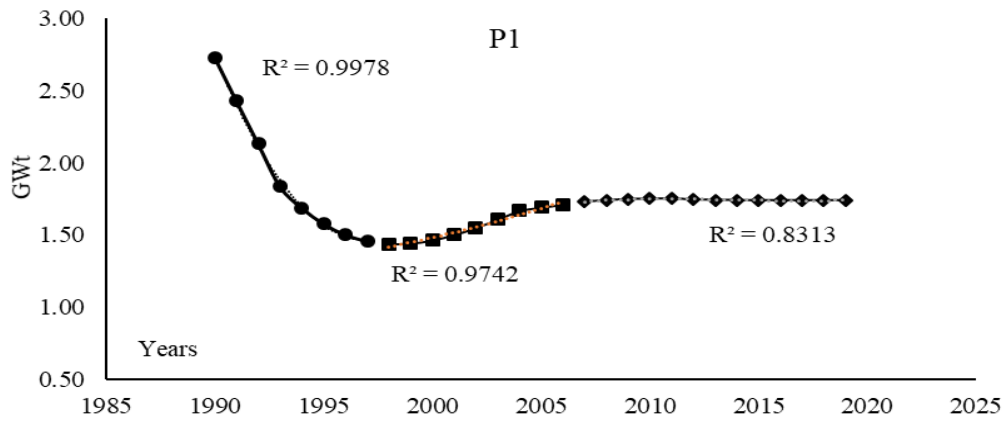
Source: authors' construction

Each type of goal corresponds to a certain state of the socioeconomic object. To establish a correspondence between the target type and the current state of the object, it is necessary to calculate the values of the target parameters for a given time and correlate the obtained result with the classifier of possible target types. As a result, we get an answer to the question: what type of goals corresponds to the existing state of the object.

The next stage is the formulation of the strategic goal for all the selected six parameters and in accordance with the classifier. All types of goals can be used as analysis options according to the procedures. This procedure includes the inverse effects of the implementation of the given parameters. Possible target parameters can be used as initial settings: non-decreasing population; doubling production; doubling the standard of living of the population; improving the quality of life. Natural scientific management tools are new ideas, projects, technologies (innovations), divided into three classes: 1) class of innovations associated with new energy carriers (N); 2) class of innovations associated with an increase in the generalized coefficient of technology perfection (f); 3) class of innovations related to improving the quality of planning (coefficient of presence (absence) of a consumer) (ϵ).

Research results and discussion

Based on the results of the calculations, figures of trends of useful power dynamic helped to identify Latvia's development for three periods: the 1st period 1990-1999; the 2nd period 2000-2007; the 3rd period 2008-2019 (Figure 5). For assessment, tree points (years) were selected: 2000, 2008, 2019.



Source: authors' construction

Fig. 4. Dynamic of useful power changes $P(t)$ of Latvia in period 1990-2019, GWh

Based on the considered indicators, an integral assessment of Latvia in points 1990, 2000, 2008 and 2019 was made. The evaluation results are presented in Table 7.

Table 7

Indicators of socioeconomic and sustainable development for Latvia in 1990, 2000, 2008, 2019

Years	M(t)	TA(t)	GDP	PX	N(t)	P(t)	G(t)	U(t)	q(t)	QoL	f	E	PHP
	10^6 cap.	years	10^9 euro	10^3 euro	GWh	GWh	GWh	GWh/cap.	x	kWh/cap.	%	%	kWh/cap
	1	2	3	4	5	6	7	8	9	10	11	12	13
1990	2.7	70.2	3.6	1.6	9.1	2.7	6.4	1.0	1.0	0.7	31	11	1.5
2000	2.3	70.2	9.0	3.6	5.0	1.5	3.5	0.6	1.1	0.4	31	11	1.6
2008	2.2	72.1	17.8	11.2	5.5	1.7	3.8	0.8	1.1	0.6	33	14	1.7
2019	1.9	75.7	29.9	16.0	5.5	1.7	3.8	0.9	1.0	0.7	33	14	2.0

Source: official database data and authors' calculations

In order to assess the Object in relation to the external environment, three indicators were calculated in 2008 and 2019 in selected countries and the EU as one region: energy imports (EIMP) as part (%) of energy use in the Object; relative weight of a country's useful power normalized by world population (WM); relative weight of a country's useful power normalized by world gross domestic product (WP) (Table 8). According to the calculated data in Table 8, the relative weight of Latvia in terms of WM is within the values of the Baltic Sea region countries and the EU. The United States has the highest values, indicating higher per capita productivity. The weight of Latvia in terms of BP is in the nature of a decrease and in 2019 is the world average. This parameter has a high value for China, which indicates the excess of the economy in production terms over monetary terms. The share of energy imports tends to decrease for Latvia, as well as for the USA. During the same period, China doubled the value of this indicator.

Table 8

Energy export part (EIMP), relative weight of country's useful power normalized by world population (WM) and world gross domestic product (WP) in 2008 and 2019

No	Country/region	Abbrev.	EIMP		WM		WP	
			2008	2019	2008	2019	2008	2019
			%	%	x	x	x	x
1	Latvia	LV	61	45	1.4	1.5	1.6	1.0
2	Lithuania	LT	58	75	1.1	1.4	1.3	0.9
3	Estonia	EE	23	0	1.7	1.7	1.5	0.9
4	European Union	EU	55	55	1.9	1.6	0.5	0.5
5	USA	USA	25	7	4.5	4.3	0.7	0.8
6	China	CH	8	15	0.7	1.2	2.9	1.4
7	World	WR	x	x	1.0	1.0	1.0	1.0

Source: official database data and authors' calculations

The internal structure of the Object is estimated using GDP indicators and the structure of the part of the population employed in the economy. The following indicators were used for Latvia in 2000, 2007, 2019: industry (including construction) value added as a part of GDP (IND); agriculture, forestry, and fishing value added as part of GDP (AG); services (including transport) value added as part of GDP (ST); population employed in the economy (LM); population unemployed in the economy (ALM).

Table 9

Internal structure parameters of Latvia in 2000, 2008, 2019 (%)

Year	IND	AG	ST	LM	ALM
2000	24	4	72	27	15
2008	22	3	75	29	8
2019	19	4	77	24	7

Source: data from the World bank database

The state of Latvia in 2019 was definition based on the calculated and determined parameters at all assessment tiers, as well as using the dynamics of useful power changes for the period from 1990 to 2019 (Fig. 4). The main assessment parameters are presented in Table 10.

Table 10

Development scenario of Latvia for the period 1990-2019

N	period	scenario	dM	dP	dN	dU	dq	df	d ² N	d ² P
1	1990-1999	Degradation	< 0	< 0	< 0	< 0	> 0	= 0	< 0	< 0
2	2000-2007	Extension growth	< 0	> 0	> 0	≥ 0	> 0	= 0	> 0	> 0
3	2008-2019	Zero growth, stagnation	< 0	= 0	= 0	≤ 0	> 0	= 0	= 0	= 0

Source: authors' calculations

The obtained target parameter values make it possible to identify Latvia's situation in the 2008-2019 period as unsustainable development, i.e. the possibility of development remains, but in the future an accelerated and sustainable recession, a decrease in consumption, a deterioration in the quality of life and a decrease in the population are expected. If the current version of Latvia's development continues, it means long-term stagnation and further degradation. Unfortunately, the first serious signals in the form of population decline are already happening.

Formulating a future positive development scenario requires the following goals: maintaining or increasing the population (M); maintaining or increasing the total consumption of energy resources in power units (N); maintaining or increasing the total final product in power units (P); increase in the generalized technology perfection coefficient (f); improving the quality of the natural environment (q); raising the standard of living and level (U).

Conclusions

The analysis of the research results allows formulating the main requirements for designing and managing sustainable development.

- 1) In the design and management of sustainable development of systems, natural science meters and units of measurement, reduced to a single unit of measurement, should be used for systems open to constant energy flows.
- 2) The proposed design methodology makes it possible to formalize the task at different stages and levels of the system, based on the formalized principles and criteria of sustainable development, to determine the parameters of the system's current and target state, and to determine the size of the system, problems and predict the consequences.
- 3) Latvia's situation in the period 2008-2019 can be characterized as unsustainable development, and if it continues, it would mean long-term stagnation and further degradation. Therefore, measures are urgently needed to evaluate the goals of sustainable development and to implement measures that would ensure further development of the country.

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INVESTMENTS IN HUMAN CAPITAL AND ITS EFFECTIVENESS

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Abstract. Modern global and innovative world, effective use of the workforce is a necessary factor for the development of a competitive economy and high rates of economic growth. This is impossible without the development and improvement of human capital and modern education system. Advancement of science, technology, medicine and other fields requires appropriate development of human capital. We consider particularly important the investments made in human capital according to different (especially tourism and agricultural) sectors and the study of their effectiveness.

The purpose of our study is to justify the need to invest in human capital and to investigate its effectiveness, for which we conducted a survey of employers and employees in the field of agriculture and tourism about their attitude towards professional growth measures (training/seminars); the role of the state in this direction is also important. In the research process, we used statistical analysis and qualitative research methods. The conducted research showed us that. Holding of training/seminars for improving the qualifications of employees is without compromise, but it is becoming difficult to find funding. There is a mixed attitude on the part of the state and employees, while 57% of these measures are financed by employers. The investment made in this direction has an economic and social effect. Increases employee motivation and productivity, which has a positive impact on both the company's and employee's income.

Effective management of investment in human capital contributes to the development of creative social actions.

Based on the actual data of the developed countries, it was found that there is a direct relationship between the expenditure on education and the economic growth in the long term. As a result of acquired knowledge and experience, in the presence of highly developed human capital, productivity and profitability increase.

International indices and rankings are one way to measure a country's progress in various directions; however, it should be noted that they do not accurately reflect the current situation in the country. The human capital index (0.57) is considered a good level, however, in reality; the quality of the databases used in their calculation reduces the accuracy of the indices and ratings.

Key words: human capital, investments in human capital, education, labor productivity.

JEL code: E24, I25, D24, Z32

Introduction

In the modern global and innovative world, effective use of the workforce is a necessary factor for the development of a competitive economy and high rates of economic growth. This is impossible without the development and improvement of human capital and the modern education system.

Effective management of investment in human capital contributes to the development of creative social actions. This process is based on determining the economic value of education, its economic assessment, resource allocation, planning and management of state policy and strategy.

The purpose of our study is to justify the need to invest in human capital and and to investigate its effectiveness. The purpose of our research is to substantiate the need to invest in human capital and to investigate its effectiveness

Based on the purpose of the study, we set the following tasks:

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- 1) to investigate the attitude of employers and employees working in two important areas of the economy of Georgia - agriculture and tourism - towards events related to professional growth (training/seminars);
- 2) to identify problems and determine possible solutions;
- 3) to highlight the regulatory role of the state in this regard.

Statistical analysis and qualitative study methods were used in the study process.

The object of study is Human capital index components and education/professional skills.

A scientific innovation of our study is a critical analysis of study materials of employers and employees in the field of tourism and agriculture of Georgia and, based on this, revealing the cause-and-effect relationships between investments and income in human capital.

Research results and discussion

People engage in certain labour costs to receive certain incomes in the future. Costs determining future monetary and material income are evaluated as investments in human capital. Such investments include spending on education, medical services and healthcare, training and upskilling at the organizational level, job seeking and migration (Saite I., 2021).

It should be emphasized that the size and effectiveness of human capital depend on the level of education of individuals and their ability to act. In the developed countries of the world, issues of the effectiveness of investments in education based on the cost-benefit ratio have been developed.

Johnson & Johnson (J&J) admits that health is one of the essential components of human capital. That is why they grant great importance to the health and well-being of their employees.

J&J offers employees a free course called Energy Performance. During this course, employees learn about healthy eating that increases energy. The course led to an increase in the labour productivity of employees and a decrease in personnel turnover rates.

"Our people are our most important asset," this is one of the fundamental principles of Adobe. The company pays up to USD 1,000 per year to support learning and development opportunities through conferences, books, online courses or webinars.

Continuous innovation cannot be sustained only by technology. Google is one of the most innovative companies all over the world. The tech giant fosters a culture of innovation. One of Google's 8 principles of innovation is "seeking ideas everywhere," where employees are encouraged to openly share their ideas. Another principle urges Google's employees not to be afraid of failure. This encourages employees to take risks and present their innovative ideas without fear of failure. Google invests in its human capital because it understands that people are the catalyst for growth and innovation (Bridgit, 2021).

These examples illustrate the power of developing individual skills and abilities. Human capital is one of the most important drivers of growth and innovation.

The basis for calculating the indicators of the economic efficiency of investing in human capital is the assumption that investments in human capital increase the labour productivity of workers, which, in turn, leads to an increase in income.

About determining the value of human capital, there are the following problems to be solved:

- 1) determination of human resources as production factors;
- 2) determining the value of human capital;
- 3) determination of depreciation and amortization of human capital.

The economic effectiveness of education is defined as the ratio of direct monetary income in education to the costs associated with its reception. Education increases the effectiveness of various types of human activities in the labour market and beyond its bounds.

The impact of education on the development of society as a whole is important, especially in the aspect of social integration and society stabilization. If we take into account all types of non-monetary income earned from education, we can say that education is characterized by social effectiveness. (World Bank Group, 2018)

In addition to the benefits to individuals, investment in human capital has benefits for the economy as a whole. The collective economic impact will be reflected in the rate of economic growth.

A significant part of human life takes place outside the labour and capital markets. He/she spends a lot of time on the existence and resting. The education received has a positive effect on health, and also provides for a more rational approach to the use of free time. The impact of education on the development of society as a whole, especially in terms of social integration and stabilization of society is also worth noting. If we consider all types of non-monetary income earned from education, then we can say that education is characterized by social efficiency.

International indices are used to determine the level of development of countries and international ratings, however, it should be taken into account that indices and ratings cannot accurately reflect the current situation in the country even in the area which they are an assessment tool for.

In order to assess the level of human capital development and the general situation in this field, the human capital development index accepted in international practice is used, which is a general indicator for assessing the level of human development in the country.

The Human Capital Index (HCI) evaluates the amount of human capital that a child born today is likely to have accumulated by the time he/she turns 18. This index is a modern measure developed by the World Bank that focuses on the performance and productivity of the next generation.

Human capital has an economic value. It consists of knowledge, skills and health that enable people to fulfil their potential as productive members of society.

Various approaches have been developed to measure human capital. Two approaches are mainly discussed in the economic literature. One of them relies on the assessment of this index according to the indicators. The second one is based on the reflection of the monetary aspects of human capital (both the expenses directed to the development of human capital and the incomes, the growth of which can be influenced by human capital).

In other words, the index measures the distance separating each country from the threshold level - that is, from ideal health and full education of a child born today. The index describes the state of the country in terms of labor productivity of future generations of workers. Initially, 28 countries with different regions and different incomes participated in the development of this project (including Georgia). To date, the index is developed for 173 countries, and the countries involved in this project not only make calculations but also determine national priorities to ensure the growth of human capital. The index takes values from 0 to 1. For a country where a new-born is provided with an ideal level of education and healthcare, this indicator will be equal to 1. For comparison, in the USA this index is 0.70, in Canada - 0.80, in Germany - 0.75, in Finland - 0.80, Singapore has the highest HCI in the world and its value is 0.88. According to 2020 data, the indicator of Georgia is -0.57. (World bank Group, 2020).

Globally, 56% of all children born today will at best half of their potential productivity in adulthood; and 92%, at best - 75% of their possible productivity.

A child born in Georgia today, with full education and perfect health, will reach 57% of its potential productivity in adulthood, which is relatively below the average for the Eastern Europe and Central Asia region, but slightly higher than the average for countries with higher incomes.

According to the components, the indicator of Georgia is as follows:

- probability of reaching the age of five: 99 out of every 100 children born in Georgia reach the age of 5;
- a number of years of school education: in Georgia, a child who starts education at the age of 4 is expected to complete 12.9 years of schooling by his 18th birthday;
- harmonized test assessment scores: in Georgia, school students receive 400 points on a scale, where 625 have a high result, and 300 have a minimum result;
- school years adjusted according to education: taking into account the actual education of school students, the estimated number of school years is only 8.3 years;
- the rate of reaching old age throughout Georgia - 85% of 15-year-old children will reach the age of 60. These statistics indicate the health risks that a child born today may face under current conditions (World bank Group, 2020);
- healthy development (without delays)- 2020 data on delays in development is not available for Georgia. According to 2017, 89 out of 100 children develop without delays. 11 out of 100 children have delay in development and thus face cognitive and physical risks that can last for a lifetime.

Accordingly, the methods of measuring human capital are diverse and reflect the in-depth nature of this characteristic.

Therefore, it is important to create the necessary conditions for the development of human capital, and the state should focus its attention on this factor to get results in the future.

Along with the development of society, all areas of its activity are developing. Advancement of science, technology, medicine and other fields requires appropriate development of human capital. We consider it particularly important to study the investments made in human capital according to different fields and their effectiveness.

In modern conditions, it is urgent to carry out study in the direction of agriculture and tourism, because currently, the level of labour productivity in the agricultural sector of the country is low. Factors of production are used irrationally. It should be noted about the low qualitative indicators of human capital in rural areas, which is causally related to rural social & economic problems. At the same time, in recent years, the development of tourism has become one of the priority fields of the country's economy, but only a small part of the tourism potential is used, the service culture is low, and depending on the situation, it is necessary to take measures in terms of human capital development.

It was interesting for us to find out how investments in education in these fields were evaluated in terms of the qualitative indicator of human capital and increase in income. We developed a questionnaire for employees and their employers/companies separately and conducted a survey in the field of tourism and agriculture.

We interviewed 88 employers/companies. 65% of respondents were top managers, and 35% were direct owners. The organizational-legal form of the surveyed companies was diverse. According to the annual income, 70% of the surveyed companies earn more than GEL 500 000, 25% - more than GEL 100 000, and 5% - up to GEL 100 000-500 000.

50% of the companies presented have micro enterprise status, 30% - medium enterprise status and 20% - large enterprise status. The vast majority offer training seminars for staff to improve their qualifications. 45% of them do it monthly, 35% - once every 6 months, 15% - once a year, and only 5%

do not conduct training for employees. 70% of employers finance training themselves, 20% - through various international organizations and foundations, and 10% - by employees themselves. During this question, the employers exclude the role of the state as a sponsor.

Depending on the company, the cost incurred for training one employee during the year is various. Only 20% spend more than GEL 900, 25% - GEL from 300 to 600, 10% - from 600 to 900 GEL and 45% spend GEL 300. on average. The answers seem to depend on the legal & organizational form of the companies and the number of employees. Despite the fact that the employers surveyed have different approaches to the amount and frequency of training costs, unanimously (100% of the respondents) consider it necessary to train employees in order to improve their competencies.

In their comments, the interviewees separate employee training according to the fields. It was revealed that it is important for employers not only to improve narrow professional skills (in particular, in the direction of service, and international standards of hotel operation) but also to develop general skills (in the direction of management, prompt problem solving, communication improvement, general standards and procedures of the company). In the comments, it was also pointed out that employees are doing internships abroad at different times of the year. A large number of employers believe that spending money to improve employee motivation and skills always brings positive results and has a direct impact on the quality and forms of service, as well as on the company's revenue growth.

The attitude of the employees towards professional training shall be unequivocally positive, and their economic or social effect shall not be disputable. However, a study conducted with employees showed different results.

During the study, the subject of our interest was the respondents' sector of employment; age; gender; status; the number of employees in the company. We also asked the following questions: How often do you attend training? Who finances the training? Have the completed professional training helped you in your career advancement and how? Have the training helped you to increase your work productivity (please comment)? Do you think training is necessary?

220 respondents took part in the study.

55% of respondents belong to the tourism sector, and 45% - to the agriculture sector.

41% of respondents have been employed for one year, 43% have been employed for 1-5 years, and 14.9% have been employed for more than 5 years. The ageing index of the respondents was as follows: 91% are of 20-29 years old, 4.5% are of 30-39 years old, and 4.5% are of 40-49 years old. 12% of employees belong to large businesses, 34% - to medium businesses, and 54% to small businesses.

The respondents had the opportunity, at the same time, to choose several answers to the question "How does the company provide the opportunity to raise your qualifications and develop?". 18% of the respondents think that the company does not care about raising the qualifications of its employees at all. 52% of the respondents answer that the company constantly plans internal training to develop professional or other competencies. 10% say that the company allows them to take additional study leave and to benefit from the financing of preparatory courses and exams. 16.4% answer that in order to share knowledge and experience, the company allows them to go and work in the company's branches abroad.

It was interesting to us how the companies tried to raise the motivation of the employees. The respondents had the opportunity to choose several answers at the same time. The study results are quite interesting; 67.2% think that the organization creates a pleasant working environment; 37.3% say that the organization plans some activities/meetings to build corporate spirit, including in non-work environments; 40.3% think that the organization properly assesses and encourages the results achieved

by the employees; 13.4% say that the company does not care about raising the motivation of employees at all.



Source: Constructed by the authors based on the survey results

Fig. 1. Funding of the trainings (according to survey results)

According to the training attendance frequency, the answers were as follows: 33% - every month, 30% - every 6 months, 25% - once a year, and 12% never attended the training. In 57% of cases, the employer financed the training that can be evaluated positively; 18% say that international organizations/funds financed the training; 9% - the training was financed by the state, and 16% financed the training with their own funds (Figure 1).

40.3% of respondents are ready to pay up to GEL 300 for training, 32.8% will pay GEL 300 to 600, and 3% answered that they could pay GEL 600 to 900; 23.9% think that they will not pay for the training at all.

It was interesting for us whether the training helped to increase labour productivity and income. It turned out that it helped in 66% of cases, more or less - in 28.4% of cases. And 4.5% believe that it did not help.

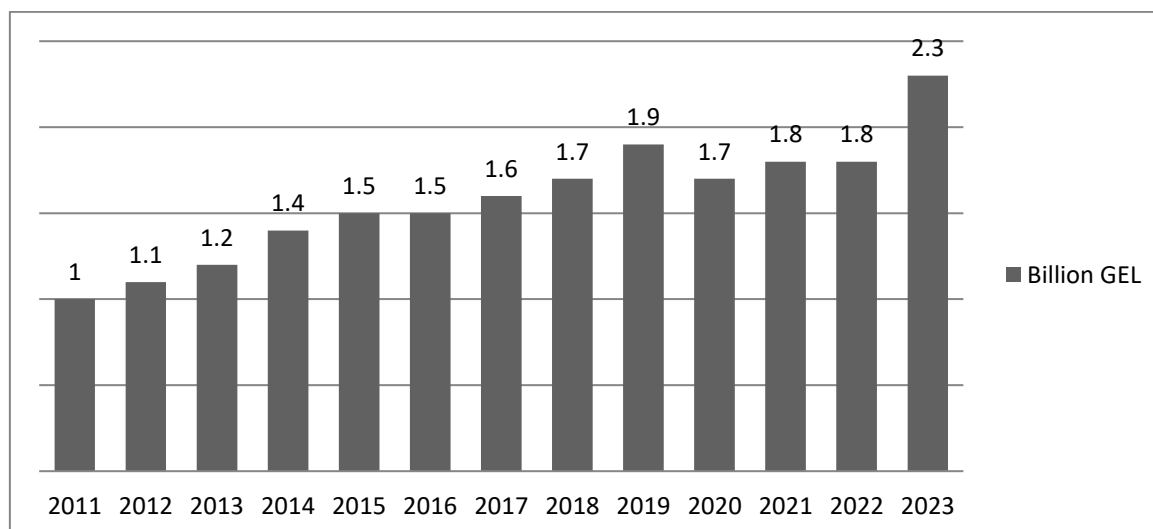
Despite the different attitudes, the vast majority (86.6%) believe that the need for qualification raising and development training courses for professional and career growth is quite high.

Respondents could also leave comments and some of them were especially interesting (see below).

- "I think one of the best ways to increase human capital and its effectiveness is to conduct training."
- "The knowledge/skills gained during the training help us in our future career development, and most importantly, the communication with more experienced, professional people and trainers motivates us to take many more successful steps in the field where we are employed."
- "It would be good if motivational activities will become more active that will increase the working capacity of the staff."

Thus, the study carried out clearly showed that there are grand problems in this regard. Namely, some employers do not consider it necessary to make expenses to raise the qualifications of the employees. And 1/3 of the employees would not have been able to raise their qualifications without the funds received from international funds and the self-financing of employees (20%+10%). The opinion of 24% of employees that they should not pay for their professional growth is unacceptable. However, we must take into account the low social background in the country and the low employee wages, which in many cases are barely enough to meet the minimum needs of the family. In the agricultural field, the employer (farmer) is often self-employed; he is advised to take training courses, rather than spending on temporary/seasonal employees and then share the developments with others. In general, the aspirations of rural residents

towards professional growth and innovation are less. Therefore, they prefer to use traditional approaches instead of high-tech, innovative methods.



Source: Constructed by the authors based on state budget of Georgia 2011-2023

Fig. 2. Expenditure on education (billion GEL) in 2011-2023*

Based on the study results we were once again convinced of how necessary and important it is for employers to take care of the professional development of their employees. The investment made in this direction has an economic and social effect. It increases the employee's productivity, which has a positive impact on both the company and the employee's salary, and everything combined has a macroeconomic effect - economic growth.

Although for respondents the state has a passive role in investing in education, state spending on education actually tripled during 2010-19 and reached GEL 1.8 billion. As a result, the share of education in total state expenditure increased by 3.7 percentage points to 11.9% in the same period. A half of the funding from the budget allocated for education in 2019 was spent on the general education level, 7.5% - on higher education and only 2.8% - on professional education. The rest spending was for preschool education (15.3%), infrastructure projects (14.7%), science promotion (3.4%) and other support programs (6.5%).

In Georgia, state spending on education increased from 2.8% to 3.6% of the GDP in 2010-2019. Despite this positive dynamic, this index is low compared to Western European countries, where education costs are more than 5% of GDP. According to the Budget Code of Georgia, since 2022, the expenditure on education has increased to 6% of the GDP in order to improve the quality and efficiency of the education system (Figure 2).

The total expenditure on inclusive education (which implies the inclusion of persons with disabilities in the educational process) increased by 33% annually on average for eight years and reached GEL 27 million in 2021, and it increased up to GEL 35 million in 2022 (1.5% of the total cost). (State budget of Georgia, 2011-2023).

The investments are distributed according to sectors or individual investment projects. Economic and non-economic favourable environmental conditions of distribution, the state's social & economic policy and tasks are primary factors of investment effectiveness.

The factors determining the overall effectiveness of investments at the macro-economic level throughout the country are acceptable social, political, cultural and ecological effectiveness conditions (income of the population, standard of living, political stability, ecological security, etc.).

In general, when discussing investment efficiency factors, we can distinguish the below traditional types, namely:

- innovative process, i.e. use of science and technology achievements;
- level of investment process management and organization, use of modern management methods; qualification of personnel.

Operation of the economy self-regulation mechanism and the state regulation mechanism; natural conditions; the nature and degree of use of the mentioned factors (level, scale) determine the effectiveness of investment resources for individual projects or the entire country.

Personnel qualification is directly related to scientific & technological progress and management improvement. Modern techniques and technology cannot be used, and progressive methods of management and organization cannot be mastered by personnel without proper qualifications - workers, specialists (engineer & technical staff). In general, in all fields, the qualification of workers - "moral wear" (obsolescence of existing knowledge) is notable. Therefore, the training of new staff requires continuous attention to the progress of modern science and technology.

As for the - state regulation mechanism, it mainly plays a supporting role in raising the economic efficiency of investments. Its role is more important in terms of increasing the social, political, cultural and environmental impact of investments. Here, investment projects are selected based on appropriate methods, especially the method of expert assessment. The state's policy should determine the directions of investments in the mentioned areas, which should be done following the needs of the society, that is, to obtain a social effect. In most cases, the largest part of investments is directed to industry, especially small investments in agriculture. The same should be said about the directions of the service sector. Such a structure of investments cannot contribute to the dynamic and proportional development of the economy, even the growth of the final result of investments throughout the country, therefore it needs improvement.

Conclusions and recommendations

- 1) It is important to develop the best skills in the formation of human capital. Skill generation is a time-consuming process; therefore, the whole process of human capital development requires a long-term policy.
- 2) Effective management of investment in human capital contributes to the development of creative social actions. This process is based on determining the economic value of education, its economic evaluation, resource allocation, planning and management state policy and strategy.
- 3) Georgia has an average index of human capital (0.57) in the world ranking, the condition of individual components of the index should be considered. The human capital index is an important tool for evaluating human capital, however, the accuracy of the indices and ratings is reduced by the quality of the databases used in their calculation. Databases and cross-country comparability are a significant problem for developing countries due to imperfect methodology and databases.
- 4) A study on how the employers and employees assessed the investments in education in terms of the quality of human capital and the increase in income was conducted with employers and employees in the agricultural and tourism sectors. Holding of training/seminars for improving the qualifications of employees is without compromise, but it is becoming difficult to find funding.
- 5) For 57% of the respondents, the employer financed the trainings, which can be evaluated positively. But the passive role of the state (only 9%) and 16% self-financing of employee training is not the desired result.

6) Despite the fact that the state annually increases budget funding for education, it is still insufficient, and both employers and employees point to the lack of public spending.

From the results of the research, we were once again convinced of how necessary and important it is for employers to take care of the professional development of their employees. The investment made in this direction has an economic and social effect. It increases the productivity of the employee, which has a positive impact on the income of both the company and the employee, raising his standard of living. Everything goes together to the macroeconomic effect - economic growth.

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ASSESSING THE DEVELOPMENT AND HARMONISATION OF HIGHER EDUCATION SYSTEM IN GEORGIA FOLLOWING THE BOLOGNA PROCESS

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Abstract. The development and harmonization of Higher Education system in Georgian remains a challenging process. Georgia became a part of the Bologna process in May 2005 and this significantly changed the country's higher education system, bringing it closer to European standards. Despite the positive changes, there is a number of reforms that have been under argument among researchers.

The research analyses the Bologna process in general and its implication in the Georgian higher education system, rethinking the main goals and approaches of the Bologna process and evaluating its significance. The paper particularly addresses the quality assurance standards in general and its execution in Georgia, the internationalization of higher educational institutions of Georgia, and students' mobilities inside and outside of the country within an Erasmus Mundus and Erasmus+ framework. The results of the study show that the Bologna process has positively impacted higher education system in Georgia, it has become more transparent and closer to international standards; however, there is still room for improvements, especially in the scope of internationalization and process of attracting international students.

Key words: higher education in Georgia. government and education, Bologna Process.

JEL code: I28; I23; H52

Introduction

Since 2000, the education system of Georgia, including the higher education sector, has undergone a number of reforms. Among them were a number of radical steps that have positively changed the Higher Education Sector in Georgia. The main goal of this was modification of the education system of the post-Soviet period and reorganization of it according to modern standards, the so-called Europeanization. The initial task of the reforms was the creation of an internationally recognized higher education system under conditions of growing competition. The aforementioned reforms were preceded by legal foundations known as the Bologna process.

Bologna process, which was initiated in 1999 by 29 Western liberal democracies, has succeeded and brought significant changes not only in European countries, but has impacted educational systems worldwide (Marquand, 2018). According to previous research (Scott, 2018) the Bologna Process has been a key instrument for many eastern and central European countries for reconnecting these countries to the European educational system after many decades of totalitarian rule. Also, other post-Soviet countries of Central Asia with varying degrees of success have tried to approach unified Western European standards. However, there have been a lot of challenges for these countries, of which the most significant, according to Heyneman and Skinner (2014), have been corruption, private higher education, mobility of students and qualifications via ECTS, and integration into the European community.

Georgia joined the Bologna process in 2005, at the Bergen summit. According to Glonti and Chitashvili (2006), for the country this important step became the initial stage of fundamental reforms of the educational system, and on the other hand, it was a manifestation of the Western course chosen by the post-revolutionary government. Involvement in the Bologna process was a solution for the newly elected government to get out of the chaos created in the educational space in the post-Soviet period, which

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included not only the financial crisis and corruption in higher educational institutions, but also the lack of strategic planning and management of education, innovative teaching and research methods, updated curricula and research-based teaching.

This study aims to assess the main goals and approaches of the Bologna process and evaluate its significance in Georgia. To reach the aim, two research tasks were selected: (1) to review the scientific literature and regulations regarding development of Bologna process; (2) to analyse implementation of Bologna process in Georgia. Various research methods were used within the scope of the study, such as induction, deduction, analytical comparison, statistical analysis and evaluation, and qualitative approach to national and international reports, scientific literature regarding Bologna process and its implementation in Georgia. Additionally, statistical data from the National Statics office of Georgia was analysed. In the context of the theoretical literature review, the analysis of secondary sources was carried out. The events before the Bologna Process were summarized, as well as the normative documents of the Bologna Process were processed, namely: the Sorbonne (1998) and Bologna (1999) declarations, the summary communiques of the meetings of the ministers of the European countries responsible for higher education (Prague, Berlin, Bergen, London, Leuven, Bucharest, Budapest -Vienna and Yerevan). In the research, the authors have described the importance of the mentioned documents in the aspect of planning and implementation of the main standards in higher education in Georgia.

Research results and discussion

Development of Bologna process

On 19 June 1999, in Bologna, one of the oldest university cities in Italy, the joint declaration of the European Ministers of Education, known as the "Bologna Declaration", was signed. The declaration was signed by representatives of 29 European countries (Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom), which laid the foundation for the creation of the European Higher Education Area. The Bologna Declaration was preceded by the adoption of such documents as: the Magna Carta Universitatum, (1988), The Lisbon Convention (Convention on the Recognition of Qualifications Related to Higher Education in the European Region, 1997) and the Sorbonne Declaration (Harmonization of the Architecture of the European Higher Education System, 1998).

The main idea of the Bologna process is to increase the compatibility of education systems of different countries and the international competitiveness of European higher education. The signatory countries of the Bologna Declaration (1999) agreed on the following directions:

- introducing an easily understandable and easily comparable, compatible academic quality system, including through the diploma supplement. The purpose of which is to promote the employment of European citizens and the international competitiveness of the European system of higher education;
- introduction of a system based on two main levels, pre-diploma and post-diploma levels. A prerequisite for admission to the second level of education is the successful completion of at least three years of the first level. The academic degree awarded at the end of the first level of higher education, as the appropriate level of qualification, must be acceptable for the European labour market. The second level must be completed by awarding a Master's or Doctorate degree;
- creation and implementation of the European Credit Transfer and Accumulation System (ECTS) as a means of promoting student mobility. It should be possible for students to move between countries and recognise their academic qualifications after mobilities.

In the following years after the signing of the Bologna Declaration, the member countries of the Bologna process met every two to three years in the same format to summarize the results already achieved for the past period and to draw up future plans. During the period from 1997 to 2020, there were signed 15 legal regulations and agreements, starting from the Lisbon Convention (1997) till Rome Communiqué (2020), all of them analysed below. At the same time, the number of countries interested in the Bologna process adoption also increased.

One of the main legal foundations for the establishment of a unified European educational system was represented by *The Lisbon Convention (1997)*. With this document the participants of the convention recognized the right to higher education as a decisive factor in the expansion and development of human knowledge. It is recognized that higher education plays a vital role in promoting peace, understanding, tolerance and mutual trust between countries. The great diversity of education systems in the European region is a reflection of its cultural, social, political, philosophical, religious and economic diversity, which is a special achievement and deserves respect. In order to realize the aforementioned in reality, the participants support the full use of educational resources for each citizen of all member countries, stimulate them to continue their studies or complete a specific period of study in educational institutions of other countries.

In 1998, *Sorbonne Declaration (1998)* was signed – a joint declaration of the four higher education ministers of France, Germany, Italy and the United Kingdom. The document stated that the open European area of higher education contains rich positive perspectives, but on the other hand, the European area of higher education requires constant efforts to remove barriers and create teaching and learning structures that expand mobility and close cooperation. With this document countries agreed to strengthen the intellectual, cultural, social and technical dimensions of Europe, which is largely determined by the universities, whose role is crucial for such development (Sorbonne Declaration, 1998:1).

The Sorbonne Declaration announced the idea of lifelong learning, and also focused on the role and importance of internationalization of education. The conversation concerns the European Credit Transfer and Accumulation System (ECTS) and the principles of its use. With the abovementioned declaration, the foundation was laid for the system of credits, since the recognition of received credits would make it possible to start or continue studying in various European universities and to obtain an academic degree at any time of life. Declaration also noted that the student should have the opportunity to start academic work at any time of his professional life and from any basis. The willingness and desire to create new international programs and mobility of students and teachers between universities was declared.

Bologna Declaration (1999) presents the basis of the modern educational system. The main goal of the Bologna process is to develop certain means and tools for connecting national educational systems. The declaration emphasizes that European higher education institutions accepted the challenge and played a key role in the creation of the European space of higher education and the revival of the fundamental principles of the 1988 Magna Charta Universitatum of Bologna. This is very important, since it is the independence and autonomy of universities that ensure the constant relevance of higher education and research to the changing needs, demands of society and the development of scientific knowledge. The course was taken in the right directions, but achieving a high level of compatibility and comparability of the higher education systems of different countries required continuous efforts.

In 2021, *Prague Communiqué* defined several new elements:

- **Introducing a system of easily understandable and comparable academic degrees.** Ministers urge universities and other higher education institutions to take full advantage of existing national

legislation and European mechanisms aimed at promoting academic and professional recognition of courses, degrees and other achievements, so that citizens can use their qualifications, competences and skills in the entire European area of higher education;

- **Introduction of the ECTS credit system** - for greater flexibility in the process of learning and awarding qualifications, it is necessary to adopt a single cornerstone of qualifications, which will be based on a credit system, such as the European Credit Transfer and Accumulation System (ECTS) or another easily comparable system with transfer and accumulation functions. It was the first attempt to promote the compatibility of students' European higher education and their placement in the European labour market, together with publicly recognized quality assurance systems;
- **Promoting mobility** - Ministers confirmed that improving the mobility of students, teachers, academics and administrative staff (as set out in the Bologna Declaration) is an important achievement. Thus, they confirmed their determination to overcome all the obstacles that prevent the free movement of students, teachers, scientists and administrative staff and emphasized the social importance of mobility. They noted the mobility opportunities offered by EU programs and the progress made in this field;
- **Quality assurance** - the ministers emphasized the need for close cooperation, mutual trust and recognition of national quality assurance systems at the European level. Encourage universities and other higher education institutions to share best practices and establish mutually acceptable mechanisms for assessment and accreditation/certification.

Berlin Communiqué (2003) was an important meeting as 7 new countries were included in the process (Albania, Andorra, Bosnia and Herzegovina, Holy See, Russia, Serbia, Montenegro and Macedonia). Thus, the number of countries involved in the process increased to 40. It was decided to allow all member states of the European Cultural Convention to be involved in the Bologna process and to submit a plan for the implementation of the Bologna goals in the higher education system.

Bergen Communiqué (2005) was important for the countries of Eastern Europe. On 5 May 2005, new countries joined the Bologna process at the Bergen ministerial conference (Armenia, Azerbaijan, Georgia, Moldova and Ukraine). The number of participating countries has increased to 45.

With Dublin Descriptor (2005) a framework of qualifications for the European Higher Education Area was adopted. The document discusses the three-level education system, learning outcomes and qualifications for each level. Competencies have been defined for each level of education.

Kazakhstan joined the Bologna process in 2010, when *Budapest-Vienna Declaration* was signed. The Bologna process and its results, the European space of higher education, regional and international cooperation in higher education were named as an unprecedented example at the global level. Confidence and interest in it increased significantly in different parts of the world and made European higher education more accessible to the world.

The participating parties in *Yerevan Communiqué (2015)* noted that the voluntary convergence and coordination reform of the education system took place. It is based on strong public funding, shared views on quality assurance and recognition principles and processes, common tools and is implemented through a single quality structure. Thanks to the Bologna reform, the opportunities for mobility of students and graduates within the European Higher Education Area have been increased through the recognition of their qualifications and period of study. Graduates of educational programs are provided with the knowledge, skills and competences to continue their studies or join the European labour market. Educational institutions are becoming more and more active in the international context, and professors and teachers collaborate in joint pedagogical and research programs.

Paris Communiqué (2018) symbolically coincided with the 20th anniversary of the signing of the Sorbonne Declaration. Analysing the achieved results, it was emphasized: academic freedom and unity, institutional autonomy, participation of students and academic staff in the management of higher education, common progress - in the introduction and implementation of agreed reforms. The Paris Communiqué, for the first time during the Bologna process, recommended the implementation of short-cycle programs that would facilitate the rapid training of students for employment.

Finally, *Rome Communiqué (2020)* when Ministers' approach inclusive studies and training, innovative teaching and assessment methods and interconnected frameworks and tools to facilitate and enhance international cooperation. Hence main emphasis was made to higher educational institutions as key actors in meeting the United Nations' Sustainable Development Goals by 2030.

Results of Bologna process in Georgia

Initial reforms of higher education in Georgia took place before the Bologna Declaration - after collapse of Soviet Union in 1994 when Georgia had switched to a two-tier system of higher education, when the German model of higher education existing in the Soviet period began to be replaced by the Anglo-Saxon educational model (Amashukeli M. et al., 2017). These changes were implemented for the first time with the introduction of undergraduate and graduate programs of the Faculty of Physics at Tbilisi State University. During the following years, this process gradually covered various higher educational institutions. In 2005, the reform of the third level, "postgraduate", was implemented, which was equalized to the doctoral level, therefore postgraduates received a doctorate degree (International Institute for Education Policy Planning and Management, 2008).

There are some visible results of the Bologna process in Georgia. The following dimensions have been developed over 20 years:

- unified quality system of compatible and comparable qualifications;
- European Credit Transfer and Accumulation System (ECTS); quality assurance and its mechanisms;
- mobility programs of students and academic staff;
- close connection of higher education and research;
- the connection of higher education and the ability to adapt to the demands of the employment market;
- lifelong learning;
- social dimension, which implies equal access to higher education, both in gender and ethnic-cultural terms;
- inclusion of the European dimension (mobility and international cooperation) in higher education;
- inclusive and innovative approaches to learning and teaching process is recognized in the Ministry of education and science Georgia, but it is not financially supported by the state.

Despite the positive evaluation of Bologna Process in Georgia, e.g. that the Bologna process supports strengthening the graduate's employability (Lezhava, 2016; Tsiklashvili, Poladashvili, 2021), there are some criticisms that exist regarding the achieving goals stated in previous communiques. The authors further have assessed several aspects of higher education in Georgia, such as quality assurance, internationalization of higher educational institutions and mobility of students and academic staff.

Quality assurance: In Georgia LEPL National Center for Educational Quality Enhancement promotes the improvement of the quality of education within the scope of its competence, as well as develops recommendations, authorizes educational institutions and accredits their educational programs, provides confirmation of the validity of educational documents issued in Georgia, implements the recognition of

education received abroad, maintains the register of educational institutions and verifies the linguistic correctness of the strict registration document - the state document confirming education.

The process of institutional accreditation in Georgia was started by the Ministry of Education and Science of Georgia in 2004. The purpose of accreditation is to assess the compliance of educational programs with standards. Accreditation is mandatory for all levels of regulated educational programs.

The importance of accreditation is conditioned by the fact that in case of refusal of accreditation or cancellation of crediting, the University loses the right to receive a state grant for BA and a master's grant for the relevant educational program. Accordingly, higher educational institution stops implementing the regulated educational program, including at the doctoral level.

With this record, it can be concluded that through the National Center for Educational Quality Enhancement, the state controls the quality of education, monitors the fulfilment of all conditions by higher education institutions, and on the other hand avoids excessive budget spending to finance the education sector. However, the subject of criticism is the fact that the record may be used to artificially reduce educational programs. In addition, one of the negative outcomes of the accreditation was the fact that it has become a very formal procedure that was based on meeting the regulations only formally, while the study programmes, aims and the means of achieving outcomes, where not substantively verified (Lezhava, 2016).

Internationalization of higher educational institutions

In the context of raising the quality of education and increasing the competitiveness of higher education institutions, the internationalization strategy of higher education and its subsequent implementation are gaining increasing interest.

Internationalization of higher education institutions includes mobility of students and academic staff, joint educational and research programmes.

The development and implementation of the internationalization strategy in the long term is the basis for the success of the university in various directions.

Despite the importance of internationalization, the research conducted in Georgia until now has not given promising results. In particular, according to Alferidze (2014), 11% of Georgian public universities did not have a clear strategy for internationalization, only 4 universities out of 28 universities had a strategy published on their website. It is not drawn up according to the classical scheme of strategy development, and the internationalization part of strategies is largely wishful thinking rather than reasoned strategic directions.

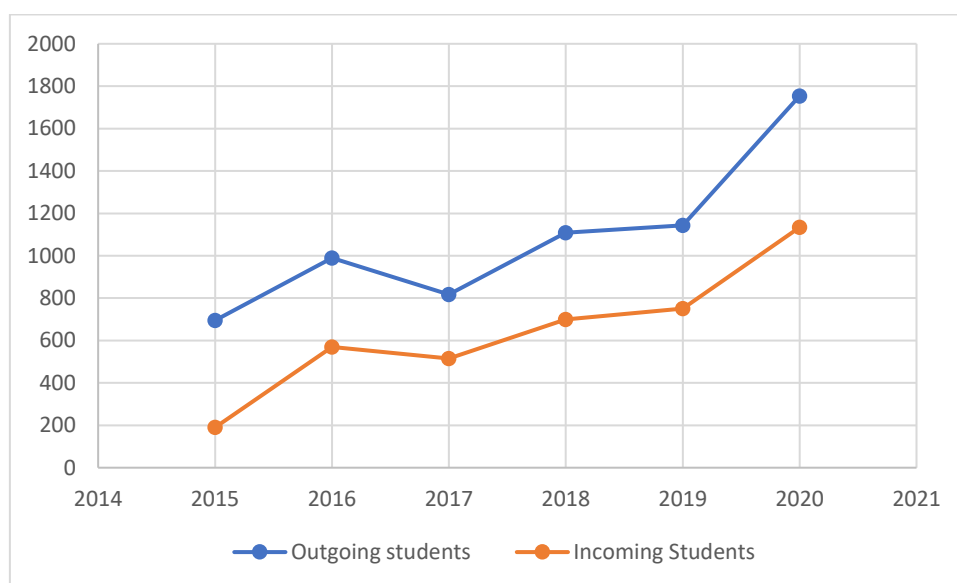
As part of this research, during 2017-2020, most universities changed or renewed their internationalization strategy. This was facilitated by raising the issue of internationalization in the higher education institutions authorization standards. Today, authorization already obliges higher education institutions to have:

- internationalization policy;
- international cooperation and internationalization mechanisms and analysis of their effectiveness assessment;
- mechanisms for attracting foreign students and staff.

The Bologna process resulted in several steps improved in higher education system of Georgia and initiated internationalization process. Considering the Soviet system for the country, it became a huge perspective for further improvements that would be granted from internationalization and globalization.

There are few key aspects that hinder of developing the process. Mainly it relates to financial issues; however, also lack of English-speaking academic staff negatively impacts internationalization (Kvantaliani, 2022). First, it has to be mentioned that the number of incoming students is rather small, compared to the number of students going abroad. At the same time studies have shown that the number of incoming international students is increasing each year, especially from African and Asian countries, e.g. India, Nigeria, Iraq and Azerbaijan (Kyantiliani, 2022).

Similar trend and remarkable imbalance are also notable among Erasmus+ participant students (Figure 1).



Source: authors' calculations based on National Erasmus+ office of Georgia, 2023

Fig. 1. Incoming and outgoing Erasmus+ students in Georgia

According to the above-mentioned statistics, Georgian higher education is not attractive for students during their Erasmus+ mobilities. Some problems and difficulties exist regarding the Visa issues entering Georgia for a long time, accommodation, awarding credits, finding compliance courses etc.

Mobility

Students' and academic staff mobilities were firstly recognized and approved under the Sorbonne and Bologna Declarations. International mobilities were accepted for the idea of exchanging skills and experience, thoughts and plans of improvement of academic sphere. Later, during the Bucharest Ministerial Conference (2012) partner countries addressed the European Union creating specific regulations and funding the international mobilities among partner countries and universities.

Approaches and goals of the Bologna process are usually based on voluntary reforms that are suggested to partner countries. However, legislation and administration are grounded on local government. In Georgia, Erasmus Mundus and Erasmus+ mobilities are increasing in all aspects for students and staff mobilities that are funded by European Union; however, financial support of Georgian universities for mobilities is rather limited. Credit mobilities are not funded by the state (Lezhava, 2016).

Conclusions

- 1) From the time of the Soviet Union transformation, the higher education system's adaptation to the modern standards was a reform that was highly assessed by national and international experts. Following the Bologna process, higher education system in Georgia has changed significantly - three

cycle system and the qualification framework provided by EHEA are recognized and implemented at all higher educational institutions in Georgia.

2) The corruption that was during the Soviet and Post-soviet era was eliminated and accreditation of universities and study programmes have become more transparent. Quality assurance standards are modernized and rationalized to European standards. However, there are some aspects that still need to be improved.

3) Credit transfer and mobility processes are simplified to European higher educational institutions. Still, challenges exist among Georgian higher educational institutions, mainly when students want to change the institute or academic programme.

4) Internationalization and flows of incoming foreign students are very significant areas for the development of higher education in Georgia. While current numbers of foreign students are not high, though there is a tendency of the number of foreign students to increase, especially from African and Eastern Asian countries.

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EMPIRICAL ANALYSIS OF THE INVESTMENT POTENTIAL OF THE FINANCIAL MARKET OF GEORGIA

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Abstract. Constant growth in the quantity of goods and services produced in a country is an indication of economic development. As the most important economic sector, manufacturing requires easy access to capital to maintain business continuity. Due to the underdeveloped mechanisms of financing capital flows in the real sector of the economy, the financing of the production process of enterprises in Georgia using favourable financial instruments remains problematic despite more than three decades of economic system transformation. In Georgia, the financial market is limited to the segment of the money market, which is the primary driving force of businesses in the developed nations of the world for the smooth financial provision of the production process. Unfortunately, the securities market is limited to the distribution of shares among joint-stock companies, which is the best opportunity for both financing and investment for enterprises and individuals who participate in the market.

The economies of developed nations have validated Adam Smith's observation from two centuries ago that "the more perfect the markets, the more efficient the economy". A perfect market is one in which there are no impediments to the free flow of resources among market participants. Inclusion of all financial market institutions in the distribution of resources is the issue that could not be eradicated from the Georgian economy.

Based on the current situation, it was aimed to analyse the role of each financial institution in the financing of enterprises. The institutional structure of the financial market and the investment potential of each institution were analysed for this purpose. The effect of financial institution investment opportunities on the nation's gross domestic product was determined through empirical analysis. With the results obtained by institutions operating on the financial market, including the correlation, the regression equation was clarified. Using the method of forecasting, the 10-year increase in the volume of bank loans and insurance company investments was calculated. On the basis of the obtained results, proposals to maximize the use of the defective segment of the financial market were developed.

Key words: market, investing, financing, enterprise, financial instrument.

JEL code: G1, G11, G21, G22, G31

Introduction

The movement of cash flows determines the economy's viability and its long-term strategy for the next few years. The banking system is a credit-based institution whose primary objective is to maximize profit. This is logical, but the development of the money market cannot be determined solely by the presence of credit institutions in the ring of money movement. The primary vector is the formation of financial savings and their conversion into credit resources.

In the modern economy, financial markets perform essential functions that not only enable the conversion of savings into capital and ensure the efficient allocation of capital, but also collect and process vast quantities of information required for making investment decisions. It is difficult to conceive of an imperfect financial market in the twenty-first century, the burden of which would primarily fall on the banking sector. In such a scenario, the supreme economic law of competition makes money more expensive, delaying the development of production. The financing of corporations with securities occupies an important place in the history of the development of financial markets. This mechanism provides production with financial resources and contributes to business continuity. Institutionally, the Georgian

financial market comprises banking-credit, microfinance, insurance, and stock institutions. The most important aspect is their growth and full participation in the financing of business entities.

The issue raised in the paper is the condition of enterprise financing by these institutions. The problem is the result of three decades of banking sector dominance as the primary source of financing. The activity of financial market institutions is the movement of cash flows that are mutually dependent. The "price" of the credit resource depends on the economic condition of the entity supplying these resources, i.e. the enterprise is financed with a cheap monetary resource, receives a high profit, and distributes the profit as necessary to banking and stock institutions. A country establishes a state fund, the standard of living rises, "long-term capital" - life insurance, a pension fund - participates in the movement of cash flows, and a profit-driven circle is completed. During the research process, an examination of information sources related to the financial market revealed that the involvement of insurance companies in the Georgian financial market with "life insurance reserves" in the provision of enterprises with cash resources is still a distant possibility; due to the high risk of the stock market, trading in shares is limited to "internal" distribution. Consequently, the development of the economy is primarily funded by foreign investments. The financial market is both a generator of incoming and outgoing cash flows and a catalyst for financial crises. This is demonstrated by the 50 percent decline of the New York Stock Exchange in 1907, the Wall Street depressions of 1929 and 1937, the global financial crisis of 2007-2008, and the decline in prices of mortgage-backed securities (MBS), which were linked to US real estate.

As a result, global financial institutions were severely damaged. The financial markets of small economies facilitate the participation of financially stable financial institutions in investment financing.

According to the purpose of the paper, the following tasks were assigned.

- 1) Evaluation of the role of the Georgian financial market in providing enterprises/organizations with financial resources, based on which the investment opportunity and role of each institution in the financing of enterprises, as well as their impact on the GDP of the country, were determined.
- 2) On the basis of descriptive statistics of a distinct institution of the financial market, the level of development, the share of the GDP, the factors, and the answer to the given task were determined, and empirical research methods were utilized.
- 3) Based on the total volume of annual financial investments on the financial market, an economic development forecast was generated.

On the basis of descriptive statistics of individual institutions of the financial market, their level of development, share of GDP, factors are identified, and empirical research methods are used to test the hypothesis. The economic development forecast is based on the total annual volume of financial market investments. The financial market converts corporations' financial resources into investments. Different economic conditions result in varied levels of demand. In particular, when the economy is booming, wealthy companies with stocks do not turn to the financial market, which reduces the demand for loans and encourages firms with limited resources to take out loans, thereby increasing the cost of loans. Thus, opportunities and needs to access loans fluctuate cyclically on the loan market.

Dorrucci et al. argued that a (domestic) financial market develops when it contains all financial institutions, to whose financial instruments economic agents must have unrestricted access in order to protect their positions from adverse shocks. Important characteristics of such markets include transparency (reduction of information asymmetry), competition, and rule of law. Consequently, the developed financial market will attract the savings of various economic agents and contribute to the economic growth via efficient redistribution (Dorrucci et al., 2009).

A favorable environment for economic activity necessitates a stable, transparent, and efficiently operating financial market, whose legal regulation ensures the protection of investors' rights, thereby boosting market confidence (Tsintsadze et al., 2021).

In his speech, Rodrigo de Rato, managing director of the International Monetary Fund, stated that "the benefits of healthy financial markets are well known. The role of these markets in mobilizing savings and allocating them to productive investments is crucial. Moreover, robust local markets can provide the public and private sectors with a more stable source of financing, thereby protecting their capital from volatile global flows. In the past decade, financial markets have significantly enhanced economic performance by creating a vast array of products that permit a more efficient allocation of savings. Rapid financial development contributes to economic development" (Rodrigo de Rato, 2007).

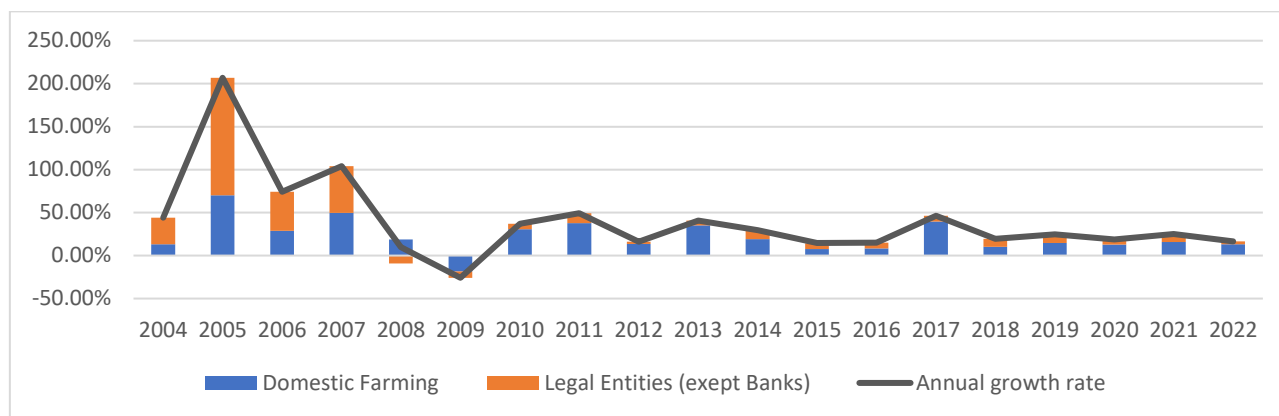
The availability of statistical information reflecting the functioning of the country's financial market, the evaluations of experts, and the use of tried-and-true research methods enabled the identification of problems in the Georgian financial market.

Research findings and discussion

When a financial system can provide services to market participants under both normal and stressed conditions, it is stable. It is the primary pillar of the economy's sustainable development. The role of Georgian financial market institutions in providing enterprises with financial resources is inconsistent. The role of individual institutions in enterprise investment is discussed against the background of the reasons described in the paper's introduction.

Companies have maintained access to financial resources as a result of the support measures implemented by the National Bank and the government and the grace periods offered by commercial banks for loans. However, under conditions of increased uncertainty, bank loans continue to be the primary source of financing for businesses. The contribution of business loans to the expansion of bank loans will increase in 2022. In June 2022, the annual growth of total loans was 12.5 percent, with business loans contributing 7.2 percentage points to this figure. After the spread of the pandemic in 2020, lending to legal entities slowed significantly. However, the demand for business loans increased in the second quarter of 2021, and a downward trend was observed in the second half of 2022.

If the dynamics of the recovery of the companies' activities improve and international tourist flows recover gradually, the demand for goods and services will increase. This will lead to the recovery of the companies' incomes, which in turn will contribute to the expansion of investment and employment. Thus, the existing positive dynamics will be transferred to the household sector, accelerating the economic recovery and recovery process.



Source: compiled by the authors based on the data from NBG

Fig. 1. Components of the annual expansion rate of bank loans

The graph depicts loans issued to legal entities between 2008 and 2009. It fell due to the global financial crisis and could not recover to its 2006-2007 level. Why did this setback occur? To answer this question, it is necessary to analyse other financial market institutions by comparing their investments in the banking sector to their share of investments in the stock market. In the first half of 2022, as a result of the resurgence of the economy, a trend toward revenue restoration became apparent. However, the rate of recovery remains sluggish. Companies' financial vulnerability is determined by their reliance on foreign sources of financing, proportion of short-term debt, and degree of dollarization of liabilities. Credit funds allocated to highly productive sectors of the economy generate greater added value, whereas loans granted to low-productivity sectors have minimal effect on economic growth. In addition, excessive debt growth exacerbates the risk of insolvency among borrowers and increases the likelihood of a financial crisis.

Due to the underdevelopment of Georgia's financial market, the majority of firms (small, medium, and large) rely primarily on bank loans for funding. Households with savings and legal entities with excess financial resources contribute to the supply of credit resources. According to data from 2022, only 915 of the 3,122 joint stock companies registered in the country are active. There are 83 large, 108 medium, and 724 small containers. According to the rules governing the behavior of investors on the stock exchange, investing in securities issued by a small joint-stock company is unacceptable. This is why commercial banks and large publicly traded corporations appear as market participants. Commercial banks are favored over the other investment options, and so they indirectly contribute to the provision of financial resources to businesses.

Inflation, government decisions, supply and demand, foreign investment, and other variables contribute to the volatility of the financial markets. The purpose of this paper is not to examine the influence of the aforementioned factors, as the Georgian financial market is far from perfect, and it is first and foremost necessary to identify the development issues in relation to the investment opportunities of the operating financial institutions. The following variables were chosen as research variables: gross domestic product (dependent variable); investments made by commercial banks; transactions made on the stock exchange; and investments made by insurance companies (independent variables), as revealed in Table 1.

Table 1

Investment data of financial market institutions

Year	GDP (million GEL)	Financial institutions' investments (million GEL)	Transactions conducted on a stock exchange (million GEL)	The investments made by the insurance provider (million GEL)
2004	9800	0.12	46.67	0.56
2005	11600	0.39	62.36	0.74
2006	13800	0.29	169.4	0.98
2007	17000	1.40	194.26	1.85
2008	19100	0.76	95.75	2.64
2009	18000	1.14	96.05	5.32
2010	20700	0.99	16.84	9.34
2011	24300	2.33	726.72	6.71
2012	26100	2.71	51.95	6.94
2013	28863	3.82	48.33	5.75
2014	32430	4.94	943.98	4.81
2015	36095	5.67	37.53	5.46
2016	40174	6.53	146.16	6.74
2017	37846	9.55	131.44	8.05
2018	44600	11.41	109.14	10.92
2019	49300	14.24	50.73	14.66
2020	49300	16.93	61.98	21.96
2021	60000	21.16	194.26	23.66
2022	64007	24.65	785.23	2.08

Source: authors' calculations based on the statistical data of the National Bank

On the basis of an analysis of financial market participants, it was determined that 95 percent of the investment resources of insurance companies that operate under the legal form of corporations are placed in the deposits of commercial banks. Furthermore, the fact of securities emission and participation in stock market transactions after the establishment is not evident. For the adequacy of the regression model, data were collected from 2004 to 2022.

Thus, the following variables were defined as independent:

- 1) volume of loans issued by commercial banks to legal entities by years - X_1 ;
- 2) transactions conducted on the securities exchange - X_2 ;
- 3) investments made by the insurance organization - X_3 ;
- 4) according to the hypothesis, the dependent variable (Y) is the country's gross domestic product, the volume of which should be affected by the goods and services produced by the country's enterprises.

The estimated equation for multifactorial regression has the following form:

$$Y = a_0 + a_1x_1 + a_2x_2 + ax_3 \quad (1)$$

In order to verify the accuracy of the data, descriptive statistics were used to examine the information. As a result, it was determined that the volume of transactions on the stock market fluctuates widely, indicating that the market is unstable; however, high volatility indicates a high risk and allows the investor to predict future fluctuations.

Table 2

Multicollinearity of variables

	Y	x1	x2	x3
Y	1			
x1	0.960065483	1		
x2	0.249624942	0.242956526	1	
x3	0.658609588	0.633102064	-0.173475526	1

Source: author's created by Excel Statistical program

There is a weak correlation between the volume of bank loans and stock market transactions, as shown in the table. This is because large companies primarily redistribute shares and less frequently finance corporations by making deals, so the money in their accounts is fictitious and does not contribute to the production process.

This is because a decline in insurance investment on bank deposits is followed by a rise in the value of stock market transactions. Which is a standard method for developing the stock market.

Therefore, the variable of stock exchange transactions was excluded from the regression analysis's factors, and the analysis was conducted with the participation of two independent variables: x1 (bank loan) and x3 (insurance company investments).

Diagrams were drawn between the dependent variable (Y) and each independent variable (x1 and x3) based on the correlation matrix. Confirmation of a linear relationship between variables and a robust correlation between GDP and bank loan volume coefficients (Appendix 1; Appendix 2).

Diagram 1

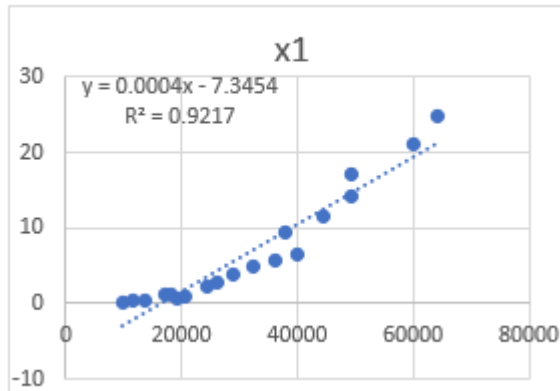
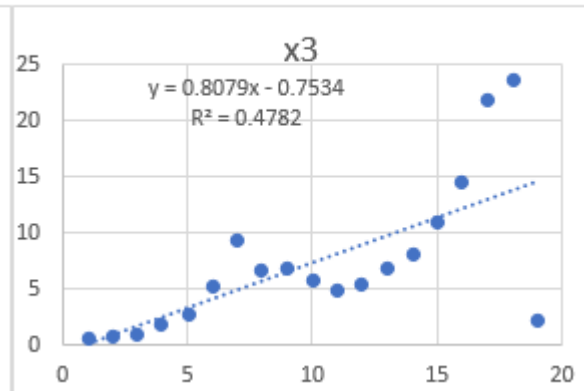


Diagram 2



Source: constructed by the authors

Fig. 2. Correlation between the linear relationship between variables and the coefficients of GDP and bank loan volume

To determine the dependability of statistical data, autocollinearity tests were conducted on variables. Utilization of Durbin Watson's criterion

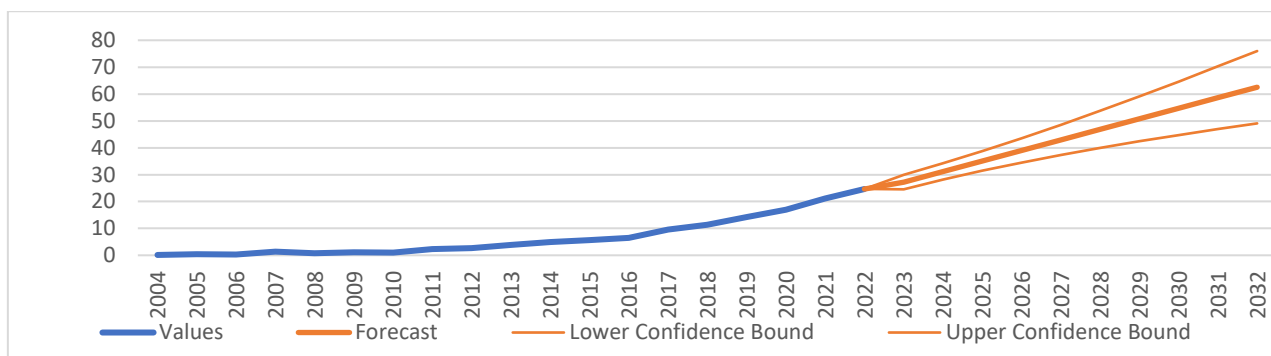
$$DW = \frac{\sum[e_t - (e_{t-1})^2]}{\sum e_t^2} \quad (2)$$

DW = 1,738 as calculated by balance data deviations. Comparing the balances to Durbin Waston's suggested criteria, it was determined that there is no autocorrelation. A linear relationship between the variables enables regression analysis.

Normalized $R^2 = 0.92$, as determined by regression analysis, demonstrates that factor selection was adequate. Specifically, bank loans stand out in terms of their effect on GDP growth, as their ratio is approximately nine times greater than the ratio of insurance company investment volume.

The conducted research is absolutely pertinent to the level of financial market development in the country. Until now, the only source of capital for businesses has been deposits in the banking sector. The high demand on the financial market increases the cost of the loan, thereby retarding the country's production growth.

It is essential to forecast the effects of bank loans and insurance companies on GDP growth. Since the data of the independent variables of GDP change over time, the Dickey Fuller test was used to determine whether the time series was stationary. Excel was utilized for forecasting. The forecast of GDP growth cannot tell us much about the growth of the financial market, as it is influenced by a multitude of other variables. For this reason, bank loans were anticipated.



Source: author's created by Excel Software Predicting

Fig. 3. Predicting the volume of bank loans

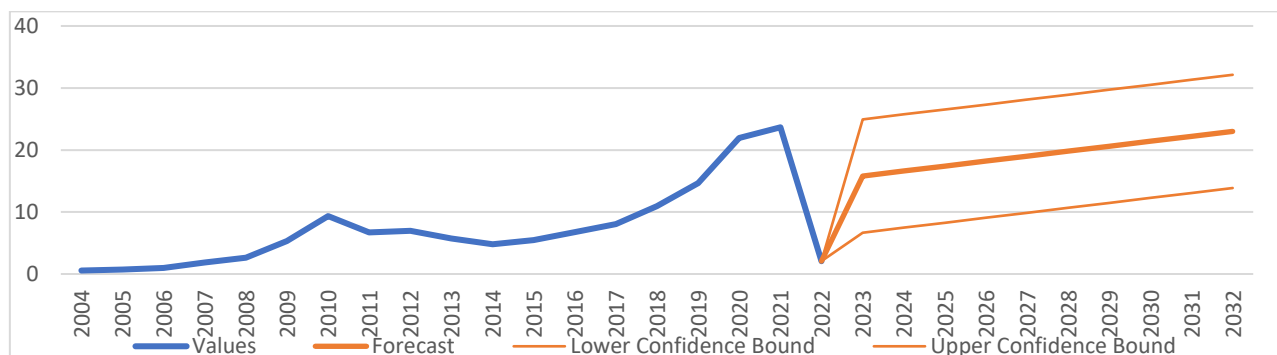
The forecast graphs indicate that bank lending will increase by approximately 150 percent over the next decade, with a 95 percent confidence interval. The nearly identical relationship between the upper and lower bounds and the predicted rates is also readily apparent. If other factors remain unchanged, there will be no sudden increase in bank loans, which is an indicator of the stability of both the banking system and the economy. On the basis of the projected data, it is reasonable to assume that the increase in bank loans will result in the expansion of production and the availability of loans for small businesses. A developed economy affords the chance for the growth of the financial market, and vice versa.

Table 3

Forecast data of bank loans

Year	Forecast	Lower Confidence Bound	Upper Confidence Bound
2023	27.239587	24.54	29.94
2024	31.160933	28.14	
2025	35.08228	31.45	38.71
2026	39.003626	34.48	43.52
2027	42.924972	37.29	48.56
2028	46.846318	39.91	53.78
2029	50.767665	42.39	59.15
2030	54.689011	44.73	64.65
2031	58.610357	46.96	70.26
2032	62.531703	49.08	75.99

Source: author's calculations



Source: authors' created by Excel Software Predicting

Fig. 4. Forecasting the volume of insurance company investments

Table 4

Forecast data of insurance companies

Year	Forecast	Lower Confidence Bound	Upper Confidence Bound
2023	15.803949	6.68	24.93
2024	16.60314	7.47	25.73
2025	17.402331	8.27	26.53
2026	18.201522	9.07	27.33
2027	19.000713	9.87	28.13
2028	19.799903	10.67	28.93
2029	20.599094	11.47	29.73
2030	21.398285	12.27	30.53
2031	22.197476	13.07	31.33
2032	22.996667	13.87	32.13

Source: author's calculations

With a confidence interval of 95 percent, the insurance market is expected to experience a growth spurt through 2023, followed by a steady increase in the years that follow. In 2022, insurance companies redirected the majority of their capital to the establishment of branches, which will have a negative impact on income growth in the coming years.

Even though the forecast indicators are on the rise, this does not meet the criteria for a perfect financial market. Due to high risk and a lack of long-term investment capital, insurance company investments in securities remain problematic. Participation of successful businesses in the role of issuer; placement of pension funds with a high degree of risk.

Conclusions

The study of financial market institutions revealed that the Georgian financial market is institutionally perfect, with the presence of banking, microfinance, insurance, stock, and pension funds, but functionally underdeveloped. The smooth operation of all institutes ensures that the enterprise is not reliant on a single source of financing; as a result, loan interest rates are lowered, economic growth is promoted, and the standard of living is raised. On the Georgian financial market, only the banking sector finances businesses with deposited funds, according to the research. Notable is the Fitch Rating of financial institutions. The National Bank of Georgia's website states: "Compared to other countries with a BB rating by Fitch, Georgia's effective and dependable policy framework and strong governance indicators strengthen the country's rating position." During the COVID-19 pandemic, the country maintained stability, according to the same

information. We concur with the rating agency's assessment, but the development of the financial market cannot be achieved by concentrating solely on the development of the banking sector, and the necessary financial investments for the growth of businesses will always be "expensive."

For the direct participation of all institutions in the transformation of financial resources into production investments, the following is required:

- 1) to increase the investment potential of insurance companies, the accumulative and returnable life insurance subsector, which permits the use of long-term free cash resources as credit resources, should be developed;
- 2) individuals should be permitted to trade so they can invest their savings in stocks in order to increase the volume of transactions on the stock exchange;
- 3) according to a study of the impact of bank loans, insurance company investments, and stock market transactions on GDP, bank loans will remain in the lead for the next ten years. To alter the current state of affairs, it is necessary to form businesses as open joint-stock corporations, which will expand the free trading of shares and increase the investment potential;
- 4) in order to expand the scope of free trade, initial stock market speculation should be prohibited.

The developed financial market is characterized by a number of factors, including infrastructure, regulatory frameworks, local investors, the ability to diversify to protect against high risks, a high level of liquidity, a vast array of financial instruments etc. With this list, the following evaluation of the Georgian market can be made: the legal and regulatory framework is in place, all types of financial institutions are operating, but their financial stability, investment opportunity, and financial instrument issuance are still problematic; as a result, the banking sector bears the burden of financing, as confirmed by the study.

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NEW DIMENSIONS IN THE DEVELOPMENT OF SOCIETY

THE ROLE AND THE RIGHTS OF INDIVIDUAL IN DATA ECONOMY ECOSYSTEMS: IMPLEMENTATION OF THE 5G ELECTRONIC COMMUNICATION NETWORKS IN LATVIA

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Abstract. The article aims to reveal human privacy aspects of implementing 5G technologies in Latvia and provide an insight into how technology affects individuals and their privacy and property rights.

The research analyses Latvian and European Union policy planning documents and regulatory acts in the 5G technology implementation and digital transformation, looking at them from the perspective of the ecosystem approach and individual rights.

As a result of the study, it is revealed that the European Union and its member states are already facing a severe dilemma - priorities must be chosen: protection of individual data and private life or rapid development of the digital economy. The European Union's efforts to secure 5G networks and data security are taking longer than the technology ecosystem expects.

The fact that the implementation of 5G technologies has been transferred to the hands of telecommunications operators (private business structures, with very little public capital or even global structures) and the development of different services are more private sector-oriented as well creates a threat that people and even state will not be able to control the use of data that is processed using data transmission networks.

The study contributes to the discussion on the ethical aspects of digital transformation and data economy at individual and national levels.

Key words: data economy, ecosystem, 5G, ethics.

JEL code: H4, L88

Introduction

The European Union (EU) has set ambitious goals for achieving leadership in economic development by building it on a sustainable digital infrastructure regarding connectivity, microelectronics, and the ability to process vast data as they act as enablers for other technological developments to support our industry's competitive edge (European Commission, 2021). 5G technology is a prerequisite for excellent and secure connectivity for future business, citizen and society development.

In order to support the creation of 5G networks in Latvia, it is expected that for the creation of these networks, restrictions on the right to use private and public real estate are determined in the regulatory acts, as is the case for other public service providers (electricity supply, water supply) (Cabinet of Ministers of Latvia, 2021).

Also, the ever-widening development of digital services encourages abandoning other delivery channels (face-to-face, mail) in the private sector and public services.

The task of the research is to determine whether the 5G infrastructure and its public services are as safe and ethical from the individual's point of view as electricity and water and whether the setting of these restrictions does not infringe on the individual's privacy. The second task is to determine whether an individual can receive services if he wants to avoid his data being processed at the direct service provider and in data transmission networks.

An ecosystem approach will be used to accomplish this issue. The European digital compass (European Commission, 2021) widely uses the concept of the ecosystem to describe various industries or systems where digital technology and industry cooperation are observed, such as the digital education ecosystem, health industry ecosystem, service ecosystem, agricultural ecosystem, and mobility ecosystem.

The European strategy for data (European Commission, 2020) sees this concept as referring to an ecosystem data space that includes businesses, civil society and individuals.

James F. Moore in the 1990s introduced the descriptive term "ecosystem" to explain non-biological systems as a metaphor to describe complex, interdependent relationships between different actors (participants of the system) in the business environment (Rantanen Minna M., 2019), (Moore J. F., 2006).

Such an approach allows using the concept of an ecosystem to describe how a particular set of elements works with specific goals. Ecosystem boundaries need to be defined on a case-by-case basis, as one ecosystem can be viewed both in isolation and as an element of another.

Digital technology service providers (DTSP) create an ecosystem that provides services and processes a wide variety of data, including personal data, for those services. Public administration is the ecosystem by itself and cooperates with the DTSP ecosystem. At the same time, public administration processes personal data containing sensitive information. The third ecosystem is the individual who receives services (voluntary or mandatory) and whose data is processed. The interaction of these three ecosystems will be examined by analysing the policy planning documents and the information available in the Latvian State Enterprise Register.

The following methods are used in the study: analysis of policy planning documents to reveal what goals are planned to be realized by introducing 5G technologies and what other policies it affects; grammatical and teleological interpretation of regulatory acts to determine how the European Union and Latvia regulate the issues of personal data processing and the creation of 5G infrastructure. The principles included in the policy planning documents and regulatory acts are compared with the theoretical insights found in the scientific literature on the formation of the data economy and the role of the individual in it.

Data transmission networks are the first step that takes data from its origin to processing. Therefore, it is vital to create this first step so that only those data that do not violate the individual's privacy are processed.

When using any digital service, an individual faces the fact that the information he provides creates data whose re-use he cannot control. The individual has no choice - but to agree to the service provider's terms or refuse to use the service. 5G technologies multiply the possibilities of collecting and re-using any data, including those whose further use is not in the individual's interest. In practice, the privacy policies offered by mobile operators and telecommunication service providers generally comply with the General Data Protection Regulation (GDPR). However, the volume and use of collected data, as well as different understandings of what is identifiable personal data, create conditions for these data to be used for purposes that remain unknown to the data subject.

5G technologies are considered to be the critical point for the development of countless new services. However, the disadvantage is that these services will be developed based on data collected from individuals forced to consent to the data processing to perform simple daily activities.

The EU and Latvian experts have evaluated several areas and scenarios for the application of 5G technologies and discovered the high potential for development on the one hand and increased risks for data security, as well as the need to solve ethical dilemmas regarding the uncontrolled use of identifiable personal data on the other hand.

The article examines the implementation of 5G technologies from the point of view of the ecosystem approach, as well as analyses the problems individuals face when using digital services, highlighting the individual's and state's ability to influence and control the further use of identifiable data.

Research results and discussion

EU policies for building data economy and implementing 5G technologies

An action plan 5G for Europe envisages that every EU member state will identify at least one major city to be "5G enabled" by the end of 2018 and that all urban areas and primary terrestrial transport paths will have uninterrupted 5G coverage by 2025 (European Commission, 2016, p.4).

5G is not only a new paradigm for electronic communication. On the socio-economic and political sides, 5G has been defined as the essential technological component in the digital transformation of society and the economy in the most advanced countries over the next decade. On the technical side, the advantages of this technology include higher speeds and greater capacity, latency, reliability, flexibility and efficiency (Cavanillas, Curry, & Wahlster, 2016, p.3).

The European Digital Compass points to three main areas where the data economy could make the most significant contribution: digitally-enabled health solutions, digitally-enabled green solutions and intelligent edge computing – applications (European Commission, 2021). However, studies analysing four sectors (automotive, healthcare, transport and utilities) show that, despite significant benefits, there are significant risks to the privacy of individuals (European Union, 2016).

Considering identified risks, the European strategy of data (European Commission, 2020) defines an ambitious goal – to find our European way of data economy, balancing the flow and wide use of data while preserving high privacy, security, safety and ethical standards. With the General Data Protection Regulation (GDPR) (European Parliament, 2016), the EU created a solid framework for digital trust. The upcoming review of the GDPR may provide further valuable elements in this regard. Other initiatives that have fostered the development of the data economy are the Regulation of the free flow of non-personal data, the Cyber Security Act, and the Open Data Directive (European Commission, 2020).

This approach is different from the United States of America, where the organization of the data space is left to the private sector, with considerable concentration effects and China, where a combination of government surveillance with strong control of Big Tech companies over massive amounts of data without sufficient safeguards for individuals dominate (European Commission, 2020).

5G implementation from the ecosystem prospective

James F. Moore described a business ecosystem as "an economic community supported by a foundation of interacting organisations and individuals—the organisms of the business world". Often, a platform of any kind acts as a central point for the business ecosystem (Iansiti & Levien, 2004), (Rantanen Minna M., 2019).

An ecosystem can consist of several elements that can be ecosystems in themselves. That way, it is possible to define different ecosystems depending on the point of view - for example, from the point of view of DTSP, business interests are at the centre, while public administration is the client. On the other hand, DTSP is one of many suppliers for public administration, and the performance of public administration functions is at the centre.

According to James F. Moore, each business ecosystem goes through four successive phases in its development: (1) birth - when the cooperative challenge is working with customers and suppliers to define the new value proposition around a seed innovation, but from the point of competitiveness, it is essential to tie up critical lead customers, key suppliers, and important channels; (2) expansion when the task is to bring the new offer to a large market by working with suppliers and partners to scale up supply and to achieve maximum market coverage and defeat similar ideas; (3) leadership when it is necessary to provide a compelling vision for the future that encourages suppliers and customers to work together to continue

improving the complete offer and maintain strong bargaining power to other players in the ecosystem, and (4) self-renewal what means work with innovators to bring new ideas to the existing ecosystem and maintain high barriers to entry to prevent innovators from building alternative ecosystems (Moore J. F., 1999).

M.Rantanen et al., describing e-government, offer to look at it as an ecosystem – a complex socio-technical system incorporating citizens, organisations, companies, and government agencies. It uses electronic platforms to create and distribute value to its participants. Citizens are involved in this system through the Institute of Citizenship, and it is assumed that citizens are stakeholders in the e-government system (Rantanen Minna M., 2019, lpp. p.1643). However, if DTSP as a supranational company (or ecosystem of several companies) is the centre of the ecosystem, the concept of citizenship is irrelevant.

The European Commission planned the implementation of 5G technologies as a Public-Private-Partnership (PPP) (European Commission, 2016). The 5G Infrastructure Public Private Partnership (5G PPP) was a joint initiative between the European Commission and the European ICT industry (ICT manufacturers, telecommunications operators, service providers, SMEs and researcher Institutions) (5G PPP). It means the European Commission for the development and implementation of 5G technologies created an ecosystem – PPP, which included EU and industry representatives for developing infrastructure, which potentially can become a good part of the future economy. Severe public funding was invested in ensuring that 5G technology is available in Europe by 2020 (European Commission, 2016).

Member states were involved in this ecosystem as well. They were responsible for allocating and assigning 5G pioneer bands, security measures of 5G networks, investment and funding, and national security. Deployment of 5G networks was the responsibility of mobile network operators and 5G vendors (European Court of Auditors, 2022, p.11). Here, we can observe an ecosystem containing EU institutions, EU member states and DTSP industry representatives - mobile network operators and 5G vendors. Citizens were not involved in this ecosystem. Initially, they are mentioned as possible users of potentially developed new services they were involved in the research phase. However, the issue of the threat that the introduction of 5G technologies and the use of these services could pose to their privacy has not been sufficiently discussed. On the other hand – European Commission recognises the role of citizens and wants their active involvement in the digital transformation process (European Commission, 2022).

From an ecosystem perspective, digital transformation and 5G implementation is the offer of the DTSP ecosystem to the EU and the Member States at the governmental level that have adopted them. The research activities, which have been carried out jointly by research institutions, industry representatives and the government, have been focused on researching the application of technologies to achieve the goals set by the EU. Here we see a top-down approach, where residents and society are relatively little setup.

Returning to the ecosystem approach defined by James F. Moore, the digital technology ecosystem did not look for customers in the environment of citizens or SMEs. However, it used another ecosystem - the EU - to attract new customers. Besides that, the shared ecosystem (EU and DTSP) are now working on the next step and developing a vision from the 6G network ecosystem (5G PPP, 2021).

However, the fact that DTSPs are already ready to offer 6G technologies, but the EU has not yet been able to use the opportunities offered by 5G technologies indicates that technologies are developing much faster than people in their habits or public administration will ever be able to do. These ecosystems have different rates of development. The fact that the DTSP ecosystem requires customers to buy innovative products does not mean that Member States should pressure citizens to adopt these technologies.

EU policies in the field of individual's data protection and cyber security

The Commission has already taken several steps since 2014. With the GDPR, the EU created a solid framework for digital trust. The upcoming review of the GDPR may provide further valuable elements in this regard. Other initiatives that have fostered the development of the data economy are the Regulation of the free flow of non-personal data, the Cybersecurity Act, and the Open Data Directive. The Commission has also engaged in digital diplomacy, recognizing 13 countries as providing adequate protection for personal data (European Commission, 2020).

Personal Data economy ecosystems rely on the cooperation of organizations and individuals. However, in current research on data economy ecosystems, individuals are only data subjects and not part of the ecosystem. Also, data economy ecosystems are currently being orchestrated mainly by a few big tech companies, which have faced scandals due to their unethical practices concerning personal data. This development has led to a lack of trust towards collecting personal data, which could undermine the promised benefits of personal data economies for all. (Rantanen & Koskinen, 2020).

According to GDPR, a data subject refers to any person who can be identified, directly or indirectly (European Parliament, 2016). The use of digital services provides experience to the provider of these services (for the entire ecosystem if all stages of the ecosystem are involved in providing the service, including communication services) and to the user. For the user, this experience is individual and personal. In this case, the question is who owns the user experience if it is anonymized (data about transaction are separated from personal information) and stored as data - the user, the direct service provider or the entire service provider ecosystem? Service providers receive fees for services and user experience in the form of data. The volume of this data exceeds what is required directly for the provision of the service; therefore, its processing does not meet the requirements of the GDPR.

For example, if individual pay for a parking space with the application. In that case, information is processed not only about the payment but also about the car and location, and the user cannot control the re-use of this data. In addition, the mobile device must be linked to a bank card to make a payment. In this case, an answer to the question is required - who owns the user experience accumulated in the form of data?

European data strategy also recognizes the problems in re-using natural person's data. Since increasingly large amounts of data consumers generate when they use IoT devices and digital services, consumers may face risks of discrimination, unfair practices and 'lock-in' effects (European Commission, 2020).

Shoshanna Zuboff finds that technologies are designed to render our experience into data, and this typically occurs outside of our awareness, let alone our consent. Whenever we encounter a digital interface, we make our experience "datification" (Zuboff, 2018, p.233).

Vermanen *et al.* indicate that technology's ethicality depends on many issues, such as the nature of the technology, the context of its use and its potential implication. They admit that using a framework including four ethical issues the information age creates: privacy, accuracy, property and accessibility (Vermanen, Rantanen, & Harkke, 2022).

A special report of the European Court of Auditors recognizes that the security of 5G networks is a matter of national security. However, the implementation of security measures is a matter of national competence. The Network and Information Systems Cooperation Group established by the NIS Directive (ENISA, 2023) adopted an EU toolbox on 5G cybersecurity, specifying several strategic, technical and

support measures to deal with 5G security network threats identifying the relevant actors for each of these measures (European Court of Auditors, 2022, p.29)

Implementing security measures takes time, which means that many member states will not be able to ensure the creation of 5G infrastructure within the planned deadlines.

From the point of view of the DTSP ecosystem, creating the infrastructure necessary for the development of the data economy will be delayed due to the need to implement cybersecurity measures. Also, the need to comply in detail with natural persons' data protection regulation requirements will require additional measures.

5G infrastructure development in Latvia

5G implementation issues in Latvia are currently regulated by the Cabinet of Ministers' Order "On the Development Plan for the Electronic Communications Industry 2021-2027", which meets the requirements of the planning documents of the European Union.

This plan envisages the creation of 5G infrastructure along the country's largest highways, along the Rail Baltica railway corridor, and in cities where the population exceeds 50,000, i.e. in Riga, Daugavpils, Liepaja and Jelgava (Cabinet of Ministers of Latvia, 2021), (Ministry of Transport). Research conducted in Latvia has established that high-speed Internet in Latvia is necessary for the following sectors: intelligent transport, smart healthcare, digital content services (media and entertainment), smart production and smart education (Ministry of Transport, 2020).

As in most EU countries, implementing 5G infrastructure in Latvia is the competence of mobile network operators or electronic communication service providers. The physical infrastructure of 5G is the property of these merchants. They are equated with public service providers such as water and electricity in their rights. In order to understand whether there is a difference between these public service providers, let us look at the data on mobile operators in the Latvian Enterprise Register in Table 1.

Table 1

Ownership and Status of Mobile Operators in Latvia

Mobile network operator	Owners	True beneficiaries	Status of a person important to national security
LMT	Ltd "Manager of Public Assets Possessor" (Ministry of Economics) (5%), Telia Company AB (24,5%), SONERA HOLDING B.V. (24,5%), State owned company "Latvian State Radio and Television Centre" (23%), Limited liability company „Tet" (23%)	It is impossible to find out the true beneficiary of the legal entity	Yes
Tele2	Tele2 Sverige Aktiebolag (100%)	The beneficial owner is a shareholder in a joint-stock company, the shares of which are listed on the regulated market, and how control over the legal entity is exercised results only from the status of the shareholder.	Yes
Bite Latvija	Bite Lietuva (100%)	It is impossible to find out the true beneficiary of the legal entity	Yes

Source: information compilation prepared by the author based on data of the Register of Enterprises of the Republic of Latvia, <https://info.ur.gov.lv>.

As it can be seen in the Table 1, unlike water supply and electricity service providers, only LMT is controlled by the Latvian state. It is impossible to ascertain the beneficiaries of the other two service providers.

The mobile operator registers the connection between a person (natural or legal) and the subscription number (SIM card). The mobile operator determines the terms of the contract - the individual can only agree to them or choose another service provider or refuse to use this service.

From the perspective of an individual, the conclusion of a contract with a mobile communications operator, which the Latvian state can influence only through regulatory acts, is grounds for doubting the individual's ability to defend his rights in the field of data protection.

An individual's claim for a ban on the re-use of data (in fact, the individual will not have the opportunity to obtain evidence of such facts) must be proven in court if service provider if the service provider does not recognize the violation. However, an ordinary person is unlikely to have the finances for such claims. Service providers have incomparably more opportunities to defend their point of view.

Digital service usage and development in Latvia

Latvia ranks 23rd among the EU countries in integrating digital technology in enterprises by the EU Digital Economy and Society Index (DESI). Although Latvia has improved in some instances, it is still below the EU average in almost all indicators (European Commission, 2022, p.12). DESI measurement regarding integrating digital technologies indicates that many Latvian companies need help to use the currently available digital technology opportunities. Therefore, there is no reason to believe that the immediate creation of 5G infrastructure could change anything. It leads to the conclusion that there is no acute need for 5G coverage in Latvia. This situation may change under the influence of external factors, such as the construction of Rail Baltica, where it is expected that 5G coverage will be available throughout the railway corridor.

Above mentioned does not mean that Latvia is not working on services that could be interesting for the digital economy. In Latvia, and especially in Riga, there are areas where 5G coverage is available, and companies can develop innovative ideas, such as the VEFRESH movement, where technology companies have teamed up with real estate developers to turn the historic VEF factory neighbourhood into an intelligent city innovation space (VEFRESH).

In the field of digital public services, the situation is even better. Latvia ranks 11th in the EU for Digital public services, scoring above the EU average in most categories.

That is why there is no reason to worry about Latvia's possible significant backwardness in implementing digital technologies at the current pace of development.

It must be remembered that competition is one of the methods of promoting the introduction of innovations (DeVries, Tummers, & Bekkers, 2018). Such evaluation mechanisms as DESI allow determining the member state's progress, but the DESI criteria cannot be considered policy goals. Therefore, following EU standards in the field of personal data processing, primary care must be taken to ensure that data collection and use meet the interests of individuals.

Conclusions

From the ecosystem approach, the EU is an economic and political ecosystem. This ecosystem at the government level has accepted the offer of DTSP to create the infrastructure for the development of the data economy. The EU promotes digital technology infrastructures with political and economic means, including implementing 5G technologies in member states. Financial incentives are used to implement these

technologies, and the possibility of applying legal sanctions to those Member States that do not implement the telecom regulations within the specified deadlines is allowed (European Commission, 2021).

The annual DESI index assesses in detail the progress of member states both from the point of view of connectivity and data technology integration. For the state, it also acts as a motivating factor for competition and a method for introducing innovations (DeVries, Tummers, & Bekkers, 2018).

Using the PPP model in creating 5G infrastructure allows for attracting additional investments for implementing these projects. However, in the case of Latvia, it can be seen that these investments and EU funding tied to projects are directed to companies whose beneficiaries cannot be ascertained using publicly available state registers.

At the level of EU regulatory acts, the individual's right to personal data protection is respected, but this is still not enough to achieve citizens' trust in 5G technologies, as even the GDPR cannot provide sufficient protection of rights if it regards of the collecting of user experience. This corresponds to the situation described by Sfofshanna Zuboff as surrender when the DTSP ecosystem creates applications that require data sharing and use this data for their own development (Zuboff, 2018, p. 233).

The introduction of 5G technologies is a project of the DTSP ecosystem and the European Union as an ecosystem. As a project, it meets with the "iron triangle" of project management: budget, scope and schedule (The Mind Tools Content Team). Implementation of information and data security requirements and personal data protection requirements increase the scope of this project. This means that the introduction of 5G will not be able to provide such rapid economic growth as the planning documents promise. However, the benefits of protecting the privacy of individuals are positive.

In order to ensure the protection of individual rights, the assumptions set by S. Zuboff should be taken into account: (1) that it must be the individual alone who decides what experience is rendered as data; (2) that the purpose of the data is to enrich individual's life, and (3) that the individual is the sole arbiter of how the data are shared or put to use.

Implementation of these principles would require additional costs for DTSP. From the point of view of the relationship between the individual and the state, any public service should maintain alternative delivery channels so that the individual can receive them without sharing his data and experiences if he does not want to. Private sector service providers should also consider the individual's views on sharing their experiences in the form of data. Normative acts regulating the protection of consumer rights should provide for the obligation for the service provider to publicly announce that the receipt of the given service will require the use of digital technologies that provide for the collection of experience data. Thus, the individual would be given the right to choose - to use this service or not.

It is even more difficult to realize that only the individual can decide how his data is processed and used. The desire not to share one's experience should not create situations where a person is deprived of his basic rights. This can create a new type of digital divide when part of the society does not agree to use digital technologies, not because they are not available, but because they require sharing experiences under compulsion. This means that wider public involvement is needed in all issues related to data re-use in decision-making. Such decisions cannot be taken by the DTSP or the government alone.

It is unethical on the part of the government and DTSP to ask individuals to transfer the right to make decisions about the fact that the individual should share his experience.

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OPPORTUNITIES AND LIMITATIONS FOR USING BIG DATA IN THE MARKETING INDUSTRY

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Abstract. The use of big data in marketing in Latvia is a relatively new and unexplored field, therefore the most important information about the possibilities of using big data in marketing and the limitations related to it has not been collected so far. In order for company management and marketing specialists to be able to manage the risks arising from the use of big data and the implementation of privacy policies, it is necessary to identify them, assess the main causes and analyse the impact of risks on consumer behavior. Despite the rapid development of technology, many companies avoid the use of big data, and the interest of consumers in the use and processing of their data is also growing. The research objective is to evaluate the scientific and practical problems of big data use and privacy, to identify the main actualities of big data use in marketing, the advantages and limitations of use, as well as to investigate consumer attitudes towards the use of big data. In order to attain the objective of the research, a literature review of public databases, literature and research articles is performed followed by interviews of experts representing big data analytics in Latvia and consumer survey. As a result of the research, it was concluded that consumers' knowledge of big data use and processing technologies is relatively low, therefore there is a low interest in privacy compliance and violations, and the size of the company does not affect the awareness of the importance of using big data in marketing, making business decisions and conducting company consumer analysis.

Key words: big data analysis, marketing, consumer attitudes, advantages and limitations of big data.

JEL code: M31

Introduction

In less than a generation, the Internet has changed the way society lives and provided more opportunities for the generation, analysis, and distribution of large volumes of new data. As more and more data are generated, big data has attracted considerable attention from both the public and businesses. The use and analysis of big data allows companies to build profiles of their customers based on historical and real-time behavior at specific locations and times. Likewise, the results of big data analysis can improve a company's marketing strategy, provide a better customer experience, and increase revenue. Undoubtedly, big data analysis can create more opportunities to develop companies and business ideas, but with these opportunities come challenges. Not all consumers understand where and how their data is used and what information is used, so some companies refrain from using big data in marketing. There is a need to explore the risks and challenges associated with big data, as well as identify the benefits of using it.

The use of big data in marketing in Latvia is a relatively new and unexplored field, therefore the most important information about the possibilities of using big data in marketing and the obstacles related to it has not been collected so far. In order for company management and marketing specialists to be able to manage the risks arising from the use of big data and the implementation of privacy policies, it is necessary to identify them, assess the main causes and analyse the impact of risks on consumer behavior. Despite the rapid development of technology, many companies avoid the use of big data, and the interest of consumers in the use and processing of their data is also growing.

The **objective of the research:** evaluating the scientific and practical problems of big data use and privacy, identifying the main actualities of big data use in marketing, modern trends in privacy and its implementation in companies, identifying the importance of big data use and privacy in the development

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of the company. Research hypotheses: consumers' knowledge of big data use and processing technologies is relatively low, thus there is low interest in privacy compliance and violations. Research object - the importance of using big data in the development of the company.

Subject of research - opportunities and obstacles to the use of big data in Latvian companies.

Research tasks are: to identify the main benefits of using big data in marketing and the limitations associated with them in literature sources and scientific articles; to conduct an interview of big data analytical experts on the possibilities of using big data for Latvian companies and conduct a consumer survey on big data technologies and the importance of privacy.

The following **methods** were used in the study: the method of qualitative and quantitative research was used to achieve the objective of the research. In the study, a survey of Internet users was conducted, in which 443 Internet users, residents of Latvia, participated. A random sample was taken.

A qualitative research method was used - expert interview, in which six Latvian marketing experts were interviewed, who were selected according to their education and work experience.

At the end of the work, conclusions will be gathered and proposals will be developed for those working in the marketing sector and Latvian companies for increasing the understanding of the importance of using big data.

Research results and discussion

1. Literature review

Authors Moorthy, Lahiri and Biswas emphasize that like other socio-technical phenomena, Big Data triggers both utopian and dystopian rhetoric. On one hand, Big Data is seen as a powerful tool to address various societal issues, offering the potential of new insights into areas as diverse as cancer research, terrorism and climate change. On the other, Big Data is seen as a troubling manifestation of Big Brother, enabling invasions of privacy, decreased civil liberties, widening of inequality and increased state and corporate control (Moorthy et al., 2015). In this article, authors review the scientific literature to identify the benefits of using big data.

In the era of big data and technology, the amount of available data has grown exponentially, and complex algorithms have been developed (Shi-Nash et al., 2017). In addition, computing power and data storage capabilities have continually improved. This has provided companies with the opportunity to create data analytics capabilities and increasingly digitize their operations, which has become a crucial element in the survival and prosperity of businesses. Today, discussions about big data are largely economic in nature. In addition to issues related to data collection, storage, and ownership, a key question is the value that big data can create, the economic benefits of its use, and how it can help companies outperform their competitors.

The results of McAfee and Brynjolfsson's study show that companies that self-identified as data-driven performed better in terms of objective financial and operational results than other companies that were not classified as data-driven companies (McAfee et al., 2012). For companies seeking technology-based competitive advantages to drive significant business growth, big data allows companies to create additional value. Big data enables companies to become smarter and more innovative in ways that have not previously developed. The author Saksonova (Saksonova, 2013) also emphasizes the importance of innovation and efficiency for companies in various industries.

The use of big data analytics allows managers and marketers to make decisions that are based on data rather than intuition or past experience. Based on the authors Katalina and Saksonova, companies are

always looking for ways to increase efficiency (Katalikina & Saksonova, 2022). According to a McKinsey Global Institute (MGI) report, big data is becoming a key foundation for competition, productivity and the creation of new products and services. Big data analytics are critical in times of data glut and can provide unanticipated insights and aids to decision makers (McKinsey Quarterly, 2011). Companies seek to use data analytics to better understand the changing external environment that will affect their competitive position and discover new business opportunities.

Research shows that companies can use customer information to create a competitive advantage and profit growth that is 5 to 6 percent higher than the company's competitors who do not use big data in marketing decision making (Biesdorf et al., 2013). However, such efforts by companies also increase the vulnerability of customer data or create a potential perception of a company's harm to consumer privacy through the unwanted use of big data or the mining of personal data, such as data mining that may result from data breaches or identity theft. As such, data collection efforts can also have a downside, with customers often expressing distaste for a company's privacy policies and data collection practices (Sipior et al., 2011). Therefore, a topical question in marketing is ways to prevent these negative effects from occurring and to balance the company's profit increase over its competitors.

Survey questionnaires have long been one of the main means of collecting data on consumer attitudes, beliefs and opinions and are useful for assessing specific characteristics of individuals, as well as for building an understanding of public opinion and producing accurate official statistics (Liu et al., 2017). With the development of technology, it is possible to turn the traces left by consumers in the digital environment into more information about consumer behavior (e.g. purchase history, personal interests obtained while browsing the Internet) in the form of big data. Authors Baker and Eck, Cazar, Callegaro, and Biemer believe that big data and surveys have great potential to complement each other, allowing scientists to better understand each consumer individually and society as a whole, for example by combining the low cost per unit of data of big data (compensating for the increasing cost of survey data collection) is an opportunity to collect very specific information about the research question (Eck et al., 2021). According to the authors of the paper, by combining the results obtained in customer surveys with consumer big data, it is possible to find in-depth regularities that can explain the factors creating customer experience, consumer satisfaction and loyalty.

Today's digital technologies have created many potential sources of personality-related big data. Smartphones and other personal electronic devices contain a variety of sensors (such as microphones, cameras, light and proximity sensors) and data logs (such as call and text message logs, web browser logs, and application usage logs) that provide rich and diverse sources of behavioral data (Tay et al., 2020). Bluetooth data and GPS navigation features in mobile phones can track where a consumer is, when and with whom, all of which can reveal personality and personality traits (Mønsted et al., 2018). Advances in technology not only offer new sources of personal data, but also enable companies to collect data in new and more efficient ways. However, the authors of the paper would like to emphasize that not all countries' legal framework allows the use of such personal data, as they allow identification of the consumer's place of residence and other personal information that may threaten consumer safety. Therefore, the company's data specialists need to use the advantages provided by the data, but carefully understand the extent to which the data is allowed to be used by the law. Further research on big data should look for technological solutions to be able to protect consumers' privacy (consumer's personality cannot be identified), but at the same time provide companies with opportunities to analyse these data, from which data analysts can obtain important market trends.

Among the many directions of development in digital technologies, social media platforms stand out as particularly rich sources of personal big data (Alexander III et al., 2020). Given the large number of people who now regularly use social media networks, extremely large data samples with a wide demographic range (race/ethnicity, gender, age, geographic origin, and culture) are often represented. Social media content such as tweets, comments, news and reviews have contributed to the extensive generation of big data from platform providers or various websites. The analysis of social media data using various traditional data mining and machine learning techniques is still an active research area. For example, social media data can reveal market research information through consumer insights that improve business decision-making (Ghani et al., 2019).

The most common uses of big data in the social media environment are trend detection, social media analysis, sentiment analysis and opinion mining (Pavaloaia et al., 2019). For example, social media helps companies get customer feedback about their products, which can be used to adjust the decisions they make and gain value for their product. Research has confirmed that most existing social media big data analysis approaches are based on machine learning. Machine learning is an area of artificial intelligence that has been used in many social media platforms to identify patterns and relationships in data. However, working with large amounts of data collected from social media in different formats has also created some challenges related to social media specificities, such as the slang and jargon used in social media posts. Big data collected from social media is meaningless until it is properly used to guide decision-making by turning massive amounts of social network data into meaningful results (Gandomi et al., 2015). Also in this aspect, according to the authors of the work, the quality of big data is essential. Although the data that has been collected from social media is very diverse, quality is also very important for this category of data, but precisely because of this diversity, it is difficult to determine whether the data will provide qualitative and usable conclusions.

An accurate and efficient demand, supply and price forecasting model directly affects customer satisfaction and inventory accumulation (Atnafu et al., 2018). To ensure the proper operation of the supply chain management system, companies need to improve demand forecasting. Businesses are in the era of big data, and companies are collecting data from multiple dimensions. There is a shift from traditional forecasting methods to advanced data science methods as business leaders realize that historical sales data and marketing channels have a huge impact on forecasting accuracy. Companies are trying to map customer behavior patterns so that they can optimize their marketing spend, thereby improving their overall financial performance. By measuring the quantitative effect of marketing campaigns through various channels, these companies attempt to calculate the return on investment (ROI) impact. This has ultimately led to the emergence of a new buzz phrase, demand-driven forecasting, which is a combination of demand generation, demand sensing and responding to real consumer demands. These methods use big data analytics to evaluate the success of marketing strategies by identifying consumer behavior patterns (Kumar et al., 2020).

The need to change the mindset of a company's culture is very important in big data analysis, because the use of big data can mean changing traditional practices (Wang et al., 2018). Big data analysis refers to companies' ability to identify sources from which it is possible to obtain different types of data with different output rates, as well as ways to collect, store and further analyse this data in order to achieve the company's strategic and operational goals. Although big data is available, it does not immediately give the company a guarantee that these goals will be achieved, it depends on the company's information system and IT capabilities (Tay et al., 2020). From this perspective, the possibilities of using big data in marketing

are closely dependent on the skills, knowledge and motivation of employees, which in turn depends on the company's material resources, such as IT hardware and computer programs for processing big data.

Data analytics capabilities have become critical business skills as the amount of data available to companies, the types of data, and the rate of data change in business increases (LaValle et al., 2011). Enterprise data analytics capabilities refer to their ability to leverage and develop resources based on big data analytics to gain insights that can lead to sustainable competitive advantage in a dynamic environment. Building data analytics capabilities requires the integration of strategic resources, including tangible, intangible and human skills (technical and managerial skills), among which human skills stand out as the most important to execute and develop data analytics capabilities (Akter et al., 2016).

Summarizing the advantages of using big data in marketing, the authors of the work conclude that the collection and processing of big data can provide companies with very extensive knowledge about their consumers, contributing to the understanding of the customer's wishes and needs, thus improving the service experience. Based on the findings of scientific and theoretical research, used as a basis for further research, which is intended as a basis for clarifying the opinions of experts in the field of marketing, IT and data protection on the possibilities and limitations of the use of big data in marketing and the development trends of data analysis, as well as to discover what is consumer knowledge about the use of big data in marketing.

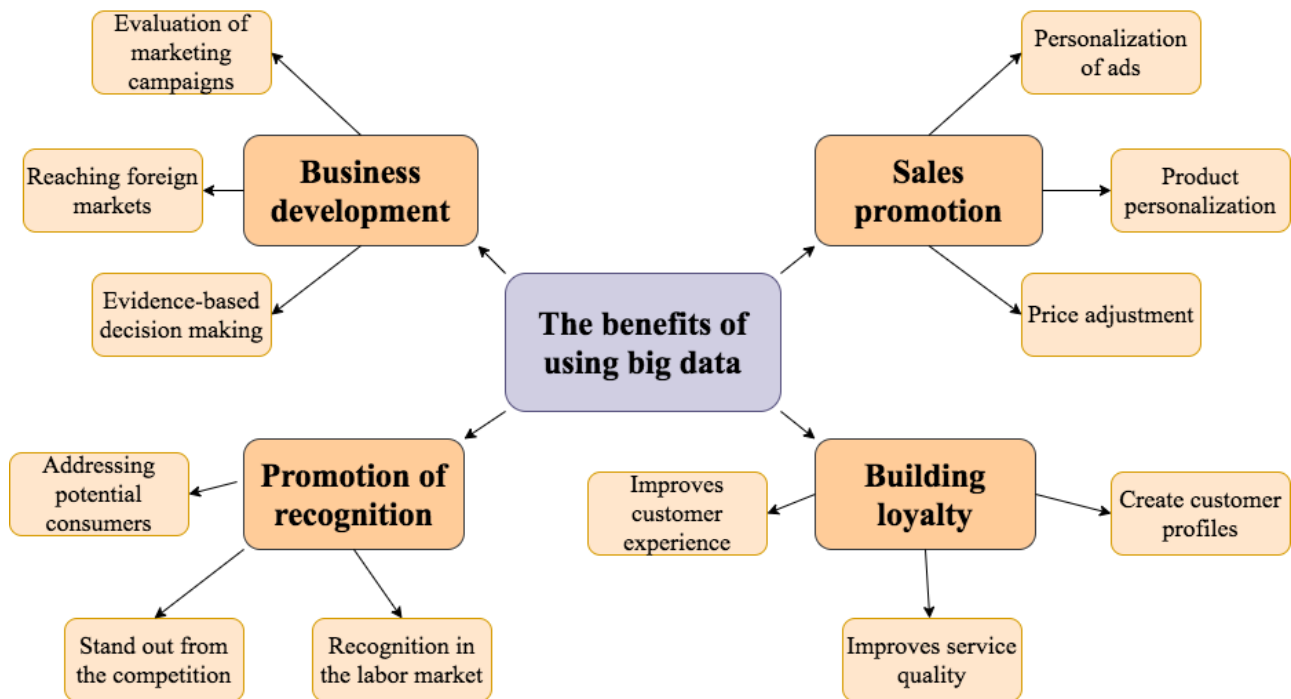
2. Advantages and limitations of using big data

The method of qualitative and quantitative research was used to achieve the objective of the research. In the study conducted by the authors, a survey of Internet users has been conducted with a participation of 443 Internet users, the residents of Latvia. A random sample was taken. The aim of the study is to find out the opinions of experts in the field of marketing, IT and data protection on the possibilities and limitations of using big data in marketing and the development trends of data analysis, how to discover what consumers' knowledge is about the use of big data in marketing. The consumer survey was conducted in the period from April 25, 2022 to May 8, 2022. The survey was created and completed using the survey tool Question Pro. 443 respondents took part in the consumer survey. Data analysis was performed using statistical data analysis methods: descriptive statistics and Pearson's correlation, gathering data in tables (simple and cross tables) and creating graphs. The SPSS Statistics 22 program was used for analysis, as well as Microsoft Excel 2016. Graphs were created using Microsoft PowerPoint 2016.

An expert interview has been used as a qualitative research method, during which six Latvian marketing experts have been interviewed: Maris Kulikovskis, Janis Bergs, Aldis Erglis, Andris Kalniskans, Ivo Krievs, Emils Ludvigs Erglis. The experts have been chosen in accordance with their education and work experience. In order to obtain information about the use of big data in marketing in Latvian companies, the author of the paper chose to conduct a qualitative study - semi-structured in-depth interviews, which consisted of five questions. Given that semi-structured interviews do not follow a precise interview plan, they are easier to adapt to the conversation process and the professional experience of the interviewee. One of the main advantages is that, if necessary, it is possible to change the order of questions and ask additional questions that supplement the expert's answers.

As shown in Fig. 1., several experts recognize the personalization of a service or advertisement as one of the most important benefits, because today's consumer wants to receive very specific and directly addressed offers. Also, several experts mention that traditional marketing channels, such as print advertising, television or radio, will no longer be as effective because they offer the same content to all consumers. Therefore, one of the categories of advantages could be defined as a sales promotion, which

includes benefits that contribute to the growth of the company's sales results - a personalized advertisement or an offer that reaches the consumer at the right stage of making a purchase decision.

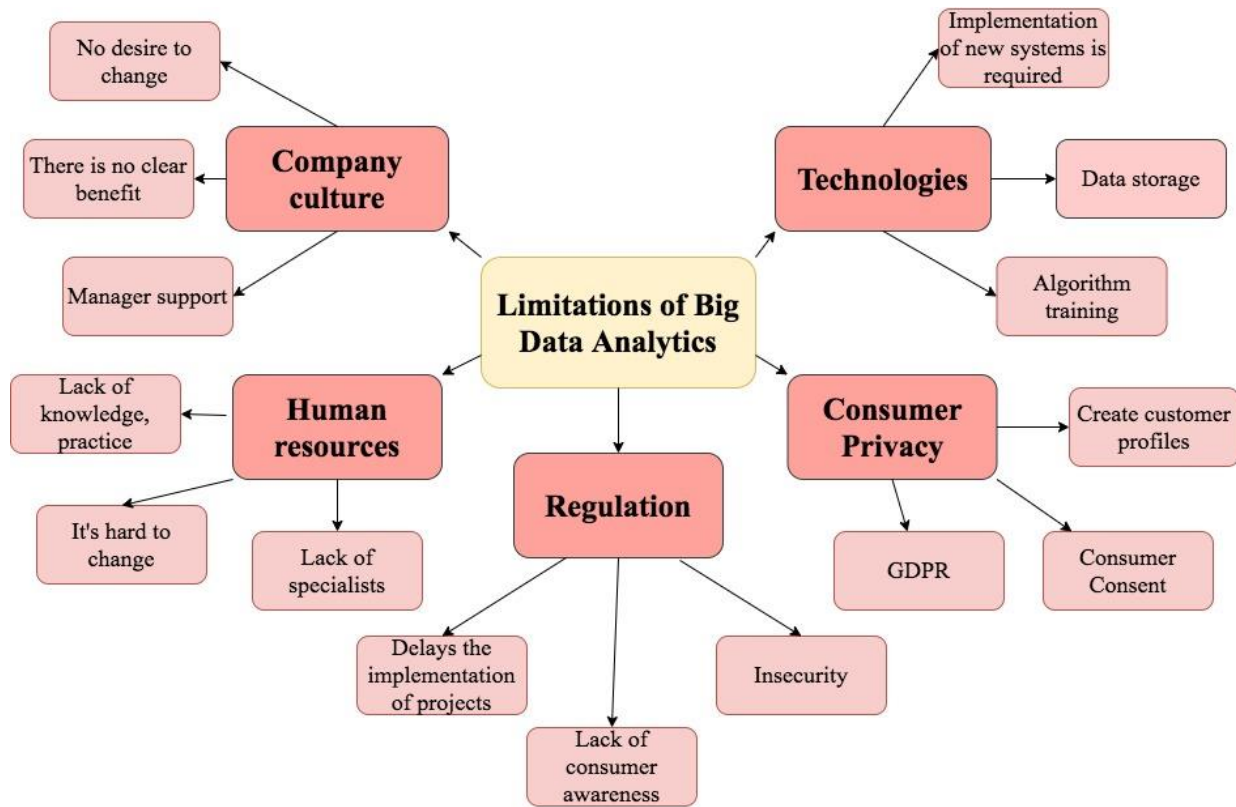


Source: author's construction based on expert interviews

Fig. 1. The benefits of using big data

Experts emphasize that not only is advertising personalization essential, but content marketing customization is also very important as it can improve consumer loyalty, which is essential in a saturated market. As the second most important benefit, experts recognize the improvement of the customer experience. Experts repeatedly emphasize that in a saturated market, for example, in retail and gas stations, it is very important to retain the consumer, but this will not be possible if service or service errors occur regularly in the consumer's experience, which are not identified and corrected. Big data analysis helps to determine at which stage of the service or in which trading institution this error occurred and allows to correct it quickly and efficiently. Big data in e-commerce also allows identifying at which stage of the shopping process the consumer has stopped the process or spent too much time, which may indicate system errors or processes that the consumer does not understand. Improving the customer experience is important not only for a specific customer, but for all customers in general, because the entire service delivery process is improved. Therefore, the authors of the work define the second category of benefits - promotion of loyalty, which includes benefits such as improving customer experience and service, preventing service errors and creating special, individual offers, creating a consumer profile and predicting future purchase behavior.

As shown by the answers of experts collected above, not all companies choose to use big data analysis in marketing, therefore the authors wanted to find out what, according to experts, are currently the most significant limitations in the use of big data and how these obstacles could be overcome. As shown in Fig. 2., the authors of the work categorized the most frequently mentioned limitations of using big data into five groups – barriers related to company culture, technological barriers, human resource limitations, consumer privacy and existing regulatory barriers.



Source: author's construction based on expert interviews

Fig. 2. Limitations of big data analytics

One part of these limitations relates to data collection, maintenance and analysis systems. Companies need to invest in data systems - CRM systems (customer relationship management system), marketing automation systems, web platforms are needed. Expert A. Erglis believes that some of the technological obstacles are related to the development of big data algorithms themselves - the biggest obstacle or side effect from the use of big data is that data sets often contain biases that can unfairly put certain groups at a disadvantage or focus excessively on certain actions to the detriment of others. For example, if a data set is dominated by a certain gender, then the algorithm will most often choose that gender. It is not enough that the company has this data, but it must also be arranged correctly so that discriminatory factors do not arise.

Experts believe that a company can overcome technological limitations, as long as the existing culture of the company is favorable to it. The desire and ability of the company to change and develop is very important. Also, in the implementation of various new solutions, the manager's support and understanding of why the particular technology is necessary in the company is essential. The expert also adds that it is the duty of specialists to convince the manager of the need for data analysis. Also, the company must evaluate the ROI (return on investment) - whether the organization will really benefit financially, because the goal of every business is to make a profit. One should not just follow the big data trend and implement this analysis only after the implementation. Equally important is the involvement of marketing specialists and lawyers in this process, and their attitude towards changes, because, as expert M.Kulikovskis claims, the company's legal, marketing and IT departments must work in harmony. These conditions are especially important in the e-commerce industry. A global solution is difficult to find, but surely the company must be based on these three cornerstones. As the last, but not the least, obstacle, the authors of the work categorize all restrictions related to consumer privacy. Both consumer actions and attitudes can affect the effectiveness of using big data in an enterprise.

3. Attitude of Latvian consumers towards the use of big data in marketing and willingness to share private data

According to the results of expert interviews, consumers' attitudes towards the use of big data in marketing and willingness to share their private data could be influenced by consumers' knowledge about the use of big data in marketing. In order to assess consumers' digital environment habits, survey participants were asked to indicate which mobile devices they use on a daily basis for work and private needs and which services or products they regularly use on the Internet. In the digital environment, respondents most often use social media (99.32%), communication options (99.10%), such as WhatsApp and Messenger, e-mail services (65.01%), navigation (62.08%) and search engines (64.79%). On the other hand, the most popular devices used by consumers for work or private purposes are a smartphone (98.87%), a laptop (87.58%) and a desktop computer (51.92%). Therefore, it can be concluded that the participants of the survey are active users of digital services and devices, whose private data is controlled or unknowingly ends up in the digital environment or with companies that can use this data for marketing purposes. This division is also essential for marketing content creators, when it is important to adapt the content created by the company to the needs of the consumer or the device of content consumption. If the content is not consumed due to its inappropriateness, the company is less likely to obtain consumer data that could then be used to analyse the information and create personalization.

Univariate analysis of variance or ANOVA shows that the respondent's age and income level have a statistically significant effect on whether the consumer is ready to provide his private data to companies so that the company can improve its services. Younger consumers are more willing to allow companies to analyse their private data for service improvement purposes than older consumers (the lowest average score for this statement is among the 55-64 age group - 2.71 out of 5 points). Likewise, consumers with an income level above 500 EUR per month will have a lower average rating for readiness to provide their data than consumers with an income level below 500 EUR per month. According to the results of the ANOVA test, the respondents' gender and education level do not statistically significantly affect the consumer's willingness to provide their data to companies. Marketers whose company's target audience is older people need to pay close attention to what consumer data is used for and how this analysis is communicated to the target market in order to increase the positive attitude of this age group towards marketing big data collection and analysis. Also, attention should be paid to the fact that the conditions of data collection and analysis are clear, transparent and easy to understand.

Crucial to the study was whether consumers would be willing to pay for online products and services but protect the security of their data. According to the results of the study, the majority of consumers, or 74.5%, would prefer not to pay for services, but understand that in return the company is going to collect and use the consumer's personal data for commercial purposes. As can be seen in Table 1, this trend is most clearly visible in the age group up to 44 years. On the other hand, starting from the age of 45, the proportion of consumers who would rather pay for services rather than allow companies to use their personal data for commercial purposes increases. The authors of the paper explain such results with the greater caution of consumers in these age groups and the desire to insure against various risks.

Table 1

Cross-tabulation of respondents' willingness to pay for online services and respondents' age

Respondents' willingness to pay for online services		Age of respondents						Total
		up to 24 year	25-34	35-44	45-54	55-64	65 and over	
In general, I'd rather pay for a service than let companies use my personal data for commercial purposes	Number of respondents	18	39	24	26	3	3	113
	%	24.7%	27.5%	16.0%	39.4%	37.5%	75.0%	25.5%
In general, I would prefer not to pay for the service, but I understand that in return the company is going to collect and use my personal	Number of respondents	55	103	126	40	5	1	330
	%	75.3%	72.5%	84.0%	60.6%	62.5%	25.0%	74.5%
Total	Number of respondents	73	142	150	66	8	4	443
	%	16.5%	32.1%	33.9%	14.9%	1.8%	0.9%	100.0%

Source: author's construction based on survey, n = 443

According to the authors, the negative (26.58%) or neutral attitude (48.20%) of consumers towards the use of big data in marketing can be explained by the uncertainty associated with both the use of data and the implementation of privacy measures in most companies. The majority of respondents (48.20%) are not sure or see more advantages or disadvantages of using big data in marketing.

The results of the quantitative study show the knowledge and attitude of Latvian consumers towards the use of big data in marketing and implemented privacy security measures. Summarizing the data obtained in the study, it can be concluded that, despite the respondents' high use of digital technologies and services, the respondents have no information about what internet user data is generated, where it ends up and who analyses it, which indicates low knowledge in the use of big data in marketing and business. Most consumers do not object to having their data analysed so that companies can provide consumers with personalized offers or to improve the quality of the company's product or service. However, consumers object if this data is sold to third parties for marketing and commercial purposes, which proves the importance of data control emphasized in the theoretical part.

In general, experts agree that the use of big data for marketing purposes is becoming an increasingly important part of business and can give a company's products and services a number of advantages over their competitors. Also, experts believe that the existing regulation partially prevents Latvian companies from reaching the full potential of using big data, because often the law is not sufficiently specific or relevant to the industry. But despite the limitations of the General Data Protection Regulation, companies are choosing to use big data analytics because of the benefits it brings.

The authors of the paper conclude that although the use of big data has many of the advantages listed above, they do not arise solely from the fact that big data analysis is performed. According to experts, the company must constantly improve its customer database and make sure that this data is of high quality. Similarly, the use of big data does not depend on the industry in which the company operates, but on the business goals that the company wants to achieve. If the company's goal is to improve customer service, then it is likely that the company will pay attention to the data of the customer's experience, data acquisition and analysis of the obtained information, regardless of the industry in which the company operates.

Conclusions

- 1) Big data analysis is very important in the era of data saturation and digitization, and it can provide previously unexpected insights and aids to decision makers, such as creating personalized advertisements and offers, giving a company a competitive advantage, improving search engine results, increasing profit growth, obtaining information about consumer behavior, build a consumer profile, obtain more information from survey results and improve the consumer experience.
- 2) One of the main limitations of big data is not data storage or analysis, but how organizations can effectively transform data into relevant and reliable information that can be used in further stages of business.
- 3) As the main advantages from the collection and analysis of big data, experts recognize the potential for business development (reaching foreign markets, service automation), sales promotion measures (advertising personalization, price adjustment), building consumer loyalty and promoting brand recognition. The experts' assessment coincides with the advantages of using big data found in the literature analysis.
- 4) The use of big data is recommended and suitable for any business sector that is characterized by continuous environmental and product changes and where these changes are difficult to predict. One of the prerequisites for data analysis is the datafication of the customer experience, as a result of which the company obtains digital data about the experience of using the customer's service.
- 5) There is no statistically significant positive correlation between high or average consumer digital skills and knowledge about privacy and big data collection on the Internet, suggesting that consumers with high technological skills are less concerned about their privacy than consumers with low digital skills.
- 6) The majority of consumers, or 74.5%, would prefer not to pay for services, but understand that in return the company is going to collect and use the consumer's personal data for commercial purposes.
- 7) 51.3% of the survey participants would rather allow the company to use the collected data to provide the consumer with personalized offers, while 29.3% of the respondents find it difficult to answer this statement.

Recommendations

- 1) In order for companies to be able to prevent changes caused by the rapidly changing external environment and to reduce unpredictability in the industry, the authors of the paper recommend marketing specialists to implement big data analysis in the company.
- 2) The company's marketing specialists should emphasize consumer benefits, such as receiving personalized advertisements and offers and price optimization, when communicating with consumers about private data collection and analysis.
- 3) The company's marketers should make sure that the privacy rules and policies intended for the consumer are written in understandable language, without redundancy and specific terms, in order to promote consumer understanding of the big data analytics measures implemented by the company and increase consumer trust in the brand.
- 4) For the company's marketers, facilitate the alignment of marketing, IT, and legal departments to help overcome barriers related to big data analytics, such as technological, regulatory, and consumer privacy trends.
- 5) In order for companies to be able to implement big data analysis, the authors of the paper recommend marketing and data analysis specialists to dataize the consumer's purchase decision-making

process, from the stages of which it is possible to obtain the consumer behavior, profile and satisfaction data necessary for big data analysis to improve service quality.

6) For the company's marketing and data analysis specialists, develop data analysis methods that ensure obtaining marketing conclusions even from a small data set, in order to save the company's technological resources and adapt to the trends of the big data analysis industry.

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COOPERATION WITH DIASPORA PROFESSIONALS WORKING IN INTERNATIONAL ORGANISATIONS AS A RESOURCE FOR DEVELOPMENT

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Abstract. The diaspora is increasingly seen as a potential resource for development and the ways in which the diaspora is involved in the development of the country of origin are becoming more diverse. Review of scientific literature shows that there has been little research on the perspective of highly skilled diaspora professionals on cooperation benefits for their homelands, as well as diaspora engagement for home country development and for diaspora diplomacy are rarely linked.

The article draws attention to the perspective of highly qualified Latvian diaspora professionals on cooperation with Latvia and the benefits to the country from such cooperation, linking cooperation for diaspora diplomacy and for development. The article will also examine whether the benefits of cooperation identified in other studies (mainly from the state viewpoint) coincide with the vision of diaspora professionals on such benefits.

The data used in the analysis is derived from the study "The involvement of Latvian professionals in diaspora diplomacy and the potential of network diplomacy" and further analysis is possible thanks to the State research programme "New solutions to study demographic and migration processes for the development of Latvian society". The main results illustrate the framework for cooperation between diaspora professionals and the public administration in Latvia, the most significant benefits of diaspora diplomacy and the benefits from diaspora engagement for development (the transfer of social capital, as well as the transfer of experience, knowledge, ideas and practices to the public administration and other sectors). The data reveals high readiness of highly skilled Latvian diaspora professionals to cooperate, and diverse benefits of cooperation for national development and international visibility of Latvia.

Key words: diaspora diplomacy, diaspora engagement, high skilled professionals.

JEL code: O19

Introduction

A major new dimension in the development of society is the significant growth of international migration and the diversification of forms of mobility. A growing number of countries do not see their emigrants as lost taxpayers or "brain drain", but as "national assets", as a potential for development, and are seeking various ways how to engage their diasporas in the development of the country of origin (Kingsley, 2018; Kuznetsov, 2013). A quickly developing phenomenon is diaspora diplomacy, which is mainly addressed in scientific literature in the context of international relations (Birka, 2022; Stone & Douglas, 2018), but can also be seen in the context of the diaspora engagement (Boyle & Kitchin, 2013).

In Latvia, the issue of diaspora engagement as a resource for development is particularly topical due to high emigration rates, a lack of human resources and slow economic development. The Diaspora Law adopted in 2018 emphasizes that one of the policy tasks is to "promote the involvement of the diaspora in the development and promotion of the Latvian economy, exports and investments, knowledge and technology transfer, Public administration, research and development" (LR Saeima, 2018). It is noted that a broad set of measures is needed to strengthen the diaspora's relationship with Latvia's culture, economy, and science, as well as to promote the civil and political participation of the diaspora. Five years have passed since the adoption of the Diaspora Law, and what changes have happened: what is the diaspora's view on whether and how state has managed to promote engagement of the diaspora in development of the country? This is particularly relevant at a time when there is a global race to attract talent and high-skilled professionals who play a key role in economic development.

The article will therefore focus on the views of high-skilled Latvian diaspora professionals, who is working in international organisations, on cooperation with Latvia and on the benefits of such cooperation. Latvia is

a country with a shrinking population and the highest population loss is due to international migration, so it is very important to encourage return migration, or at least to engage diasporas in the state development processes (Bela & Mieriņa, 2018). This study on the views of diaspora professionals working in international organisations on the benefits of cooperation will form a conceptual link between the study of diaspora engagement and diaspora diplomacy, which is currently developing in parallel in migration studies and international relations studies. The article will also examine whether the benefits of cooperation identified in other studies (mainly from the state viewpoint) coincide with the vision of diaspora professionals on such benefits.

Scientific literature shows that there has been little research on the view of highly skilled diaspora professionals on cooperation benefits for their homelands (Stone & Douglas, 2018). Similarly, scientific literature on international migration and development focuses on the role of governments, that develop targeted institutionalised links with the diaspora and work to attract diaspora resources and promote cooperation (Kuznetsov, 2013; Pande, 2018). But existing research does not sufficiently address specific cooperation between the public administration and those working in international organisations from the perspective of professionals. Scientific novelty is based on in-dept analysis of views and initiatives of highly skilled diaspora professionals who cooperate with their homeland and the finding that diaspora professionals see their engagement in diaspora diplomacy and their contribution to national development as related.

The article is based on data from the study "The involvement of Latvian professionals in diaspora diplomacy and the potential for network diplomacy" (Bela, Mieriņa & Pinto, 2022), which uses a mixed study methods design, and data consist of five pilot interviews; document analysis on the experience of the Czech Republic, Denmark, Ireland and Slovakia in developing diaspora diplomacy; a quantitative survey of Latvian diaspora professionals working in international organisations (N = 150), six focus group discussions (further FGD) (N = 18) and four in-depth interviews with top level professionals. The article analyses only qualitative data obtained from the study (FGD and four in-depth interviews), and analysis is continued in the framework of the State Research Programme "New solutions to study demographic and migration processes for the development of Latvian society" (VPP-LETONIKA-2021/4-0002).

One of the biggest challenges in the implementation of this study was the identification and reach of the target group – Latvian diaspora professionals working in international organisations, because target group is small and specific. The article examines only the selection and recruitment of FGD and semi-structured in-depth interview participants. Selection and recruitment were carried out using information collected by the Ministry of Foreign Affairs from the Latvian embassies, and from information from the movement "Economic Cooperation and Investment for Latvia" (movement #esiLV) network, provided by co-founder of the movement Elina Pinto (she was also involved as researcher in the study "The involvement of Latvian professionals in diaspora diplomacy and the potential for network diplomacy"). #esiLV is grassroots organisation, aiming "to gather and represent Latvian diaspora entrepreneurs, professionals, investors and researchers and to build bridges of cooperation and knowledge transfer with partners in Latvia, in order to facilitate sustainable and dynamic development of Latvia and its regions" (#esiLV, n.d.). There were approximately 40 persons on each list, many of them overlapping. Approximately 30 persons were selected to invite in FGD, using both lists. The recruitment of participants focused on ensuring broad institutional and geographical coverage. Since the study participants represent very different institutions, to each focus group discussion were invited participants from one type of institutions (Table 1). Senior executives were interviewed individually, arranging the day and time of the interview according to their options. Each participant received an individual invitation send via e-mail. Very few invited professionals did not answer,

and some were not available at particular date and time. Fieldwork was carried out in the last week of June and first week of July 2022. Members of the target group live in different countries of the world, so the interviews and FGD were organised on-line using Zoom. Research participants were informed about research aim, objectives, recording, data storage, who will access data and how data will be used. Informed consent was obtained, including permission to use data for both above mentioned research projects (but not to re-use data for other projects). Given that some research participants agreed to expose their name and affiliation in publications, while others don't, anonymity is assured to all. As research participants are easily recognisable, even general information about their workplace is not disclosed.

Table 1

Affiliation of research participants in focus group discussions and semi-structured interviews

Code	Affiliation
FGD1	International justice professionals (judges of the European Court of Justice)
FGD2	Professionals working in international intergovernmental organisations (UN, OSCE, WHO, PB)
FGD3a	Professionals working in EU institutions outside the EU
FGD3b	Professionals working in EU institutions inside the EU
FGD4a	Professionals working in international non-governmental organisations
FGD4b	Professionals working in international non-governmental organisations
I1	Senior executive working in European Commission
I2	Senior executive working in The Foreign Affairs Council
I3	Senior executive working in The European Bank for Reconstruction and Development
I4	Professional working in United Nations Development Programme agency, NY

The theoretical framework of the article is shaped by the concept of diaspora engagement and diaspora diplomacy as a relatively new phenomenon in international politics and diplomacy. Cooperation with diasporas forms the basis for both diaspora engagement and diaspora diplomacy. The contribution of the diaspora may be interpreted as "diaspora capital" consisting of human, financial and knowledge flows and regarded as foreign resources available to the country, city, region, place or organisation of origin (Kingsley, 2018). The article will focus on social networks and social transfers between diaspora professionals and the public administration in Latvia. Diaspora diplomacy, on the other hand, refers to the involvement of the diaspora networks, talent, and goodwill in the pursuit of national interests (Cull, 2019). Diaspora diplomacy is an element of public diplomacy and includes five key components: listening (to understand others' opinions, understanding, vision); advocacy (to defend ideas and national interests abroad); cultural diplomacy (e.g., guest artists, promoting their country's culture); exchange diplomacy (e.g., student exchange, exchange of scientists); international broadcasting. Important elements of public diplomacy are nation-branding and reputation building (Cull, 2019). This study focuses on elements of listening and advocacy, as well as on nation-branding and reputation building.

Existing studies highlight the importance of the country's ability to position itself as close as possible to critical network centres in modern diplomacy and international policy making to increase its international visibility and influence. Mobilising, building and managing networks is therefore a vital source of power (Slaughter, 2012, quoted from Stone & Douglas, 2018). However, mobilising, building and managing networks is vital in every area, including public administration, the non-governmental sector and the economy. Networking is an important prerequisite for all diaspora engagement practices (Petkeviciene, 2016). Also, social transfers as transfers of experience, knowledge, contacts, ideas and

practices are not possible without networking and cooperation. The studies concluded that social transfers can contribute to the introduction of a new culture of work organisation, the exchange of experience, the development of civil society and democracy, the promotion of legislative initiatives and international cooperation in different areas and matters (Dimante, 2007; Brinkerhoff, 2012). The article focuses also on diaspora professional's awareness of the diverse benefits that networking and cooperation can bring to the country of origin.

Research results and discussion

1. Assessment of the cooperation framework

Latvian diaspora professionals working in international organisations view cooperation with Latvia as very important and necessary and highlight the importance of interaction between the state and professionals. Cooperation is seen as important in terms of nation-branding, increased international visibility and strengthening of influence, reputation building and advocacy, and the contribution of the diaspora to the transfer of social and intellectual capital. The limited human resources of Latvia are highlighted (for example, "we are too little to ignore the cooperation needs and potential benefits" (I2)), and all participants in interviews and FGDs confirm the need for cooperation and its positive benefits. The need for cooperation is also confirmed by quantitative data: 35% of professionals working in international organisations would like to cooperate in the future, and for 53% respondents, interest in cooperation depends to a large extent on the circumstances and offer. Only a few respondents have a completely negative attitude toward cooperation (Bela, Mierina & Pinto, 2022). Diaspora professionals working in international organisations see themselves as belonging to Latvia, as a resource that wants to be of use, they want to contribute to Latvia's development, to be noticed and recognized.

However, current cooperation is described as irregular and ad hoc, depending on people in office (e.g., Latvian ambassadors, heads of missions, specific public administration employees). Quantitative data also shows that only 10% have been in close cooperation with representatives of Latvia over the past five years, 46% cooperated irregularly or rarely, while 42% have not cooperated at all (Bela, Mierina & Pinto, 2022). Several participants see a positive trend in cooperation patterns; there is increase in interest, expanding forms of cooperation, and regularity in some sectors, but cooperation is still based mainly on individual initiative rather than on a systemic and strategic approach.

The study participants see value of the regular cooperation network as long-term strategic resource in strengthening Latvia's international visibility and influence in foreign relations. However, participants themselves were more interested to contribute to Latvia's development and to strengthen Latvia's visibility and influence in particularly EU institutions and decision-making.

It is recognised that cooperation requires an investment of human resources and time, and one of its preconditions is the development of a collaborative culture both in the public administration and in Latvian society as a whole. A second prerequisite for successful cooperation is a strategic approach: cooperation must be purposive and with a long-term perspective. This vision is entirely in line with the approach mentioned in scientific literature and with that of those countries developing diaspora diplomacy (Bela, Mierina & Pinto, 2022).

Systemic and strategic cooperation is seen in conjunction with the development of professional careers and can be interpreted as targeted development of the social networks between the state and its professionals abroad. This issue is less addressed in previous studies but appears in the approach of countries working to strengthen their representation in the European Union (e.g., Denmark, the Czech Republic, Ireland). Cooperation should start with targeted support for young professionals (e.g., by first

recruiting them to work in public administration, then helping to build a competitive CV through secondments and other tools for advancing international experience, motivating application for posts in international organisations and supporting competition for these posts). At this stage, the state may invest more than it receives in return. Once people have gained jobs and are climbing the career ladder, the country needs to maintain regular cooperation. One FGD participant stated that the public administration is very often helpful and supporting during the competition, but afterwards is no longer interested in the particular professional (hence a lost opportunity, potential that is not being used). This is also confirmed by the figures of the quantitative survey – 71% of respondents have never felt an interest from Latvian state institutions in their professional activities. If cooperation exists, the benefits are balanced between the two sides at this stage. It is noted that only after 15-20 years, when professional have reached the highest point of his or her career, the Latvian state will gain more than the professional from cooperation. Perhaps for the professional the most important are symbolic and emotional benefits – “that there is a feeling that someone knows you and that you are appreciated. That someone is ready to listen to you” (I1).

2. Benefits of cooperation for public diplomacy

The study participants see a wide range of benefits for the country or origin, which is in line with the components of the diaspora diplomacy mentioned above: strengthening of visibility and establishing reputation; strengthening public influence and persuading others; supporting information and knowledge transfer for better understanding of other countries and regions. In the classical sense, professionals working in international organisations strengthen the influence and visibility of the Latvian state in the countries and organisations where they are located. Less explored in previous research is the fact that professionals working in international organisations are willing to provide tools for the public administration of their home country, thus helping it to achieve better results in the representation of state interests and increasing the influence of their homeland.

The contribution of professionals working in international organisations to strengthening state visibility and establishing reputation can be seen in relation to the statement of some FGD’s members that in international organisations and professional circles attention is paid to where each person comes from, and therefore being from Latvia also promotes the name of Latvia. Professionals in very high positions and outstanding specialists in specific sectors significantly raise Latvia’s visibility and reputation; their performance in professional activities, in conferences, in events, makes others think that talented people can come from this country. People with outstanding knowledge in a sector or field contribute to the notion that this sector or field is strong in their country of origin.

The study participants see the benefits of strengthening state influence and persuading others. Professionals working in an international organisation have the possibility to better listen to employees of the Latvian public administration – a person from Latvia is more receptive to Latvia’s arguments. And he/she will also, because of his/her international experience, be able to explain the position of Latvia or to inform the representatives of other countries in the relevant organisations in a way that is more easily perceived. In this way, it is possible to influence processes, policies, decision-making in Latvia’s preferred direction. It was also noted that the interests of the EU member states are also important in the EU’s common interests. Professionals from Latvia can help to reach a compromise so that Latvia’s position is better placed in the EU’s compromise position. The rebuttal of disinformation about Latvia could also be a significant benefit because professionals in high positions are listened to and trusted.

The benefits of counselling (which could also be considered as one of the components of the transfer of professional intellectual and social capital) are essential in terms of strengthening national influence. Whether it would be a matter for the Latvian Presidency in the EU or a candidate for the UN Security Council, Latvia needs a vision, a plan, and priorities that Latvia wants to achieve. Professionals working in international organisations can advise on international developments, comment on issues (plan, campaign etc.) from a specific organisation or industry perspective, or from a wider scale of global trends. Counselling can certainly be seen more broadly, for example in relation to Latvia's development priorities, sectoral development issues, etc. Establishing and maintaining a community of professionals working in UN agencies and organisations would be very valuable in terms of counselling on development cooperation. Involving professionals not only from United Nations offices in New York, Geneva, Washington, but also from regional centres (such as Addis Ababa, Dakar, Istanbul, Bangkok, Panama) as well as people working in the countries of the particular programmes, can raise a deeper understanding of development cooperation needs in a broad range of countries. It can help to formulate strategies for Latvia to engage in multilateral development cooperation projects and thematic directions of interest of Latvia. Professionals working in international non-governmental organisations from Latvia may also be a resource for development cooperation, as these organisations aid countries with middle and low incomes and can therefore play an advisory role on the situation.

3. Benefits of cooperation in the transfer of knowledge, professional and social capital

The benefits focused on promoting the development of Latvia and the strengthening of the public administration were most mentioned in discussions. Also, the transfer of social capital, international experience and knowledge in various areas and sectors were mentioned frequently. Because there are not even two million people in Latvia and limited human resources, "we need to use absolutely all people who can be of help to Latvia. Latvia has this added value and Latvia should try to regain these brains if only for half an hour".

First of all, the transfer of professional capital covers the "knowledge of processes, the knowledge of policies and the knowledge of people". Professionals working in international organisations may inform about processes, procedures, decision-making progress, and "backstage" discussions, which in turn helps the Latvian public administration to act more appropriately or make better decisions. The word "inform" is only partly applicable. It was noted that often employees of Latvia's public administration have insufficient knowledge of decision-making processes, policy development processes, procedures and methods in international organizations or EU institutions, and diaspora professionals can provide this knowledge, which, in turn, would allow the public administration to work more effectively. It was stressed that all professionals should respect certain conditions of employers, which include neutrality, equal treatment of all member states, non-disclosure of inside information outside the organization, etc. It should be noted that open lobbying of Latvia's interests cannot be allowed in professional activity as it is incompatible with the requirements of neutrality and equal treatment of member states. It was noted that it could be beneficial for the Ministry of Foreign Affairs or sectoral ministries to maintain contacts at least at informal level to ascertain, for example, contextual information on current events, more efficient application completion, etc. The main benefit here is that informal contacts and sharing of information could help to make better and more informed decisions.

Knowledge transfer, expertise in certain areas and issues can be of benefit to public administration, civil society, higher education, the economy and elsewhere. For example, it is valuable for public administration, students, NGO employees to learn how to work with one or another topic or issue in different international

organizations, because in each it is handled in a slightly different way. Whether it's the EU, NATO or the UN, similar issues and common challenges are faced, but each institution pays attention to different aspects, so comparing and knowing how similar issues or challenges are handled in different international organisations is very valuable. Knowledge transfer and exchange is essential both for professionals working in international organisations among themselves, and for those working in public administration and NGOs in Latvia. In one group, it was emphasized that everyone has expertise or highly specialized professional knowledge, which they would be happy to invest in Latvia, especially in areas where Latvia has fewer resources.

The transfer of knowledge and expertise between professionals from different fields and industries within Latvia and outside can be considered. The vision of international NGO's would also be useful in order to look at the position or decision of Latvia (or the lack thereof) in a wider international context – providing feedback on how the position or decision of Latvia (or lack thereof) on any issue look internationally. A number of FGDs and interviews have highlighted that professionals working in international organisations can provide a view from the outside, fresh ideas, a different point of view. Suggestions may not be followed, but they could be listened to and the existence of this differing view could be taken into account that such a view is also possible. Critique from the outside can also encourage a broader view – "What is the highest standard we could achieve in this area. It is necessary to help the country to strive for the highest standard possible" (FGD4a). In several FGDs, it was pointed out that it would be preferable for those working in public administration to familiarize themselves with the world's best experience in a particular field or issue, rather than simply reproduce the existing "order of things".

The transfer of knowledge is illustrated by the cooperation between Latvian judges working in the European Union's justice courts and judges working in Latvia and other professionals in the field of justice (FGD1). Individual appeals come before the EU General Court, in which companies or Latvian citizens want to oppose a decision of the European institutions, and it is therefore important that Latvian judges are informed about General Court topicalities. Latvia, as an EU member state, must also apply in its judgments the EU laws that are in force in Latvia as in each EU member state. The main contribution of those working in the EU courts is that they can explain laws and rules, demonstrate, and share techniques. They are also very interested in understanding how Latvian justice works, because this, in turn, provides a better contribution to discussions with colleagues at the EU level – there is always an example to build on. However, the benefits can be broader, as judges not only have highly specialised legal expertise at the European Court of Justice, but also an expanded knowledge of other EU legal systems. It is pointed out that it would also be too narrow to look at cooperation as a mere cooperation between judges or cooperation with the Latvian public administration. The judges pointed to the need to strengthen the private sector's knowledge and understanding of the EU legal system. The benefits of both sectoral and cross-sectoral cooperation and exchange of experience were also noted in other discussions. One discussion highlighted that it is very rare to find specialists who are equally familiar with both legal issues and the specific sector (FGD2). So, cooperation in this direction would have great added value.

Another benefit of the transfer of professional and social capital is illustrated through link between mobility and the 'brain return', which cooperation can facilitate. Some participants of the study are considering the idea of returning to Latvia and working in public administration (the survey data also show a sufficient proportion of such professionals). Also, it is pointed out that in today's rapidly changing world, public administration requires completely new knowledge, which until five years ago civil servants did not need, both at EU and the member state level (I1). It is therefore important to ensure a balance between stability, continuity and heritability, and the new realities of today's life, which require new approaches and

new knowledge. Nowadays, in any organization, in order to remain competitive, it is necessary to ensure a good balance between the possibilities of growing those people who already work in these organizations and the arrival of "new blood", which contributes to a new perspectives and new ideas. This cannot be achieved by people just "moving" between ministries, people must come in from outside as well. By "outside" can be understood both people with work experience in international organisations and the EU institutions, as well as from other areas.

As regards the benefits of mobility in the transfer of knowledge and experience, various forms of cooperation were mentioned. The consideration of the transfer of experience as a benefit would be incomplete without mentioning the benefits of relatively short-term mobility. Both the FGDs and the interviews emphasize that Latvia should more actively use the opportunities to share staff and existing internship programs – limited mobility allows to gain experience and knowledge about the institution, as well as establish contacts, which, upon returning, provide added value to Latvia through the knowledge, experience and contacts acquired in the international organization. Hosting and traineeships appear in different contexts, including in relation to the possibility of a professional gaining international experience, which in turn then allows him to apply for positions in international organizations and potentially emigrate. This benefit can turn into a loss for the state – "brain drain" – if at least "brain circulation" or knowledge transfer is not achieved through cooperation and various forms of diaspora involvement back to the country of origin or return after a period of service abroad.

The recommendations made in FGDs and interviews confirm that today's networking practices cannot be confined to just one area, it demonstrates the multilateralism of cooperation and the close interlinkages between the different fields (Ho & McConnell, 2019; Stone & Douglas, 2018), as well as echoing the findings of talent migration researchers on the importance of "brain circulation" – it is essential to restore the knowledge and experience of those who have left to their country of origin (Supule, 2020).

Increase and transfer of social capital is essential both in increasing the influence of the state (especially in decision-making processes) and in the better-informed decision-making in Latvia. A wider range of social contacts ensures wider access to more diverse information, and personal contacts facilitate the exchange of such information. Several FGDs emphasized that it's much easier to call someone you know personally, and it's also possible to do so after official business hours. Just one participant interpreted the role of personal contacts negatively, associating it mainly with "being relatives and friends" and the risks of corruption in the Latvian public administration, emphasizing the importance of formal procedures in solving any issue. However, in most cases, in addition to formal procedures and a hierarchy in the handling of certain issues, it was noted that informal communication and social contacts are of paramount importance – "the whole of Brussels exists due to everyone talking to each other, mostly informally" (FGD4a).

Social contacts of professionals working in international organizations can help the transfer of professional capital by attracting high-level experts or renowned lecturers to top-level events and international conferences. Professionals working in international organizations themselves can also share their knowledge with colleagues in Latvia and students of Latvia's higher education institutions. Several FGD and interviews mentioned guest lectures in Latvia's higher education institutions as a form of cooperation that provides several benefits – young people see international career prospects in their chosen field and gain an understanding of the work specifics of international organizations, which is impossible to obtain only from theory or a person who has never worked in such an organization himself; knowledge transfer takes place (I2, FGD1, FGD2). "For example, how one manages a large organization. There are not so many large organizations in Latvia where we can practically learn how to run them. Therefore, inviting people to give guest lectures would be welcome" (I2).

Social transfers, consisting of the transfer and exchange of knowledge, skills, values, ideas, and attitudes should be considered as a benefit within the broader context of promoting changes in society and the development and strengthening of democratic values. It is precisely on these issues that the most significant contribution can be made by those working in the international NGO sector, who, as the main beneficiaries of their contribution to the state, saw an opportunity to improve good governance, strengthen good governance practices in public administration, create a space for discussion and more confidently express critical opinions, attract internationally renowned experts, transfer the experience of democratic countries of the "old" Europe on how the non-governmental sector cooperates with the state. In democratic societies, elected officials, civil servants and public sector employees are accountable to those whose interests they represent, and NGOs represent a mechanism that enables the public to verify that policies and decisions have been taken in the public interest and are being properly implemented. It was pointed out that the role of the diaspora professional provides "the advantage that you are one of us, but not a local. You can say things more directly" (FGD4a). The function of NGOs is to hold the public administration and elected politicians accountable, as well as to form a critical discussion about the decisions, policies, achievements or, on the contrary, inaction taken in public administration on an issue. It's an awkward role – everyone likes to be praised, but it's unpleasant to hear criticism. When expressing a critical opinion, there is a risk of spoiling the relationship. Latvian society is small, and these risks are high. The dual outsider and insider position allow criticism to be expressed more directly, as well as to view local processes in an international scope (FGD4a, FGD4b). It is also necessary to learn how to formulate and listen to constructive criticism in order to achieve a result that is more in the public interest – "The view from the outside should not be seen as painful criticism, but as a common desire to strive upwards" (FGD4a). It was also pointed out that civil society appears to be represented in dialogue with the state – for example, for a long time, Latvian Chamber of Commerce and Industry and the Employers' confederation of Latvia have been the main partners of dialogue also on social issues, however, both these organisations do not represent socially vulnerable groups, whose interests are mostly underrepresented in policy making and discussions. Therefore, professionals from Latvia working in international NGOs point to the need to strengthen the NGO sector in Latvia and encourage it to defend the interests of all groups of society more actively and promote dialogue in policy making, not only perform the function of a constructive critic. It must ensure that policy and decisions are taken in the public interest and properly implemented. Latvia still must learn how to create a culture of discussion between the state and the non-governmental sector and see diversity of opinion as a resource – "one can discuss with one's own why there is one or another position" (FGD4a). It is pointed out that now there is often a lack of substantiated arguments why a particular wording, norm or order is enshrined in any policy, law or Cabinet regulation. Professionals working in international non-governmental organisations believe that they could also provide support to Latvian NGOs in attracting international cooperation projects, which would significantly strengthen the capacity and resources of NGOs.

Conclusions

- 1) Diaspora professionals working in international organisations consider regular and purposeful cooperation between them and the public administration, NGO sector, education, and economic sector in Latvia as a long-term strategic resource that allows to contribute to the development of Latvia and also to strengthen Latvia's international visibility and influence, especially in EU institutions.
- 2) In the field of public diplomacy, diaspora professionals working in international organisations are strengthening the influence and international visibility of the Latvia in the organisations and countries

where they are located, as well as they are willing to provide instruments to the Latvian public administration in order to help it achieve a better result in representing the interests of the state and increasing the international influence thereof.

3) The significant benefits of cooperation are also transfer of knowledge, professional and social capital. Diaspora professionals often emphasise the important role of personal and informal contacts in the exchange of information and for the decision-making. It is believed that the influence of Latvia would be greater if the public administration had better knowledge of decision-making processes, policy development processes and procedures in international organisations and EU institutions. Professionals working in international organisations see themselves as a resource that can advise also on global trends and views on any issues from the positions of specific international organizations.

4) The results of the study confirm that Latvian professionals working in international organisations see equally diverse benefits from cooperation with the public administration and other sectors in their homeland, as identified in studies conducted so far. They are also very interested not only in strengthening the international visibility and influence of Latvia (contribution to diaspora diplomacy), but also in providing their knowledge to Latvia's development (contribution to development).

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DEMOGRAPHIC CHALLENGES OF RURAL AREAS IN LATVIA: REFLECTIONS OF THE COVID-19 PANDEMIC

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Abstract. Typical case of rural depopulation represents a spiral of diminishing returns between negative natural population growth, shrinking employment opportunities, out-migration of the young, active and creative individuals and degrading socio-economic environments needed to support them. In 2020, health measures introduced due to COVID-19 pandemic by many European countries, including Latvia, have brought changes to the traditional concept of workplace, creating remote and hybrid working environments within multiple economic sectors. The rapid uptake of remote or hybrid working and the positive feedback of both workers and employers indicate a fundamental shift in the concept of workplace, suggesting a need to revisit the established rural population development approach. This study aims to evaluate the changes in rural population dynamics and population disposition towards demographic processes before and during the COVID-19 pandemic, while assessing the possible changes in the rural demographic development approach needed in order to encompass the changing realities. Authors use available population statistics and compare results of the two consecutive nationwide population opinion surveys carried out before and during the COVID-19 pandemic in Latvia. Study results indicate some new opportunities and new challenges for the rural population development in Latvia. Authors conclude that rural areas can benefit from the remote work possibilities, as it reduces role of employment constraints in the rural development equation. However, remote work is still unlikely to fix the rural-urban divide in Latvia, as many rural areas are lacking the necessary infrastructure or enabling institutions necessary to attract and sustain remote workers.

Key words: regional demography; COVID-19 pandemic; survey data.

JEL code: J11, I38, R1.

Introduction

Demographic viability of rural regions goes hand in hand with their social and economic well-being. Demographic processes are often found to be intricately and bi-directionally linked with local social and economic environment through direct and immediate mechanisms like employment and taxation, or more sophisticated and long-term interactions like gradual shifts in gender balance or age structure affecting workforce composition, causing skill-shortages and degrading economic output potential.

It is well accepted in the literature that a typical case of rural depopulation normally represents a spiral of diminishing returns between negative natural population growth, shrinking employment opportunities, out-migration of the young, active and creative individuals and diminishing social environments needed to support them (Hospers G. J. and Reverda N., 2015; Raugze I. et al., 2020). Therefore, it is not a surprise that most contemporary rural population development measures, being proposed or implemented in Latvia and elsewhere in Europe, seek to brake this downward spiral by either artificially creating new and diverse local employment opportunities, or encouraging economically productive population to move further from cities and metropolitan areas. This is usually achieved by promoting rural lifestyle, improving accessibility and speeding-up daily commute.

In 2020, COVID-19 pandemic has introduced noticeable changes in daily life and workstyle across the globe. Health measures introduced by many European countries, including Latvia, have brought some previously unfeasible changes to the traditional concept of workplace, creating remote and hybrid working environments within multiple economic sectors using modern IT solutions and communication tools

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(Kosteas V. D. et al., 2022). The rapid uptake of remote or hybrid working and the positive feedback of both workers and employers indicate a fundamental shift in the concept of workplace, suggesting a need to revisit the established rural population development approaches focused on the employment-driven demographic change.

The aim of this study is to evaluate recent demographic changes in rural areas in Latvia and to formulate main socio-demographic challenges and opportunities in rural population development (including reflections of the COVID-19 pandemic) on the threshold of third decennial of the 21st century. For this purpose, authors use available population statistics and results of the two consecutive nationwide population opinion surveys carried out before and during the COVID-19 pandemic. First survey (n=2049) was conducted at the beginning of 2016 within the research programme EKOSOC-LV (hereafter EKOSOC-2016 survey). Second survey (n=4457) with a significant portion of the same questions was launched during a COVID-19 pandemic in the middle of 2021 within the research project DemoMig (hereafter – DemoMig-2021 survey).

Noteworthy, ten years after the Population Census of 2011, a new Population Census was performed in Latvia in 2021. This recent Population Census was implemented with an innovative method – with the use of administrative data only (CSB, 2021). Changes happened in the description of population data collected by official statistics as well. Until 2019, Central Statistics Bureau (CSB) of Latvia published demographic data by factual place of residence. Since 2020, that practice was changed to the use of registered place of residence only (OSP, 2023). Such changes have to be taken into account in the analysis of time series data. Furthermore, since 1 July 2021 a new administrative territorial division was implemented in Latvia, which has led to recalculation of territorial statistics by the CSB, still ongoing. Additional insight to an actual residence is provided by experimental statistics (CSB, 2023).

Study results highlight new opportunities and new challenges for the rural population development. Authors conclude that rural areas can benefit greatly from the remote work opportunities, as it partially removes employment constraints from the rural development equation. However, remote work is still unlikely to fix the rural-urban divide in Latvia, as most rural regions are lacking the necessary social, economic and technical infrastructure or enabling institutions necessary to attract and sustain the remote workers.

Research results and discussion

This paper is structured into three sections. The first section provides an overview of the available regional population statistics, highlighting the urban-rural divide in demographic development of Latvia before COVID-19 pandemic and the observable changes in rural demographic processes during the pandemic years.

The second section mainly presents and compares selected results of surveys EKOSOC-2016 and DemoMig-2021 carried out before and during the COVID-19 pandemic. This provides additional insights into alterations of population mobility, remote work engagement and attitudes towards demographic development.

The third section features a discussion about the possible benefits and pitfalls of remote work in the context of Latvian rural demographic development. Authors examine both implications and prerequisites of remote work in rural areas in light of the available literature.

1. Rural population dynamics

Since 1990, when a number of population in Latvia during the whole post World War 2 period reached its maximum at 2.67 million people, depopulation processes started and continued in both urban and rural

areas. Decrease of urban population during 1990-2022 was more pronounced compared to rural: -31% and -27% respectively. That caused an increase in share of rural population among the total population of Latvia from 30.8% up to 32.0% (OSP, 2023 – Table IRD070). The share of rural population in 2021 in Lithuania was 32%, but in Estonia 31%. The share of rural population in all three Baltic States exceeded average of the European Union - 25%. The highest proportion of rural population was recorded in Poland (40%), but the lowest in Finland (14%), Denmark and Sweden (12%) (World Bank, 2021).

Since 2011, when consequences of 2008-2010 recession have settled, absolute and relative annual change in a number of urban and rural population of Latvia continued to be negative, but less extreme (Table 1). Contrary to that, during the years of COVID-19 pandemic absolute and relative annual decline of population both in urban and rural areas intensified compared to pre-pandemic period. Explanation for that may be found in population ageing and the fact that senior residents were more affected by COVID-19 pandemic and excess mortality, which led to higher age-specific mortality rates and accelerated rural depopulation in 2021-2021.

Table 1

Average annual absolute decrease (1) and average annual absolute decrease relative to number of population at the beginning of time period (2) among urban and rural population during 2011-2015, 2016-2019 and 2020-2021 in Latvia

	2008-2010	2011-2015	2016-2019	2020-2021
Urban population (1)	-27 455	-13 405	-10 711	-11 149
Rural population (1)	-11 613	-7 725	-4 610	-4 811
Urban population (2)	-1.84	-0.95%	-0.80%	-0.86%
Rural population (2)	-1.65	-1.16%	-0.73%	-0.79%

Source: authors' calculations based on OSP, 2023 - Table IRD070

Situation in the two neighbouring countries was different compared to Latvia. Estonia's urban population continued to increase both in pre-pandemic and pandemic years (Table 2). Contrary to that, increase of rural population in pre-pandemic years was replaced by decrease during pandemic years 2020-2021. In Lithuania, like in Estonia, urban population demonstrates positive dynamics during pandemic years compared to pre-pandemic periods. Absolute and relative decline of rural population worsened during the peak of COVID-19 pandemic.

Table 2

Average annual absolute changes (1) and average annual absolute changes relative to number of population at the beginning of time period (2) among urban and rural population before and during COVID-19 pandemic years in Estonia and Lithuania

	Estonia		Lithuania	
	2018-2019	2020-2021	2016-2019	2020-2021
Urban population (1)	3 892	7 002	-15 181	15 440
Rural population (1)	637	-4 514	-8 437	-9 486
Urban population (2)	0.43%	0.76%	-0.78%	0.82%
Rural population (2)	0.16%	-1.12%	-0.89%	-1.04%

Source: authors' calculations based on Statistics Lithuania, 2023 Table - Resident population by county and municipality at the beginning of the year, and Statistics Estonia, 2023 Table RV0291U

It should be noted that the factual number and the share of urban and rural population differ in official statistics when compared to experimental statistics. Breakdown of the population by urban and rural inhabitants in official statistics is performed according to their permanent place of residence. Urban

population, according to that criteria, refers to those persons who live in cities and towns with at least 2 000 usually resident population, and in a number of historically established cities, where the population may be less than 2 000. The status of a city and a town is assigned and cancelled by the Saeima with a law. All the remaining inhabitants of Latvia are categorised as rural population (CSB, 2023).

The criteria defining sparsely populated areas in experimental statistics allow characterising inhabitants residing in rural areas from a different perspective. That group of population, according to the criteria used in experimental statistics, includes all usually resident population living outside cities, towns and densely populated areas with at least 500 inhabitants. In line with this methodology, in 2021, population in urban (densely populated) areas in Latvia declined by 13 083, but in rural (sparsely populated) areas declined by 4 393, which resulted in the split between these groups in the total number of population of 80.0% and 20.0% respectively.

Experimental statistics data show that percentage of population in rural (sparsely populated) areas varies significantly by statistical regions: Pieriga - 19.4%, Vidzeme - 44.0%, Kurzeme - 28.9%, Zemgale - 32.3% and Latgale- 32.7% (OSP, 2023).

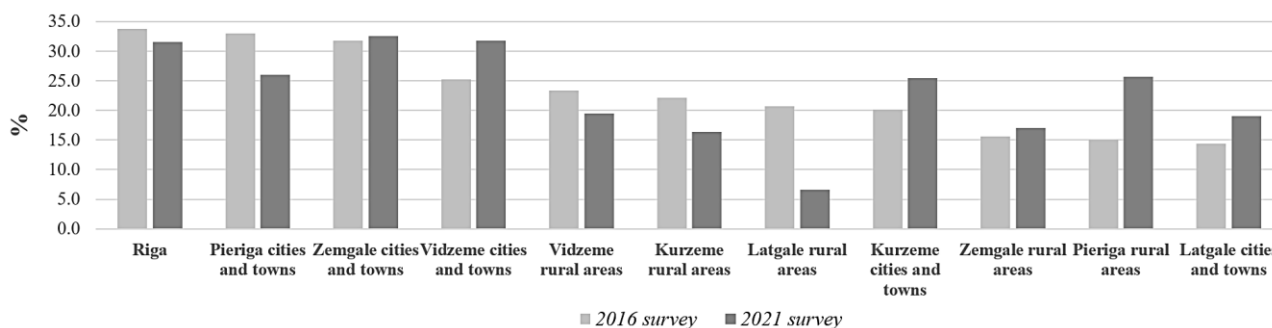
Pieriga region has the smallest proportion of population in rural areas, being closest to the capital city Riga and having the youngest age composition of population. It is the only region in Latvia with a positive increase of population number during 2011-2022, including largest positive internal migration saldo (21.8 thousand). Pieriga is also the only region with the positive natural population increase (3.0 thousand) over the same period. On the other end of the scale, Latgale region in the Eastern part of Latvia with the 2nd highest share of rural population had the biggest negative internal and international migration balance and the biggest natural decline of population among regions (excluding the capital city Riga).

Further analysis of the rural population dynamics and associated factors should be viewed in the context of the main statistical trends described above (international and internal net migration, as well as natural increase / decrease of population).

2. Population mobility, migration intentions and remote work

The comparison of the consecutive population survey results provides a unique opportunity for assessing changes in regional migration processes, population mobility intentions and engagement in remote work practices based on the first-hand data.

When comparing the reported mobility figures, we can look at the information provided by the respondents about their mobility during the five years leading up to the survey.



Notes: Weighted data. Numbers include mobility within the same city or municipality.

Source: authors' calculations based on EKOSOC-2016 and Demomig-2021 survey data

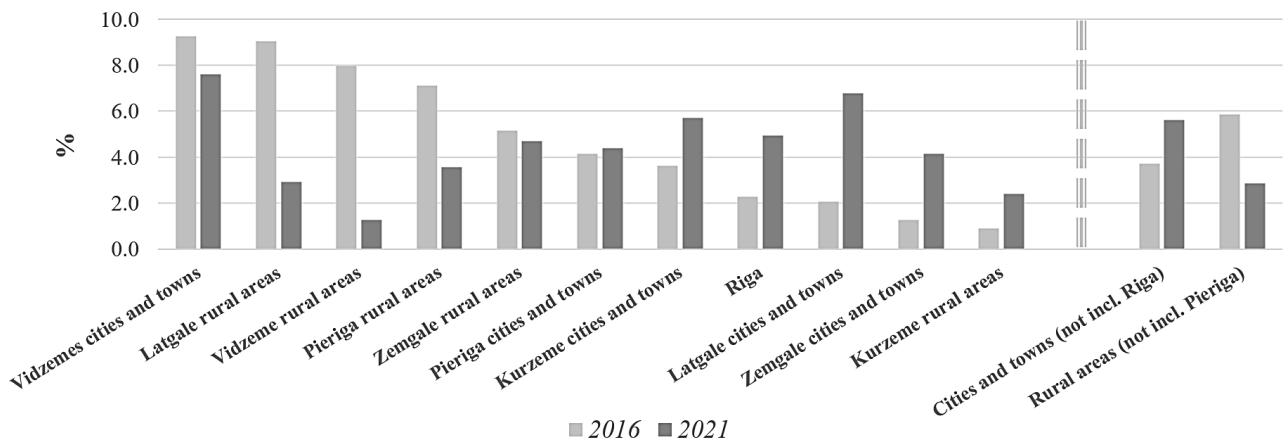
Fig. 1 Share of urban and rural residents who have changed the place of residence within five years leading to 2016 and 2021 survey

Figure 1 shows the share of those urban and rural residents in each region who have changed the place of residence within five years leading to 2016 and 2021 survey respectively. To give the overall evaluation of population mobility level, the numbers presented in this figure also include mobility within the same city or municipality. The total share of persons who have changed their place of residence is approximately the same in both periods included in the surveys – 25.7% and 26.2% respectively. Among the rural areas, Pierīga stands out the most, where 15% of the population lived in their current place of residence for less than 5 years in 2016, and 25.7% in 2021. This indicates increasing mobility processes in Pierīga, both when moving from other regions and changing the place of residence within the same area.

The opposite situation is in the rural areas of Latgale, where 20.7% of the population lived in their current place of residence for less than 5 years in 2016, and 6.6% in 2021. One can notice a general trend of increasing mobility in cities, as well as in the areas closer to Riga. Among persons who have changed their place of residence in the last five years leading to 2021 survey, the proportion of persons who came from another (not their own) region of Latvia has increased in all territories (except the cities of Kurzeme). This is most noticeable in rural areas, where 14.7% of immigrants were from another region in 2016 and 33.9% in 2021.

It is important to note that in Latgale (both in cities and in rural areas), a significant proportion of newcomers have previously lived abroad (in the 2021 survey - 8.4% of newcomers in cities, 9% in rural areas). From the literature, one can assume that a significant part of these individuals were return migrants (Mierina I. et al., 2021). Interestingly, in the 2016 survey results, there was a similar proportion of such newcomers in the cities and towns of Latgale (8.5%), but they were not found in the rural areas.

Looking into the near future, Figure 2 demonstrates the difference in migratory intentions of rural and urban populations between 2016 and 2021 surveys. In order to highlight potential inter-regional mobility changes, this figure represents only intentions to move to another municipality or abroad. Compared to 2016, the proportion of persons who plan to change their place of residence in the next year has increased in the 2021 survey (in 2016, there were 6.7% and in 2021 – 8.1%). However, this trend is mainly driven by the urban residents. The nationwide proportion of rural residents who plan to change their place of residence has decreased from 7.2% to 5.7%. This difference is even greater, if one does not count the Pierīga rural areas, which can be considered as a part of Riga metropolitan area (5.8% in 2016 and only 2.8% in 2021 survey). Particularly strong drop in migratory plans can be observed in Latgale and Vidzeme rural areas.



Notes: Weighted data.

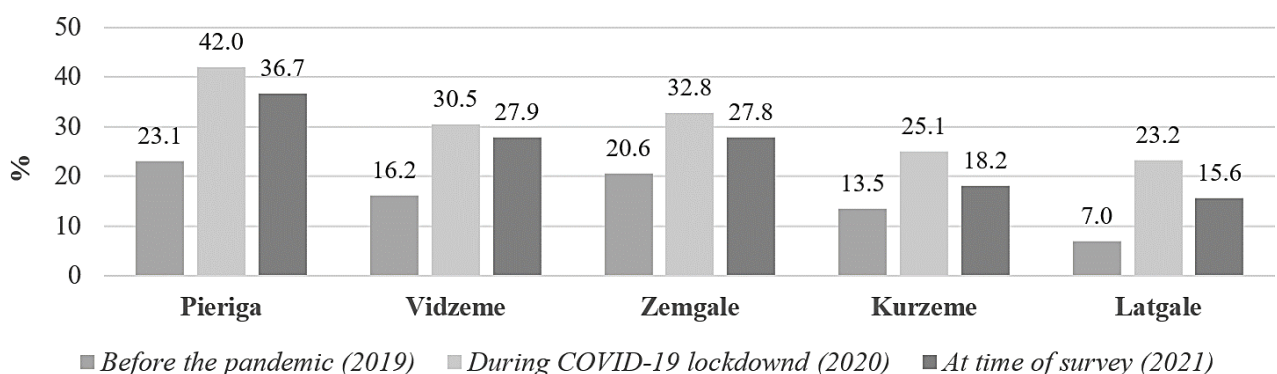
Source: authors' calculations based on EKOSOC-2016 and Demomig-2021 survey data

Fig. 2. Share of urban and rural population expressing wishes to move to another municipality or abroad in 2016 and 2021

The destinations, to which rural residents aspire to go, have also changed. In 2016, 5.1% of rural residents planned to go to another municipality within the borders of Latvia. In 2021, however, there were only 1.8% of such residents, but it was more popular to look for a new place of residence within the borders of the current municipality (2.6%).

Overall, it can be concluded that the mobility processes in the rural areas, with the exception of Pieriga (which falls within Riga metropolitan area) are on decline. The proportion of rural residents who have changed their place of residence (except for Zemgale) and those who plan to do so (except for Kurzeme) has decreased significantly.

The data presented above indicate that during COVID-19 pandemic Latvia was experiencing some level of so-called "urban exodus" event observed in many other European countries. However, we should remember that these numbers cover a highly specific time period of global pandemic. In order to benefit from these positive dynamics in the long term, it is crucial to understand the underlying processes and relations (Gutierrez E. et al., 2022).



Notes: Weighted data. Riga region is omitted from this figure, as it does not have rural areas.

Source: authors' calculations based on Demomig-2021 survey data

Fig. 3 Share of rural population working remotely or in hybrid format in 2019 - 2021

Figure 3 shows levels of rural population engagement in remote or hybrid work over the course of the COVID-19 pandemic. All rural areas presented an increased population participation in remote employment activities during the peak of the pandemic, which declined somewhat in 2021. Pieriga, Vidzeme and Latgale rural areas have demonstrated the highest growth in population working remotely or in hybrid format

in 2020, which correlates with observations about population mobility in these areas and supports information from other countries found in some literature sources such as Randall L. et al., 2022; Gallacher G. and Hossain I., 2020; Brynjolfsson E. et al., 2020. Retention of the remote employment after the peak of the pandemic was also high in rural areas of all regions. However, survey results for Kurzeme and Latgale rural areas show troubling decline of remote employment figures in 2021, which bring out concerns about the sustainability of the remote work model in these areas, as well as availability of remote working opportunities in locally predominant economic sectors (Dingel J. I., and Neiman B., 2020).

In order to explore the future prospects of remote work in Latvia, it is important to look at other available survey data sources. Recent study "Remote work as an opportunity to attract human capital for the development of Latvia" published by University of Latvia Center for Diaspora and Migration Studies (Mierina I. et al., 2021) provides further insights into attitudes and expectations of employees and entrepreneurs concerning the remote work, focusing on possible benefits for return migrants and diaspora members. Business surveys and employee interviews carried out within this study show, that even after the pandemic, a large part of the labour market hopes to continue working remotely. Employer surveys show that more than half of entrepreneurs plan to keep at least some of their employees working remotely or in hybrid formats. There is also a noticeable desire on the part of the employees to maintain a remote or hybrid work model.

All of the above suggests new possibilities for social, economic and demographic development of Latvia and its rural regions through implementation of various remote work models, which could make rural areas more attractive to economically active population groups and may even facilitate domestic and international return migration.

3. Challenges and opportunities for rural development

Limited observations and experiences recorded in the literature show that remote work has been proven to support development of rural areas and communities in several key dimensions (Davies A., 2021). Remote employment opportunities help building or safeguarding more diverse and inclusive local communities by attracting or retaining young professionals and bringing new local economic initiatives. If remote workers choose to move to or stay in rural areas, their taxes and daily spending may provide direct economic stimulus to the local businesses and municipal budget.

Revitalisation of regional business landscape through remote work is also an important aspect. Recent studies (Stefenberga D. et al., 2021) have shown that local businesses in Latvia face several principal challenges on their road to recovery after COVID-19 pandemic and that of overcoming current economic instability. These include adopting new digital technologies, accessing new markets, adjusting to changes in business environment and local customer solvency. Influx of remote workers to the declining rural areas may help addressing these concerns for local businesses. Furthermore, remote workers may help building ties with businesses located in urban areas and create networking opportunities between rural and urban economic actors.

However, not all rural areas are capable of attracting remote workers and capitalising from the changes in population mobility patterns. In this context, most successful rural communities share some common characteristics, which partially mimic urban and sub-urban socio-economic environment. These characteristics can include good internet access and sufficient local ICT infrastructure, as well as accessible public services and social venues capable of supporting younger and more active residents. The remote rural regions with limited possibilities to facilitate such basic requirements are least likely to succeed in attracting remote workers and participating in the on-line labour market. As a result, remote work alone is

unlikely to solve the urban-rural divide in Latvia or any other country (Braesemann F. et al., 2022). For example, Latvia and its regions already benefit from high level of internet availability; however, there are significant digital inequalities among regional populations that should be addressed in the context of remote employment possibilities (EUROSTAT, 2022; Lase K. and Sloka B., 2021).

Increased population engagement in remote or hybrid work does not necessarily mean better prospects for all rural areas. Observations presented in sections one and two of this paper clearly show the unequal distribution of population engaged in remote work and heterogeneous changes in regional migration trends during the last few years. One can clearly see these trends following the availability of aforementioned conditions and institutions enabling them. These institutions may include social services, networking opportunities, transport facilities and other venues supporting more diverse and active local community. Furthermore, age and gender composition of the remote workers must also be taken into consideration (Vanadzins I. et al., 2022; Moretti A. et al., 2020).

This does not necessarily imply that remote and traditionally agrarian rural areas cannot benefit from remote workers settling further away from metropolitan areas. Previous studies have underlined that such areas have a high potential for economic diversification thanks to their local natural and cultural resources. In order to capitalise on these resources, these regions need to be accessible and attract visitors from other areas, so that they can use local services and support local business (Rivza B. et al., 2019; Andersson M. and Karlsson C., 2004). A more distributed settlement of economically active population groups in some areas can have various positive spillover effects on neighbouring territories, which could not attract remote workers by themselves. With some remote workers choosing to settle further away from the capital (e.g. regional development centres), services in the surrounding areas will need to grow to match the specific needs of remote workers (Felstead A. and Henseke G., 2017), which in turn can benefit the larger surrounding communities.

As a final remark, one should consider the deliberation presented above in light of the broader rural depopulation trend across Europe and beyond. Several notable recent studies, including those carried out under the ESPON programme of the European Union (Raugze I. et al., 2020; Copus A. et al., 2021) have indicated that depopulation requires new ways of thinking about rural development, which views population shrinkage not as a burden, but as an inevitable reality or even potential positive opportunity. Under this mind-set, it is important to cautiously investigate local conditions in rural regions and invest accordingly in growth-focused or adaptation-oriented local policies. Findings of this study support such pragmatic approach and provide additional arguments and criteria for making the appropriate policy decisions.

Conclusions, proposals, recommendations

- 1) The decline in number of rural population in Latvia over the last three decennials was less pronounced compared to urban residents, which led to an increase in total share of rural population to 32.0% according to official statistics or to 20.0% in sparsely populated areas according to experimental statistics. Due to an excessive mortality among senior residents during COVID-19 pandemic, absolute and relative annual decline of rural population in Latvia intensified compared to pre-pandemic years, which resembled the situation observed in Estonia and Lithuania.
- 2) Survey results show that mobility processes in most rural areas of the country are on decline. The proportion of rural residents in all regions (except Pierīga) who changed their place of residence and those who planned to do so decreased significantly between 2016 and 2021. Particularly strong drop in migratory aspirations can be observed in Latgale and Vidzeme rural areas. Contrary to that, urban areas are showing increasing out-migration intentions among residents.

3) Pierīga, Vidzeme and Latgale rural areas demonstrated the highest increase of population working remotely or in hybrid format in 2020, which correlates with observations on population mobility in these areas. Retention of the remote employment after peak of the pandemic was also high in rural areas across the country. However, survey results for Kurzeme and Latgale rural areas show troubling decline of remote employment figures in 2021, which brings out concerns about the sustainability of the remote work model in these territories.

4) The study shows that rural areas can benefit from the remote work, as it reduces the role of employment constraints in the rural development equation. However, literature sources indicate that remote work is still unlikely to fix the rural-urban divide in Latvia, as many rural areas are lacking the necessary social, economic and technical infrastructure or enabling institutions necessary to attract and sustain the remote workers in the long-term.

5) The survey results and literature sources suggest exploring new possibilities for social, economic and demographic development of Latvia and its rural regions through implementation of various tailored adaptation policies, which could help rural areas cope with population change or become more attractive to economically active population groups.

Acknowledgements

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MOTIVATING FACTORS IN THE PROFESSION OF SOCIAL WORK IN LATVIA

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Abstract. The issues of social change and development, social cohesion and empowerment, elimination of inequality have been relevant and important in all societies at all times, and Latvia is no exception. An important prerequisite for their successful addressing is a well-developed social work profession and a sufficient number of qualified social work specialists. Despite the topicality of social work, its practical implementation in Latvia faces a number of problems, among them the country still lacks a significant part of the necessary specialists. This paper aims to analyse the factors that motivate people working in the demanding profession of social work in Latvia, revealing the main factors that should be addressed as a priority in solving the problem of insufficient number of employees. Empirical data was collected by survey method, n=145. The study is based on A. Maslow's needs theory and F. Herzberg's two-factor motivation model. It is analysed how social workers evaluate the importance of and the satisfaction with motivating factors; the attention is also paid to the factors that have a greater influence on the willingness to work to work in the field of social work. The research concludes that there is a difference in the opinions of social workers about the importance and satisfaction: more important factors have lower satisfaction scores, especially reward-related issues. This is one of the most important aspects that needs to be addressed, because the issues of pay, workload, working conditions are the ones that reduce the willingness to work in the social work profession.

Key words: social work profession, motivating factors, Maslow's needs theory, Herzberg's two-factor motivation model.

JEL code: J24

Introduction

The provision of social support including social work has been essential from the beginning of the formation of modern society. International Federation of Social workers (2014) gives a following definition of the profession "*Social work is a practice-based profession and an academic discipline that promotes social change and development, social cohesion, and the empowerment and liberation of people. Principles of social justice, human rights, collective responsibility and respect for diversities are central to social work*". In order to fulfil the tasks assigned to it, and to address needs, moral and ethical norms of society, legal obligations, and to promote the implementation of the defined principles, a sufficient number of professional and highly qualified social workers is a necessary prerequisite. However, despite the importance of social work, its practical implementation in Latvia faces several problems. One of them is a lack of professional staff. There can be several reasons for this, including the fact that in Latvia it has not yet been understood and accepted that a social worker is as necessary as a doctor in a modern society. Also, there are no serious studies of the dynamics of social problems, so there is no plan for how many social workers the country needs or will need in five or ten years.

Although the situation is improving with every year, the country still lacks a significant part of the necessary specialists. Only about 70% of social services provide the statutory norm: one social work specialist per 1000 inhabitants (Labklajibas ministrija, 2022). The lack of employees is also indicated by V. Anstrate (2019) "*... there is a crisis of shortage of workers in the industry. The variety of social problems is increasing, but the work is emotionally heavy, relatively low-paid. In addition, several years of study are required. ... Social workers are getting old, there are not enough new ones.*" The role of social work in Latvian society is essential, however, analysing the current situation in the industry, a problem can be seen with recruiting and attracting employees to the profession.

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The aim of the paper is to analyse the factors motivating people to work in the social work profession in Latvia. The tasks are: to give a theoretical insight into motivating factors; characterise the general motivation policy, and analyse different motivating factors emphasizing their importance and satisfaction with them in the social work profession.

The study is based on A. Maslow's needs theory and F. Herzberg's two-factor motivation model, which includes motivators (beneficially affecting job satisfaction) and hygiene factors (preventing employee dissatisfaction). The hypothesis that motivators and corresponding motivating factors of Maslow's theory are more important in the profession of social work than hygiene factors, despite that the latter correspond to the basic levels of Maslow's hierarchy of needs, will be tested.

Research results and discussion

1. Theoretical framework of motivating factors

Understanding and interpretations of motivation and related concepts, such as needs, motives, drives, desire, are very diverse and depend on the theoretical position of the authors. Sociological insight into issues of work motivation from different perspectives is provided by several sub-fields, of which sociology of organizations, sociology of work and career counselling theories address this issue most directly. From the organization theories of motivation that define specific motivating factors and characterize their influence, the most popular and widely used are Abraham Maslow's and Frederick Herzberg's theories.

According to Maslow, human decision-making is determined by a hierarchy of needs. He proposed five main needs forming the basis of human behavioural motivation, and grouped needs into five levels and arranged them in a hierarchical order:

1st - Physiological - basic issues of survival such as nutrition, housing, health etc. Organizations usually respond to them with salary, health insurance and stable employment;

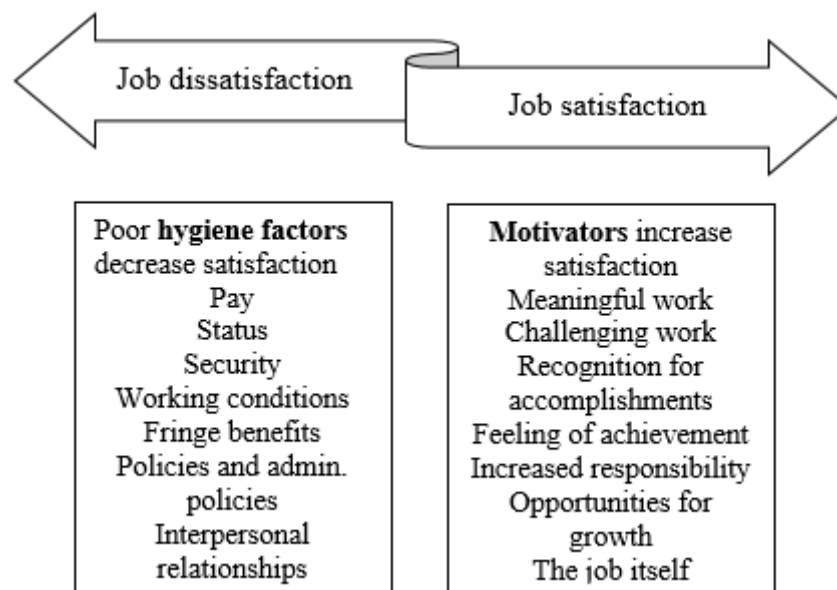
2nd - Security - stable physical and emotional environment issues such as benefits, pension, safe work environment, and fair work practices;

3rd - Belongingness or social needs - social acceptance issues such as friendship or cooperation on the job. In organizations, they are usually manifested by the formation of informal groups of employees, but on the part of organizations, to satisfy them, they tend to hold joint events, promote teamwork, provide opportunities for contact etc.;

4th - Esteem - positive self-image, respect, reputation and recognition issues such as job titles, nice workspaces, and prestigious job assignments, tend to use various reward systems for success, from simple praise to promotion, information about successes and evaluation of their importance etc.;

5th - Self-Actualization - achievement issues such as workplace autonomy, challenging work, and subject matter expert status on the job. Organizations address them by providing employees with new challenges, independence and responsibility, and opportunities for growth (Tanner, 2022; Laegaard, Bindslev, 2006).

Based on the findings of Maslow, Herzberg came up with his so-called the two-factor theory of motivation, which is still one of the most influential and discussed theories in the field of motivation. He concluded that satisfaction and dissatisfaction could not be measured reliably on the same continuum (Nickerson, 2021). Herzberg added a new dimension to Maslow's theory by dividing the motivation factors of employees not only into separate groups but also assigning them a movement from unsatisfied to a neutral and satisfied state within certain limits. According to Herzberg, it is important to divide all influencing factors in only two groups - motivators and hygiene factors.



Source: Authors' created based on Kurt, 2021; Nickerson, 2021

Fig. 1. Herzberg's motivators and hygiene factors

Hygiene factors are responsible for preventing the feeling of dissatisfaction but they cannot create satisfaction. They only prevent discomfort, which would otherwise interfere with the full performance of one's work duties. On the other hand, motivators are responsible for creating a feeling of satisfaction. Their absence does not cause dissatisfaction, but allows to perform duties without special motivation, however, in order to stimulate employees to work with greater pleasure, dedication and efficiency, this is exactly the group of factors that should be paid attention to. "In such a model, there is even a possibility that the employee is both satisfied and dissatisfied at the same time - "I love my job, but I hate the salary" situation" (Rice University, 2019).

It can be assumed that by nature hygiene factors correspond to the first three basic levels of Maslow's pyramid of needs while motivators correspond to two highest levels of the pyramid. The main novelty of the theory is the conclusion about the ability of these factors to influence the employee's sense of satisfaction, and the two groups of factors do not overlap in their influence but work in complementarity. Hygiene factors and motivators are distinct. These two separate continua support the possibility that someone can be content with certain aspects of their jobs but discontent with others.

2. Motivation policy

Motivating factors and their practical use in an entire industry is determined by the existence of a unified employee motivation system and recruitment policy. Already in the state's strategic planning documents, as in the long-term conceptual document "A growth model for Latvia: People first", the person, the resident of Latvia, is put in the foreground, prioritizing the interests, wishes and actions of the individual. The model is based on a people-centred approach and foresees nationally coordinated actions to address employment, availability of human resources etc. issues (A growth model ..., 2005). In "Sustainable Development Strategy of Latvia until 2030", among the priority directions of action, it is envisaged to increase labour force participation and make maximum use of all available human capital, as well as to develop the availability of social services by developing the care economy (Sustainable Development Strategy..., 2010). Likewise, in the National Development Plan of Latvia for 2021-2027, the direction of action "Social inclusion" has been determined emphasizing the importance of social work, aiming to improve the motivation and remuneration system, and professional competence of social workers and social service providers, as well

as to strengthen social policy planning, monitoring and evaluation systems (Latvian National Development..., 2020). The Ministry of Welfare has developed a policy planning document "Social protection and labour policy guidelines for 2021-2027", which foresees several goals, directions of action and tasks in solving problems related to social work (Socialas aizsardzibas un..., 2021).

From the policy planning documents, it follows that the general state policy foresees a unified, strategic approach, goals and tasks for the development and implementation of policies related to social work, recruiting and motivating employees, increasing the quality of work and remuneration, as well as solving problems related to the working environment such as work safety, gender inequality and disbalance, access to the latest technologies etc. However, planning documents are essentially only plans or wishes that employers consider necessary to provide to potential and existing employees, but the success of the implementation of these plans, which would characterize the actual situation, may be different.

The conducted studies (Safege Baltija, 2012; Baltic Institute of Social Sciences, 2020; 2021) show that, although the general planning documents define the need and specific tasks for a unified approach to the recruitment of employees and motivation system in the public sector, in practice, the results of the implementation of such plans in the social work sector are not noticeable. The understanding of the mentioned issues depends on the individual situation and opportunities. The situation in the industry has not significantly improved at least in the last ten years, and all the expected positive effects have remained only at the planning stage This significantly reduces confidence in the possibility of achieving the set goals and the effectiveness of the planned actions. thus, affecting the attractiveness of the social worker profession in the eyes of potential and existing employees, as well as the entire society.

3. Methodology and sample

A quantitative approach - a survey method - was used to collect empirical data. The survey took place from February 24 to March 7, 2022. The convenience or availability method of sampling was applied. The survey questionnaire was created and distributed using the online survey tool Google Forms, and a link was sent to the social services of all municipalities with a request to forward it to all their social workers. 145 responses were received from 1304 social workers (Labklajibas ministrija, 2020). The margin of error is 7.27%. Respondents were offered to evaluate various statements that cover all groups of needs and express various characteristics of the profession. A 5-point scale was used to measure the importance of motivating factors and satisfaction with them, where 1 corresponds to the lowest rating and 5 to the highest. Mean values were used for further analysis.

A fairly even distribution of respondents was obtained across Latvia: 21% from Riga, 8% from other national cities of Latvia, 23% from Latgale, 21% Vidzeme, 21% from Kurzeme, and 6% from Zemgale. Among all respondents, only 1 was a man, that confirms that social work is a so-called "female profession", therefore data analysis by gender is practically impossible. The average age of the respondents is 45.5 years; the sample mode is 52 years, which indicates that mostly older people are employed in social work; 13% of the respondents are aged 60+, which is very close to or over the retirement age.

4. Importance of motivating factors

The analysis of the situation in the social work profession indicates that such aspects related to motivating factors as educational opportunities, job stability, support, development opportunities and general social needs can be evaluated positively, while negatively - the high demands placed on employees, relatively low wages, work environment risks, workload, use of technology, gender disproportion,

employees' evaluation system, prestige of the profession and opportunities for career growth (Baltic Institute of..., 2020; 2021; Labklajibas ministrija, 2020; 2022).

The survey data shows that in general the respondents have recognized practically all motivating factors as important or very important. This means that one specific factor, which should be given the greatest attention in the motivation of social workers, cannot be singled out but practically all groups of factors must be addressed at the same time.

Table 1

Importance of motivating factors

Factors	Mean	Maslow's theory		Herzberg's theory	
		Factors	Mean	Factors	Mean
Social status, prestige	3.78	Self-Actualization	4.18	Motivators	4.23
Success at work	4.18				
Acknowledgement of success	4.28				
Overall performance of the organization	4.48				
Career opportunities	3.80	Esteem	4.28		
Professional growth	4.41				
Degree of responsibility	4.42				
The work process itself	4.50	Belonging-ness	4.59		
Relations with subordinates	4.41				
Relations with colleagues	4.60				
The attitude of the superior	4.76	Security	4.61	Hygiene factors	4.60
Job retention guarantee	4.48				
Working conditions	4.68				
Safe working environment	4.68				
Work - personal life reconciliation	4.51	Physiological	4.58		
The amount of the salary	4.64				

Source: created based on the authors' calculations

Theoretical sources most often highlight women's pursuit of stability and security, accepting lower pay or worse working conditions (Giddens, 2006). The data from this study shows a slightly different picture. Although safety and stability aspects are recognized as most important in theory, the factor of job retention guarantee, which is a direct measure of job stability, is only in the 8th place in terms of importance. However, it should be noted that there is a small difference between the ratings of all factors. So, although the stability factor is not among the first in terms of ranking, it is not far behind the most important factors in terms of mean value. Therefore, no significant inconsistency with the theory can be found here. On the other hand, remuneration and working conditions take the 3rd and 4th place in terms of importance, so it can be concluded that even if such theoretically-marked reconciliation actually takes place, it happens reluctantly, and the factors of remuneration and working conditions still have high importance in the so-called 'female professions', including social work.

The hierarchy of groups of motivating factors in social work in Latvia does not fully correspond to Maslow's theory. The study shows that the factors related to security and stability are slightly more important than physiological needs factor, which satisfaction depends on the salary. The physiological needs have fallen from the 1st to the 3rd place, which coincides with the findings of the sociology of work on the specifics of the choice of the career in 'female professions'.

Regarding Herzberg's theory, hygiene factors are the most important as it follows from the survey data. In a territorial section, the importance of hygiene factors over motivators is most pronounced by social workers in Latgale and Latvia's national cities, except for Riga but least pronounced in Riga and Kurzeme.

In general, it can be concluded that the factors associated with the lowest levels of the hierarchy of needs according to Maslow's theory and the hygiene factors which by themselves do not cause job satisfaction according to Herzberg's theory, are more important for social workers. Such situation in the profession probably exists due to the many still unresolved problems.

5. Satisfaction with motivating factors

The study also focused on how satisfied social workers are with the actual situation of motivating factors in their workplace. Respondents were offered to evaluate several statements about each of the factor groups of Maslow's and Herzberg's theories, respectively. In general, the data shows that social workers are more satisfied than dissatisfied. When analysed by territorial section, a lower rating than the average was shown in Riga and other national cities of Latvia but it was higher in the regions.

Table 2

Satisfaction with motivating factors

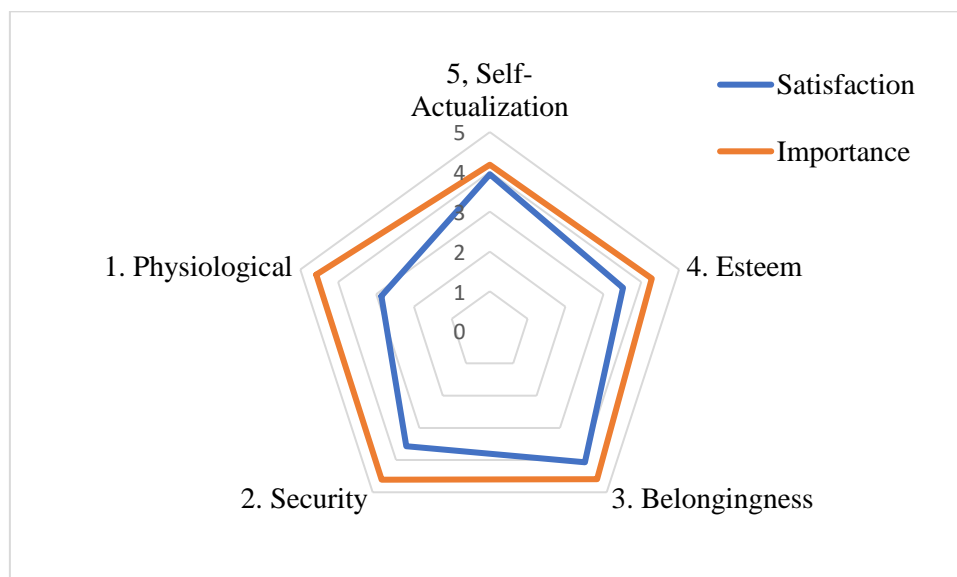
Maslow's theory		Herzberg's theory	
Factors	Mean	Factors	Mean
Self-Actualization	3.94	Motivators	3.72
Esteem	3.52		
Belongingness	4.07	Hygiene factors	3.64
Security	3.57		
Physiological	2.86		

Source: created based on the authors' calculations

Of all the motivating factors, the statements related to the group of physiological needs factors received the lowest ratings, especially those related to remuneration (mean values 2.59 - 2.99), and the prestige of social work profession (2.41). At the same time, the statements related to social needs factors got the highest ratings - cooperation with colleagues (4.31 - 4.53), with managers (4.14). The opportunities for professional self-actualization were highly assessed, especially, the professional skills and abilities they already possess. Social workers also are relatively satisfied with job stability and the importance of the profession in the society (mean vary from 4.04 to 4.24).

Evaluating the survey data in the context of Herzberg's theory, it can be seen that both groups of factors are assessed very similarly, with a slight predominance of motivators over hygiene factors. However, differences in data dispersion between them should be noted. If within the group of hygiene factors there are both the highest and the lowest rated factors, that is, there is a high dispersion of data (standard deviation 0.59), then in the case of motivators all results are more similar (standard deviation 0.47).

Analysing the importance of motivating factors and the level of employees' satisfaction with them, it can be seen that social workers gave higher ratings to the importance (mean 4.18 - 4.61) than to satisfaction with them (2.86 - 4.07). The highest satisfaction rating is lower than the lowest factor importance rating, which leads to the conclusion that there is an imbalance between what is important to social workers (what they expect) in their work and the real situation in the profession.



Source: created based on the authors' calculations

Fig. 2. Satisfaction and importance of motivating factor groups

Social workers express a high level of satisfaction and low importance for the groups of self-actualization and esteem factors, which make up the entire group of motivators according to Herzberg's theory. On the other hand, all groups of factors corresponding to Herzberg's hygiene factors are of high importance but the level of satisfaction with them differs. The group of physiological needs factor should be noted here with the largest discrepancy between the two assessments. Therefore, this is the issue that requires the greatest and most urgent attention. Other hygiene factors – factors related to safety and social needs – are with a high level of importance and satisfaction. Although it can be concluded that there are no significant problems with them at the moment, however, considering that they greatly affect the motivation and satisfaction of social workers, it is necessary to monitor their condition so that the situation does not become worse in the future. Keeping in mind that not all factors in these groups are assessed equally high, the focus should be maintained on improving some potentially problematic aspects, such as communication issues between managers and subordinates or provision of all necessary resources.

The results of the survey also show that social workers are dissatisfied with the general state social policy and the results of its implementation, which in itself reduces the motivation to be a part of the relevant sector, however, at the same time, the workers are a little more optimistic about the implementation of the policy in their organization.

The conditions that would affect leaving the social work profession were focused on as well. The respondents in general are not strongly inclined to change their profession. The data show that 14% are determined to remain in their profession under any circumstances, and 71% are currently not thinking about the change, however certain factors can facilitate it, while 10% of respondents have already decided to leave social work. In a territorial section, social workers in Riga and other national cities of Latvia, as well as in Zemgale, are the least likely to think about changing their profession, but in the other regions, such plans appear relatively more often. The most problematic factors that could contribute to the change of profession are related to insufficient remuneration, workload, working conditions and the prestige of the profession (50 - 60% of social workers would consider leaving, if they were offered another job with higher salary, less workload or better working conditions). But the levels of responsibility, more challenging work and development opportunities have only a minor impact on that.

Overall, social workers are more satisfied than dissatisfied with most motivating factors and their situation in the industry. The average rating of all statements is 3.68 out of the maximum possible 5 points. This is also confirmed by the relatively high ratings for "I am satisfied with my choice of profession" (3.91) and "I am happy to go to work" (3.65). However, there is undeniably room for growth and improvement here.

Conclusions

- 1) According to the theories of Abraham Maslow and Frederick Herzberg, a person's motivation to do work is influenced by such factors as salary, working conditions, job security, social contacts with other employees, success, growth opportunities etc.
- 2) In Latvia, the general state policy foresees a unified strategic approach, goals and tasks for the implementation and development of policies related to social work, recruiting, attracting and motivating employees.
- 3) The research results show the difference in the opinions of social workers about the importance of various motivating factors and satisfaction with them. Social workers consider to be the most important those factors related to security, belongingness and physiological needs (lower levels of Maslow's pyramid), but they are more satisfied with belongingness and self-actualization (the 3rd level and the highest level of the pyramid, respectively). Similar results are shown by comparison between Herzberg's motivators (which correspond to the highest levels of Maslow's pyramid) and hygiene factors (three lowest levels): hygiene factors are more important to social workers, but motivators have higher satisfaction scores. Therefore, the proposed hypothesis is not confirmed.
- 4) Serious problems are currently observed in the group of physiological needs factor including mainly reward-related issues. The factor is rated as one of the most important and at the same time received the lowest satisfaction ratings. Therefore, this is one of the most important aspects that needs to be addressed, as the issues of pay, workload, working conditions are the ones reducing the willingness to work in the social work profession but their successful solution could be motivating for employment in the social work profession.

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SOCIAL MARKETING: PROMOTING A CHANGE IN PUBLIC BEHAVIOUR. A CASE STUDY OF COMPANY "RIGAS MEZI"

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Abstract. Social marketing is often used in public administration and in the activities of NGOs, for example in health care, traffic safety, anti-corruption etc, but there is a lack of case studies on the design of these campaigns, the methods used, as well as the results achieved. However, public administration and NGOs are not the only ones that can use social marketing to change the social order, since in business too, public opinion and action often affect and influence companies in various sectors that work in the public interest or manage state and municipal property. The aim of the study is to develop a concept for the implementation of social marketing campaigns, based on theoretical knowledge about social marketing and empirical data analysis. In order to achieve the objective of the study, the monographic method, the document analysis, the secondary data analysis, the contextual analysis and the quantitative data analysis to find out consumers' views on social marketing and what tools would encourage behaviour change. Based on the findings of the study, a concept was developed for the future implementation of social marketing campaigns. Findings. It was concluded that educational/informative materials, real experience stories, statistics and facts, increasing penalties and legal liability, as well as the introduction of new solutions, such as the deposit system for new groups of consumer goods, contribute to a change in social behavior. Company "Rigas mezi" needs to focus on reducing pollution, preserving and enhancing natural values and reducing forest fires. Based on the theoretical and practical research, the authors developed a social marketing impact process, which is presented as a theoretical social marketing impact scheme.

Key words: consumer behavior, municipal corporation, social behavior change, social marketing, sustainable development goals.

JEL code: M31

Introduction

Already in the 1970s, researchers in the USA saw an opportunity to use marketing principles applied in business to solve various social problems in order to initiate a change in public opinion or behaviour. This was the beginning of the concept of social marketing, which is most often practised in public administration, non-governmental and non-profit organizations in order to promote social welfare in areas such as environment, health, material well-being, security etc.

In recent years, several social campaigns have been running in Latvia in the areas of health care, traffic safety, combating corruption and the shadow economy, and solving environmental protection issues. However, there is a lack of detailed research of these campaigns, including on the application of methods, measurement of the results achieved etc., which could serve as a foundation for more effective communication between public administration and the public regarding sustainable development issues.

Public administration and non-governmental organizations are not the only sectors that use social marketing to create changes in the existing order in society and promote social, economic, and communicative effects. Public opinion and actions are also relevant in the business environment directly affecting and impacting companies of various sectors with a public-service mission, including the management of state and municipal properties.

Waste discarded by the members of society, malicious or unintentional forest fires, destruction of the forest with motorized vehicles etc. are just a few examples of harmful activities faced on a daily basis by companies that manage municipal properties, such as forests. The reasons for harmful public behaviour can be different and include ignorance, impunity, lack of knowledge and awareness etc.

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Research results and discussion

The social marketing in essence is based on the idea that socially desirable behaviour or public behaviour can be achieved more effectively if marketing methods are applied in addition to social advertising (Kotler F., Zaltman G., 1971). To understand the role development of the concept of social marketing, several definitions of social marketing were analysed. These include, for example, that "social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviour that benefit individuals and communities for the greater social good. Social Marketing practice is guided by ethical principles. It seeks to integrate research, best practice, theory, audience, and partnership insight, to inform the delivery of competition-sensitive and segmented social change programmes that are effective, efficient, equitable and sustainable" (International Social Marketing Association, 2017). "Social marketing is a process that uses marketing principles and techniques to change priority audience behaviors to benefit society as well as the individual. This strategically oriented discipline relies on creating, communicating, delivering, and exchanging offerings that have positive value for individuals, clients, partners, and society at large" (Lee N. R., Kotler P., 2019). Social marketing is a practice-based framework guided by ethical principles, integrating "research, best practice, theory, audience, and partnership insight, to inform the delivery of competition-sensitive and segmented social change programs that are effective, efficient, equitable and sustainable" (Bardus M., Assaf S. A., Sakr C. J., 2023). Therefore, it can be concluded that social marketing that combines ideas borrowed from commercial marketing and social sciences is a proven tool for influencing behaviour in a sustainable and cost-effective way (National Social Marketing Centre, 2022). As the definition of social marketing evolved, the benefits of social marketing programmes were identified over time. For example, initiated behavioural change promotes public benefit and well-being (Bormane, S., Batraga, A., 2018; Bormane, S., Putans, R., 2022).

The biggest difference between social and commercial marketing is the product. Commercial marketing involves specific products and services, whereas social marketing mostly promotes intangible and more conceptual products. In the case of social marketing, the product is increasingly related to changes in an individual's thinking, attitude, lifestyle, or behaviour (Liao C., 2020). Therefore, social marketing activities should be focused on creating value and offer to society, emphasizing a product, service, idea, or some type of experience. The company has to become attractive in the eyes of the target audience, thus finding the possibility of solving some social problem or satisfying the needs and desires of the consumers (French J., Gordon R., 2015). First, however, a detailed feasibility study of the situation is required. The causes of unsuccessful social marketing campaigns include insufficient research of the problem, weak development of social marketing intervention strategy, erroneous or inaccurate identification of interested parties (target audience), management, and lack of consistent action (Cook J., Lynes J. Fries S., 2021; Akbar, M. B., Foote, L., Soraghan, C., Millard, R., Spotswood, F., 2021).

Competition can be considered essential when planning social marketing programmes. It can either promote or prevent change. When developing social marketing programmes, competitive aspects should be taken into account; and activities promoting interaction and change, as well as, in the case of competition, neutralizing/obstructing activities, should be developed.

In order to effectively implement social marketing programmes, it is necessary to apply the elements of the marketing mix – product, price, place, and promotion. Similar to commercial marketing, it is necessary to contemplate and evaluate each of these elements for use in the context of social marketing. In social marketing, ideas can serve as the product, whereas changing people's actions or behaviour can be the price. On the other hand, place and promotion in social marketing work in the same way as in

commercial marketing, and both require considering the place and channels of product distribution, i.e., the means of product promotion.

The role of consumer behaviour in social marketing. In the context of social marketing, consumer behaviour plays a decisive role. This is caused by the fact that the expected result of a social marketing intervention is a change in public behaviour. It raises the issue of what exactly creates, influences, and changes consumer behaviour.

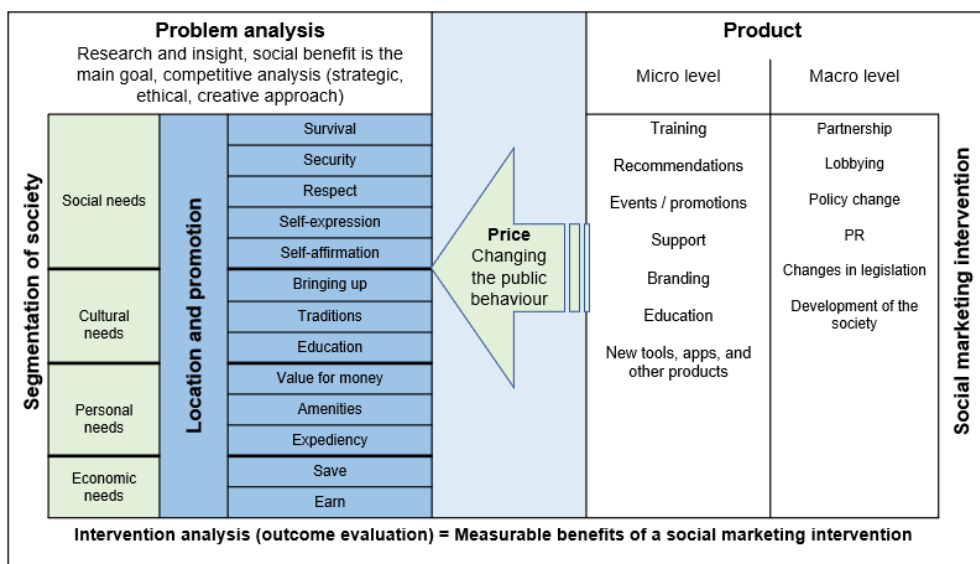
Instead of simply buying products and services, consumers are looking for solutions to their existing and potential problems. Consumer behaviour is complex and often unpredictable. It is driven by the social, cultural, personal, and economic needs of consumers (Rajagopal, 2018). This means that the adoption of new behaviour largely depends on whether the offer will conflict with either of the drivers of consumer behaviour. When implementing social marketing activities, efforts should be made to ensure that the product created meets the defined social, cultural, personal, and economic needs.

Consumer (including public) behaviour is largely driven by the creation of needs and the available solutions that satisfy consumer demands (desires and needs). By understanding the problem, it is possible for social marketing practitioners to more accurately determine the target audience, create acceptable concepts for changing behaviour, and as a result, achieve higher efficiency. For example, researcher M. L. Rothschild offers a conceptual framework for the behavioural management of public health and social issues by providing three tools that promote behaviour change: education, value exchange offer, and changes in legislation. The application of these tools depends on the specific target audience's desire and motivation to change or, on the contrary, reluctance to engage (Rothschild, M., 1999).

In order to encourage the society to change its behaviour, one or more of the following conditions must be met: 1) the individual has fully developed a strong positive intent (commitment) to act; 2) there are no environmental restrictions that make it impossible for action to occur; 3) the individual has the necessary skills to act; 4) the individual must believe that the advantages (benefits, expected positive result) arising from the action are greater and more significant than the disadvantages (costs, expected negative result), in other words, the person must have a positive attitude; 5) the social (regulatory) pressure to perform an action felt by the individual must exceed the willingness to do nothing; 6) the individual must consider that the performance of an action is compatible with his/her self-image or that its performance does not violate personal standards that activate negative self-sanctions; 7) the individual's emotional reaction upon taking action should be more positive than negative; 8) the individual should consider that he/she has all the necessary talents to be able to perform the specified actions in different situations and conditions (Fishbein M., Ajzen I., 2009). These conditions include barriers that must be overcome for action to occur. This means that in order to achieve a change in public behaviour, it is necessary to develop a strategy that includes techniques which can "break down" the barriers interfering with consumer decisions. In order to be able to do this, it is first necessary to find out which of all the barriers are involved in making a specific decision, and therefore, these should be the focus of the campaigns. In addition, it is necessary to find the points of contact that act on select emotions and psychological stimuli that promote action. The created campaign communication and visual and informational materials should include the above-mentioned points of contact so that they are attractive to the target audience. The above is represented in the theoretical social marketing impact scheme that reflects the interaction of the elements of the marketing mix and the process of changing public behaviour (Fig. 1).

In general, the process can be divided into several stages: 1) *problem analysis* (implemented at the basis of each marketing intervention planning stage). Actions of the members of society are stimulated by unlimited desires and needs. In general, they are divided into social, cultural, personal, and economic

needs. However, in order for social marketing to be more effective, segmentation of the society must be carried out for each intervention, including determining what needs stimulate existing actions or attitudes; 2) *product development*, which can be divided into micro and macro levels. At the micro level, products affect the target audience, a small part of society, or even each individual separately, while at the macro level, social marketing programmes and products affect a broad section of society or even society as a whole; 3) *product promotion* (including advertising and display). Through awareness of the needs of the target audience and following the development of the product, it is possible to determine where and in what way the product should be promoted – what marketing communication channels and activities will be used to reach the target audience; 4) *Pricing*. Pricing is the middle-stage between product development and problem research – in social marketing, it is manifested as a prediction of behaviour change. Namely, the higher the change in public behaviour, the smaller the initially identified problem becomes. In the model, "price" is represented as an arrow pointing in the direction of society's needs. Namely, the more the initially identified needs are met, the more likely it is that a change in behaviour will occur in society.



Source: authors created based on literature review

Fig. 1. Theoretical social marketing impact scheme

Analysis of the intervention, including regular surveys, data collection and comparison, should take place at all stages. It also allows for the adjustment of the products, as well as in the case of effective intervention, reveals the achieved results, which are manifested in the public benefit and various types of benefits for the organization (the initiator of the intervention). The performance of social marketing activities cannot be determined using classic marketing measurements, therefore, in order to determine the performance of social marketing, each activity may involve different types of data and means of obtaining information.

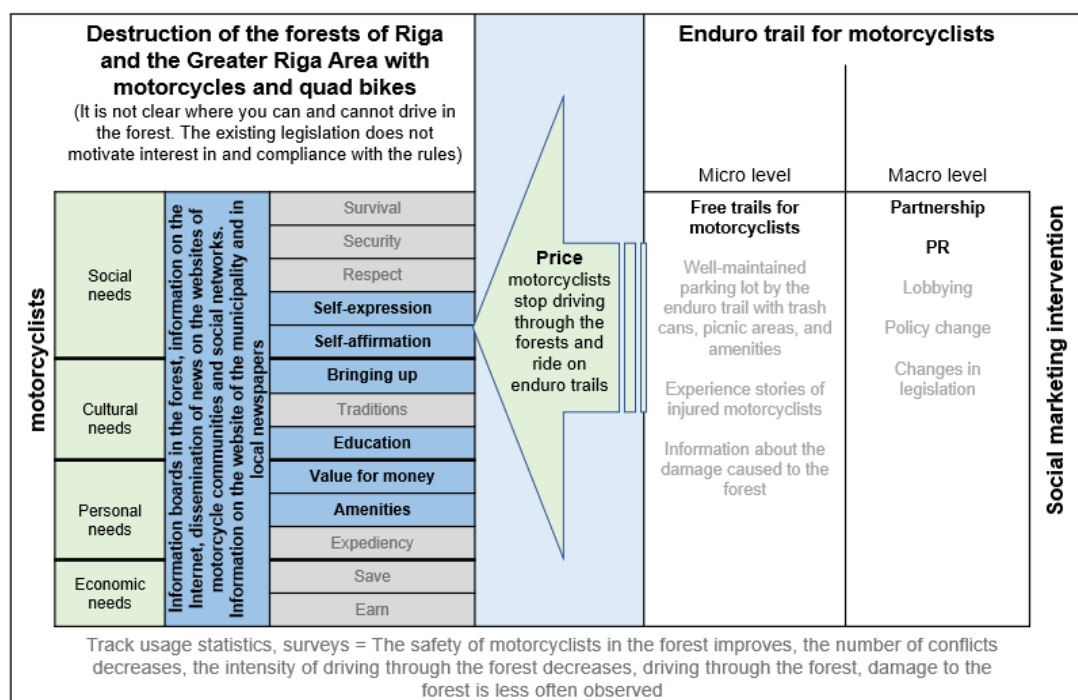
In general, it can be concluded that the public administration, non-governmental organizations, other non-profit organizations, and companies that practice social marketing provide a benefit to the society through various marketing activities and promote a change in public behaviour. As a result, the implementation of social marketing can give organizations recognition, create competitive advantages, highlight brand value, and reduce expenses that caused by the activities to mitigate the consequences arising from unwanted public behaviour (Kotler P., Hessekiel D., Lee N., 2012).

Materials and methods

The case study of company "Rigas meži", a commercial enterprise owned by Riga City municipality that deals with the administration and management of forests, public greenery, and other types of real estate owned by the municipality (company "Rigas meži" website, 2022). The company manages territories that are home to a large number of the residents of Riga metropolitan area, and other cities, and every day the company faces various consequences of human actions.

The company implements and participates in social initiatives in order to reduce the consequences of these actions or to change the habits of the society that are environmentally harmful. The case study is based on the social marketing campaign "Enduro trails – experience the forest on a motorcycle!" ("Enduro takas – piedzīvo mežu uz moča!"). The campaign is a unique product. Enduro trails are marked routes created in the forest for motorcycle and quad bike riders. Similar to walking trails, they are designed for public recreation, however Enduro trails are tailored for motorcycles.

The purpose of Enduro trails is to make visiting them safer, more comfortable, and more interesting than the usual forest trails that are often located in protected natural areas or close to populated areas, including recreational facilities. With this campaign, the company wants not only to protect nature and make enduro motorcycling more controlled, conscientious, and cultured than before, but also to reduce conflicts and mutual dislike between the groups of society representing different interests. Motorcycling in the forest very often causes dissatisfaction among certain members of society, which manifests in a variety of ways, and in more radical cases it even poses a threat to people's health, for example, when traps are set in the forest to punish motorcyclists.



Source: authors created based on case study (social marketing campaign case study)

Fig. 2. Integration of the campaign "Enduro trails – experience the forest on a motorcycle!" into the social marketing impact scheme

Using the theoretical social marketing impact scheme as a basis, the Enduro trails campaign is integrated in this scheme to discover if and how the tools and methods used in this campaign affect the identified problem, and whether they meet the needs of the motorcyclists.

The impact scheme of the campaign "Enduro trails – experience the forest on a motorcycle!" defines the problem and identifies the causes of the problem. Additionally, the needs of the motorcyclists have been determined, contributing to the existing actions, and these must be satisfied by the social marketing product, namely, Enduro trails for motorcyclists. The product of this social marketing programme is Enduro trails, which are able to address the need for self-expression and self-affirmation, but do not satisfy the need for awareness and education. Currently, such trails are not very good value for money, nor do they provide sufficient amenities. In order to be able to act on all the existing action-stimulating needs, it is necessary to expand the social marketing offering with additional products and influence-promoting tools.

Based on the lessons learned in the case study, a survey was developed to find out the opinion of consumers about social marketing and what tools would promote a change in public behaviour. The purpose of the survey was to find out which social marketing tools would promote a change in public behaviour, as well as how the society would benefit from practising social marketing.

Based on the limitations of the research, the target audience of the survey is the residents of Riga metropolitan area of working-age. According to the data available on the Official Statistics Portal of Latvia, of Riga metropolitan area was home to 612,655 people of working age in 2022, forming the general dataset (Official Statistics Portal of Latvia, 2022). Using the research sample calculation tool, it was determined that the size of a representative sample with 5% error equals 384 respondents (Raosoft, 2022). The survey was conducted electronically and distributed via Facebook groups for the people living in the neighbourhoods of Riga metropolitan area with a total of 262,000 members. Such data collection method is characterized by random sampling. Survey period – 21.11.2022 to 12.02.2023. Sample size – 802 respondents.

Communication channels. In order to reach the audience more effectively, it is necessary to find out how the residents of the neighbourhoods of Riga metropolitan area would prefer to receive news from the company "Rigas meži". Facebook was the most frequent choice, perhaps since the survey was distributed via this social network. Environmental advertising and Internet news portals are tied for second place, as both options were preferred by 14% of respondents. The popularity of news portals is related to the fact that they are regularly found at the top of the list of the most visited websites in Latvia. However, the respondents' answers reveal that people notice and are willing read the information available on information boards placed in the forest or near waste bins. The company "Rigas meži" does not have an Instagram account, however a significant part or 10% of respondents would like to receive company news directly through this social media platform.

Upon analysing the responses per age group, it was revealed that the youngest respondents aged 18-24 most often marked the company's website as the preferred way of receiving information: this option was marked by 16% of the respondents in this group. This indicates that younger respondents search for information more consciously and purposefully, because unlike social networks or media, company websites are visited in case of specific questions.

Further examination of the responses in the younger age groups clearly marked a trend, indicating that a smaller proportion of respondents choose the Facebook website as a channel for receiving information. Although Facebook was chosen more frequently by all age groups, the popularity of this social network is still lower than that observed in the overall distribution of answers.

Tools and methods to reduce forest destruction and littering. Respondents indicated that the most effective method for improving the situation would be to increase penalties and legal liability, which was marked by 22% of respondents, respectively. This is not a social marketing tool, but initiating such changes is possible with the help of social marketing. In general, the respondents' responses on this issue

are evenly distributed – increase of penalties and legal liability (22%); better-tailored tracks, sports areas (21%); more recreational routes for motorized vehicles freely available to all (20%); informative signs in the forest (16%); educational materials on where and how motorized vehicles may be driven in the forest (15%). Such a distribution of replies indicates the need for a complex solution to the problem, creating both recreational areas, as well as informing and educating the public. Respondents under the age of 40 and respondents who live in Riga understand the need for recreational routes for motorized vehicles freely accessible for all better than the other groups of respondents in the sample, and they marked it as the most popular answer.

The most harmful human activities in the forest. The respondents ranked the answers in order of priority from 1 to 6, where 1 is the most harmful human activity in the forest, and 6 is the least harmful human activity in the forest.

Their replies revealed that the most harmful human activity in the forest is unintentional or malicious burning. Considering the danger of fires and their potential harm to people, this is indeed a very significant risk and every possible step should be taken to reduce the number of fires caused by human carelessness or malice. However, it should be taken into account that there is no such measure that can reduce the occurrence of these fires, so the greatest attention should be paid directly to the formation of the habits of conscientious behaviour of people.

Respondents marked littering as the second most harmful human activity in the forest. The company "Rīgas meži" actively communicates and implements campaigns also about this important problem that concerns the respondents, for example, the company launched a campaign about waste in the forest "#TīriRīgasMeži" (company "Rīgas meži" website, 2022).

Destruction of the forest with motorized vehicles is takes the fourth place and the respondents think this topic is less important than unsanctioned and unauthorized felling of trees. It could be explained by the fact that motorcyclists only represent a small part of the society. Their harmful activities usually take place locally and therefore only affect the residents of nearby neighbourhoods. Also, building barriers to stop motorcyclists was marked as the least harmful activity. If assessment would have been made taking into account the potential lethal consequences of this activity, it would have been rated higher, but the respondents rated it lower than everyday activities, such as poaching, perhaps given the fact that such cases occur relatively rarely.

Priorities of "Rīgas meži". The respondents' answers reveal that company "Rīgas meži" should primarily focus on reducing pollution. The next two equally prominent priorities are "preservation and increase of natural values" and "reduction of the number of forest fires". The first of these two also resonates with the goals of the "Enduro trails" campaign – to reduce the destruction of valuable natural areas. The results reveal that "Rīgas meži" should focus more on the prevention of forest fires. In order to accomplish this, it is necessary to form partnerships with the interested parties and jointly communicate fire safety promotional activities during the fire-hazard season.

After summarizing the conclusions obtained by analysing the theoretical sources, studying the previous experience of the company "Rīgas meži" regarding social marketing, and analysing the consumer survey, a concept was developed in order to allow "Rīgas meži" to further solve social issues by using social marketing tools and methods, and the plan consists of 4 stages.

Table 1

Concept for improving social marketing programmes

Stages No.	Objectives
Stage 1	An analysis of the problem should be carried out and the target audience should be determined. It is necessary to determine the competition (cooperation, activities hindering change), the target audience (who causes the problem, or is it the society as a whole), and determine what social, cultural, personal or economic needs motivate the current behaviour.
Stage 2	According to the information obtained in Stage 1, the most suitable tools should be selected and a social marketing product should be developed. At this stage, the ability of the parties involved in the planning of the social marketing programme to influence political processes should be considered if necessary to initiate changes in the broader society. The survey shows that effective tools include educational materials, events (promotions, volunteer clean-ups), stories of real experiences, as well as the introduction of new solutions, such as Enduro trails.
Stage 3	Location and promotion. During the social marketing campaign "Enduro trails – experience the forest on a motorcycle!" it was found that the potential of spreading social messages on Latvian public media is not being used. Latvian public media provides an opportunity and social marketing programme planners should actively use it, as it allows reaching and addressing a very wide target audience. When identifying the causes of problems, it sometimes becomes clear that it is a specific, local target audience, which neither company-owned social networks nor Internet news portals can reach. In such cases, other communication methods should be considered, such as direct marketing communication.
Stage 4	The performance indicators of the social marketing programme should be defined. Depending on the specifics of each programme, indicators such as attendance, measurable quantity or volume, economic indicators (sales growth or losses), the opinion of the target audience, and other indicators could be useful, allowing to assess whether the programme is functioning as planned.

Source: authors created based on literature review, case study and consumer survey

Conclusions

The analysis of the scientific literature, the case study of the social marketing campaign of company "Rigas meži", and the consumer survey on social marketing and tools to promote a change in behaviour provide the following conclusions:

- 1) The performance of social marketing activities cannot be determined using classic marketing measurements, therefore, in order to determine the performance of social marketing, each activity may involve different types of data and means of obtaining information. Sometimes it can be very difficult, too expensive, or even impossible to get statistically accurate data, and therefore such measurements are often not carried out. It is considered one of the biggest mistakes made by social marketing practitioners.
- 2) The main goal and result of social marketing is public benefit; however, the marketing is based on the exchange of values, therefore the benefits (including economic benefits) for the company resulting from social marketing should be perceived as a natural and logical result of marketing activities.
- 3) Municipal companies cater to various public interests and face clashing views. They deal with the consequences of public behaviour, arising as a result of various social problems. It is necessary to delve into the causes of the action and the needs of those who carry out the action, because the change of action is promoted by points of contact that act on selected emotions and psychological stimuli promoting action.
- 4) Social marketing, although based on classical marketing, is an interdisciplinary method, the use of which requires combining the theories and tools of various social, psychological and economic sciences.
- 5) It is precisely in the neighbourhoods of Riga metropolitan area that fires occur most often, but they are also considered a significant risk elsewhere in Latvia. Stakeholders, namely, forest owners and monitoring and rescue authorities, issue individual communications regarding fire safety. As a result,

the information is not presented in a uniform way which makes it more difficult to perceive and remember. There is a lack of a unified approach to the communication of human-caused fires.

6) The most common form of communication of "Rigas meži" has been informing the public, but the company has also been involved in social initiatives. Although the topics communicated by the company range widely and often refer to specific target audiences, news is distributed through the same communication channels. As a result, citizens are not sufficiently informed about the company's social marketing initiatives, so this approach is not useful when communicating segmented social marketing campaigns.

7) The feeling of impunity, or lack of control, is one of the main motivating factors for harmful human activities. The existing situation satisfies the need for security felt by the perpetrators of harmful activities, which is why they engage in unauthorized behaviour.

8) Residents would most like to learn about the news of "Rigas meži" on the Facebook and Instagram, but the company does not have an Instagram account, therefore some residents do not have the opportunity to receive information on the platform of their choice.

9) "Rigas meži" should focus most on topics such as reducing pollution, preserving and promoting environmental values, as well as reducing the number of forest fires. One of the initiatives to preserve and increase environmental values is the social marketing campaign "Enduro trails – experience the forest on a motorcycle!". In terms of reducing the number of forest fires, information about fire-hazard seasons are published and people are reminded that activities, such as lighting fires or driving mechanized vehicles, should be avoided in the forest during this time. However, this is not enough to achieve more conscientious behaviour of the population during the fire hazard season.

10) What is most lacking in the campaign "Enduro trails – experience the forest on a motorcycle!" is its evaluation, i.e. campaign analysis. The attendance of these trails is not measured, as well as no criteria have yet been defined that would indicate a decrease in the number of cases of destruction of the forest. This, in turn, prevents the ability to determine the benefits of this social marketing campaign.

11) "Rigas meži" does not take advantage of the opportunity to broadcast social marketing campaigns with the support of Latvian public media, which has the potential to reach a large target audience.

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LATVIAN WOMEN'S EXPERIENCES IN THE CONVERGENCE OF CRISES IN LATVIA IN PERIOD 2020-2022

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Abstract. This study explores vulnerability of Latvian women in the context of the climate crisis, post-pandemics and threat of war. Women are more concerned about environmental problems than men but have less resources to build their resilience towards a variety of interconnected social, political, ecological and economic crises. Aspects such as women's political rights to access, control and manage environmental resources determine their vulnerability. As their role is often assigned to maintaining a healthy environment at home, at work and in the community, unequal pressures, unfair expectations and unspoken challenges were explored in the qualitative research. Since no similar research has been carried out before, a broad group of participants were invited to participate in the study. The immediate aftermath of pandemic restrictions and the time of Russian military aggression in spring 2022 interfered with the phase of data gathering and in result broadened the spectrum of issues discussed with women. The historical moment in which we conducted our research has shown that long-term and time-stretched risks play a secondary role in women's lives. Because of their social role as caregivers, immediate problems usually require much more of their attention and resources. This leads to limitations in possible adaptation and resilience building.

Key words: climate crisis, resilience, polycrisis, gender, Latvia.

JEL code: Z1

Introduction

Research project 'Ready for change?' provided an opportunity to explore for the first time the vulnerability of Latvian women during the looming climate crisis threat. This topic has been extensively researched abroad by UN researchers, other development organisations, the European Parliament (2017) and ecofeminists such as Greta Gaard, Maria Mies, Ariel Salleh or Silvia Federici, with many studies predominantly focusing on the situation in the so-called Global South (Di Chiro, 2017; Isla, 2017; Jerneck, 2018; Dengler & Seebacher, 2019).

In Latvia, this topic has not yet appeared in either academic or non-governmental research. Although there is a policy on climate change adaptation (Latvijas Vestnesis, 2019, Ministru Kabinets, 2019), even the Ministry of Environmental Protection does not directly address women in its studies, except to define retired women as a risk group among many others, such as unborn children or disabled people (VARAM, 2021). This innovative analysis thus points to the relevance of ecofeminist research (Mies & Shiva, 2014; Salleh, 2017) and feminist perspectives on common resource management (Federici, 2004; 2011; 2019), which should be applied to collective resilience in Latvia to the manifestations of the climate crisis.

It is important to understand that the management of common resources can also be defined as a process of making and remaking community, and a feminist perspective pays particular attention to everyday practices, social relations and spaces of creativity and social reproduction in which people come, share and act together (Federici 2011, 2019; Clement et al., 2019).

Silvia Federici, in her historical work *Caliban and the Witch* (2004), outlines that women in the past were seen as men's commodities and common resources, and stresses that all processes of managing common resources must analyse power (Lapniewska, 2016). However, now, in an era of change in the capitalist system that is so destructive for nature, the most intensive reproductive labour - giving birth and raising children - still needs to be brought together in supportive communities in order to break the trends of separation and privatisation of productive and reproductive labour (Podlashuc, 2009).

Climate crisis affects all societal spheres, including well-being, on a global scale, but some population groups are more vulnerable to impacts and women are particularly vulnerable. While it is important to take into account issues of interaction (national context, economic situation, level of education, social status etc.), this study focuses on women in the broadest possible context in order to provide a good basis for further discussion based on the primary findings.

The authors therefore focus on the role of gender in three broad areas: (i) the making of the climate crisis; (ii) the experience of the consequences of the climate crisis in everyday life, and (iii) institutional and individual responses to the climate crisis and its convergence with other crises.

Therefore, we have formulated the research questions:

1. Do women observe and/or notice the climate crisis in their daily lives?

The first research question was included to explore women's experiences of the climate crisis. As the climate crisis is a global issue, it was decided to explore how women experience it personally, what changes they observe in their daily lives, whether the climate crisis has become more visible and how it affects their lives.

2. What are women's key social capital resources and how do they use them in their daily lives to adapt to the effects of the climate crisis?

According to the theoretical framework, it is a social resource that can be used to solve everyday problems, such as dealing with the manifestations and consequences of the climate crisis.

3. What narratives/stories do women create when they talk about their experiences of the climate crisis?

The climate crisis exposes women to an insecure environment to which they have to adapt, and to do so they use their social capital.

Research results and discussion

1. Social commons from a feminist perspective

In such a study, it is crucial to recognise that the impacts on women and women's responses to environmental degradation are very different. In the global context, women are very often responsible for water supply, food security and share responsibility for energy for cooking and heating, but their limited participation in decision-making and property rights make them more vulnerable to the negative impacts of the climate crisis.

From a theoretical standpoint, ecofeminist approach is appropriate for a case study on social commons for women. The introduction of the term 'ecofeminism' in 1974 is attributed to the French feminist Françoise d'Eaubonne. Ecofeminist perspectives on the problems of environmental degradation and social injustice stem from the assumption that the treatment of nature and each other are inextricably linked (Gaard, 2001).

Ecofeminism explores the relationship between women and nature in society, illustrating the female body as a natural resource from the perspective of Karl Marx's theory of reproductive labour (Fakier, 2020). It is based on four main arguments. Firstly, the most obvious of these is reproductive labour, which is based on one's own biological characteristics related to becoming pregnant, carrying a child and breastfeeding or caring for a child in the infant phase of development. All of this has a huge impact on women's relationships with other people, their position in the labour market, their career development and their economic situation. Secondly, the work of maintenance and care is based on the social construction of women's gender identity. This is particularly true of the roles socialised for them at an early age: carer, attention-giver, listener, maintaining everyday relationships within the family and with friends, creating celebrations and responding to crises. All of this constitutes additional roles for women in society.

Thirdly, physical work, which is often perceived as part of women's lives. Both in the household - work that is additional to the daily workload outside the home - and in agriculture - which is often socially expected but does not bring direct economic benefits. Fourthly, women's symbolic relationship with nature through poetry, folk stories, paintings, which are the most ambiguous. On one hand, this relationship of female innocence, fertility and motherhood to nature has often been fetishized, subordinated to the male imagination of a weak and submissive woman. On the other hand, in situations where the stigmatising factor of masculine identity has been removed from the relationship, women have used it as empowering, supportive, a source of their own knowledge, resilience, inner harmony and solidarity and community building.

All these dimensions are very visible in Latvian society, where women try to remain economically active despite raising children, a second shift at home, unpredictable care work, caring for sick family members (especially children and seniors) and all the symbolic expectations (gardening, celebrations and public appearances). At the same time, they often have knowledge based in natural systems and are skilled social networkers.

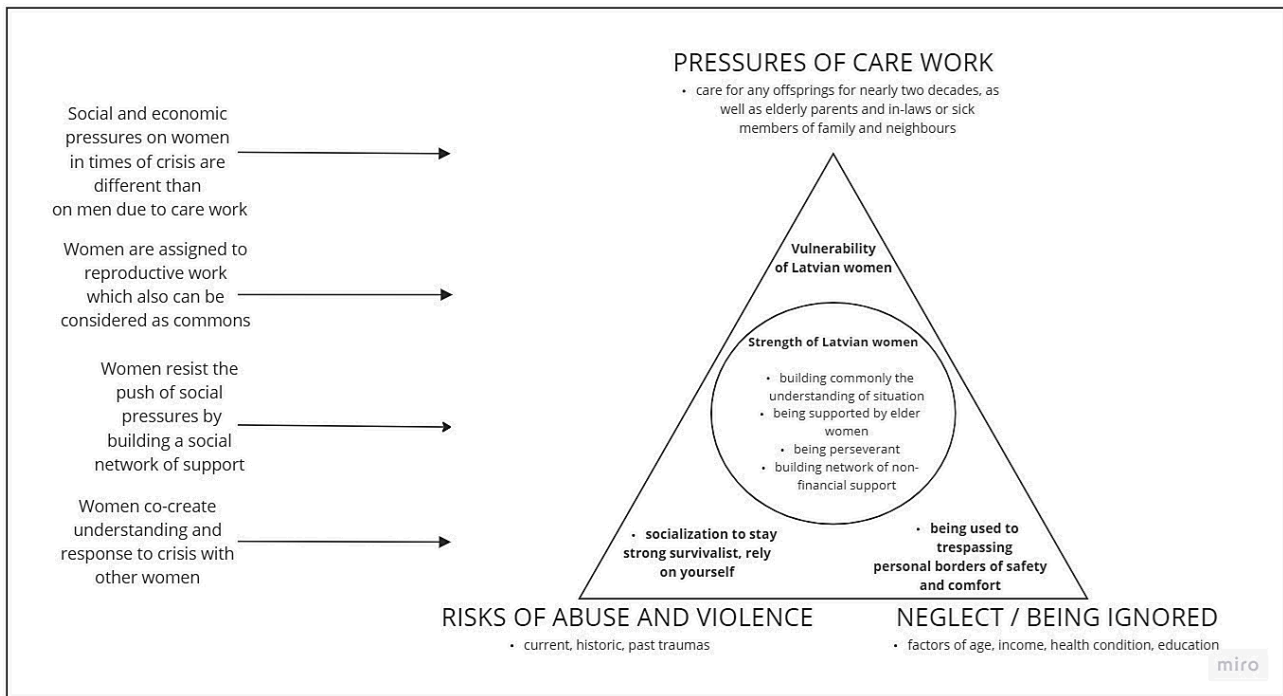
In this part of the study, we also adopted a feminist political ecology perspective (Harcourt & Nelson, 2015; Bauhardt & Harcourt, 2019), which draws on Marxist theory, ecofeminism and political ecology. It explores two important factors relevant to our study. First, women's political rights to access, control and manage environmental resources. This is important to understand whether they are concerned about environmental collapse and whether they have the resources to build their resilience to this time of converging crises. Secondly, maintaining a healthy environment at home, at work and in the community was explored, as well as unequal pressures, unfair expectations and unspoken challenges.

Although the topic of women's vulnerability to the climate crisis, their capacity to develop resilience and access to natural resources has been widely analysed, especially in the context of the Global South, no similar research has been carried out in Latvia. NGO Zala Briviba summary (Zala Briviba, 2020) on climate justice provides general information on the situation of women in the world and separately addresses social inequalities in terms of carbon footprint, showing that in Latvia:

- the richest 10% together emit almost a third more than the poorest 50%;
- the richest 1% have 37% of the greenhouse gas emissions of the poorest 50%;
- the poorest 50% in Latvia have 4 times higher carbon footprint than the poorest 50% worldwide (ibid.).

Although that study does not refer directly to the situation of women in Latvia, these impacts are relevant because women in Latvia are the poorest of all EU Member States, with 23% of women at risk of poverty, compared to the EU average of 17% (CSP, 2022).

Women make up a disproportionately large share of the poor and are likely to be disproportionately vulnerable to the impacts of the climate crisis. Gender inequality is an international problem that can exacerbate the effects of the climate crisis globally, and women's needs are often not taken into account in developing countries and their participation in climate crisis processes and debates at national level is insufficient. Ulrich Beck highlights the problem of the individualisation of responsibility for different risks, which we explored by focusing on experiences that are particularly relevant to women (Beck, 2008). The below graph in Figure 1 explains the key concepts of this research.



Source: author's own data

Fig. 1. Trying to understand Latvian women's vulnerability in period 2020-2022

2. Unusual data collection design during the COVID-19 pandemic

Women's perspectives were explored in different focus groups of women in the Kurzeme, Vidzeme and Riga regions to help us understand the multiple factors influencing women's vulnerability at a time when remote threats of environmental collapse, societal (COVID-19 health crisis) and geopolitical (war in Ukraine in 2022) influences were interacting to affect women's well-being within a broader set of societal and economic responses.

The research has generated many insights into how adaptation to the climate crisis is gendered and how women's vulnerability is not based on their biological characteristics, but much more on the gendered distribution of land, labour, decision-making power and other resources (Jerneck, 2018). As a result, the social and economic pressures on women in times of environmental collapse become much more severe (Gaard, 2015).

The qualitative study on women's vulnerability and resilience required a particular approach because in these discussions we did not ask neutral questions about the context of professional life, facts about farms, businesses or attitudes towards the use of natural resources. It was entirely focused on the deep concerns, fears and anxieties of women meeting for the first time. We knew this could not happen online on the Zoom platform because we would never reach the level of intimacy and trust to be able to share perspectives truly and deeply, with women from different generations. Face-to-face discussions were organised after the COVID-19 pandemic restrictions were reduced. However, it was also a challenge to create this welcoming atmosphere when many of the women participants had not met in a face-to-face conversation in a larger group for almost two years. Although it was legal in spring 2022, feelings of personal discomfort, fear and insecurity could still take precedence over the excitement of finally being able to meet with everyone sitting together at a common table or in a circle.

As we know, women have been co-creating and sharing their understanding of their reality for centuries. They learn from each other how to maintain traditions, how to celebrate beautiful moments in their families and communities, how to support each other in difficult moments and crises. Building a common

understanding together helps them to assess more realistically the level of dangers and risks and often to find solutions or build resilience together. Additionally, in Latvia, the notion of being strong, surviving whatever life throws at you, and not revealing too much of your personal life in a personal conversation with a stranger (which was taught by the war years, life in Soviet reality, and passed on) led us to conclude that the only feasible way to conduct this research was in face-to-face meetings for group discussions. In a group situation, women are more willing to share their vulnerability without ignoring their needs and fears as they tend to do in individual conversations, when they are more likely to give seemingly expected, socially desirable answers.

The atmosphere of the focus groups was very important. We designed it to be homely, welcoming and relaxing. We prepared the possibility to pay for the participation. Childcare during the discussions was an additional option. This supportive environment and the cosy rooms instead of formal spaces helped to create a good atmosphere. We also provided tasty, homemade snacks and drinks and adapted the time to the women's possibilities. We got various confirmations that this approach works, and many participants praised the preparation of the discussion groups.

Another important factor was that we used special materials to stimulate the conversations - beautiful drawings of the emotional landscape to check everyone's well-being at the beginning of the meeting, visuals that were light and fun while referring to important and serious topics such as social inequality, poverty in Latvia, the economic crisis, post-normal society, floods and other natural disasters.

We had also prepared materials with key words on future risks, which were intended to trigger associations or to link topics that had not been mentioned in the conversation. We really wanted to explore not only rationalised, verbalised justifications and explanations or participants' knowledge about the climate crisis, but also feelings, needs, tacit knowledge, intuitions, hopes etc.

Just as important as creating an appropriate context is a research ethic that is grounded in feminist principles (Hesse-Biber, 2015) of power relations between researcher and research participants and the reflexivity of the researcher. We followed the principles through a sequence of actions:

- creating a research team that would allow for the acknowledgement of any experience that women want to share (sharing their history);
- reflecting on power relations - not pressurising or exploiting the women participants (not going into too sensitive topics, letting them choose the level of sharing);
- each theme was from the women's perspective and they are helped when needed (discovering similarities in their experiences, validating their stories, acknowledging their feelings, creating space to support the group);
- building a shared understanding - examining possible conclusions, allowing the group to reflect on common points; examining arguments about wider, systemic institutional oppression, stepping back if this is not relevant to their experience.

The researchers faced difficulties finding respondents immediately after the lifting of the pandemic restrictions, and therefore used a 'snowball' approach, asking participants to suggest other women for the discussions, and making sure that different groups of women were represented in each discussion. In the result, seven focus groups were carried out with the following profiles.

- 1) Older women from small towns (10 participants)
- 2) Single mothers or from single women households (13)
- 3) Women aged 30-40, with higher education, living in rural areas or smaller towns (7)
- 4) Women aged 20-35 with tertiary education (8)

- 5) Women with tertiary education, from different branches of science, Riga (5)
- 6) Women who are environmental activists (7)
- 7) Participants in the Permaculture Design Certificate Course (PDC) (10)

The diversity of the 50 women who participated in our focus groups made it difficult to make generalisations about the social profiles of different women because of the relatively small, specific samples of different groups, but at the same time provided a solid basis for common conclusions that linked the experiences of many women.

3. The role of social capital in women's lives

Social capital is a relational construct made up of resources (labour, transport, time, ties, power, etc.). Resources can be accessed when individuals have developed ties with others who share trust and values (Families & Social Capital ESRC Research Group, 2005). Social capital is inherent in the whole society. Key elements of social capital are social networks, shared norms and values, and beliefs about trust. These elements only become social capital through purposeful use (Igaune, 2010). 'Social capital is the beneficial cooperation of people, a network of relationships that facilitates collective action problem solving' (Brehm & Rahn, 1997, p. 999).

In the context of this study, social capital is particularly important as women's support circle or other women who help in daily life or in critical situations, share information and help each other in their communities, and at a basic level, the development of social capital requires resources of time and space, security, social and physical resources, repeated and open communication (Franklin et al., 2005).

Social capital is an important resource for women in the world in climate crisis. Women often cannot prepare for various reasons, such as lack of time and money. To make life easier for themselves, women are very supportive of each other and participate in different communities and associations of people with similar life experiences. Women use social capital as one of the tools to help them in times of need. They can rely on religious communities and congregations to survive in crisis situations. Women stress that communication is particularly important, that women know how to ask for help and that they receive it.

Women note that they are used to living on their own, without help from institutions, including family and the state. When talking about help, women use the wording 'asking for help' which they refer to as something they find unusual and are generally critical of the possibility. Additional narratives about help from the state mention the problem of 'not knowing who to believe' in the context of the state, there is an audible distrust of it, and there is a fear of asking for help. Available OECD data collected between 2010 and 2018 show that only 30.7% of the Latvian population trust the government (OECD, 2022).

It is harder for an older person to live on their own. Small local government in principle do little to support dignified life of pensioners beyond state provision, leaving this responsibility on family or in many cases at the mercy of local community. They do not have tools (except for scarce project funds in municipalities that implement some community projects), resources and in many cases they will depend on strength of small communities like the ones in religious parishes, NGOs or specific local leaders.

Women find it harder to adapt, finding preventive mitigation to natural disasters caused by the climate crisis almost impossible. In general, women do not change their habits dramatically because of the climate crisis, as they believe that it will happen on its own and 'step by step'. One of the main reasons why women cannot pay more attention to climate change was the narrative of the burden of hardship, summarised by one environmental activist in April 2022: *'We come to the same thing, that it is the woman who will have to take care of everything if there is a crisis. She will be the one who will stay with the children and look*

for their food. So, for women and children we have to keep the land and nature at a level so that nature can take care of women and children if men have to go to war.'

Women are socialized, expected and pressurized socially to be the first to respond to the immediate, most severe crises, responding to the everyday needs of those closest to them in the context of immediate impact such as: (a) care work (including support for children's education, health care for the elderly in the family) and support for relatives and friends; (b) economic pressures which can even lead to dramatic decisions due to serious financial difficulties, and (c) they are also more vulnerable to various forms of violence, abuse, ill-treatment and risks of exploitation, which will be discussed in the next section.

Preparations for the climate crisis are linked to economic realities in their lives for a variety of reasons: rising prices, caring for children, paying for loans and property vulnerability. Women recognise that they are economically vulnerable.

According to 2022 data, of the total population in Latvia, 82% women in comparison to only 57% of men, who spend their time after paid work caring for and educating their children or grandchildren, as well as cooking and housework (Gender Equality Index, EIGE, 2023).

Starting from childhood usually daughters take on more of care work than sons. Several respondents mentioned the expectation for a woman to take care of a man's elderly mother if a man has no sister, who then would be expected to do it. Seems like in Latvia women have been playing roles of main caregivers even at times of being the breadwinners in households for generations.

Specific individual stories women have shared with us grow into systemic issues about women's resilience. On a political level, this is well analysed within a feminist political ecology that looks at environmental rights and the work of women caregivers (Bauhardt & Harcourt, 2019).

4. Different types of risks for women

When we applied for and started this research project, the climate crisis had become perhaps the biggest global crisis that was beginning to receive attention in Latvia. But soon after, in spring 2020, the COVID-19 pandemic spread across Europe and not only made the research more difficult, but also created many difficulties, pressures and tensions for all members of society.

Although some respondents did not experience significant pressures in their daily social life, a slower pace of life, time to reflect on their lifestyle and relationships, most felt anxious about their work and education situation, the need to adapt to the constraints of everyday life and new relationship dynamics among household members and relatives. Without well-known ways to reduce stress, it was difficult to achieve a healthy balance in everyday life.

Confusion around medical and political decisions in dealing with the pandemic's aftermath has forced people to make radical decisions about their sources of economic security and has often rearranged their social network.

For example, compulsory isolation not only put many at serious risk of poverty and neglect, but also increased violence against women, children and the elderly in some households. Very often leaving victims with even less support than before. These themes were gradually being highlighted in the Latvian media in 2022. In many cases, especially in rural areas where women's life without a man is much harsher, the Latvian adaptation model of 'enduring' was played out, forcing women to submit to certain circumstances because of the lack of hope that any alternative is possible.

This is not to say that women showed themselves as victims of a man's world. Many have admitted that men also experience violence from a young age, but they rarely define it as such, complain about it or heal from the trauma of such events. However, the number of female victims in households is much higher -

60% of women in Latvia have suffered psychological abuse at the hands of a partner, the highest rate in Europe. 51% of respondents have experienced controlling behaviour from their partners, 15% have experienced economic violence from their partners and 14% of respondents have reported being victims of stalking (FRA, 2014). While the risks of violence can apply to all, they are generally much higher for women.

Almost simultaneously with hopes of emerging from the pandemic in the spring of 2022 and planning fieldwork for this case study, Russia launched a war in Ukraine. This has bombed not only cities but the human psyche in many post-Soviet countries. The fear of Russia's unpredictable, post-imperial ambitions reminded many of the unhealed, unspoken but well-known traumas of many, including Latvians. People were shocked, life on the streets became quieter and slower, everyone began to imagine big life decisions and security plans for themselves and their loved ones. This showed us once again the interconnections between economic, social, geopolitical and environmental crises of all kinds and their severe impact on society.

At the same time, women admitted that many felt a paralysing psychological vulnerability that prevented them from thinking about the bigger picture or longer-term crises such as the climate crisis, but at the same time dominated their thoughts about the threat of war in Latvia. This is largely because war poses a threat of violence and exploitation of all kinds. While men struggled with anger against an unjustified attack on another country or fear of being called upon to defend the country against the Russian army, women feared various forms of violence documented in the first months of war in Ukraine.

At the same time, many women acknowledged that while pathologies in families and in times of war have been silenced for couple of generations, this is the first time in history that Latvians have the courage, skills and environment to discuss, analyse and act on them. However, the unpredictability of the economic and geopolitical situation has taught Latvians to focus on the present, not to plan far ahead, not to save or not to plan for the long term. This has a particularly severe impact on women's lives in old age (living last decades of their life most probably with no partner) and their dependency from younger family members, as many have chosen to care for their families and farms without economic security rather than develop their professional careers.

The difficulties of older women's lives in Latvia are well known and discussed in the media, but nothing much is done about it. However, the problems seem to differ between urban and rural places. In the cities women's poverty might relate to absolute basic survival. On average, women in rural areas seem to be more supported with garden grown food, non-monetary exchanges with neighbours and long term friendships, safe social network. In general, one could say that we are losing many women in a kind of vicious triangle of violence, vulnerability and neglect.

5. Socialising women's roles and perspectives on men

A large part of the discussion on women's vulnerability and resilience was socialisation to the female role, psychological and emotional boundaries and how women experience these from early childhood. This is an important topic for the respondents because the way they have been taught to perceive and fulfil their social responsibilities (including their roles in the family) has had a huge impact on how they perceive priorities in their lives and whether they are able to take care of themselves and strengthen their resilience.

Women are taught to respond to immediate demands in the family, to be a psychological and physical support to those in need. The 'good girl myth', as the respondents put it, is transmitted and ingrained in girls from a young age - the expectation that they should be nice, submissive, sweet, quiet and responsive.

Girls are expected to do this much more than boys. This applies not only to upbringing at home, but also to education in schools and socialisation with relatives and neighbours.

At the same time, many women said that this stems from two trends related to their families, which have the greatest impact on their upbringing. One is related to the absence of men in the family - historically linked to traumatic geopolitical events that simply deprived households of fathers, grandfathers and sons. At the same time, during the Soviet era, for almost five decades, men were expelled, imprisoned, threatened, psychologically and mentally oppressed. This inevitably had an impact on subsequent generations of men, who often faced undetected post-traumatic stress disorder and other problems in various unhealthy ways - violence and addiction.

Without blaming men in particular, many women recognised that that generation of women was largely left alone to care for their families. As another woman explained, both problems - the absence of a father or his negative influence in the family, as well as raising overburdened grandmothers and mothers - led to a whole generation of children being often neglected and taught by example that any struggles, worries and hardships must make one stronger. Life without men who could be aggressive, could become a burden or unwelcome threat, made women so independent that opening to trust and vulnerability (both so fundamental to any healthy relationship) remains at times challenging.

In conclusion, socialisation to being sympathetic and supportive to everyone in any kind of need over your personal needs, as well as the long experience of being pressured, used or neglected, leads women to a pathological feeling of being useful (therefore important and valued by others), even if they are harming themselves. This is particularly true in rural areas, where the concept of self-care is less common and hard work is idealised.

Importantly, in all the discussions, women tried not to stereotype men or see gender differences as black and white dualism. They openly shared their challenges and difficulties with their partners without attributing the same characteristics to all men. At the same time, they repeatedly praise men for their technical skills, help in the household, long-term thinking and ability to take decisions independently.

They often expressed concern about men's lack of skills in dealing with psychological problems and their inability to express their concerns. Many said that they do not want to rely on men, but when they do, their help and support is perceived very positively. In general, women saw themselves, especially in rural areas, as more vulnerable without male support. This is particularly true because of the mechanisation of rural work and the growing impact of the climate crisis.

Conclusions, proposals, recommendations

This article describes a number of reasons why women feel vulnerable to the climate crisis. Their fears and concerns, both in the current situation and for the future, stem from social and economic inequalities that limit their resilience.

Most of them have been brought up with stories of very resilient Latvian women who can survive almost anything and often have to rely only on themselves. However, resilience is not the same as survival. The former is more about adaptability, the latter about struggle for continuity of existence. At the same time, respondents are aware of how damaging this narrative can be to their physical and psychological health, and try to balance the pressures of life more than previous generations.

However, their ability to maintain this balance depends to a large extent on the resources available to them - education, the social environment in which they live, the support of a stable partner, the availability of help in bringing up children, finances, etc. Overall, personal and family security in social and economic

terms allows us to think more broadly about others, the environment and the consequences of the climate crisis.

No such research has been carried out in Latvia; therefore, a broadly demonstrative group of women was invited to participate in the study. At the same time, the results have certainly been affected by the difficulties of conducting research in the immediate aftermath of pandemic restrictions and during a time of war anxiety.

Convergence of crises as interconnectedness of global negative trends affect all people in the society, however some will be more vulnerable to it. Further development of this unprecedented research might bring analysis of the factors that bring about the difference to variety of women living in Latvia. This should happen in a dual manner. Firstly, by reflecting on existence and accessibility of gendered data in Latvia in virtually all spheres of public data. Secondly, by Gendering perspectives on issues until now seen as common problems with no gender.

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DIGITALIZATION OF THE FRUIT AND BERRY PRODUCTION IN LATVIA

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Abstract. The current global developments that require an increase in efficiency, productivity, and sustainability are affecting fruit and berry growers. Without strategic initiatives at the governmental, non-governmental, and farm levels, the sector might fall behind in the global race for competitiveness. The goal of this study is to examine digitalization solutions in fruit and berry production and analyse whether and how they will impact the economic performance and competitiveness of Latvian farms working in this specific agricultural sector. To achieve this aim, both quantitative and qualitative research methods were applied, including theoretical analysis of digitalization solutions in agriculture, sectoral analysis, and gathering empirical data from Latvian fruit and berry producers, NGOs, researchers, and technology industry representatives. The results suggest that digitalization leads to increased efficiency and productivity, contributing to competitive advantage of Latvia's agricultural holdings growing fruits and berries. However, numerous recommendations by stakeholders and the authors have been developed in order to accelerate the process.

Key words: digitalization, agriculture, fruit and berry production, productivity, efficiency.

JEL code: O13

Introduction

With increasing world population and the consequent strains on finite amount of land, fresh water reserves and natural resources, the agri-food system is expected to face various challenges in near future, raising the issues of efficiency, innovation and sustainability high on the global agenda. Agriculture is a field where digital technologies have a potential to increase the precision of production, stimulate innovation and transform the accustomed way of doing business, leading to new business models and improved efficiency of business processes (Hartmann et al., 2021).

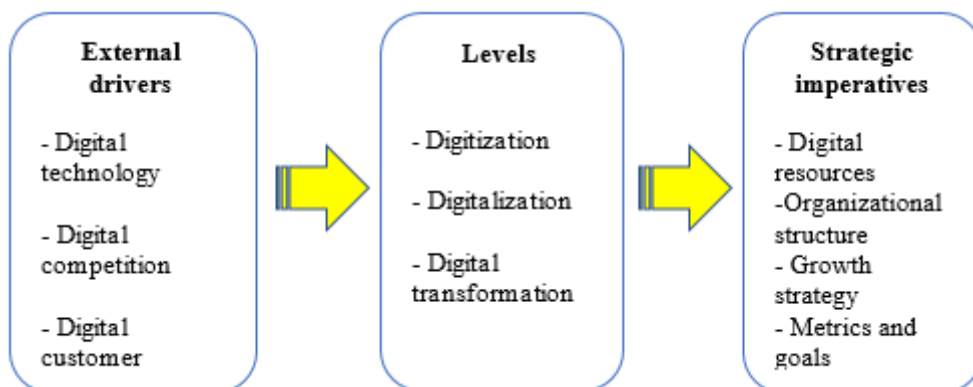
While exploring the subject, scholars often navigate between terms *digital transformation* and *digitalization*, at times also referring to *digitization*. The overarching term of digital transformation encompasses "strategic transformations targeting organizational changes implemented through digitalization projects, with the goal of enabling major business improvements" (Warner & Wagner, 2019, as cited in Caputo et al., 2021). As Verhoef et al. (2021) note, this is a multidisciplinary phenomenon – it requires alterations in strategy, organization, IT, supply chains and marketing. Meanwhile, digitalization, represents "a wide sociotechnical process and implies the integration of multiple technologies into aspects of daily social life" (Brennen & Kreiss, 2016, as cited in Caputo et al., 2021). Within this research, both terms are applied. Digital transformation is perceived on the strategic level – as the overarching change of how a firm employs digital technologies to develop a new digital business model, while digitalization is referring to more specific initiatives, application of technologies. Within this context, authors often talk about digitization – transition from analogue information to a digital format (Caputo et al., 2021). As the Figure 1 reveals, digitization can be perceived as the first step towards digital transformation.

Scholars commonly cite various technological advancements as driving the process of digitalization, including broadband internet, smartphones, cloud computing, speech recognition, online payment systems and cryptocurrencies. Additionally, the advent of big data has given rise to technologies like artificial intelligence, blockchain, IoT, and robotics, highlighting the necessity of digital transformation for businesses. These innovative technologies have significantly altered the competitive landscape, intensifying

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global competition and often giving an advantage to digitally-savvy, younger companies (Verhoef et al., 2021).



Source: Verhoef et al., 2021

Fig. 1. Flow model of digital transformation

With increasing global population, traditional farming tends to take a heavy toll on the natural resources of the world. As overpopulation advances, technologies can help to minimize external inputs and increase efficiency, productivity and sustainability (Graziano da Silva, 2022). While information and communications technology (ICT) is becoming faster, cheaper and more accessible globally, the argument of digital advances tackling environmental problems and climate change gains more solid ground and the technologies become more widespread. The Netherlands have seen a major growth – in 2007 only 15% of the nation’s arable land was cultivated, using precision technologies, while in 2017 it was already 65% (Carolan, 2017, as cited in Rotz et al., 2019). From a global perspective, as the SMARTer Report states, by 2030 the agricultural crop yields will increase by 30% and will save over 300 trillion litres of water and 25 billion barrels of oil per year, contributing to CO2 emissions, as well. In order to reach these advances, Smart Agriculture has to be applied in the form of such technologies as satellite imaging, geographic mapping, machine to machine connectivity, sensor-based technologies and advanced data analytics that could lead to practices that are more productive, sustainable and precise (SMARTer Report 2030, GeSI, 2016).

Table 1

The use of ICT tools and their impact on the production technologies

ICT tools	Impacts
<p>Precision agriculture:</p> <ul style="list-style-type: none"> • connectivity between machines and equipment • sensors and satellites • advanced data analytics • ICT-enabled genomic sequencing of livestock, seeds and plants. 	Monitoring, tracking, real-time data via mobile apps or messaging enhances efficiency of resources – water, fertilizer, nutrition, equipment and others.
<p>Information and communication platforms:</p> <p>online platforms and apps that gather data and transform it into valuable information, thereby facilitating the decision-making process.</p>	Providing the right information throughout the food chain reducing food waste at production, distribution and consumption.
<p>Farm management technologies:</p> <p>automation and optimization of general farm practices and back-office IT.</p>	Enhanced productivity: higher crop yield and income potential (monitoring soil and livestock, forecasting, early detection of problems).
<p>Traceability and tracking systems:</p> <p>smart logistics allow better tracking of food as it is stored and transported.</p>	Advanced analytics and forecasting allow for preventive cautions to environmental shocks and build resilience.

Source: The SMARTer Report 2030; GeSI, 2016

According to theoretical analysis, precision farming solutions are some of the most successful digitalization initiatives implemented in Latvia's agriculture, particularly solutions that focus on real-time monitoring, measurement, and response to crop, field, and animal variability, which optimizes input returns and conserves resources (Rivza et al., 2019). The use of sensors is becoming more prevalent, as indicated by international projects like ATLAS (*Agricultural Interoperability and Analysis System*) and the initiatives of the Association of Latvian Organic Agriculture. Various IoT sensors are being applied for crop monitoring, irrigation, plant protection, and other purposes, alongside initiatives like Data Driven Dairy Decisions for Farmers. Robotics is also an area witnessing innovation, with the development of an automated robot weeder equipped with sensors and lasers under the Latvian University of Life Sciences and Technologies, and other logistics robotics projects currently in progress (Osadcuks, 2020).

Nevertheless, researchers and practitioners point at various difficulties, particularly for small and medium-sized enterprises (SMEs), to implement ICTs and digital initiatives. These difficulties include unclear objectives, unmanageable risks, a lack of digitally advanced workforce to fully utilize ICTs, a shortage of management skills among workers needed to transform workplace practices, and insufficient resources to support digitalization initiatives (Pierenkemper, Gausemeier, 2021). Furthermore, inadequate funding for ICT initiatives, a scarcity of qualified personnel, and insufficient development of digital infrastructure in rural areas are commonly cited as the primary barriers to digitalization in agriculture (Rivza et al., 2019). In addition, practitioners have noted that digital solutions are often designed for standard situations and may not be adaptable to the diverse operational and production processes encountered by SMEs, which may require expensive adaptations (Zalane, 2021).

This paper proceeds as follows: the second section reveals a concise description of materials and data employed in order to conduct the study; the following section is devoted to the main findings of the study; and the final section summarizes the findings and recommendations for the digitalization of fruit and berry subsector.

Materials and methods

In order to verify the hypothesis, the authors undertook several research tasks. These included a theoretical analysis of digitalization solutions in business and more specifically in agriculture; a sectoral analysis of Latvia's agriculture industry and its fruit and berry sub-sector; and gathering empirical data from producers to evaluate the current state and potential for digitalization within this sector. Following a descriptive research design, the theoretical discussion was based on scientific articles from Web of Science and Scopus databases, while quantitative data were obtained from the databases of Eurostat and Central Statistical Bureau of Latvia, complemented with qualitative data provided by semi-structured interviews from a variety of stakeholders.

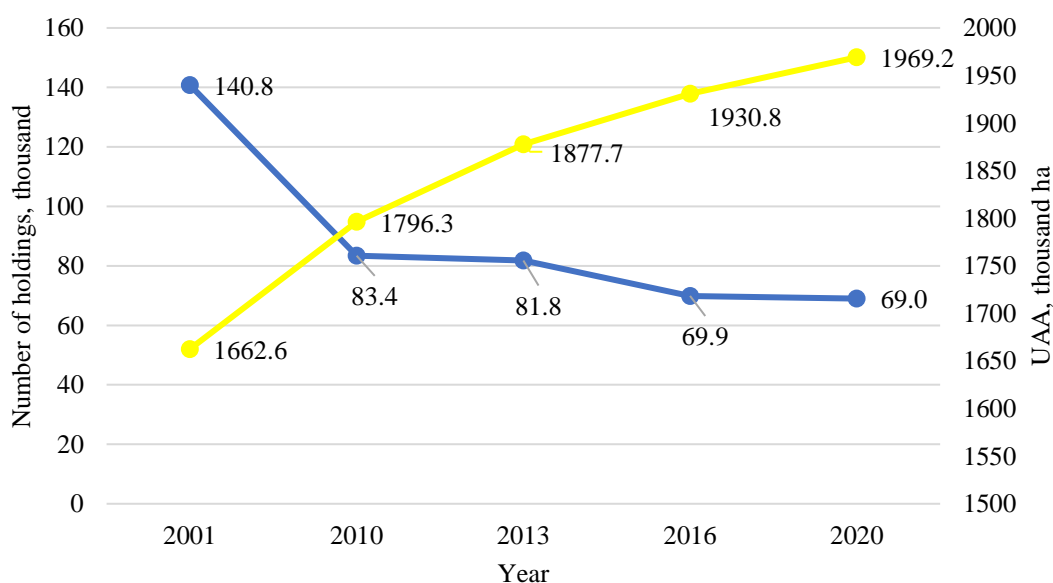
The semi-structured interviews were conducted with the following participants: Juris Ducens (LLC *Silvermoon*), manager of a recently established small-sized highbush blueberry orchard; Gundars Karklins (LLC GUKA), a long-established owner and manager of black currant orchard and member of board at the cooperative society *Bio Berries Latvia*; Gints Strazdins (agricultural holding *Kurpnieki*), owner and manager of an apple and honeysuckle orchard, horticulture lead at the Association of Latvian Organic Agriculture; Janis Lindermanis, co-manager at LLC *Skoru darzi*, sales and business developer at various other tech companies (*Anatomy Next*, *Alternative Plants*, *Defibrillator Baltics*); Inga Laksa, co-founder and co-owner of LLC *Will Sensors*, which is a Latvian-founded company that offers sensors for measurement, detecting, counting, warning, safety, control and monitoring, cloud solutions, for agricultural sector among others; Maira Dzelzkalaja-Burmistre, Vice-Chair of the Board at the NGO *Zemnieku Saeima*

(Farmers' Parliament); and on the research side – Sarmite Strautina, Member of Scientific Council, Lead Researcher at the Unit of Genetics and Breeding at the Institute of Horticulture, Latvia University of Life Sciences and Technologies. The carefully selected respondents hence included researchers, representatives of conventionally and biologically oriented NGOs, representatives of orchard management and innovative hi-tech companies. Each interview was organized around a pre-determined set of open questions, however, allowed the interviewee the flexibility to explore specific issues further.

Concentrating on a particular subsector within a specific country provides an opportunity to delve deeply into its intricacies. However, this approach may also serve as a research limitation, constraining research outcomes as they cannot be readily generalized and applied to other sectors in different geographical locations.

Research results and discussion

Since the first Latvia's post-independence agricultural census in 2001, there has been a noticeable trend of consolidation, with a decreasing number of economically active farms and a consistent increase in utilized agricultural area (UAA). As of 2020, there were 69 thousand economically active farms, representing a 17.3% decrease over a decade. Conversely, the UAA in Latvia has grown by 9.6% (equivalent to 172.8 thousand ha) during the same period, as depicted in Figure 2. The decline in the number of agricultural holdings was particularly rapid between 2001 and 2010, when 40.8% of farms diminished. This implies a rise in average UAA managed per holding. The census indicates an average of 11.8 ha per holding, whereas the last year's data shows that, on average, one farm manages 28.5 ha – more than twice the previous amount.



Source: authors' construction based on the data of Central Statistical Bureau of Latvia

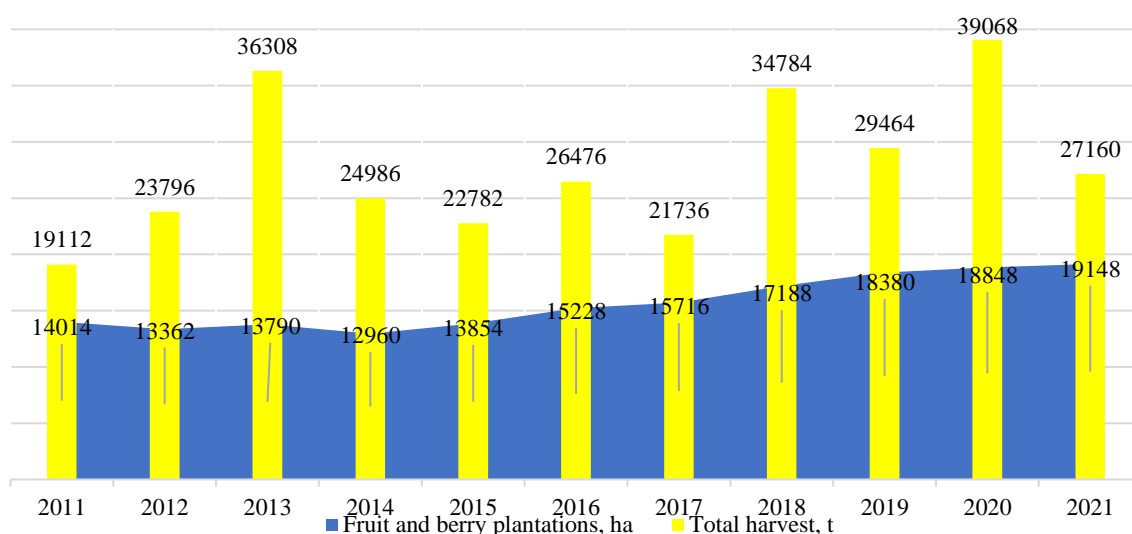
Fig. 2 Agricultural holdings and UAA in Latvia, 2001-2020

In addition to the aforementioned trend, there has been a notable increase in the economic size of farms, measured by standard output³. Since 2010, there has been a 6.3% decrease in the number of small holdings, which now constitute 85.2% of all agricultural holdings in Latvia. However, these small holdings account for only 22.7% of the total agricultural area.

³ Standard output (SO) is used to classify agronomic holdings by size. It is the average monetary value of the agricultural output at farm-gate price, in euro per hectare or per head of livestock (Official Statistics of Latvia, 2022). According to the EU's classification, holdings with SO up to 14.9 thousand euro are small, from 15.0 to 99.9 thousand euro are medium-sized, and over 100 thousand euro are large (Standard Output, [s.a.]

On the contrary, farms with a large standard output in 2020 managed over half (51%) of the total UAA in Latvia, according to Official Statistics of Latvia in 2022. While the consolidation of resources has advantages, upholding of farms that are less than a hectare is important for Latvia's rural areas. A sharp decrease brings along high unemployment and deepens the divide between urban and rural areas (Rivza et al., 2019). A similar trend, albeit on a larger scale, can also be observed within the research subject of this paper – the fruit and berry growers of Latvia. The number of farms decreased from 67,892 in 2001 to 1,171 in 2010, and slightly increased to 1,227 in 2020, as per Agricultural Censuses conducted in 2001, 2010, and 2020. Simultaneously, the average area per fruit and berry farm increased from 0.37 ha in 2005 to 0.55 ha in 2016 (Pilvere, 2021).

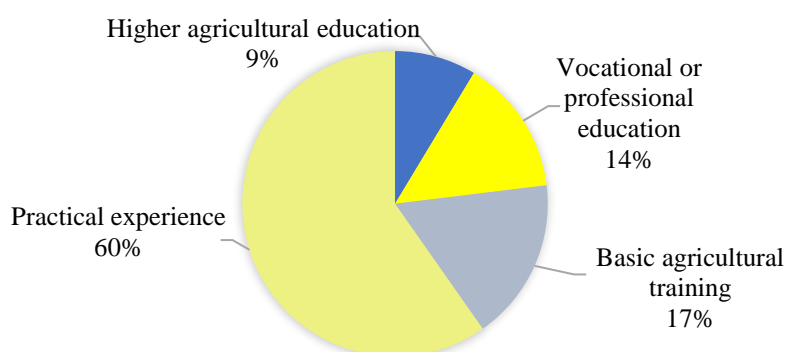
Alongside an increase in plantation hectares, the harvest data covering the past decade reveal an uneven, yet growing yield by fruit and berry holdings (Fig. 3) illustrating the influence of weather conditions and other aspects providing the volatility of the harvest.



Source: authors' construction based on CSB Statistical Database, LAG080

Fig. 3 Area (ha) and Total Harvest (t) of Plantations in Latvia, 2011-2021

Meanwhile, the demographic data of fruit and berry specialization indicates that these agricultural holdings are primarily managed by individuals aged between 45 to 64 years (51.1%), followed by those aged 65 and above (25.4%), with the remaining 23.5% being younger farmers.



Source: authors' construction based on CSB Statistical Database, LSK20-113

Fig. 4 Managers of fruit and berry agricultural holdings by level of education and training, 2020

When evaluating education and training, 60% rely on practical experience, while the remaining farmers have received agricultural training at various levels (CSB's Agricultural Census and Statistical Database

LSK20-113). A comparable trend is reflected at the EU level, where 68.3% of all agricultural managers rely solely on practical training, and less than 1 in 10 (8.9%) have received full training.

Fruit and berry cultivation belong to a resource-intensive agricultural specialization that generates relatively high income per hectare. A successful harvest is dependent not only on soil fertility weather conditions but also input of resources, including technology and workforce availability. Although industry representatives object towards calculating average yields, the CSB data show that per specific cultures the output has increased immensely. Such are red currants and black currants, the yield of which has risen by 63% over the period from 2010 till 2019. Strawberry yield has grown by 58% and apple trees – by 23%. However, there are still several factors preventing the realization of the full yield potential, including diseases and pest infestations, frostbite to early blossoming orchards, a lack of sufficient plant protection products, degraded soil, imprecise fertilization activities, birds damaging the harvest, old varieties that are less resilient to weather changes, resulting in decreased storage capabilities and shelf life, as well as short harvesting time coupled with a lack of workforce (Pilvere, 2021). Many of these issues could be addressed through digitalization solutions. This highlights the need for tools to enhance competitiveness of enterprises in the fruit and berry sector, particularly SMEs.

In general, the European Union has prioritized digitalization and emphasized its importance by placing it alongside the green transition on top of the political agenda. The von der Leyen Commission has made significant efforts in this direction. The European Green Deal, including the Farm to Fork Strategy, the Bioeconomy Strategy, and the Digital Europe Programme, are examples of policy programming documents that reflect this strategic direction (Zeverte-Rivza & Gudele, 2021).

According to the Digital Economy and Society Index (DESI), which was introduced in 2015 to monitor digital progress and development, there is a considerable gap between the digital frontrunners of the EU and those member states that are lagging behind. As the index shows, particularly SMEs should be facilitated on their way towards cutting-edge technologies (DESI, 2021). Overall, Latvia ranks 18th out of the 28 member countries in the DESI index, and Denmark, Finland, Sweden, the Netherlands, and Ireland are the top five countries in terms of digitalization. Latvia scores well in the categories of digital public services and connectivity, while still falling behind in integration of digital technologies and skilled human capital. Even though commitment towards digital innovations is highlighted both in the National Development Plan and the Latvian Digital Transformation Guidelines 2021-2027, data retrieved from European Commission indicate that the EU average index has caught up with Latvia's performance and exceeded it in 2021. Both Lithuania and Estonia are ahead of Latvia within the DESI index.

Latvia lags behind also on the OECD level, and the organization is encouraging the country to focus on digitalization as a key enabler of innovation and growth – to promote digital innovation to address Latvia's societal and economic challenges; increase research funding to ICT-related projects, including RIS3 projects; raise the quality of research through competitive-based funds, higher private co-financing and systemic ex post evaluation; and assess the activities of the IT Cluster, the IT Competence Centre and other ICT-related bodies and clearly define their perspective roles (OECD, 2021).

While evaluating agricultural sector, there is evidence that farmers, their organizations, researchers, and policymakers have a theoretical understanding that digitalization is essential for innovation and growth. However, implementing information and communication technologies and digital initiatives has proven challenging, particularly for SMEs. Various obstacles such as farmers' skills, lack of funds, limited awareness of benefits, poor communication between stakeholders, and absence of specific solutions for the subsector have been identified. Nevertheless, the data analysis and semi-structured interviews reveal a willingness to explore precision farming and data-driven decision-making to reap the benefits of digitalization.

Table 2

Main viewpoints expressed in semi-structured interviews

Current situation	Main challenges and risks	Main opportunities and strengths
The subsector is small – it employs <1% of the entire UAA, which also applies to total output. Furthermore, it is a specific and challenging sector due to high level of manual work (Dzelzkaleja-Burmistre).	Lack of financing is mentioned as the prime drawback of digitalization. However, "R&D in precision agriculture is on the rise globally, and eventually solutions will become cheaper" (Strautina).	Existing scientific infrastructure and cross-sectoral cooperation that between agricultural and technology research units presents an opportunity (examples of good practice already within agricultural machinery, sensor systems, robotic applications, IoT systems models, machine learning, weeding and logistics robots and other areas) (all respondents).
26% growth in UAA employed by the subsector (2015-2020) has mostly occurred on the account of increase in organic orchards, which have a particular export potential. "A conventionally-grown berry will not out-compete the Polish harvests" (Strazdins).	Lack of digital skills (DESI Index) against the backdrop of ageing average farm managers (all respondents). Agriculture stands out as a rather conservative sector that requires simple and understandable [digitalization] solutions (Laksa).	Highly developed broadband coverage (OECD reports) – Latvia's major strength in the path towards further digitalization (all respondents).
The fruit and berry subsector is showing signs of consolidation alongside an increase in employed UAA. Hence, cooperatives are on the rise, allowing farmers to invest in technologies that would otherwise be out of reach (Karklins).	The economic size of farms and geographically scattered farming enterprises discourage digitalization. Clusters of same-culture farms would decrease fragmentation within the subsector (Dzelzkaleja-Burmistre).	General level of agricultural education and training is agreeable. Further strengthening of higher and vocational educational programmes holds a potential to enhance skills (Ducens).
Latvia stands out in terms of remote area payment submission and control (close cooperation between public administration, farmers and NGOs) (Dzelzkaleja-Burmistre).	Informal or grey economy not only contributes to low levels of productivity, but also discourages farm managers to seek efficient digital solutions (Lindermanis).	Currently on the national policy-making level major support is allocated to biodiversity issues. Instead, increasing support for farm and production modernization, including digital agri-food technologies, would allow Latvia to contribute more to EU's Green Deal (Dzelzkaleja-Burmistre).
On a farm-level dairy and cereal farming have made more progress in terms of digitalization. Examples of good practice within the particular subsector include anti-frost irrigation systems in connection with meteorological stations and warning systems, also employed to control diseases and pests (Dzelzkaleja-Burmistre).	Access to funding appears to be a crucial aspect. While innovation through projects is highly praised, it is at the same time noted that allocated resources do not match the demand. The budget for farm modernization in 2022 was 64 million euros, while submitted projects required 134 million euros (Dzelzkaleja-Burmistre).	Communication upholds an untapped potential within the subsector, bringing various audiences such as public administration, farmers, technology developers and distributors, NGOs and scientists together (Strautina, Lindermanis, Laksa).
On the post-harvest management level, more investments are seen either in medium and large companies (Laksa) or within cooperatives due to the small economic size of farms (Dzelzkaleja-Burmistre).	Unfamiliarity of advantages of digital solutions (lack of widely communicated examples of good practice). (Strazdins). General perception that technological advances are expensive and complex (Laksa).	Lack of workforce, costs of resources and further climate change which might intensify presence of pests and diseases, will contribute towards demand for nationally and locally developed and adopted digitalization solutions (Ducens, Dzelzkaleja-Burmistre).

When evaluating potential future scenarios, respondents share a common notion that adapting to change is generally difficult, however, all interviewees highlight the importance and inevitable development of subsector's digitalization. The pace of this potential development is seen differently, and, in addition, other sectors like dairy or grain production are seen as pioneers of the field also within the upcoming decade.

"New digital solutions are inevitable. One must only hope that our subsector will keep up with it financially-wise and skill-wise. Generation change is an important aspect [...]. Average age of farmers is not decreasing – both Latvia and Europe are familiar with this problem" (Strazdins). Some viewpoints were harsher, stating that openness to digitalization will determine the issue of survival within the subsector. "Digital technologies will enter mainly due to labour shortage and high costs. Another reason is climate change. Sensors and forecasting abilities will allow us to adapt to the climate that, in Latvia's case, will bring more pests. We will need digital assistants as much as possible for forecasting and decision-making" (Dzelzkaleja-Burmistre).

As for now, increasing prices have already contributed to the rational understanding that digital technologies might decrease expenditure, although further communication of best practice is recommended. "Often we used to see large-scale grain producers investing in auto steer tractors that employ satellite signals. However, when it comes to simple and even cheap solutions, like a sensor that closes the water tap and could provide considerable savings in longer run, we repeatedly hear that it is unnecessary. Frequently farm managers perceive digitalization as shiny new expensive gadgets that will require a totally new approach and adaptation; however, notable improvements can also be achieved through digitalizing the existing equipment or making the already installed sensors to provide coordinated insight into processes" (Laksa). A general country-wide and cross-sectoral problem is lack of long-term thinking, concludes Lindermanis, who is representing not only farming, but also technology start-up industry. "In a way we are discouraged from thinking in long-term. For example, agricultural insurance is a practically non-existent business niche. Well, there are options, however, the cost-benefit ratio is discouraging, which also explains why young people do not find agriculture appealing".

The farmers stress concrete and practical aspects, like a need for digital solution for the complex soil, leaf and water analysis, as well as digital tools to support plant fertilization. "An algorithm that would take into account the weather, stage of the plant's development, the specific variety and results of analysis could not only significantly facilitate daily work, but also enable more precise management and save resources, such as time or minerals, eventually also increasing productivity" (Ducens). This, however, brings up again the cost-benefit ratio for small and medium-sized farms. When evaluated against the potential return of investment, many such initiatives stay as wishful thinking.

Several suggestions have been put forward in order to help the subsector to move towards digitalization. Based on scientific publications, data analysis, and information gathered from interviews, the recommendations might cater to a broad audience including farm managers, technology developers and distributors, as well as non-governmental and governmental organizations. However, some of the suggestions provided by the respondents were highly specific, yet valuable, and therefore they will be detailed out first. Some are referring to the agricultural sector in general, some – merely to fruit and berry production.

- 1) Targeted support to cooperatives, since they work towards strengthening the fragmented voice of farmers. One particular direction could be the development of monitoring and logistics systems, as well as marketing platforms (Karklins).
- 2) Information is fragmented on many issues: specific solutions and support possibilities. Collecting it on a single platform would be beneficial (Laksa).
- 3) Facilitating cooperation between farms and scientific institutions would be mutually beneficial (Lindermanis).

- 4) Addressing distributors of digital technologies as an audience that can encourage digitalization through post-purchase consultations (Dzelzkaleja-Burmistre and Lindermanis).
- 5) Increasing support for producers (equipment, ICTs etc.) at the expense of biodiversity, which currently is a strategic priority on CAP 2023-2027 for Latvia (Dzelzkaleja-Burmistre).
- 6) Instead of focusing on well-researched areas, target support for cultures that are typical and perspective in Latvia, like quinces or raspberries to cover the knowledge gap that might be arising due to lack of interest in these cultures by international scientists (Strautina).
- 7) Work towards decreasing employee turnover in the state institutions, which could contribute to the continuity (Ducens).

With a more overarching view, the following recommendations for the entire sector were developed.

- 1) First and foremost, the issue of digital skills and competences has to be addressed on all educational levels, involving the existing vocational, higher education and life-long education framework and boosting cooperation with the NGOs of the sector, the IT Cluster, the IT Competence Centre and other ICT-related bodies.
- 2) Increase funding to agricultural holdings aimed at carrying out digital infrastructure and equipment modernization projects within the fruit and berry subsector. At the same time, a simplified administrative procedure is advisable.
- 3) Increase research funding to ICT-related projects and boost their quality through higher private co-financing and detailed post-evaluation.
- 4) Digitalization is about extracting and using data to be analysed and converted into information that can be used to facilitate the growth of the agricultural holding. In this aspect there is untapped potential within the sector in general – automatization and digitalization tools that have been purchased, are not being exploited to their full capacity. Here the issue of communication between technology developers, distributors and farmers has to be addressed. The author recommends involving NGOs as a mediator and facilitator of the process.
- 5) Enhancing networking among the stakeholders – a more intensive sharing of the examples of best practice on regional, national and international levels is needed in order to urge farm managers to explore digital options.
- 6) Encouraging clustering within cooperatives that would enhance the economic power of the growers of specific cultures.
- 7) Review the current support mechanisms that address the consequences of COVID-19 within the agricultural sector. A reconsideration of rather boosting tools that contribute to long-term change (development of applications, platforms, specific digital tools etc.) than allowances and compensations is advisable.
- 8) In addition to the current *ALTUM* option, increase access to loans, especially for SMEs, who intend to implement digital tools and systems.
- 9) Although the ageing of farmers implies a complex problem, a nation-wide campaign with an aim to boost the reputation of farming, the gains of the profession and the possibilities it opens, would be advisable.
- 10) Further contributions to vocational and higher education programmes are vitally important. In order to boost the skills of the future professionals, cross-disciplinary study courses introducing the students with the principles of robotics, programming and other digitalization-driven aspects could contribute to creating a digital mindset for future farm managers.

11) On the state level it would be important to keep encouraging such private digital initiatives as *Grow with Google* which tackles lack of skills.

12) Despite the rather optimistic evaluation in DESI, keep investing in national digital infrastructure in order to boost connectivity and reduce the digital divide between urban and rural regions.

Conclusions

1) While digitalization has been extensively studied in academia, there is a lack of in-depth research on the status quo, challenges, and facilitators of digital transformation in the fruit and berry subsector of Latvia's agriculture. This paper achieved to fill the gap by providing insights into the current state of digitalization and identifying the factors that can contribute to its successful implementation. The carefully selected list of interviewees represented stakeholders who can address the issue from the viewpoint of farmers, NGOs, the industry that offers solutions in digitalization, as well as scientific institutions that work towards the enhancement of digitalization within the particular subsector. In addition, the chosen agricultural holdings differ in size, specialization, region, and level of experience of the manager. The viewpoints of an organic farmer and farmers whose holdings are part of a cooperative were also included. As age is also often considered a barrier to digitalization, diverse opinions were represented by including interviewees in their late 30s, 40s, and 50s.

2) The research managed to outline the current digitalization situation within the fruit and berry subsector, as well as accumulate knowledge, establish facts and generate conclusions that might serve policy-makers, organizations and practitioners, facing the exponentially increasing evolution of new technologies. The results support the hypothesis that digitalization leads to increased efficiency and productivity, contributing to competitive advantage of Latvia's agricultural holdings growing fruits and berries.

3) These holdings have a potential to advance from basic to moderate, and from moderate to advanced digital usage. However, the availability of funding and skill level are significant factors that need to be addressed to achieve more efficient, sustainable, and accurate fruit and berry production in Latvia. To help the subsector towards digitalization, various recommendations have been provided in the previous section.

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INNOVATIVE FOOD PRODUCTS IN THE EYES OF POLISH YOUNG CONSUMERS

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Abstract. This article discusses the acceptance of innovative food products – i.e. new and unconventional products that have not been widely consumed so far. The aim of the article is to determine the level of acceptance of innovative food products by young Poles. We put a thesis that innovative food products are not readily accepted and that consumers do not perceive them as worth more than typical food products. Thus, food products are difficult to be subjected to major innovations. The research methodology was based on the literature review summarizing scholarly literature on the chosen research topic, a questionnaire survey, comparative analysis and logical construction research methods. This study is essential from at least two perspectives: 1) acceptance of novelties is important for the authorities shaping social policies regarding sustainable development and food security; 2) understanding the customers is important for food industry companies that want to introduce new products to the market.

Food preferences are often tied to cultural traditions, which can make it difficult for new or unfamiliar foods to gain traction. This is confirmed by the results of the study elaborated in the article: the approach of respondents to innovative food products is ambiguous - they agree that such products are beneficial for people and the Earth's resources, but not always they are ready to use them themselves. The research also shows that innovative products would not be accepted immediately and consumers would need time to get used to them. Therefore, the authorities shaping social policies regarding sustainable development and food security, as well as food producers, should plan educational campaigns explaining the benefits of alternative food sources and innovative food products.

Key words: behaviour of young Poles, culture, food consumption, innovative products.

JEL code: D11, E2, M3, O3

Introduction

An innovative product is one that introduces something new or significantly improves upon an existing solution. Innovation can take many forms, such as a new technology, a new design, a new way of using an existing product or a combination of these (Ziemnowicz, 2013). One of the approaches to innovation says that the most important thing is that the product is evaluated as new or innovative by consumers.

An innovative product can offer unique benefits that differentiate it from competitors or existing solutions in the market. These benefits can include enhanced functionality, improved user experience, increased efficiency, reduced costs, and environmental sustainability. It can also make the consumer feel more responsible for the environment and the earth's resources.

Innovation is important in business because it helps companies stay competitive, attract customers, and stay relevant in an ever-changing market. It means that an innovative product can create a competitive advantage for a company, leading to increased revenue and growth. For all this to happen, consumers must be positive about innovation. However, innovative products are often more expensive than those existing on the market. This is due to the costs that have to be incurred to develop a new product, and it is also due to the costs of introducing it to the market. This may deter the average consumer from purchasing.

The article concerns the acceptance of food novelties. **The aim of our work is to determine the degree of acceptance of innovative food products among young consumers.** We put a thesis that innovative food products are not readily accepted and that consumers do not perceive them as worth more

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than typical food products. This is a slightly different approach than to non-food products, as consumers generally agree that an innovative product should cost more (Sadik-Rozsnyai, 2016). Thus, food products are difficult to be subjected to major innovations.

This article is the first part of a larger study covering Latvia, Poland and Spain, and we are convinced that the results can be applied in each of these countries as well as in other European ones. Especially, that this topic is important from at least two perspectives: 1) acceptance of novelties is essential for the authorities shaping social policies regarding sustainable development and food security; 2) understanding the customers is important for food industry companies that want to introduce new products to the market.

Research methodology

At the beginning of 2023, an online questionnaire survey was conducted with 10 questions on innovative solutions related to food. Respondents were asked to evaluate various product innovations: vertical home gardens (vertical small shelves with plants) - a new kitchen functionality that allows consumers to grow certain edible plants at home; smoothies made from **vegetable waste (e.g. watermelon rinds); functional snacks with detailed information on** beneficial nutrients; plant-based meat substitutes - products that taste like meat, but are made from plants; a new use of cannabis, in the form of hummus or pesto; alternative proteins from plants and microorganisms added to food products; "ugly products" made from natural ingredients and waste; adult soft drinks disguised as alcohol; farmed insects and worms as a food ingredient; and finally, beer based on water recovered in a sewage treatment plant. All these products really exist and can be found on the European market. Respondents rated the given innovations on a Likert scale of 1 to 5, evaluating the statements: I think it's a great idea; I think it's good for everyone; I think it's good for the Earth; it's worth buying even if the price is higher than average. The questions were arranged in order from total rejection to total acceptance (Encyclopedia Britannica, n.d.). At the end of the questionnaire, respondents could say what they thought the average consumer would think of such innovations in an open question.

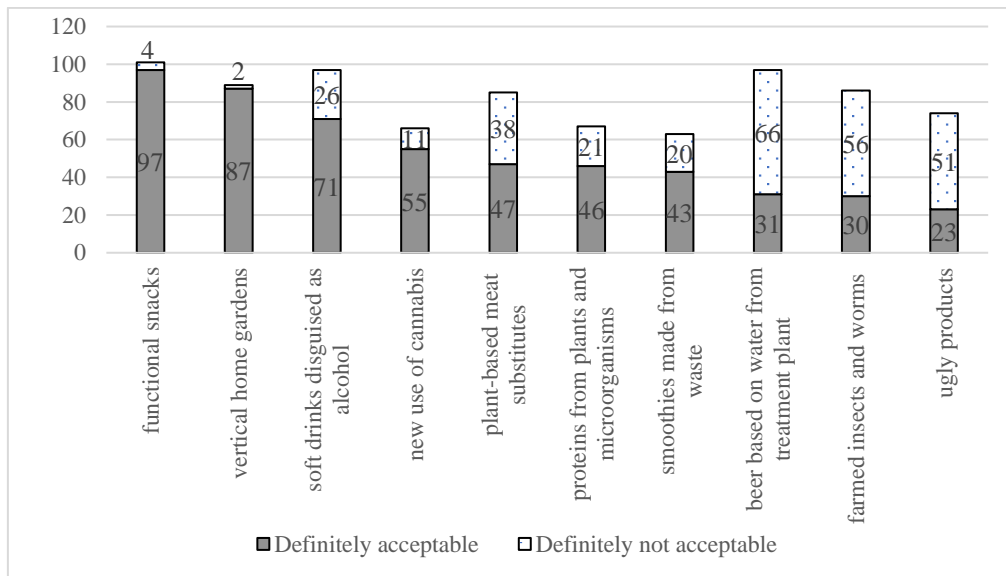
185 questionnaires were obtained, of which 90 came from women, 90 from men, and 5 people did not want to give their gender. 73% of respondents are under the age of 30, which is not surprising considering that the survey was conducted online. However, the structure of the sample does not reflect the structure of the whole society, therefore the obtained results should be related mainly to young people. The income of the respondents is also important information - in relation to the average earnings, 54% of the respondents earn below and 46% above the average income (in 2022 in Poland the average earnings was PLN 4,900 net, which is equal to EUR 1,046⁵).

Results

First of all, the respondents were asked about the acceptance of a given innovation. The answers are shown in Figure 1. It is very interesting that in a few cases the respondents are firm in their assessments - 3 innovations obtained a definite acceptance, 3 - strong rejection, the remaining ones evoke mixed feelings. Thus, the innovations which gained the greatest acceptance were: functional snacks (97 positive indications, which is 52.4%), vertical home gardens (87 indications, 47%), and alcohol-free drinks (71 indications, 38.4%). Negative reactions, however, got beer based on water from treatment plant (66 negative indications, which is 35.7%), farmed insects and worms (56 negative indications, 30.3%) and ugly products (respectively, 51 indications and 27.6%). Mixed feelings were obtained by products such as plant-based meat substitutes, proteins from plants and microorganisms or smoothies made from waste.

⁵ PLN 1 = EUR 0.2135, according to the average exchange rate of the National Bank of Poland on March 9, 2023.

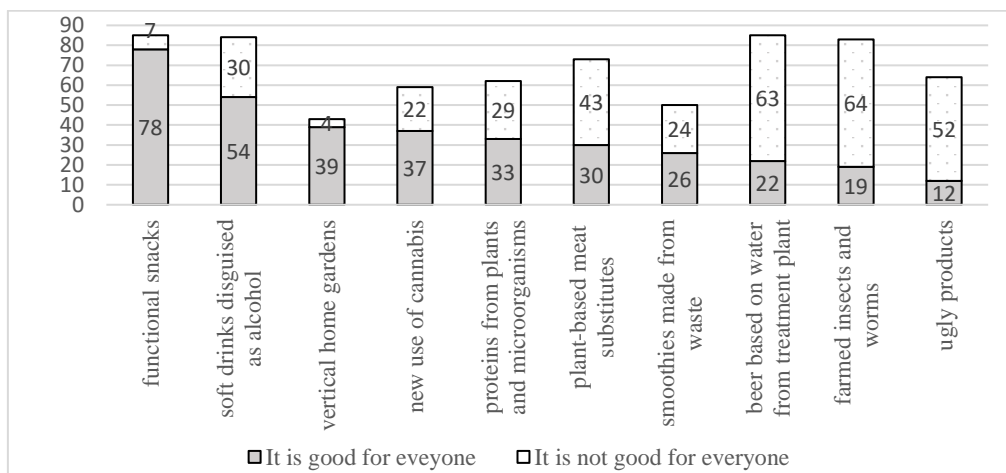
For example, the latter product received 43 positive and 20 negative indications, although respondents' opposition is not as strong as for the three products mentioned earlier.



Source: authors' calculations based on the research data, 2023

Fig. 1. Positive and negative reactions regarding food innovations (n=185)

It is evident that consumers sometimes do not accept innovations (Figure 2) - when they were asked what is good for everyone, more negative than positive indications were given to beer based on water recovered in a sewage treatment plant (22 positive versus 63 negative), farmed insects and worms (19 versus 64), and ugly products (12 versus 52). Again, 3 innovations received the most positive reviews: functional snacks (78 positive indications, 42.1%), alcohol-free drinks (respectively 54, and 29.2%) and vertical home gardens (39, and 21%).



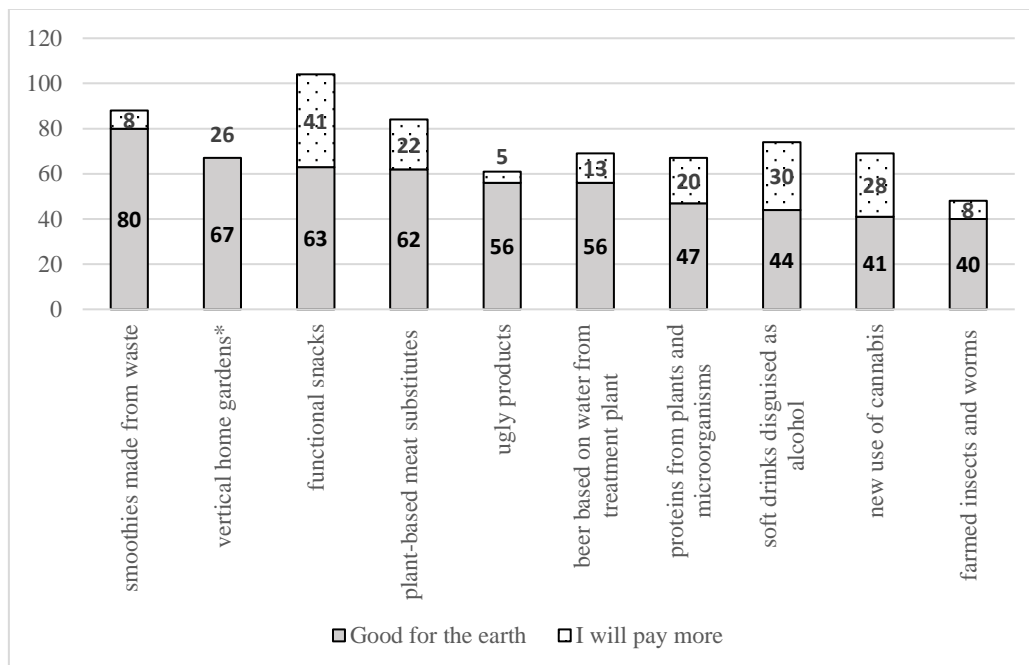
Source: authors' calculations based on the research data, 2023

Fig. 2. Are the given innovations good for everyone? (n=185)

Then respondents were asked if the innovation was good for the Earth (Figure 3) - again, the same products that previously received the most positive reviews are repeated, however, their order changes: number 1, and therefore the most earth-resource-friendly innovation, is smoothie made from vegetable waste (80 positive indications, 43.2%), then vertical home gardens (67, and 36.2%), and functional snacks (63 and 34%). With this question it can be noticed that generally the respondents evaluate innovations very positively, because the average of positive indications is 55.6 (30%), so they understand that such

innovations are good for the Earth. On the other hand, indications for the statement "they are good for everyone" were worse - the average of positive indications was 35 (18.9%).

Interestingly, according to the respondents, one of the most valuable innovations - smoothies made from waste - is at the same time rated as the one for which they will not pay more than necessary. Only 8 respondents (4.3%) declared that they could pay a little more for this product. The relationship between the overall value of innovation and the willingness to sacrifice one's money is shown in Figure 3 as well.



*vertical home gardens - here the answer was "I will do it"

Source: authors' calculations based on the research data, 2023

Fig. 3. The willingness to sacrifice one's money for products which are good for the Earth (n=185)

One question was open and respondents could enter their thoughts. Answering to what in their opinion an average consumer would think of such innovations, they said (quotations) listed below.

- 1) *Some of the innovations in the survey may be controversial, especially those related to sewage or insects, which are associated with something repulsive and "dirty". I think that it would be easier to encourage people to these ideas if things made of waste were cheaper than traditional ones. These ingredients would otherwise be wasted and so both parties can benefit.*
- 2) *Consumers may be afraid to try something new, they need time to accept.*
- 3) *I think opinions will be divided. It gave me mixed feelings. Some of the products seem quite interesting, while others are repulsive at the very thought.*
- 4) *The response depends on the person. Some people will like it more and others less, but I don't think the reactions will be very positive.*
- 5) *I think that at the beginning of the introduction of such innovations and such substitutes in food products, there will be little interest at first. But after good publicity, social media coverage, and TV coverage, some community will start to introduce these solutions to their households.*

It is evident that the respondents personally either do not have a clear opinion about the presented innovations, or the opinion is negative. In the comments of the respondents, however, it is visible what they lack - information and promotion, above all.

Discussion

It is important to note that there is no monolithic "European", or "Spanish", or "Polish" customer (Gescinska 2018; Bárcenas et al., 1998), and the cultural, social, and political characteristics of people can vary greatly depending on a number of factors, including historical context, economic development, regional differences and religion, as well as personal experiences and preferences. This also applies to the acceptance of new products or - as you might call them - innovations (Yeniyurt, Townsend 2003). In this article we discuss the acceptance of food novelties that have recently been introduced and may be accepted by a given society or rejected.

At first glance, it would seem that the group of respondents we obtained in this study is inappropriate, because mostly it is consisted of people under 30. But aren't young people the ones who are open to new things and absorb all innovations? That's why we decided to continue this study and look at the issue of accepting new things from the perspective of young people. It is generally believed that young people tend to be more open to innovations than older generations (Packalen, Bhattacharya 2019), as they have grown up in a world of rapid changes (i.e. technological advancements) and are often early adopters of new technologies, and new trends. However, it's important to note that this is not a universal rule, and there can be significant variations among different individuals and countries. Additionally, even among young people, there may be some who are more resistant to change and new ideas, as we can see in obtained results.

Factors such as education, socio-economic background, cultural upbringing, and personal beliefs can also influence how open individuals are to innovations (Sparke and Menrad, 2011). For example, someone from a rural area, and with conservative approach to life may be less open to new and innovative products compared to someone from an urban area with more exposure to and experience with new ideas (Yeganeh, 2023; Zhang and Gong 2022; Lekezwa and Zulu 2022; Masry-Herzallah and Da'as 2021).

Vanhonacker et al. (2010) says that traditional food consumption patterns are stronger in the south than in the north of Europe. But, analysing food innovations from different perspectives, you can definitely notice that everywhere food can be a multi-sensory experience, engaging our senses of taste, smell, and sight (Batat, 2019). Preparing and enjoying food can provide a rich sensory experience that can be deeply pleasurable and rewarding. So, it may be understandable that worms and other insects, although sometimes considered as a delicacy, in many other cultures are not accepted. Such a situation can be observed in the results presented in this article. The majority of the respondents had ambiguous opinions, and sometimes even negative ones, about non-traditional foods. The respondents even used the words 'repulsive' and 'disgusting'. According to our results, this is especially true for worms and insects, sewage and dirty water, and generally unsightly products. In the given cases, twice as many respondents rejected such a product than accepted it. It seems that consumers better evaluate innovations that are predetermined to provide positive, additional ingredients (such as vitamins) or do not involve eating a meal at all. Therefore, functional snacks and vertical home gardens received the most positive reactions (52.4% and 47%, respectively).

Hémar-Nicolas, Pantin-Sohier, and Gallen (2022) say, that in Western culture insects are considered as non-edible, therefore people predominantly reject insects as food. Thus, our results confirm the previously conducted research (Clarkson, Miroso, and Birch 2018; Cunha, Silva, and Cheung, 2023). What is puzzling, however, is the opposition to the recycling of dirty water and consumption of ugly products. This may be related to the trend being named "Instagram-able food" – this vogue is observed among young people for whom the quality of food is as important as the appearance. So, "Instagram-able food" refers to dishes or

drinks that are visually appealing, colourful, and spotless, and this would explain the reluctance of respondents to imperfect products. Our results show that ugly products are largely unacceptable (27.6% strongly rejected it), they are not perceived as good for everyone, and they are not among the innovations that consumers are willing to pay more for. These issues may be the subject of further research.

Governments and organizations often implement regulations and policies to reduce food waste, such as setting food waste reduction targets, providing incentives, and promoting composting and recycling programs (Koester, 2017; Fraj-Andrés et al., 2023). Consumers may take a similar approach. And it seems that some of the respondents were willing to accept the novelty because it was connected to waste reduction. According to Bekin, Carrigan, and Szmigin (2006), people undertake such challenges as utilization of innovative food, because they want to make a positive contribution to the world. Here one can see an opportunity for responsible consumption (Ozcaglar-Toulouse, 2007). In obtained results, however, we can notice little willingness to engage personally in innovative consumption. Respondents believe that innovative products are indeed good for the Earth and future generations, but they personally do not want to be involved (i.e. buy and consume). Only products that are indisputably positive, such as functional snacks, alcohol-free drinks or vertical gardens, gain the status of "good for everyone", and therefore also for the person answering the questionnaire. Innovations such as plant-based meat substitutes, proteins from microorganisms, smoothies from waste, or protein from insects and worms, are not widely accepted by young respondents. The reason may lie in the culture and tradition of eating, and the perception of what is beneficial. The question of willingness to pay more for an innovative product also refers to the benefits - in our survey, respondents believe that if something is made from waste or from ingredients that are commonly available (like worms), then producers should not charge more money for it. There were even statements to the contrary, that such products should be much cheaper.

It seems that for innovations that improve health and safety, people tend to be more willing to pay more because it makes sense to invest in their health and safety. At the same time, if the innovation provides convenience or makes everyday life easier, people are also more likely to pay more. If consumers do not see a compelling reason to accept the novelty then they become reluctant and wait for broader market information (Alphonse, Waized, and Larsen, 2020). Either way, people need motivation for acceptance of novelty and positive behaviour (Chengqin et al., 2022).

On the other hand, a certain amount of hesitation in the respondents' answers can be observed - many of them indicated that initially people will reject mentioned food innovations, but over time they will get used to. Therefore, the role of marketing and promotion on the part of enterprises producing innovative food is important - companies should promote innovative mindset and consumer empowerment (Kumar and Dholakia 2022; Ozcaglar-Toulouse, 2007). Varese, Cesarani, and Wojnarowska (2023), suggest four different interventions creating new consumer attitudes: availability of products in the supply chain, enabling personal experience, launching awareness campaigns, and finally promoting circular economy, and innovative food products. Nevertheless, it is worth noting that the level of involvement in such activities may vary depending on individual beliefs, values and life situations. Sometimes people may be more willing to make sacrifices for loved ones or communities with which they identify more strongly than for the general public.

So, certainly it all depends on the individual situation and individual approach, but we can see a certain regularity in the obtained results: the majority of respondents understood the need to reduce consumption and protect the Earth resources (Fig. 3), and mostly accept the presence of innovative food products on the market (Fig. 1), however, personally they are not so willing to consume them, and they are not willing to pay more than for typical products (Fig. 3). This is an important guideline for producers of innovative

food products: the product must be accompanied by clear information about the benefits for the respondent, and such a product must not be more expensive than classic food, because consumers will not want to pay more (Senker 1990; Vlosky, Ozanne, and Fontenot, 1999; Samaraweera, Sims, and Homsey, 2021).

It's understandable that consumers are wary because the widespread use of processed foods and artificial additives has been linked to a range of health issues, including obesity, diabetes, and heart disease. In addition, certain types of food innovations, such as genetically modified organisms can be controversial and raise concerns about the potential long-term impacts on human health and the environment (Jasrotia, Darda, and Pandey, 2022). Therefore, consumers choose products they know and about which they have enough positive information (Bárceñas, 1998), therefore, in our study, only some innovations were positively assessed by the respondents. It should be noted that no product was positively accepted in 100% by all respondents, which means that respondents are generally reluctant to accept a novelty on the food market.

Consequently, it can be said that food can be changed to a certain extent, depending on the specific context and circumstances. So, it cannot be completely new ingredients or recipes that have never been used in a given society before. For example, individuals can choose to modify their own diets by making changes to the types of foods they eat or the way they prepare and consume their food. However, attitudes towards farmed insects and worms as a food source are changing in many parts of the world, as people become more interested in sustainable and alternative food sources. As more research is conducted and new culinary techniques are developed, it is possible that insects and worms may become more widely accepted as a food source in the future (Frewer, Scholderer, and Lambert, 2003). As one of the respondents said about food novelties: "consumers may be afraid to try something new, they need time to accept". Thus, an appropriate promotion, information, and product availability will change consumer attitudes.

Conclusions and recommendations

- 1) While it's generally true that young people are more open to innovations than older generations, it's important to keep in mind that this is not a blanket statement, and there are many individual and contextual factors that can influence how open someone is to new ideas.
- 2) The acceptance of new food products depends on several key factors. First of all, food can be a powerful marker of cultural identity, as it reflects the traditions, customs, and beliefs of a particular community. Sharing and enjoying traditional foods with others can help to reinforce a sense of identity and belonging, therefore people - also young people - are attached to the food they know from their family home and are not willing to change it. Thus, innovative food products will not be accepted if there is no information about what problems they solve - problems can be with individual consumers, they can be with society, and they can be with the whole Earth - consumers just need motivation.
- 3) The approach of Polish consumers to innovative products is ambiguous - on the one hand, they see the need for rational consumption of Earth resources and they assess, that the given innovations are beneficial. However, on the other hand, they personally don't think these are the products for them and are not willing to pay more than for average food products. In their statements, the respondents were quite reserved and most of them indicated that innovative products would not be accepted immediately and consumers would need time to get used to them.
- 4) It must be said that if something is traditionally perceived as unclean or associated with waste (sewage), associated with products not intended for human consumption (food waste), or with products that have never been consumed (worms), then young consumers express strong opposition to

consumption. In such a situation, the desire to protect the earth's resources and responsible consumption recede into the background, therefore the thesis put forward at the beginning of the article has been confirmed.

5) The research results suggest that the authorities shaping social policies regarding sustainable development and food security should plan educational campaigns explaining the benefits of alternative food sources and innovative products. This is important both from the perspective of rational consumption and ensuring food availability. In addition, innovative food producers should understand consumers behaviour: consumers have the right to information and therefore need to know what is in the food; consumers must be motivated to buy and eat atypical foods; consumers must know that by buying a given product they gain benefits for themselves (better health, lower price) or benefits related to the functioning of a given society.

6) Summing up, it can be said that while individuals have the ability to make decisions, there are a variety of factors that can influence and limit their ability to make choices that align with their best interests. Addressing these factors may require a combination of individual efforts, policy interventions, and even systemic change.

7) This article shows only a part of the problem of accepting food innovations in Poland, and of course the topic is not exhausted. There are several topics that may be the subject of further research: price flexibility of innovative food products, availability of products in the distribution channel, producer's pricing policy, as well as scope of information about benefits for consumers in potential promotional campaigns.

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CONCEPTUAL PRINCIPLES OF ACCOUNTING FOR THE RIGHT TO LEASE A LAND PLOT AS A TYPE OF INTANGIBLE ASSET

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Abstract. In Ukraine, land is an important resource for agricultural enterprises. Such enterprises cannot function without land, which is the main means of production. The long history of land reform has led to significant violations in the course of legal relations established since the initial acquisition of ownership of the land plot, the land share (share) so far, including violation of the terms of the moratorium, conclusion of agreements, restricting the right of use of the land plot, non-conformity of the actual boundaries of the land plot with the borders fixed in the documentation on land management etc. The process of adapting existing national accounting standards to the requirements of international accounting standards and international financial reporting standards on the formation of an intangible asset as a land lease right is supported by a number of regulatory legal acts approved by the Government of Ukraine in the recent period. Their effectiveness in extremely difficult conditions (under martial law) is particularly relevant because the use of agricultural land for its intended purposes ensures agricultural production and contributes to the country's economic and food security. The purpose of the study is to substantiate the conceptual basis of accounting for the right to lease a land plot by allocating it as part of intangible assets. The solution of the tasks is achieved by applying general scientific methods (system analysis, generalization) and specific methods of scientific research (economic and statistical, observation, comparison etc.). The subject of the study is the allocation of the object of accounting - the right to lease land as an intangible asset. The article reveals the basic principles of international and national accounting standards of rights to lease land in the intangible assets of business entities. It was noted that Ukrainian legislation (especially those under martial law) has been amended to ensure the targeted use of agricultural land and to avoid food security risks. The process of formation of the object of accounting, in particular the right to lease agricultural land as a type of intangible asset, the criteria for the right to use land parcels, ensuring their inclusion in the composition of intangible assets, have been identified. Emphasis is placed on the need to conduct an audit (legal and technical component) before obtaining rights to land. Thus, the role and functional features of audit in the reliability of providing the legal component of the reflection of intangible assets, in particular the right to lease agricultural land, have been identified.

Key words: land, lease, law, intangible assets, accounting, auditing, standards.

JEL code: Q24, M40

Introduction

Ukraine has the largest area of agricultural land in Europe and is endowed with one third of the world's black earth stock. However, the long-standing land moratorium has acted as a disincentive to efficient land use and long-term capital investment that would provide high value added.

Russian aggression and military actions in Ukraine are a brake on the beginning of land reform, which is aimed at buying and selling agricultural land and determining market prices for land, which will promote transparent land use, development of rural areas and provision of public goods to the rural population. The granting of ownership rights to the use of agricultural land and its allocation as intangible assets is a stage in the reform of the accounting system. However, there are several unresolved issues, including at the

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legislative level, regarding the market and rental of agricultural land in Ukraine, which affect the accounting system. The martial law situation poses specific challenges.

The problems of land relations and the leasing of agricultural land are the focus of attention of scientists and legislative changes, but due to the military aggression of Russia and martial law in Ukraine, a number of issues remain that require further research and solutions. According to a number of legislative and regulatory frameworks adopted by the Government of Ukraine, an integral component is an accounting and control system that ensures the reliability of the information component in society.

The purpose of the study is to substantiate the conceptual framework for the accounting of intangible assets by allocating the object of accounting - the right to lease land.

The aim of the study is to highlight the features of the land reform of Ukraine and its impact on the change of ownership of agricultural land; determination of ownership rights for the use of agricultural land and its allocation as objects of account in intangible assets; study of conceptual framework of accounting for land lease rights in accordance with international standards of financial reporting; ensuring the accounting of intangible assets in accordance with the justification of land use rights on criteria (long-term lease, possibility of alienation of the right of lease, reliable assessment) and their legislative establishment.

Theoretical and methodological aspects of the study are based on the study of national and international standards of financial reporting, assessment of legislative and regulatory acts of Ukraine on the use of agricultural land, official statistical materials of the State Statistical Service of Ukraine, as well as scientific publications of foreign and Ukrainian economists and their own research.

The solution of the tasks is achieved by applying general scientific methods (system analysis, generalization) and specific methods of scientific research (economic and statistical, observation, comparison etc.).

The subject of the study is the allocation of the object of accounting - the right to lease land as an intangible asset.

The following the Ukrainian researchers should be highlighted: L. A. Mohylina (2015) described the statistical study of the development of intangible assets in Ukraine and highlighted sources of information; L. A. Tarasenko (2017) conducted an analysis of modern problems of independent audit of intangible assets in order to develop ways of its improvement, taking into account the specifics of the object; Y. M. Hrybovska, L. A. Khodakivska and Zh. A. Kononenko (2021) conducted studies on the improvement of the methodology of formation of the documentation and analytical base of management of intangible assets of enterprises in order to make effective managerial decisions; O. M. Yeremyan (2022) researched the information support of audit of intangible assets and identified perspective directions for quality audit.

Among foreign economists, Mark J. Kohlbeck, Jeffrey R. Cohen and Lori L. Holder-Webb (2009) conducted research to understand and implement procedures related to the auditing of valuation of fair value due to impairment. The unusual intangible asset acquired franchise rights have focused on one of the key aspects - auditing fair market values - a concept that takes on importance as financial accounting standards evolve towards a fair value base and what requires the development of audit judgment; Castilla-Polo, F. & Gallardo-Vázquez D. (2016) in their study presented a report prepared by Accounting for Sustainability (2012), according to which "more than 80% of investors and analysts believe that integrated reporting will bring benefits for their analysis and evaluation of the company," thus the authors believe that the presence and value of intangible assets are important for all types of firms. Visvanathan G. (2017) found that, unlike material assets, intangible assets create unique challenges for auditors in terms of judgment and complexity, auditors charge higher fees to firms with a larger share of intangible assets on the balance sheet. In turn, Robert Keys, Rabin Jogarajan, Eric Lee (2022) have done a research aimed

at facilitating discussion of possible solutions to the information gap perceived in financial statements relating to intangible assets, focusing on exposing unrecognized internally generated intangible assets. Whereas Azamat, K., Galiyab J., Bezhan, R. & Nurdanad, Z. (2023) presented an approach in which the basis for the company to obtain sustainable competitive advantages is the commercialization of intangible assets, that is, assets that can bring profit to the company. That is why, in order to increase the value of the company, managers need to pay attention and effectively manage business processes and strategically important resources, which include intangible assets.

Research results and discussion

Land is one of the most valuable natural resources of mankind, requiring conservation and care. According to the analysis of information of the Food and Agriculture Organization of the UN, the common world agricultural land resources are distributed as follows: China (11% in the general structure to their entire summary), followed by the United States (8%), Australia (8%), Brazil (6%), the Russian Federation (4%), Kazakhstan (4%), India (4%), and a fairly significant share belongs to Ukraine (1 %).

However, the distribution of countries in the structure of arable land is somewhat different. The largest shares are in India (11%), the US (11%), the Russian Federation (9%), China (8%), Brazil (6%) and Ukraine (2%) (Land market, 2019).

The conducted studies lead to the conclusion that 41.4 million hectares of agricultural land in Ukraine make 19% of the territory of Europe. This is quite a significant part. 32.7 million hectares of arable land of Ukraine - make up 27% of the territory of Europe. The level of land fragmentation in Ukraine is 54%, while in Europe only 35%. This information once again confirms the significant contribution of Ukraine to the food security of Europe and other countries of the world (The state of Ukrainian, 2020).

Ukraine is in the process of reforming the legal regulation of land relations. On 31 March 2020, the Law of Ukraine "On the introduction of amendments to some legislative acts of Ukraine concerning the circulation of agricultural land" entered into force, which outlines the legal basis of the market of agricultural land.

Limited land, the monopoly of land as an object of economic management, the presence of its leases and the state regulation of the land market make it small. In countries with developed market relations, including a developed land market, land sales on average account for 1 to 3 per cent of the land area. In other words, 1 to 3 per cent of land in developed countries is traded annually in modern land markets. In particular, in the US and Ireland - 1.2%. Great Britain, France and Italy - 2.0, Germany, Holland, Belgium - 1.5-2.5, in Denmark - about 4% of the land stock. This is the case in both America and Western Europe (Dankevych A., 2007).

Due to the Russian invasion of Ukraine, the functioning of most state electronic registries, including the State Land Cadastre and the State Register of Proprietary Rights, was suspended for security reasons. And without their functioning, it is impossible to acquire ownership and use land parcels under the procedure provided for in the land and other legislation of Ukraine.

According to the monitoring of land relations, the State Service of Ukraine for Geodesy, Cartography and Cadastre constantly records the process of alienation of land plots, as well as their area and average cost of 1 hectare.

The conducted studies allow us to assert that in the structure of ownership of agricultural lands of Ukraine, in particular: in communal property is 1.7 million hectares, in state ownership is 8.7 million hectares, in private ownership is 31 million hectares (Land market, 2021).

It is worth noting that 110,736 hectares of Ukrainian land are used for agricultural activities by companies with ties to citizens or residents of aggressor countries (Bloody land, 2022). According to the study, 1,284 companies have been identified in Ukraine. Among them, almost 90% of the total area of use (99,281 hectares), in the lease and/or property of the agricultural producers of the country - the aggressor country - Russia - and 10% (11,465 hectares) in the lease and/or property of the agricultural producers of the country - the aggressor of Belarus.

On March 24, 2022, the Verkhovna Rada of Ukraine adopted the Law of Ukraine "On the amendment of some legislative acts of Ukraine on the creation of conditions for food security under martial law" which made it easier for farmers to rent and use land under martial law. The Law has already entered into force. Let's highlight its main components:

- automatic renewal for 1 year of contracts for the use of agricultural plots of all forms of ownership;
- agricultural production of agricultural land plots of state and municipal property by the authorities;
- simplified procedure for the leasing of agricultural plots of agricultural use for State and municipal use for commercial agricultural production by their permanent land users and emphyteuses;
- transfer to lessees and sub-lessees of all forms of ownership of agricultural land for farming;
- new procedure for state registration of land contracts.

The solution of many tasks of functioning of economy of Ukraine during the military period, including agriculture, directly depends on the speed of managerial decisions regarding the provision of land plots for appropriate purpose, land management and land registration.

A rationally organized integrated accounting system will create a single information space (Prodanchuk A., Tripak M. et al., 2021). Land is not a product of the labour process, and, consequently, has no value. Therefore, its assessment and reflection in accounting is one of the most important unsolved issues (Tomchuk O. et al., 2018). The right to lease land is the main asset of the agricultural producer.

However, significant changes in the legislation in the so-called "military law" (2698-IX) were resumed auctions, automatic prolongation, etc. However, these changes have brought us an ambiguous understanding of the rules of law in terms of the need to register so-called "annual contracts". That is, leases were purchased in accordance with Article 2 under section 27 transitional provisions of Land Code "2) during the period when the functioning of the State Land Cadastre is suspended throughout the territory of Ukraine, transfer of agricultural plots of state and municipal property for agricultural production lease for a period of up to one year (except those that are in permanent use by persons not belonging to the state; communal enterprises, institutions, organizations), as well as land plots, remaining in collective ownership of collective agricultural enterprise, agricultural cooperative, agricultural joint stock company, unallocated and unused land plots and land shares (units)" - registration is mandatory not necessary.

Each country has its own history. For example, in France, tenants are protected by law. The land lease is for a minimum of nine years, even if the parties wish to conclude it for a shorter period, they are not entitled to it. There is an important provision in the law protecting the lessee. If the owner of the land wants to sell it, and this land is already used by the lessee, he is the first person to whom the owner of the land should offer to buy it. And if the lessee cannot buy, he may demand that the lease continue and the new owner must agree. At the same time, the owner determines the price of the land and the lessee cannot appeal it (Land Law, 2020). Globalisation processes have resulted in further challenges in the area of accounting and control. Particularly, a number of discrepancies in accounting regulations in different

countries have emerged causing difficulties in communication processes between companies and investors in international agricultural business (Gutsalenko L., Wasilewski M. et.al., 2018).

Since the modern period is a qualitatively new stage in the society development, and accounting in all its aspects is undergoing significant changes, it should accordingly lead to a transition to the new paradigm. Innovative technologies certainly update the revision of the accounting paradigm both in its methodological basis, which has developed over five centuries, and in epistemological aspects. Theoretical and conceptual research of the accounting system in the new environment is needed now more than ever (Spilnyk I., Brukhanskyi R., et.al., 2022).

The state of Ukraine has done the main thing - gave the right to participants of the market of land to own, use, dispose of land as property.

Agricultural production is impossible without the use of land, which is the main asset and supports the livelihood of economic entities.

The importance of the availability of land is whether the land is owned or leased by such an enterprise. A significant part of Ukrainian enterprises in the sphere of agrarian business mainly rent land for conducting their business.

The process of land sales and leases has both legal and economic implications. That is, such economic operations cannot be carried out without reflection in the automated accounting system of the entity. There is often a question of how to properly reflect leasing transactions in accounting, in particular land leases. Article 138 under section 138.43.4 in Tax Code of Ukraine identify 6 groups of intangible assets, in particular group 2 deals with the right to use property, namely the right to use land other than the right to permanent use of land in accordance with the law (Tax Code of Ukraine, 2010). It is therefore reasonable to argue that leasing transactions should be treated as intangible assets.

In most cases, the registration of land parcels affects the balance sheet as fixed assets, in which case the permanent use of the land parcel is implied, that is, the land parcel is directly owned. The existence of a lease agreement for a land plot gives grounds to allocate the right to use, that is, as intangible assets. The right to lease meets all criteria for the recognition of intangible assets, and the land user, in accordance with clause 5 of R(S)A 8, "Intangible assets", having received the right to use the land plot under the lease, shall include it in the accounting of intangible assets in the account 12 "Intangible assets" of sub-account 12.2 "Rights to use property". The rights to use land plots are the subject of accounting as part of intangible assets, subject to the following criteria:

- the lease is long-term (more than 1 year);
- possibility of alienation of the right to lease;
- reliable estimate (Brukhanskyi R. et.al., 2018).

The process of adaptation to the requirements of the International Accounting Standards and EU legislation in Ukraine puts forward further requirements to reporting and information trustworthiness control, which are crucial for management decision-making and increase in investment, aiming at enhancing agricultural business attractiveness (Gutsalenko L., Wasilewski M. et.al., 2018).

The requirements of Accounting Regulation (Standard) 8 "Intangible assets" are brought in accordance with the requirements of the International Financial Reporting Standard for small and medium-sized enterprises accounting for intangible assets, but these changes have not yet taken effect (On approval, 2023).

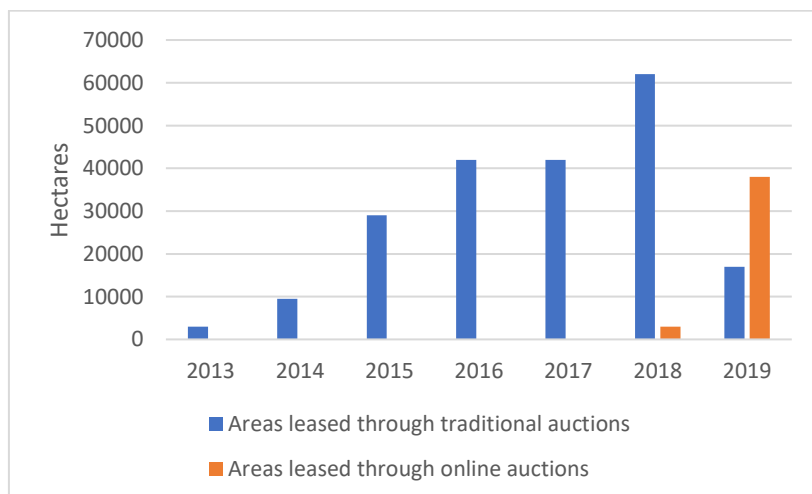
For the purposes of the National Regulation (Standard) of Accounting, the Ministry of Finance has regulated the treatment of permanent use rights of land parcels in Regulation No. 1213, where such rights

are classified as intangible assets. In its explanation, Federation of Professional Accountants and Auditors of Ukraine came to the same conclusion under IFRS: the permanent tenure right is an intangible asset and should be accounted under IAS 38 "Intangible assets" (Taran I., 2020).

IFRS 16 "Rent" sets out the principles of recognition, valuation, presentation and disclosure of the lease. In the case of a lease of land, the user identifies the object as an intangible asset, and the lessor leaves the land on the balance sheet as the main asset.

In case of acquiring the right of permanent use of the land plot, the enterprise receives an intangible asset. At the time of the creation of such a right, the intangible asset is recognized on the balance sheet at cost, taking into account the costs of processing title documents. The right of permanent use of land used by an entity in its economic activities for future economic benefits is an identifiable asset, which is not material in itself. Consequently, under IAS under section 8 and section 10 (IAS)38, such a right falls within the definition of an intangible asset. The same position was taken by the Ministry of Finance of Ukraine in Article 1 under section II of Regulation No. 1213, where it is indicated that the cost of the right of permanent use of land by State and communal enterprises that keep records according to national standards, are reflected in intangible assets (Registration of the right, 2019).

In 2013, mandatory auctions for leasing state land were introduced. After that, approximately 242,000 hectares (2.3% of the total area of state agricultural land) were successfully leased through auctions. Figure 1 shows the dynamics of areas successfully leased at auctions since 2013. Despite the fact that Resolution No. 688 of the Cabinet of Ministers of Ukraine dated on June 21, 2017, online auctions gained popularity only in 2019. Only 4 thousand hectares (185 lots in 84 auctions) were leased through online auctions in 2018, while in 2019 this figure increased to 36.5 thousand hectares (2,050 lots through 1,150 auctions) virtually replacing traditional auctions. With the exception of a few cases, all online auctions were conducted on a web platform developed and provided by the state-owned enterprise "Electronic trading system for seized property" (Figure 1) (Kvartyuk V. et. al., 2020).



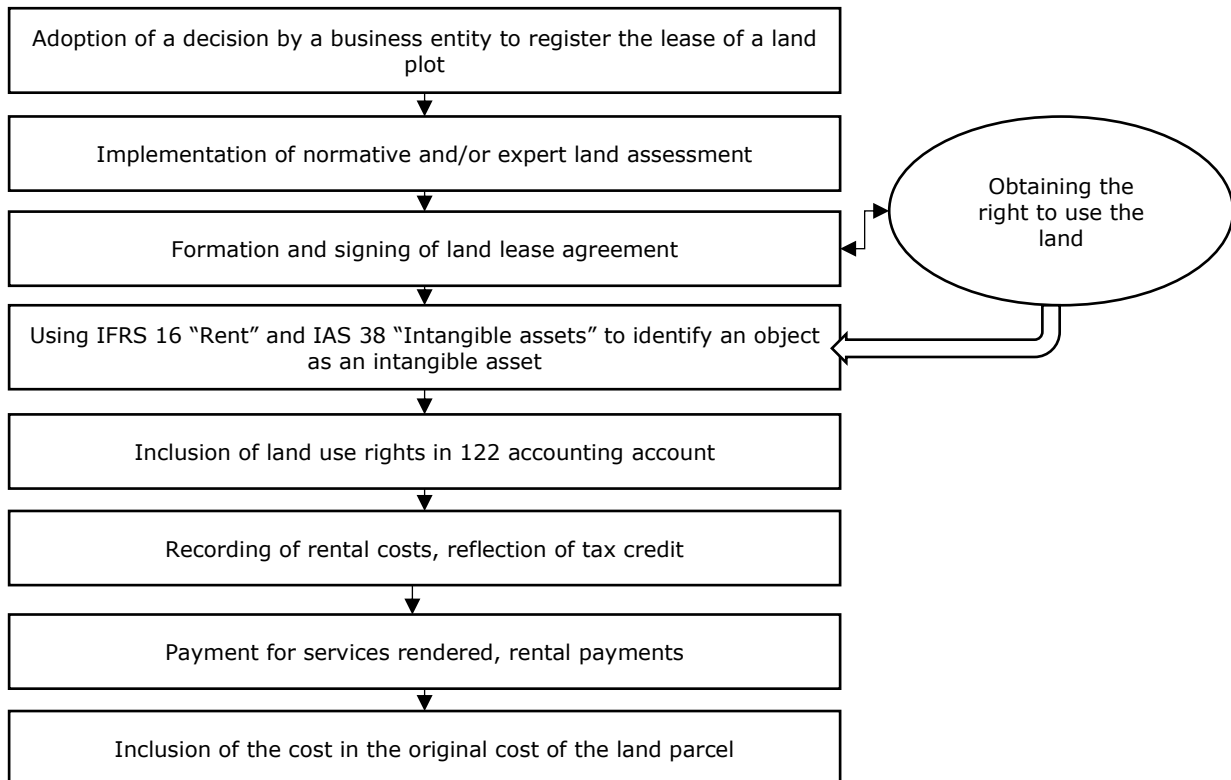
Source: authors' construction based on Kvartyuk V. et. al., 2020

Fig. 1. State agricultural land leased through traditional and online auctions (ha)

In connection with the implementation of decentralization during 2014-2021, local councils issued orders, prescriptions, decrees "On auditing the use of agricultural land". After all, the unification of territorial communities led to the transfer of land from one local authority to another, who were interested in the effective use of agricultural land, the regulation of energy saving issues, housing and utilities and transport. The need for such actions has become the audit of agricultural land parcels from the perspective of rural and village councils, landowners and land users on the basis of data from the State Land Cadastre and the

State Land Register (archive of land management documents, registers of state acts of land ownership, permanent land use rights, land leases), data of the National Cadastral System, cartographic materials, as well as direct field inspections of agricultural plots. As scientists point out "...the lack of properly organized internal control system made it impossible to prevent violations and shortcomings in the financial and economic activities of the institution, which affected its completeness of income generation, the effectiveness of expenses incurred and the formation of financial results" (Antoniuk O. et. al., 2021). Among scientists there is an opinion about the possibilities of using cellular networks, which are the next generation of development of IT technologies and provide information efficiency. (Muravskiy V. et. al., 2022).

Features of forming the right to lease a land parcel as an intangible asset are given in Figure 2.



Source: authors' construction based on the research results

Fig. 2. Formation of the right to lease a land parcel as an intangible asset

According to the results of the audit, information on owners, tenants, duration of the lease, land area, analysis of the existence of differences between different registers, the purpose and their regulatory monetary assessment was summarized. The results of the audit have streamlined the data on tenants, the area of agricultural land, the appropriateness of land use, identified both administrative and criminal offences. Conducting such an audit has become an effective tool to regulate the land issue in Ukraine.

Conclusions, proposals, recommendations

The authors' conducted studies led to the following conclusions.

1) Military actions connected with the military aggression of the Russian Federation have had a significant impact on all spheres of activity of economic entities of Ukraine. Including on the economic activity of enterprises of agrarian business the Government of Ukraine introduced amendments to the legislation on the conduct of land relations under martial law. The structure of agricultural lands of Ukraine was studied and a comparative assessment with other countries was carried out. Legislative

changes have expanded the land market and encouraged investment through long-term leases of agricultural land.

2) The war changed the land relations: the land market opened, but there is little activity there. Meanwhile, the land relations themselves are actively developing. The right to lease agricultural land occupies a special place among them. The Government of Ukraine has adopted a number of legislative acts that provide a legal basis for the use of agricultural land by natural and legal persons and for the preservation of opportunities for the development of market relations. One type of intangible asset is the right to lease land.

3) Allocating the right to use agricultural land as an object of accounting in intangible assets avoids disputes and compliance with international accounting standards and international financial reporting standards. The reliability of data on the legal component of the reflection of the intangible asset in the process of leasing agricultural land is ensured by the functional features of the audit.

4) The lease right meets all the criteria for recognition of intangible assets, and the land user, having received the right to use the land plot for lease, reflects them in the account as part of intangible assets on account 12 "Intangible assets" of sub-account 12.2 "Rights to use property." It is indicated that the criteria for the right to use land plots that are included in intangible assets include: long-term lease (more than 1 year), the possibility of alienation of the right to lease and a reliable assessment.

5) The control function and the need for an audit (legal and technical component) before acquiring rights to land plots are outlined. The role and functional features of the audit in ensuring the legal component and accounting reflection of the right to lease agricultural land as a type of intangible assets.

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RESEARCH ON SOCIAL MEDIA RELIABILITY

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Abstract. The current article analyses social media reliability. The conducted research focused on people's beliefs about the information reliability of social networks/social media. In order to find out why the respondents claim to be able to distinguish between reliable and unreliable information, they were asked to state their motives. To sum up, it turned out that it is possible to group arguments into certain categories that determine the recognition of reliable and unreliable information. The arguments of those who claim to be able to recognize reliable information: emphasize self-analysis; use of common sense; enabling critical thinking; trust their abilities; believe in intuition. The arguments of those who cannot recognize reliable information: that it is impossible to understand the reliability of information; they admitted that the information may be biased; they missed the consistency of the research process, they simply do not trust themselves. The majority of respondents do not share news articles on their personal social media. The data of the conducted research revealed the differences in opinion when choosing both social media channels and the means of information dissemination, the possibilities of separating the truth and uncertainty of information, and the further use of such information with the label of reliable or unreliable information. The conducted research will allow an overview of the spread and impact of real and fake information on social networks. The information obtained in this research will be useful for individuals who want to build online businesses, and will also provide advice to social media managers on how to create platforms that contain reliable information and generally reduce the harm of misinformation itself.

Key words: social media, information, social network, social media reliability.

JEL code: M30, M31

Introduction

In order to develop conscious and responsible users of media information, it is important that social network users understand the importance of considering the target audience, quality, authenticity, credibility, and potential impact of the message. They need to know where to find relevant information, how the media shapes popular culture and opinion, influences individual choices, shape public opinion, how to navigate the Internet, and how to ensure personal privacy in the cyber world.

A scientific issue. In modern times, social networks and their reliability are a particularly relevant topic. The same as in other countries, the use of social networks has been encouraged in Lithuania, especially during and after the pandemic. Nevertheless, the question that often arises is: is all the information currently displayed on social networks reliable?

The aim. The authors of the article aim to investigate the reliability of social networks.

Research methods. The article is based on the review of scientific literature and data from the questionnaire survey.

1. Theoretical aspects of social media reliability

1.1. Social media

Social media includes both content creation and community management - social media administration issues and social media advertising issues. Social media marketing is distinguished by the fact that it must react extremely quickly to changes –public opinion, current events, or topics. These platforms make it easy to share messages. The social aspect and human factors are extremely important for both content and advertising optimization. Social media marketing and the value of the content you create on your account depends on all the elements, i.e. attractiveness, interest, and relevance.

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Constantinides (2014) observes that companies classify social media marketing activities according to their relevance to marketing objectives. According to Constantinides (2014), companies have two main approaches to their social media activities as part of their marketing strategy: passive and active.

Gregoire et al. (2015) mentioned that social media (SM) is changing the way customers interact with businesses after service failures. Ananda et al. (2016) noticed that social media in marketing has only recently gained attention from the academic world.

Baccarella et al. (2018) analysed whether social media poses enormous risks to individuals, communities, businesses, and even society as a whole. Examples of this "dark side" of social media include cyberbullying, addiction exploitation, trolling, online witch-hunting, fake news, and abuse of privacy. Baccarella et al. (2018) illustrated various undesirable effects associated with it.

Aleksandrova et al. (2019) identified that with the new opportunities of various social networks, such as social networking sites, collaborative projects, blogs, wikis, communities, forums, content platforms etc., young people can not only communicate freely but also create and share their feelings, opinions, and emotions.

Bernetti et al. (2020) mentioned that each social media platform tends to specialize in some features, hence the selection media based. Gori et al. (2020) noticed that social media are applications based on digital technologies and have developed in the context of the Web 2.0 thus allowing users to create and share content through many different networking sites such as Facebook, Twitter, blogs, and YouTube.

Duffett et al. (2020) stated that YouTube (YT) is the largest online digital video channel with over 2 billion subscribers, and more than a billion hours of YT videos are viewed daily, especially among young users. Mpandare (2020) stated that the academic literature is rich in research on social media, and many scholars have extensively studied publicly available social media platforms such as Facebook, Twitter, and YouTube, and explored how organizations use them for their marketing, crowdsourcing, and open innovation. Recently, however, scholars have begun to take an interest in emerging organizational social media platforms that are being implemented for use within organizations. Kao et al. (2020) noticed that social media is becoming increasingly important for communication and information sharing SE (SE-social enterprises) in recent years. Since many SEs have limited resources, they use free social media for external purposes and communications. This is why Twitter is an important tool for trend analysis. Social networks are often the source of big data. Among all social networks, Twitter is one of the best. Twitter has surpassed traditional media in its effectiveness and timeliness of message delivery. Liu et al. (2022) found out that due to the rapid development of technology, there is a growing number of social networks creating and launching websites such as Facebook, Twitter, Instagram, Weibo, WeChat, etc. They help users to stay in touch with others, avoid data caches as well as provide users with convenient sharing of their lives and discovering the environment.

Kross et al. (2021) mentioned that social media is a kind of disruptive technology that comes around once a generation. Over the past 15 years, science has done an amazing job of improving what we do understand, the impact these media have on our well-being.

Di Domenico et al. (2021) noticed that social media channels have seen a dramatic spread of misinformation, widely described as "fake news". The creation and dissemination of false information is not a new phenomenon.

Taylor-Jacksona et al. (2021) stated that social media allows users to explore, manipulate, and maintain their online identities, which can allow individuals to easily adjust their sense of worth. Several researchers have expressed caution about the potential implications for mental health with concerns that people may less value their "real-world" identities, leaving individuals more vulnerable to depression-related symptoms.

Oncioiu et al. (2021) stated that communication in social networks is often accompanied by the hope of being able to communicate with equal rights. Accordingly, companies hope that social networks will not only increase sales but also attention and customer loyalty. Masa'deh et al. (2021) mentioned that social media nowadays overcomes the constraints of time and space thus encouraging businesses to communicate with potential users and increase their proximity.

Ozkent (2022) noticed that social networks help to see the connections of other users. Casero-Ripollés (2022) mentioned that social media has radically changed citizens' access to and consumption of the news. In this environment, fake news proliferates. Therefore, it is very important to understand why people consume, believe, and share fake news.

Rosen et al. (2022) analysed several individuals who used social media as an innovative way to get healthier and learn new skills during lockdown. Several participants made use of their videos and fitness accounts as ways to stay healthy and active during the period when gym and fitness centres were closed due to COVID-19 regulations.

Consequently, the analysis of the scientific literature gives evidence that social media poses a huge risk to individuals, communities, businesses, and even society as a whole. Examples of this "dark side" of social media include cyberbullying, addiction exploitation, trolling, online witch-hunting, fake news, and abuse of privacy. Social networks help not only to communicate freely but also to create and share your feelings, opinions, and emotions. Social media allows users to explore, manipulate, and maintain their online identities, which can allow individuals to easily adjust their sense of worth. Since individuals can display and hide information to influence others' perceptions and manage impressions, users can project an ideal version of themselves that is yet not achievable in real life. Several researchers have expressed caution about the potential implications for mental health, concerned that people may thus underestimate their "real" identity.

1.2. Social media reliability

The characteristics of customer communication are changing rapidly, so social networks are at the same level as traditional marketing tools. Social networks together with traditional marketing tools complement each other and create an effective communication system. Social networks, as one of the marketing tools, have expanded the boundaries of business opportunities on the Internet. Large companies use social media to maintain daily contact with customers and monitor the market. Social networks are gaining popularity in the 21st century. Millions of users around the world visit social networks every day. Currently, more and more threats are appearing in social networks, and the problem of safe use of the Internet is emphasized. In the scientific literature, preventive options are distinguished. In order to reduce the threats related to online social networks, preventive activities are important.

Ismail et al. (2013) noticed that social media has led to a paradigm shift in how people work and do business, communicate, learn, and acquire knowledge. Another issue raised is the credibility of the message/content and source. A particularly important issue is also the quality of knowledge shared.

Brody et al. (2018) noticed that fake news is information that contradicts reality. This information is originating from a fake news "sender", transmitted through a communication channel, and then received by the general public.

Prakapienė et al. (2018) stated that in order to reduce the negative impact of social networks, it is necessary to learn how to use them safely. It is unequivocally important that social networks provide a good place to share personal (mostly success) stories, and the latest knowledge, enable collaboration, etc. According to Prakapienė et al. (2018), social networks allow people to communicate directly: geographical

borders seem to be erased and the communication process is relatively cheap (internet connection services are inexpensive, and the prices of devices for communication are also very diverse).

Keshavarz (2020) mentioned that the relative importance of reliability criteria varied between studies depending on the characteristics, type of participants' source, type of information, and other conditions. Depending on the SM type, purpose, and environment, the use of SM varies. Some researchers have argued, however, that communication on SM such as Facebook, Twitter, YouTube, and Instagram can affect perceived credibility because the platform acts as a gateway to Internet quality information.

Sun (2021) proposes a method for assessing the reliability of social network information based on user perception.

Gurler et al. (2022) provided data that can be used to improvement the usability and medical quality of the videos included in the scan results. Despite the fact that Instagram and Twitter can be accessed quickly and many people like their short videos, their medical quality has turned out to be very low.

Dantas et al. (2022) mentioned that using social media in the workplace has improved employee performance. For example, the use of social networks for work and social purposes has a significant impact on companies' cost reduction, innovation, and competitive advantage in marketing activities, procedures, and works.

Majerczak et al. (2022) found out that fake news is not only a widespread phenomenon; it is also problematic and dangerous for society. The study used structural equation modelling to determine how the Polish public perceives the problem of fake news and to assess the extent to which it trusts the content published online. The main objective was to determine which factors have the greatest influence on the verification of information viewed on the Internet. The strongest positive effect on information-checking behavior was found for knowledge of fake news, followed by the intent to share information. This study extends the available literature related to fake news by identifying the effects of fake news on information verification behavior, news awareness, and the intention to share data. Obadă et al. (2022) results show that social media has an effect on the sharing of fake news about green brands.

The analysis of the scientific literature showed that more and more threats are appearing in social networks, thus emphasizing the problem of safe use of the Internet. Preventive options are distinguished in the scientific literature. In order to reduce the threats experienced in online social networks, preventive activities are important in these networks. The credibility of the message/content and source becomes very important. Social networks allow people to communicate instantly: geographical boundaries seem to be erased, and the communication process is relatively cheap (internet connection services are inexpensive, and the prices of communication devices are also very diverse).

2. Research methodology and methods

Research problem

Over the past two decades, social media has evolved from simple chat rooms and forums to an important everyday tool for keeping up with current events, from posts of friends and family to socio-political news and even scientific breakthroughs.

Social media gives people the ability to instantly access, publish and share information, but with all this power comes great responsibility as misinformation, also known as fake news, has been rampant for years. Precisely for this reason, assessing the credibility of online sources is a complex task that cannot be performed solely by computer algorithms. There is a difference between what people share online and what they actually believe in.

The research objective is to learn how social media users can identify fake information from the real news.

The research tasks are:

- 1) to analyse the sociodemographic data of respondents;
- 2) to find out the respondents' preferred sources of information;
- 3) to identify the factors promoting the reliability of the information in social networks;
- 4) to present the research results and general conclusions.

Investigation method

The quantitative research - questionnaire survey method was used to conduct the empirical/exploratory research.

Research rationale

After choosing a quantitative method of data collection - a survey, the respondents were described: according to the content, these are people who use social networks from 18 years to 80 years and older; by location, these are residents who have the opportunity to use social networks, by time, these are social network users during the selected research week.

222 respondents participated in the study, selected according to the principle of convenient sampling (Availability Sampling) based on the selection of the most convenient, closest, and most easily accessible elements of the research population.

The investigation was carried out for 7 days, from 11/16/2022 to 11/22/2022.

The questionnaire consisted of 15 questions, distinguishing demographic data, the data on the respondents' preferred sources of information, and the factors promoting the reliability of the information.

The survey included demographic questions, age group, and gender. The questions were related to the choice of social networks, and the reliability of the information in them. The interval scale, nominal scale, semi-closed type questions, closed type questions, and open type questions ending with an answer were used for the wording of the questions. The questions collected data on respondents' engagement with social media, their ability to spot misinformation, and primary sources of information.

The questionnaire was placed online using Google Forms and the link was shared with acquaintances, and friends who were asked to share it with people around them.

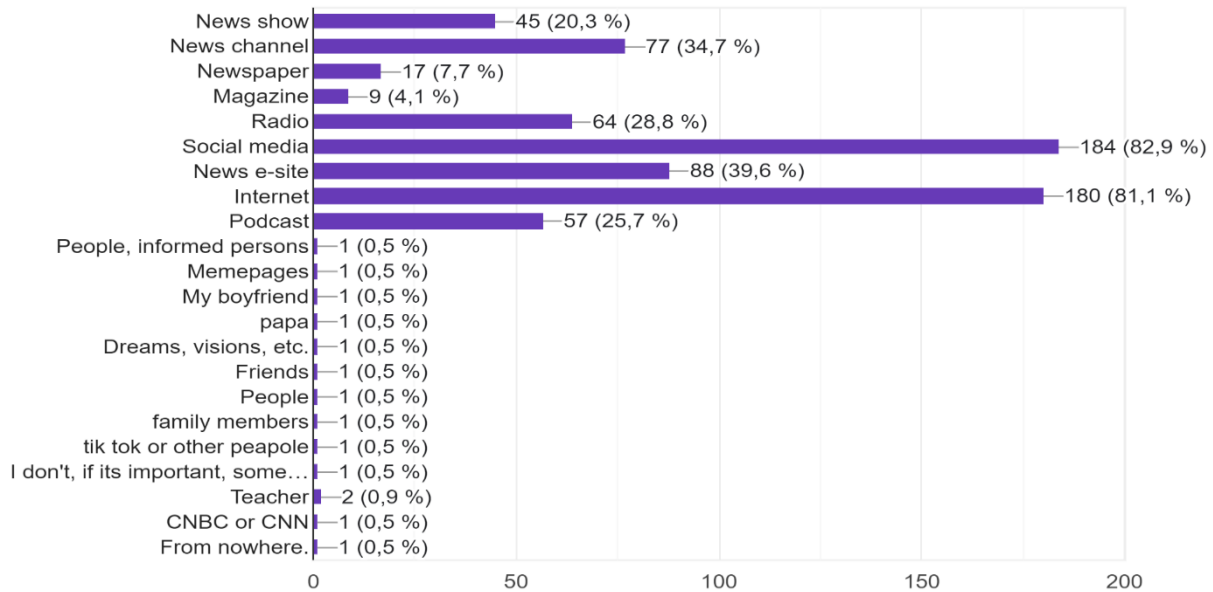
The conducted research allowed us to get a picture of the spread and impact of real and fake/misleading information in social media. This information will be useful for individuals who want to build an online business, as well as advise social media managers on how to create platforms that contain reliable information and generally reduce the harm of misinformation itself.

The principle of the right to receive accurate information has been implemented by providing the purpose and relevance of the research to the respondents before filling out the questionnaire.

3. Results and discussion

The conducted research was based on people's beliefs about the informational credibility of social networks/social media. During the research, sociodemographic data were collected from respondents using social networks by means of the questionnaire survey.

While finding out the reliability of social networks, it was observed that respondents get most of their news from social media and the Internet. Part of the respondents looks for information on news channels or news websites.



Source: made by the authors

Fig. 1. Respondents' news search location, in numbers, %

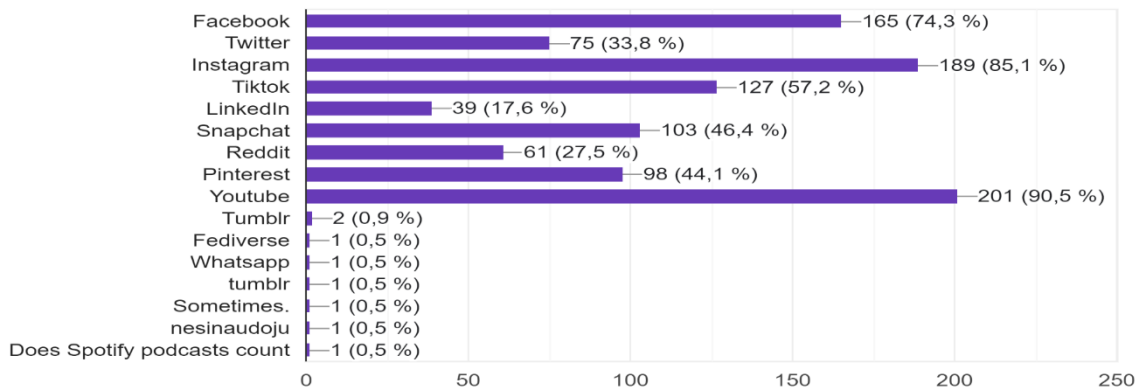
Brody et al. (2018) noticed that fake news is information that contradicts reality. Our research data shows that a greater part of the respondents checks the information, but still, there is a part of the respondents who do not do it. 118 respondents (53.2%) check themselves, 24 respondents (10.8%) check sometimes, but 49 (22.1%) respondents do not check at all. The unverified information can be both real and fake and it can spread objective or subjective information, which can be reliable or unreliable.



Source: made by the authors

Fig. 2. Verification of respondents' information obtained from different sources, %

The sources of information most often chosen by the respondents are the following social media: YouTube, Instagram, Facebook, Tiktok.



Source: made by the authors

Fig. 3. Social media chose by respondents, in numbers, %

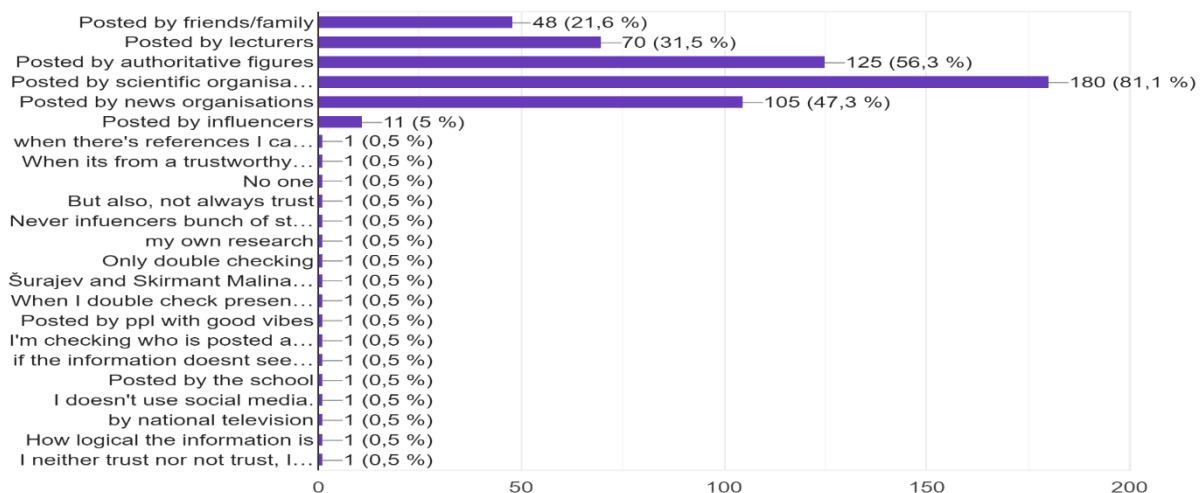
Keshavarz (2020) mentioned that the criteria of the relative importance of reliability are types of information and other conditions. The information received on social media is mostly accepted as reliable by the respondents. Although only 15 respondents (6.8%) really trust it, and 22 respondents (9.9%) do not trust it. Most of the respondents - 145 (65.3%) say that they may trust the information provided on social media.



Source: made by the authors

Fig. 4. Respondents' trust in information provided on social media, %

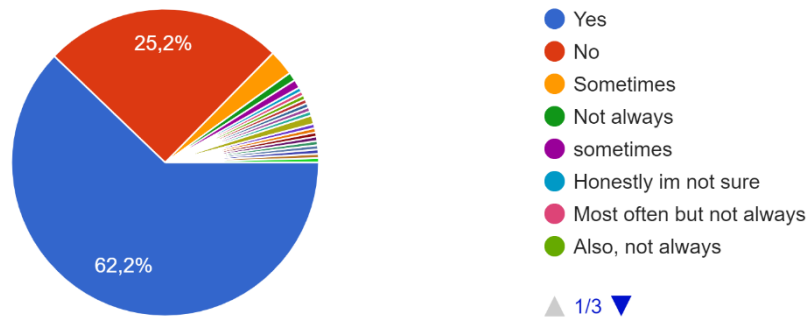
Trust in information published on social media is associated with the source publishing the information. The information published by scientific organizations is considered the most reliable source. Additionally, the information is considered reliable if it is published by famous people, news organizations, as well as teachers, friends, and family members.



Source: made by the authors

Fig. 5. Respondents' trust in sources providing information, numbers, %

Majerczak et al. (2022) noted that the strongest positive effect on the information verification behavior was found for knowledge of fake news, followed by intentions to share the information. Our respondents tend to believe that they can distinguish reliable information from unreliable information, as many as 138 respondents (62.2%) say so. 56 respondents (25.2%) say that they cannot distinguish when the information is reliable and when it is not. 6 respondents (2.7%) sometimes think that the information is reliable, and sometimes are able to distinguish reliable and unreliable information. The opinion of the remaining 20 respondents made up a small percentage (9.9%) of the overall assessment of the ability to distinguish between reliable and unreliable information.



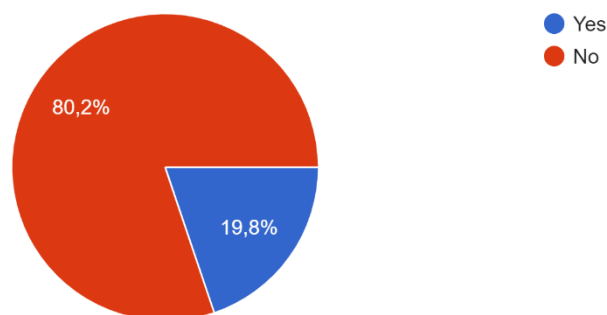
Source: made by the authors

Fig. 6. Respondents' ability to distinguish reliable from unreliable information, %

In order to find out why respondents claim to be able to distinguish between reliable and unreliable information, they were asked to state their reasoning. After summarizing answers, it became clear that it is possible to group arguments into certain categories that determine the recognition of reliable and unreliable information. The arguments of those who claim that they can recognize reliable information: 33% of respondents emphasize self-analysis, 23% - use common sense, 17% - enable critical thinking, 13% - are confident in their skills, only 7% believe in intuition and the remaining 7% are not sure about their decision. The arguments of those who cannot recognize reliable information: 45% of respondents said that it is impossible to understand the reliability of the information, 33% - admitted that the information can be biased, 15% - missed the consistency of the research process, and 7% - simply do not trust themselves.

After presenting the information about the ability to distinguish the information-determining factors, the respondents were also asked why it is believed that the information presented on social media is unreliable. The answer options were divided into four groups. 49% of respondents believe that it is the lack of authoritative sources and links that form the opinion that this is unreliable information. 21% simply perform self-analysis of information. 19% noted that there is no clear source of the information provided and this raises doubts about the reliability of the information. 11% drew attention to the bad aesthetic presentation of information when unreliable information is presented.

After finding out the opinions of the respondents regarding the information dissemination channels and the recognisability and reliability of the information, it was interesting to find out if the respondents share news on their social media channels. The survey data shows that the majority of 178 respondents (80.2%) do not share news articles on their personal social media. However, 44 respondents (19.8%) do share.

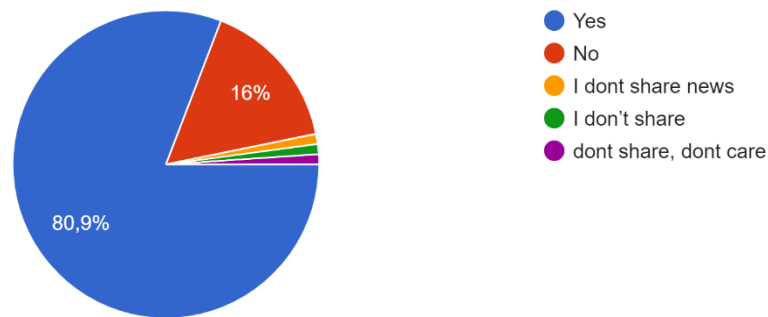


Source: made by the authors

Fig. 7. Respondents' sharing of news on personal social media channels, %

Prakapienė et al. (2018) stated that in order to reduce the negative effects of social networks, it is necessary to learn how to use them safely. The respondents evaluate the information responsibly enough

and the majority (80.9%) of the respondents check the reliability of the information before making it public. Some respondents (16%) do not check the information. The rest of the information is simply not shared.



Source: made by the authors

Fig. 8. Checking the reliability of respondents' information before sharing information, %

The data of the conducted research revealed the differences of opinion when choosing both social media channels and the means of disseminating information, the possibilities of distinguishing the truth and uncertainty of information, and the further use of such information with the label of reliable or unreliable information.

The conducted research will provide an overview of the spread and impact of real and fake information in social media. This information will be useful for individuals who want to build online business, as well as advise social media managers on how to create platforms that contain reliable information and generally reduce the harm of misinformation itself.

Conclusions

- 1) The analysis of scientific literature showed that social media is an effective means of influencing. The information collected about the user during establishing his social media operations shows what kind of environment surrounds him, and what he and his environment do in their free time, so it is possible to choose the most effective impact mechanisms. Social media not only take our time, attract attention, emotions, and data but also adjust the opinion and behavior of users. Social networks can become an extremely powerful propaganda tool. Currently, more and more threats are appearing in social networks, and the problem of safe use of the Internet is emphasized. In order to reduce the threats experienced in online social networks, preventive activities are important in networks. Another scientific issue raised is the credibility of the message/content and sources and sharing knowledge.
- 2) The data of the conducted research revealed the differences of opinion when choosing both social media channels and the means of information dissemination, the possibilities of separating the truth and uncertainty of information, and the further use of such information with the label of reliable or unreliable information. The conducted research will allow an overview of the spread and impact of real and fake information on social networks. The information from this research will be useful for individuals who want to build online business, and will also provide advice to social media managers on how to create platforms that contain reliable information and generally reduce the harm of misinformation itself.

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FACTORS AFFECTING THE REPRODUCTIVE BEHAVIOUR OF THE POPULATION IN LATVIA

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Abstract. The reproduction of society is affected by a series of social changes, as a result of which various objective and subjective factors influence the reproductive behaviour of its inhabitants. The purpose of the article is to study the factors influencing the reproductive behaviour of the population in Latvia. Research approach: qualitative research methods - expert interview, semi-structured interviews and document analysis, a quantitative method - questionnaire survey. It is concluded, hypothesis that subjective factors are the most important factor influencing the reproductive behaviour of the population has been confirmed. According to the respondents, the most significant factors influencing reproductive behaviour are: the desire to have children 65%, a stable partner and his support 53%, financial stability 51%. The tendency of modern society to "postpone the birth of children as late as possible" is a significant factor influencing reproductive behaviour has been confirmed. The birth of a child is delayed by the population for subjective reasons, such as uncertainty about the future, the desire to accumulate capital, to live and travel, and so on. The general population does not value their reproductive age. In general, the population does not objectively assess their reproductive age, because the average age of the respondents is 37.2 years, 40% of all respondents do not have children, but the answers show that respondents would like to have 2-3 children, in case all the conditions are favourable.

Key words: reproductive behaviour, subjective factors affecting the reproductive behaviour.

JEL code: I12; I39

Introduction

Low birth rate and general ageing of society are current problems not only in Latvia, but also in most developed countries. The population of Latvia has been decreasing since 1990, and within 30 years until the beginning of 2021, it has decreased by 775 thousand or 29%, including as a result of migration - by 469 thousand (Demografija, 2021). Demographic experts name the ageing of the population, constant migration and the increased fertility age of women as the main causes of depopulation. According to "Eurostat" forecasts, in the period from 2019 to 2100, the population of Latvia will most likely decrease by 43.7% (Eurostat, 2020 a).

The reproduction of the nation is affected by a series of social change processes and the reproductive behaviour of the population. In this article, the authors will examine the subjective and objective factors that influence reproductive behaviour, including the choice or desire to have children. In the framework of the article, reproductive behaviour is defined and explained as a determinant of child planning. This definition was adopted based on various foreign authors (Jennings et. al., 2012; Mills, 2011; MacDonald, 1997; Antonov, 2011) for their works in the context of the topic.

In Latvia, in studies related to reproductive behavior, the idea of reproductive behavior is also associated with the concepts of reproductive health and sexual behavior (Parskats par Latvijas iedzīvotāju reproduktīvo veselību, 2003-2011; Seksualas un reproduktīvas veselības aprūpes pakalpojumu pieejamība un iedzīvotāju riska uzvedība COVID-19 laikā, 2021). Foreign researchers characterize reproductive behaviour through the influence of the environment on reproductive abilities, as well as by analysing the importance of reproductive behaviour in the social context, which either leads to delayed fertility and reduced birth rates, or creates interest and increases birth rates (MacDonald, 1997). In other studies, scientists emphasize that it is reproductive behaviour that determines the quality of reproductive health (Arhipova, Hamoshina, 2018). It is also stated that reproductive behaviour is a system of actions and

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relationships that mediate either the birth of a child or the refusal to bear a child within or outside of marriage (Kozlova, Sekicki-Pavlenko, 2020), because reproductive behaviour is in a way transmitted from generation to generation, where intergenerational connection and support are of great importance (Jennings et. al., 2012). Sociologist Anatoly Antonov defines reproductive behaviour as a process consisting of a chain of reproductive events throughout the life of a person and family, related to the birth of children. In this process, there is an interaction of biological and social factors that determine the social content of reproductive behaviour (Antonov, 2011).

Reproductive behaviour trends are changing and there are several factors that influence this; Latvia is experiencing a change in society's reproductive behaviour model: postponing the creation of a child to a later stage of life, trying to combine a working career with family life, and both partners creating non-legal, but more equal relationships (Tautas ataudzi ietekmejosu faktoru izpete, 2013) etc. Such a context of social change is summarized in the first table below, revealing the theoretical perspective of sociology.

Table 1

Explanation of the concept of reproductive behaviour in various fields

Science field	Reproductive behaviour	Source
Health sociology	The context of social change operates at multiple levels, using multiple strategies to determine the way in which norms and behaviours can change. Evidence shows that compliance with social norms imposed by peers, families and communities is a key means of improving young people's ability to develop healthy sexual relationships and behaviours.	Institute for Reproductive Health, 2022
Family sociology	Gender roles and power relations between husbands and wives influence reproductive behaviour. However, the proximity and presence of family members serves as a precondition for many forms of social support. Thus, differences and changes in kinship network, composition and division affect family fertility.	Bras, 2022

Source: created by the authors based on the findings of Institute for Reproductive Health (2022) and Bras, (2022)

Latvian society is still in the process of change, which arose as a result of the interaction of the historical role of the family and the individual with socio-economic processes. How society functions and what specific characteristics are observable provides the necessary background to understand how these changes are to be evaluated. According to D.Reher, it is precisely in the countries of the post-Soviet zone, which suffered from war and authoritarian regimes, that relatively less developed state politics, complex and long-term changes can be observed, while at the same time there are still strong ties between generations throughout life. There are such phenomena as decision-making with family consent, late and incomplete transition to adulthood, weak civil society - low level of individual trust, distrust of the government - tax evasion, lack of trust in political systems and social institutions etc. (Reher, 2021).

Today, contradictory trends are still observed in Latvia. On the one hand, society develops at the level of individuality of people, on the other hand, traditional family expressions can be observed in society, which hinders the fastest possible development processes of individuals and hinders children's maturity. According to "Eurostat" data, in 2019 the EU men left their parents' home on average by the age of 27.1 years, women - by the age of 25.2 years (Eurostat, b 2020). People who strive for individualization and still live according to family traditions are unable to develop as they would like. The increase in the importance of individual values contributes to the achievement of individual goals and tasks, allows assessing independence and self-sufficiency.

Nowadays, the change of traditional family models is visible not only in Europe, but also in other parts of the world. For example, as noted in an Iranian study (Zohreh et.al, 2017), the rise of individual values and individualism in modern society is a mass phenomenon, as is the education and independence of

modern women as a social characteristic that affects reproductive behaviour. This was also noted by Chinese scientists (Lianchao et al., 2021), trying to understand why after abandoning China's birth control policy, when there is a loosening of rules and people can give birth peacefully, there is no obvious increase in the birth rate. These aspects and trends show that one of the determining factors in the birth of a child is the pragmatic behaviour of families or mothers, which is emphasized in the theories of consumer behaviour and rational choice in sociology. Fertility rates in many post-industrial societies are now below 1.5 children per woman, according to research. At the same time, most young people consider a family with 2 children as ideal. Many young people say they would like 2 children, but in reality plan less. The results show that the gap between ideals and intentions is larger in countries with very low birth rates, but even in countries with higher birth rates, the gap is still observable (Brinton et al., 2018). Although the reasons for the gap between ideals and intentions may vary depending on the context, the following trend can be traced. As stated in the study (Latvijas ģimenes paaudzes, 2018), creating a family is mainly associated with positive feelings; joy in life and life satisfaction are expected to increase, enabling the pursuit of other goals. This may indicate that subjective intentions are subject to objective reasons that concurrently change reproductive behaviour and affect birth rates.

There is a body of research that suggests several new social phenomena in the context of reproductive behaviour; the authors will mention some examples to sketch the processes of change that are currently being studied in different societies in the context of the analysed topic.

Firstly, *Childlessness or Childfree* - absence of children in a person's life (conscious or unconscious choice). Today, a significant number of women experience infertility, suffer from stigmatization and insults, sometimes from physical violence. Accordingly, the situation of childlessness creates gender inequality, women are usually condemned for not having children, considered selfish or condemned for not being able to conceive. However, childless men are considered interesting and not stigmatized (Gounie et al, 2022). Thus, the responsibility for childbearing falls on women, regardless of their desire or ability to bear children. Likewise, voluntary or involuntary childlessness can affect relationships with a wide social network, such as friends and colleagues (Shaw, 2011). On the one hand, women's higher education is associated with a higher number of childless women both within and between countries, especially after the age of 30. On the other hand, more egalitarian gender relations and gender equality in society increase birth rates. In recent decades, childlessness has increased between the ages of 30-34 and 40-44 for both men and women across Europe, with few exceptions. But the proportion of childless women aged 40-44 in the countries of the post-Soviet space, including Latvia, is still low (below 10%) (Mettinen et al, 2015).

Secondly, *Herbivore men* - passive men who have lost their masculinity. Japanese sociologist Fukasawa Maki introduced this concept in 2006. These are men, especially young men, who are not interested in marriage and romantic relationships but are not asexual (Fukasawa, 2006). Japanese scholars studying the herbivore men phenomenon and its implications have concluded (Ghaznavi et al., 2020) that the proportion of young Japanese male adults who are not married and not in heterosexual relationships has been steadily increasing over the past three decades. In 2015, every fourth woman and every third 30-year-old man was single. About half of singles, or one in five women and one in four men aged 18-39, reported that they were not interested in a romantic relationship with someone of the opposite sex (Ghaznavi et al., 2020).

Thirdly, *loneliness and the consequences of COVID-19* - the phenomenon of loneliness has been present in society at all times, but in modern society this problem of loneliness has become more visible. Theoretically, social loneliness describes the quantitative aspect of loneliness, that is, the absence of a subjective wider support network. In contrast, emotional loneliness is a subjective feeling of aloofness, thus reflecting a qualitative aspect of loneliness associated with the absence of deep and significant

relationships. Therefore, the increase or decrease of loneliness cannot be considered as an age-related phenomenon; on the contrary, such changes are linked to individual experience. As the researchers note, loneliness appears to lie directly between the poles of stability and change. Much of the variation in loneliness appears to occur at the individual level, and future research will face major challenges in uncovering the conditions and consequences of this individual variation (Mund et al, 2020). A quarter of EU residents said they felt lonely in the first months of the pandemic. Compared to 2016, the increase in loneliness in the age group from 18 to 35 was fourfold. The issue of loneliness has also doubled in media coverage during the pandemic, while awareness of it varies widely across Member States. The survey data shows that the COVID-19 pandemic has exacerbated the problem. The proportion of respondents who already felt lonely often doubled after the COVID-19 outbreak. In addition, young people felt loneliness more strongly (European Commission, 2021).

Subjective and objective factors influencing reproductive behaviour are: control of reproduction; role and image of women; reluctance to have children due to education and employment; changes in reproductive behaviour patterns; changes in the man's role in the family; postponement of childbirth; increase in fertility; reluctance to have children; gender equality; changes in gender roles; changes in partnerships; housing availability; economic uncertainty; reproductive limits etc. (Mills, 2011). The interaction of subjective and objective factors is difficult to distinguish, however, within the framework of the article, the authors explain subjective factors as human feelings, perceptions and desires, goals and abilities. The objective factors are the social environment or the socio-cultural form of the society (Chernikova, 2010). Subjectivity focuses on a person's mind and beliefs, not on a general, universal or scientific position. Thus, the influence of a set of subjective factors on reproductive behaviour is based on the individual's personal judgments. Objective factors have no connection with the individual's own (subjective) feelings; they refer to facts or the surrounding environment, which in one way or another can affect the individual and his reproductive behaviour ("Subjective" vs. "Objective"., 2021).

The purpose of the article is to study the factors influencing the reproductive behaviour of the population in Latvia. The main tasks are related to the description of changes in reproductive behaviour in Latvian society and the study of factors influencing subjective and objective reproductive behaviour.

The authors put forward two hypotheses. Firstly, the reproductive behaviour of the population is most significantly influenced by subjective factors. Secondly, in modern society, the tendency to postpone the birth of children until as late as possible is a significant factor affecting reproductive behaviour.

To achieve the goal, a combined research approach was used using several qualitative sociological research methods: an expert interview with public health specialist Rita Kubuliņa (duration 32 min., held on the Zoom platform on 13 April, 2022), semi-structured interviews. In the research, 10 informants (5 men and 5 women) were interviewed, who were selected according to the principle of a purposefully accessible sample, representing different ages, education levels, places of residence and family status etc., and they lasted an average of 25 minutes. Among the quantitative methods, a survey using random sampling was chosen. The survey was conducted online; the questionnaire was posted on the Visidati.lv website, spreading information about it on social networks and chats, in March and April 2022. 211 respondents aged 15 to 75 took part in the survey; the average age of respondents was 37.2 years. In both qualitative and quantitative approaches, questions were issued based on the following aspects: understanding of roles in building relationships and planning and raising children; the most acceptable family model and age for starting a family, the desired number of children, the desired age for the first child; factors affecting both subjective and objective reproductive attitudes and behaviour etc. Despite the

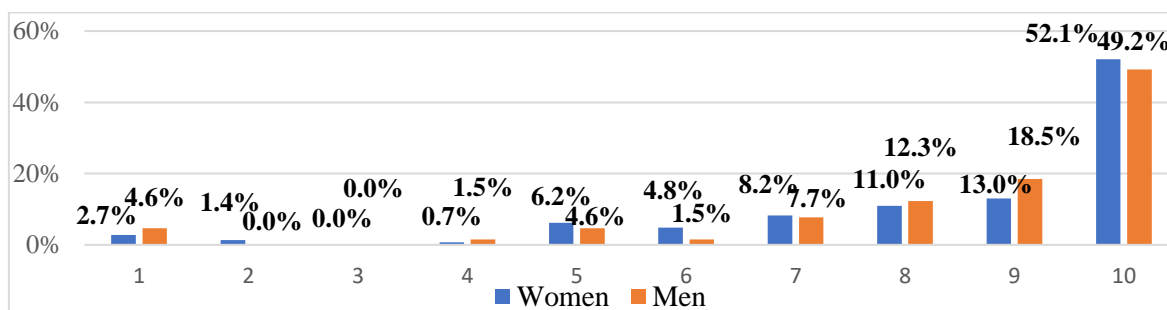
fact that the sample size data are not representative, they nevertheless allow the characterization of traits related to reproductive behaviour that have been little studied.

Research results and discussion

The results of the research show that in the area of social changes that have taken place in Latvia, the factors related to ageing and migration are mainly highlighted. Factors influencing these changes are the material side and prosperity, as well as uncertainty about the future. Analysing the information obtained in the interview with the expert, it should be noted that R. Kubuliņa, when talking about changes in society, mentioned a rapid decrease in the birth rate as the most important thing. This is also evidenced by statistical data; the most significant birth rate jump was in the period until 1987, when there were 2.16 children per woman, while at present it is 1.55 children.

Changes in society have become very visible; there is a causal relationship between subjective well-being and reproductive behaviour (Mencarini, Vignoli, Zeydanli, Kim, 2018). Respondents believe that well-being is an important and influencing factor. According to the respondents, such factors as **security for the future and well-being** have greatly influenced the changes in society. Security about the future was mentioned as an important factor by 44.1% of respondents, and well-being - by 40.8%.

The authors will analyse the factors affecting reproductive behaviour by looking at the responses by gender. Sociologist D. Reher emphasized that it is precisely in the post-Soviet countries that changes from quantity to quality in the attitude towards children are very noticeable today. When asked what factors most affect changes in society, R. Kubuliņa admitted that they are objective factors - **cultural and environmental changes**. According to the respondents, reproductive behaviour is strongly influenced by **financial stability** (Fig. 1).



Source: created by the authors based on the results of the survey data, 2022. (n=211; women n=146; men n=65; ten-point measurement scale: 1- does not affect at all; 10 - affects very much)

Fig. 1. Financial stability as a factor affecting reproductive behaviour

The informants believe that since they cannot count on sufficient support from the state, the birth of a child should be planned. The respondents' answers also showed how modern women are more concerned about financial stability: this was indicated by 52% of women, and this factor can affect women's desire to get an education first and only then to plan a family and have a child. On the other hand, almost half or 49% of male respondents noted that financial stability greatly affects their reproductive behaviour.

Today, not only the cultural and social environment has changed, but also the understanding of family formation and family models. The expert noted that today there are many different family models and all of them are considered families, regardless of their composition and size. The informants also believe that today there is no longer a family in the traditional sense, consisting of married parents and children. Today there are different family models, and if people want to have a child, the main condition is to have the ability and desire to do so. Although the data of some studies show that there is a tendency for liberal relationships to spread (Generations of Latvian families, 2018), the majority of respondents still prefer

married relationships. Several respondents answered that children are planned after marriage. Women are more convinced that marriage is important: 55% of women and 42% of men think so. Most men believe that they can live in an unregistered cohabitation. But 12% of male and 11% of female respondents note that all options are acceptable.

In the question of how difficult it is to build relationships and families nowadays and how the understanding of gender roles in this matter has changed, the informants' answers indicate changes in gender roles, as most believe that a woman should be equally active in building relationships as a man. Patriarchal views of men have diminished. In general, respondents mostly think that both partners should be equally active - 88.2% of respondents support this opinion; only 7.6% believe that men should be more active. This indicates that nowadays the **gender roles** have really changed, as there is no strong opinion that the man is the initiator of the attitude, as it was in the past, which was mentioned by the informants in their answers.

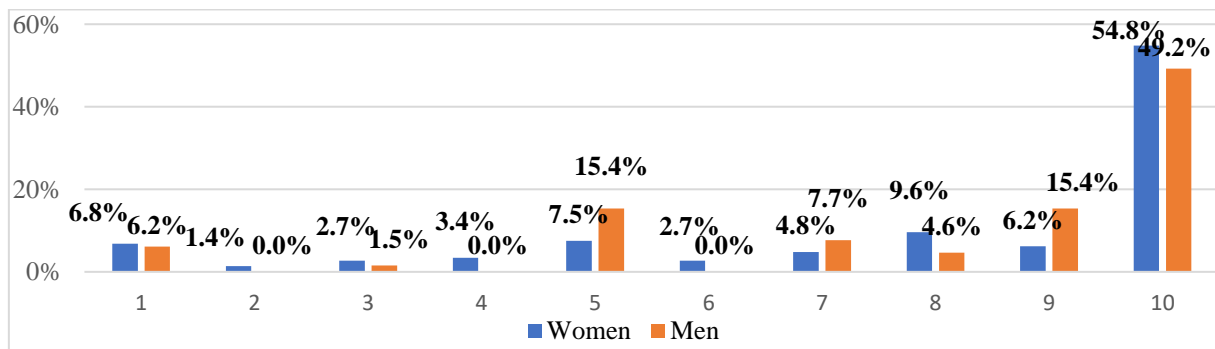
In general, informants believe that it is more complicated to build relationships now. On the one hand, technological changes have made many processes and life easier; on the other hand, building relationships today is more complex than before. In the age of consumption, the scientist E. Fromm also talks about how people assess each other from the consumer's point of view. However, in order to create a family, you must first find a partner, because the presence of a **constant partner** and his support is a very important influencing factor for creating a family and having a child. This was indicated by the majority of respondents - 92.2%. On the other hand, the support of family and friends for starting a family is not a priority nowadays, as it was considered before. However, some respondents still indicate this as an important aspect; all respondents - 54% respectively - believe that support is important. The remaining 17.3% remained neutral on this issue, while 28.5% believe that the support of family and friends is not important.

According to the respondents, it is possible to create a stable relationship at any age, even though most of the respondents note that the ages 20-29 years and then 30-39 years are more suitable for this. This is logically intertwined with the respondents' answers about the age at which women should give birth to their first child. 86% of women believe that it is better for a woman to give birth to her first child between the ages of 20 and 29; the remaining 14% of women believe that the age between 30 and 39 is the right time for the birth of the first child. These age stages were also noted by men - 91% of men believe that it is better to give birth to the first child between the ages of 20 and 29, while the remaining 9% permit the age between 30 and 39. Based on the theory, it can be concluded that **at this moment a gap appears between subjective intentions and objective environmental factors**. Many respondents claim that it is better for a woman to give birth to her first child between the ages of 20 and 29. But nowadays, based on statistical data, the reproductive age of women has increased, and continues to increase every year. As noted by J. Houman, people interact and make their rational choices based on the social environment. And since a child is often associated with additional costs, people postpone having a child until later. Today there is a late maturation which automatically delays childbearing.

A positive trend of gender equality can be observed in modern Latvia; parents and potential parents believe that both parents should be equally responsible for planning and raising a child. Both partners should plan to have children - 92.4% of respondents gave this answer. Similarly, the respondents answered the question which of the partners is more responsible for raising the child. The absolute majority or 94.3% believe that both partners - both men and women - are equally responsible. When asked who it is better to go on parental leave, the largest number of respondents answered that it is better for a woman to do it. The majority of women (53%) and men (63%) think so. Although the majority of respondents believe that a woman should be on leave to take care of a child, the rest of the female respondents tend to be neutral

on this issue. In this respect 15.2% of women strongly agree that men should be on paternity leave. It should be noted that some men - 18.5% - believe that they could be on childcare leave. Also, when it comes to raising a child, the respondents no longer really rely on the help of grandmothers or nannies, 76.8% point to this, and only 2.4% completely agreed that raising children can also be entrusted to other persons.

The decision to have or not to have children is mostly influenced by subjective factors. Most of the respondents answered that the factor influencing the birth of a child is a personal desire for a child. Accordingly 49.2% of men and 54.8% of women answered that it is a very influencing factor (Fig. 2).



Source: created by the authors based on the results of the survey data, 2022. (n=211; women n=146; men n=65;- ten-point measurement scale: 1- does not affect at all; 10 - affects very much)

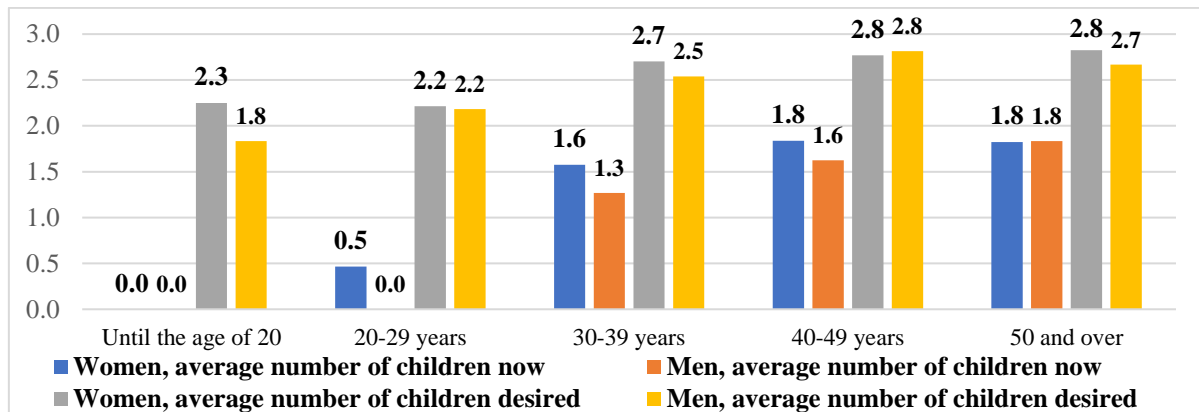
Fig. 2. **The desire to have children as a factor affecting reproductive behaviour**

The desire to obtain an education and build a career are less influencing factors than the subjective desire to bring a child into this world. Career development was indicated by 57.7% of respondents; **stable employment** was indicated by 45% of women and 46% of men. Respondents with a stable job and more stable income feel more financially secure. Respondents believe that **health status** is important - 89.5% of respondents agree with this. The **suitability of housing** as an important factor influencing the decision to have a child was emphasized almost equally by both women (39%) and men (40%). When answering the question whether **access to educational institutions** is important for children, the views are the same for both women - 69% and men - 69%. According to the respondents, 57.9% believe that a **friendly, green environment** influences such decisions. State support, according to the respondents, could have a greater influence on the decision to have a child. It was noted by 56% of men and 56% of women as a factor influencing the decision. The remaining 44% emphasized that support from the state does not influence the decision-making process. Respondents pay more attention to economic stability in the country than support from the state: 67% of men and 65% of women indicated that **economic stability** in the country influences decision-making.

According to the respondents' answers, about the birth of the first child, 38% of men and 61% of women state that their first child was born before the age of 29, but 9% of women and 11% of men had their first child before the age of 39. The rest - 51% of men and 29% of women - do not have children, but the average age of the respondents is 37.2 years. As mentioned above, the majority of respondents believe that the first child should be born before the age of 29. Information was gathered about the respondents' future plans, whether they plan to have a child in the next 1-3 years. The majority of respondents do not want and do not plan to have children in the future - this was indicated by 58.1% of women and 49.2% of men. In turn, 32.2% of women and 46.2% of men plan and want children. The smallest part remained neutral, not expressing any opinion - it was 10.5% of women and 15.4% of men.

When answering the question about the desired number of children if all conditions are favourable, an interesting inclination can be observed: out of 211 respondents, only 6 answered that they do not want

children under any conditions. The rest, in case of positive factors, would like 2.5 children, despite the fact that earlier in many answers they had indicated the opposite (Fig. 3).



Source: created by the authors based on the results of the survey data, 2022. (n=211; women n=146; men n=65)

Fig. 3. Actual and desired average number of children

It can be assumed that the individual decision of the respondents is influenced by their rational choice, so the birth of a child is postponed; and, as a consequence, the **phenomenon of "postponing children for a later time"** appears. According to the respondents' answers, residents assess their reproductive behaviour according to real events; here it should be taken into account that the majority of respondents (146) were women.

When asked **how the reproductive behaviour of the population can be changed**, R. Kubuliņa notes that a complex approach is needed. In general, the informants admit that a reevaluation of values is needed today. The country needs stability so that the citizens can feel safe. In particular, it is necessary to create a vision of the future for families with children, which would show that life does not become more difficult with children. Also, state financial support is needed, because people are afraid to have children due to various subjective fears, as they are not sure about the future.

Conclusions, proposals, recommendations

- 1) In society, there is a gap between subjective ideas and intentions and actions, which results in changes in reproductive behaviour. New social phenomena related to reproductive behaviour are spreading around the world, and some of the characteristics of these phenomena can also be applied to the behaviour of Latvian residents.
- 2) The main objective influencing factors are social and cultural changes – transition from family traditions to individualism, changes in the family institution and the understanding of gender roles.
- 3) The results show that there is a positive attitude among both women and men regarding building relationships and planning a child, that both genders have an important role and that care and responsibility should be taken in this aspect of reproductive behaviour.
- 4) The research hypothesis - the reproductive behaviour of the population is most significantly influenced by subjective factors - was confirmed. According to the answers of the respondents, it can be concluded that the following factors most significantly affect reproductive behaviour: the desire to have children - 65%, a stable partner and his support - 53% and financial stability - 51%.
- 5) The research hypothesis - in modern society, the tendency to postpone the birth of children until as late as possible is a significant factor affecting reproductive behaviour - was confirmed. Residents postpone having a child because of subjective reasons, such as uncertainty about the future, the desire to accumulate capital, live for themselves and travel etc. It must be concluded that the population does

not assess their reproductive behaviour objectively, because the average age of the respondents is 37.2 years; 40% of the respondents do not have children, but the answers show that the respondents would like 2-3 children if the conditions were favourable.

6) Based on the results of the study, the topic of reproductive behaviour should be studied more from a sociological point of view in the future, because, according to the authors, it would be useful to analyse in depth the factors influencing reproductive behaviour in the context of the renewal of society.

7) The Ministries of Education and Health Protection, in cooperation with non-governmental sector organizations, should purposefully study reproductive behaviour in order to clarify the importance and limits of reproductive behaviour in the context of societal reproduction. Also, young people should be purposefully informed about reproductive behaviour and its limits, because the view presented at the moment is limited only to the explanation of sexual and reproductive health.

8) The Latvian government needs to re-evaluate family support programs and direct them in a more targeted manner, because financial stability and security for the future are very important factors. A comprehensive set of measures should be created - financial, educational, health etc. in areas that would provide real support to families so that families with children feel stable and safe.

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CONCEPT OF ACCOUNTING FOR TRANSACTION COSTS: PROBLEMS AND PROSPECTS

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Abstract. Research in the field of institutional economics has proved the importance of transaction costs in economic governance. However, it is quite difficult to obtain reliable data about the a of the enterprise transaction costs because transaction costs are not reflected in the accounting as a separate item.

The aim of this article is to explain the rationale of the concepts of accounting for transaction costs on the separate synthetic account and on the basis of analytical accounting data with the help of modern information systems. To achieve this goal, the authors reviewed existing approaches to the classification of transaction costs for the purpose of registration. The study analysed research works on the assessment of transaction costs' proportion in the economies of selected countries and Ukraine. The authors estimated transaction costs of the investigated agricultural enterprises according to accounting data. The study reviewed research approaches to obtain the data about the transaction costs' accounting in companies.

As a result of the research, the authors developed the methods of the transaction costs' accounting on the separate synthetic account and by the help of analytical data of ERP systems. Also, the authors proposed the classification of transaction costs, adapted for the opening of analytical accounts for accounting.

Key words: accounting, transaction costs, institutional economics, ERP.

JEL code: M41, M15, O43

Introduction

The modern world is changing extremely rapidly. New products and new technologies are appearing. The rules of business are changing dramatically, new business processes arise and quickly displace the existing ones. Economic theory does not keep pace with changes in the practice of economic activity. This failure of the theory to meet the challenges of the real economy generates crises. Accounting responds to changes in economic conditions even more slowly.

More and more economists use positions of institutional and neo-institutional economic theories in their research. Today, there are made attempts to develop accounting on these principles. One of the most comprehensive works in this field is the monograph by Professor V. N. Zhuk (2013), where accounting is considered as an economic institution. Institutionalism is a fairly broad field of economic research, within which it is developing a series of economic theories. The basic ones among them are the theories of transaction costs, contracting, property rights, public choice, theory of agents etc.

The economic essence of the transaction costs was formed by such researchers as R. Coase (1937, 1960), J. Commons (1931), H. Demsetz (1968), D. North and J. Wallis (1986), O. Williamson (2001). These scientists proved the expediency of using the theory of transaction costs in business management. The main unresolved problem is the difficulty of obtaining reliable data on the rate, structure and dynamics of transaction costs. Thus, researchers who study accounting have to solve this problem. Issues of transaction costs' accounting in Ukraine are analysed in the works of such scientists as V. Zhuk (2013), H. Kireitsev (2014), M. Shyhun (2009), O. Kantsurov (2014) and others.

Studies have shown that in the economies of the developed countries transaction costs make up about half of all spending. Despite the considerable rate of transaction costs, they do not have a separate display in the accounting and financial statements, which complicates their assessment, analysis and management.

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In the research, the authors studied the current state and problems of transaction costs' accounting, analysed research works on the assessment of the transaction costs' proportion and estimated transaction costs of the investigated agricultural enterprises according to accounting data.

Materials and methods. The purpose of the article is to explain the rationale of the concepts of accounting for transaction costs, which will improve costs' management information system of an enterprise.

The tasks of the study are as follows:

- 1) to investigate the economic essence of transaction costs as an accounting object;
- 2) to estimate the proportion of transaction costs;
- 3) to summarize the existing methodology of accounting for transaction costs;
- 4) to develop a concept of transaction costs' accounting with the use of ERP systems.

The article used general scientific and specific research methods, in particular: abstraction, induction and deduction, analysis and synthesis – to assess the level of transaction costs; comparison – to study different models of accounting for transaction costs; graphic – to display the share of transaction costs in total costs, modelling – to build a transaction costs' accounting model with the use of ERP systems.

During the writing of the article, fundamental scientific literature on institutional economics and the theory of transaction costs, as well as contemporary research on the assessment and accounting of transaction costs were used. The research also used the results of the author's previous studies, financial statements of enterprises and statistical data.

Research results and discussion

1. The economic essence of transaction costs as an accounting object

Researchers of institutional economic theory draw attention to the costs associated not with production activities, but with ensuring the exchange of property rights – transaction costs.

Formation of the theory of transaction costs is associated with the articles by the Anglo-American economist, Nobel laureate, Ronald H. Coase, published with an interval of almost a quarter of the century, "Nature of the Firm" (1937) and "The problem of social cost" (1960). Investigating the peculiarities of firms functioning, R. Coase discovered and proved that the exchange of property rights in the market (transaction) is not free and thus introduced the concept of transaction costs for scientific use. He identified transaction costs as expenses related to the market mechanism use.

Researchers Shahab, S., Clinch, J. P., & O'Neill, E. (2018) justify the need to consider the impact of transaction costs even at the project planning stage. Researchers Jankova, L. Lazdins, A. and Auzina, A. (2022) emphasize the importance of ensuring the high efficiency of commercial transactions.

Yaremko, I., & Voskresenska, T. (2018) made an attempt to analyse the level of transaction costs in the economy of Ukraine and at the level of enterprises. They summarized the existing views on the accounting of transaction costs and emphasized the expediency of using information systems for their accounting. The researchers also drew attention to the fact that not all transaction costs are documented. A significant part of them is outside the document circulation.

Documentary confirmation of economic transactions is significant, because such transactions can be easily confirmed by audit data (Slobodyanik et al., 2022). And vice versa, the absence of a document does not allow to reflect transaction costs objectively.

Transaction costs, in our opinion, can be defined as costs liaising enterprise with the environment (contractors, commercial intermediaries) for the purpose of transactions as changes in property rights and

freedom, and include the costs of information search, negotiation, contracting and their enforcement. A significant source of transaction costs is the opportunistic behaviour of partners, as it is necessary to take measures to prevent and minimize the losses from improper execution of contracts.

Two behavioural assumptions as noted O. Williamson (2001), which are repeatedly referred to by the theory of transaction costs, affect the level of the latter – a limited rationality and opportunism. First, people-agents act intentionally in rational, but limited way. Secondly, people-agents do not always fulfil their promises, but back out of a contract whenever it serves their purpose.

The level of transaction costs largely depends on the institutional environment in which the enterprise operates. The better the institutional environment is, the easier transactions take place, and the costs of a transaction are minimal.

Producers who have attained the reduction of transaction costs, even at the same level as production costs, get substantial economic benefits.

For creation of an accounting method, it is important the correct classification of transaction costs. There are many options for classification. Most researchers attribute the classification of transaction costs to the stages of conclusion and execution of contracts. Based on R. Coase's works, the following classification can be used:

- costs of searching for partners;
- costs of communication with partners;
- costs of negotiations;
- costs of preparing and signing a contract;
- costs of ensure the executing of a contract.

2. Identification and assessment of transaction costs

Almost immediately after introducing the category "transaction costs" for scientific use, the researchers were faced with the problem of their measurement. Scholarly views on the subject have evolved in two directions: measurement of transaction costs at the macro and micro levels.

One of the first and the most successful attempts to measure transaction costs at the macro level is considered the concept of transaction sector developed by J. J. Wallis and D. C. North (1986). The authors of the study rated the gross income generated in providing transactional services, compared with the total value of the gross national product of the United States.

The researchers subsumed the costs of banking operations, insurance, finance, wholesale and retail trade and others to transaction costs. The results show that the percentage of the transaction services in the gross national income of the US increased from 26.6% in 1870 to 54.9% in 1970 (Wallis and North, 1986).

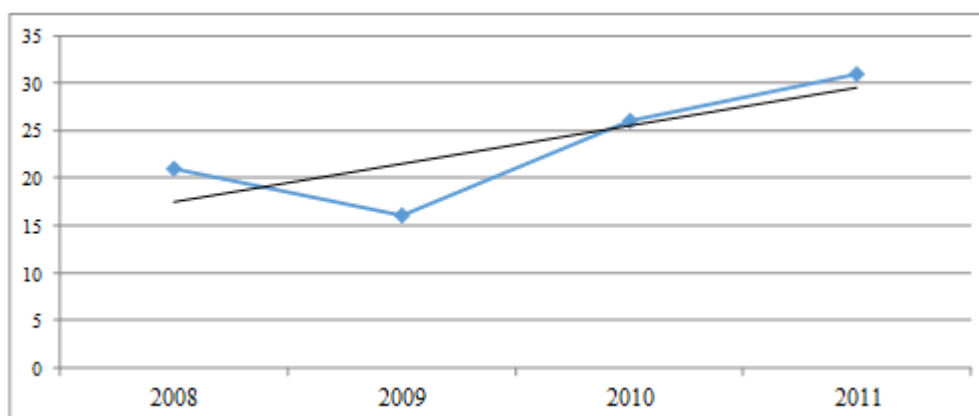
Obtaining of the information about the enterprise's transaction costs is possible by use of various methods, including economic analysis, polling, expert estimation etc. We believe that reliable data on the level of transaction costs can only be obtained from the accounting data.

Analysis of transaction costs in the economy of Ukraine shows their significant rate. In the study by O. Kantsurov (2014), there were several methods used to assess transaction costs. In one of them, it was considered that transaction costs are all non-production costs such as administrative costs, costs for sales, and other operating expenses. As a result, the author found that during 2000-2011 the sum of transaction costs of business entities (excluding banks and small businesses) increased 6-fold – from 9,2 USD billion to 56,9 USD billion.

The rate of transaction costs in 2011 exaggerated expenditures of the State Budget of Ukraine by one third for the year, approved in the amount of USD 43,0 billion. In comparison to GDP (at actual prices) for 2011, the minimal transaction costs of the economy discovered according to the accounting data amounted to 34.5%. However, if you add taxes paid by end-users which are not included in the analysis of transaction costs on the basis of financial statements of entities, namely the tax on personal income – USD 7,6 billion, value added tax – USD 16,3 billion, excise tax – USD 4,4 billion, and import duties – USD 1,3 billion, the amount of transaction costs of the economy increases up to USD 86,5 billion. Hence, the minimum share of legal transaction costs of Ukraine's economy in GDP rises up to 52.4% (Kantsurov, 2014).

The high level of transaction costs in the economy of Ukraine is due to the low quality of the tax system, the high level of taxes. Total tax burden ratio reaches up to 50% (Homovij et al., 2018).

We analysed the data of financial statements of farms from the northern region of Ukraine. The share of transaction costs in the structure of total costs of these agricultural enterprises exceeded 20% (Figure 1), which also confirms the importance of transaction costs accounting and control (Lytvynenko & Tolstonog, 2015).



Source: calculated according to the author's own research

Fig. 1. The level and trend in changes of transaction costs percentage in the total costs of the studied agricultural enterprises in 2008-2011, %

More recent studies also indicate a high level of transaction costs (Table 1).

Table 1

Analysis of transactional sector of economy in Ukraine, 2010-2016

Indicators	2010	2011	2012	2013	2014	2015	2016
The total costs, UAH billion	1079,3	1138,3	1141,1	1140,8	1066,0	961,8	984,0
Transaction costs, UAH billion	460,6	479,9	482,5	493,2	460,1	426,3	431,8
The share of transaction costs in total costs,%	42,7	42,2	42,3	43,2	43,2	44,3	43,9

Source: Grytsaenko M., 2017

Although the volume of the transactional sector has declined, its share has increased from 42% to 44% in comparison to GDP. And it means that accounting and control of transaction costs need to be strengthened.

In the study by L. Gutsalenko, the author notes that in order to reflect reliable information in financial statements with regard to European demands and international standards of financial reporting, accounting control, as well as to analyse management tools and those reducing business risks in terms of agricultural

business investment, their impact factors should be investigated (Gutsalenko et al., 2018). Transaction costs are also a factor of influence.

To date, there is no reliable statistical data on the amount of transaction costs. To solve this problem, it is necessary to create a method of accounting for transaction costs. It will be a reliable basis for their evaluation and management of enterprise costs.

3. Concept of accounting for transaction costs on the separate synthetic account

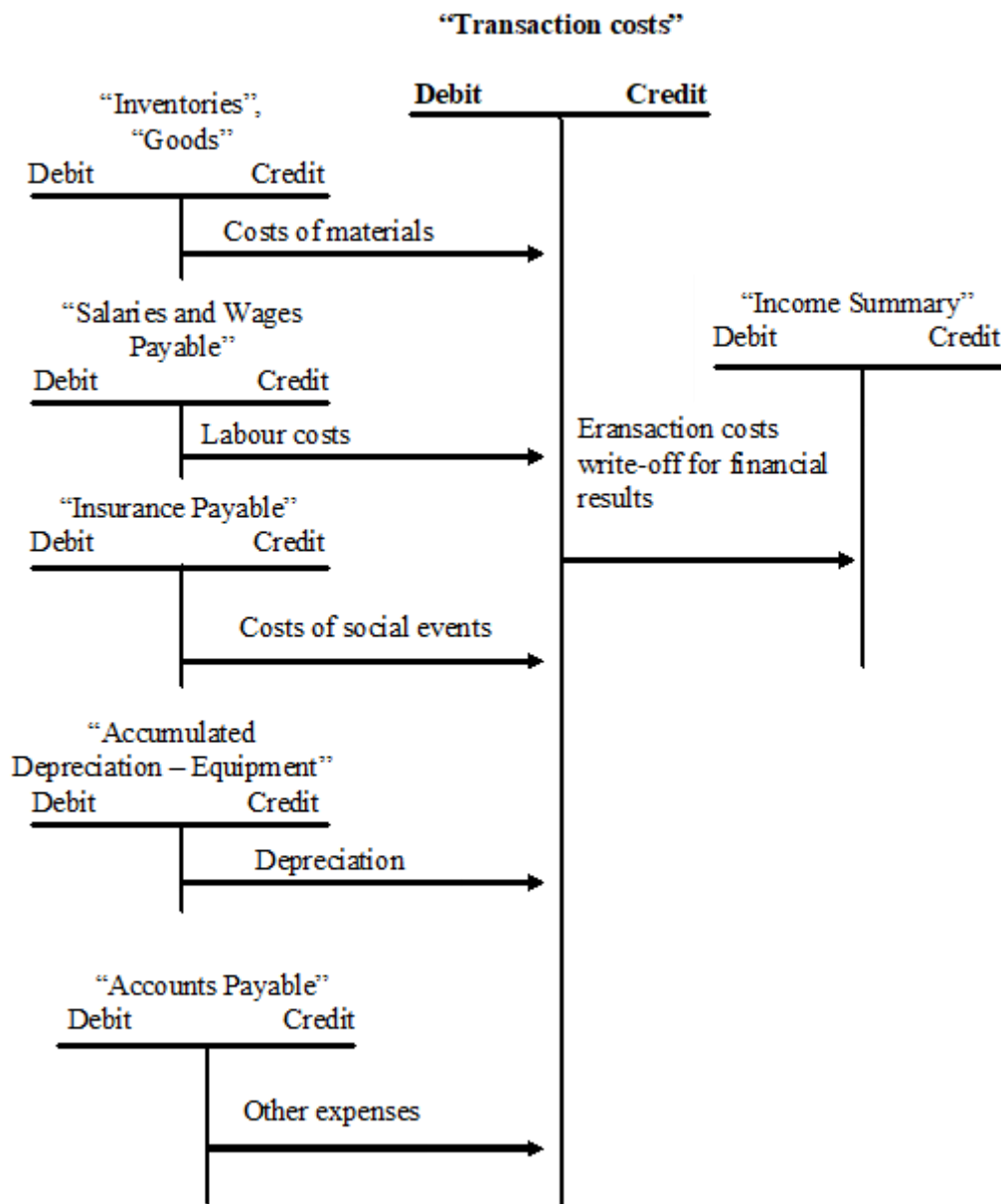
The scientific works on accounting for transaction costs offer a wide range of approaches to their accounting:

- analytical accounting of transaction costs;
- management accounting of transaction costs;
- construction of a new neo-institutional accounting model;
- using transit account "Transaction costs" etc.

However, each of these approaches has its drawbacks and insufficient substantiation. Therefore, it is necessary to implement measures to improve the accounting system. For this purpose, it is advisable to adapt the system of accounting to collect, check and summarize information about transaction costs. In the basics of organization of transaction costs' accounting, it is expedient to justify their intended purpose (Tomilova & Homovij, 2016).

Based on the research, we consider to develop a concept regarding the fact that it is appropriate to update the classification of accounting for cost and to provide separate synthetic account "Transaction costs" with sub-accounts. Sub-accounts should reflect transaction costs classification that would give information to analyse not only the dynamics, but also the structure of enterprise's transaction costs.

In general, the account "Transaction costs" is active. On the debit side, there will accrue costs in correspondence with the credit of such accounts as "Production reserves", "Depreciation (amortization) of fixed assets", "Payments for employee benefits", "Calculations on insurance" and others. The total cost accrued in the debit of the account "Transaction costs" at the end of the reporting period will be fully written off in the debit of the account "Financial results". Graphically, this approach is shown in Figure 2.



Source: author's own elaboration

Fig. 2. Chart of transaction costs mapping onto accounts

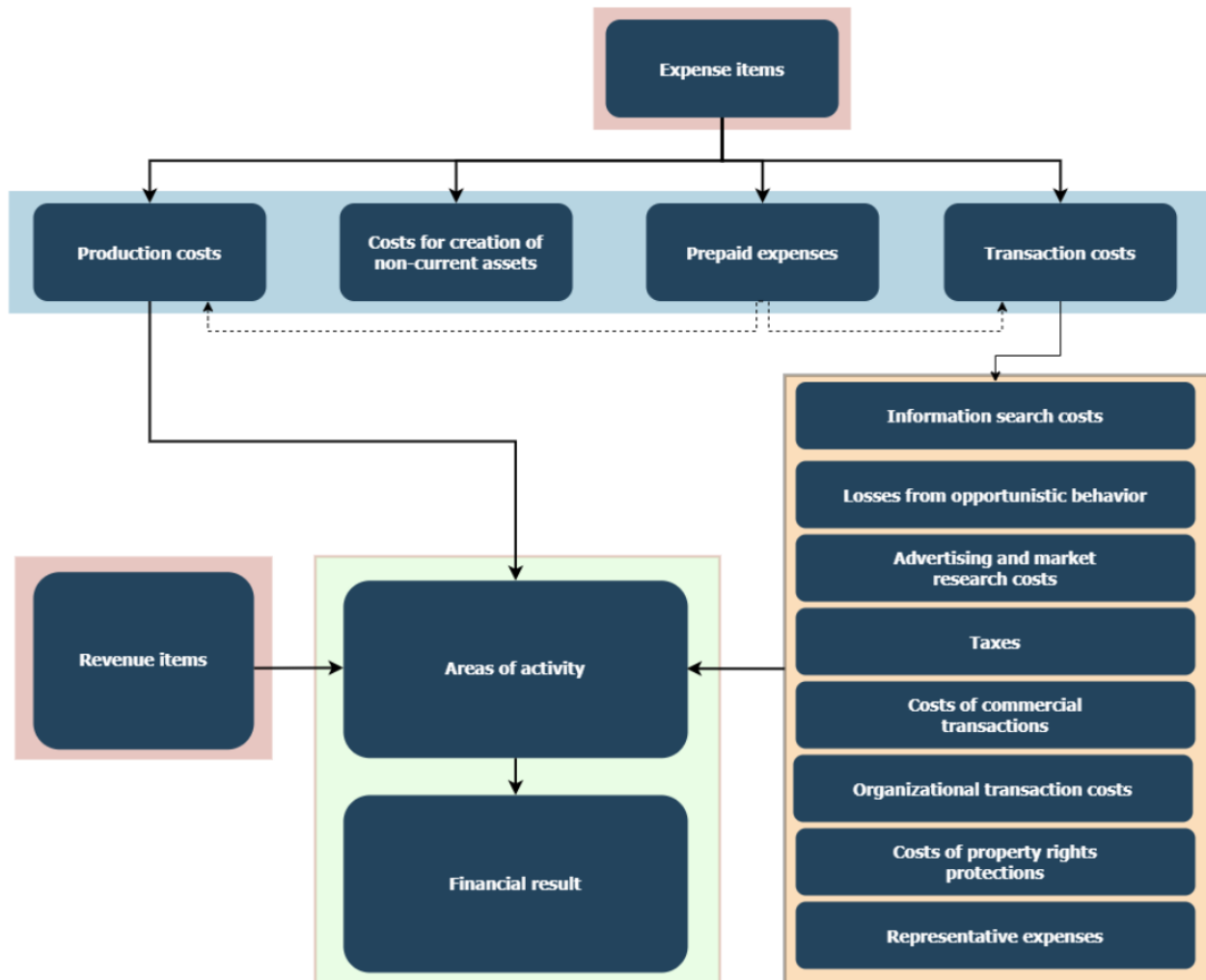
4. Concept of transaction cost accounting with the use of ERP systems

The provided technique of accounting for transaction costs using the separate synthetic account is useful thus allowing displaying all the variety of enterprise's transaction costs. However, this approach requires significant changes in the accounting methodology, which greatly complicates its implementation.

In our opinion, the use of information technologies can solve the problems of accounting for transaction costs. The digital agenda is transforming our lives in many ways. The ways in which we both interact and conduct business are radically different from those in the environment of ten, and perhaps even five, years ago. Thus, the informatization and computerization of society has reinforced changes in technology, forms, methods of accounting (Spilnyk et al., 2022, p.222).

One of the promising technologies for enterprise cost management is the use of ERP systems. The efficiency of ERP systems' use for enterprise cost management is emphasized by researchers I. Sotnyk, K. Zavrashnyi, V. Kasianenko, H. Roubík & O. Sidorov (2020).

A significant advantage of cost accounting in an ERP system is that it can be organized by several cost classifications at the same time. Accordingly, it is possible to use such a type of analysis as expense items. This will make it possible to keep track of transaction costs without using of accounting accounts. In addition, we suggest keeping records of transaction costs according to the classification shown in Figure 3.



Source: author's own elaboration

Fig. 3. The concept of transaction cost accounting in the ERP system with the use of cost items

Accumulated transaction costs can be attributed to the costs of certain areas of activity or to the financial result of the reporting period. This method of accounting for transaction costs will allow to accumulate information about the amount and structure of transaction costs for their further analysis.

Conclusions, proposals, recommendations

- 1) Complications in economic conditions and relationships between economic subjects, influenced by globalization, lead to higher transaction costs of enterprises. They become an essential object of accounting and control. However, a separate record of transaction costs does not exist. Transaction costs are accounted in other types of costs that complicates to their management. In this regard, the authors have proposed a concept of transaction costs accounting on a separate synthetic account.
- 2) In spite of significant number of existing classifications of transaction costs, it has become necessary to clarify the classification considering methodological features of accounting. The

classification of transaction costs, which was developed during the research, allows organizing their accounting on a separate synthetic account with the relevant sub-accounts and analytical accounts.

3) Displaying the transaction costs according to the proposed method does not require creating new forms of primary documents; however, it is reasonable to use the information and reports about transaction costs both in the whole enterprise and for its units. Organization of transaction costs' accounting on a separate synthetic account will improve analyticity and efficiency of information about transaction costs, provide obtaining of reliable data about the amount, structure and dynamics of transaction costs that will improve the efficiency of the enterprise cost management.

4) Using of information technologies provides new opportunities for transaction costs accounting. It allows accumulating large amounts of data, in particular about costs. At the same time, it is possible to keep track of costs according to several classifications simultaneously. A promising method of transaction costs' accounting is the use of analytical cost items in ERP systems. Accumulated data on transaction costs in the ERP system will be immediately used for enterprise management.

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BURNOUT OF THE EDUCATORS OF HIGHER EDUCATION INSTITUTIONS: ANALYSIS OF INFLUENCING FACTORS

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Abstract. Since the concept of burnout emerged in 1970's, the scientific discussion on it is still continuing. Educators follow medical workers in the list of the professions most affected by the burnout. Social nature of the work of the educators of higher education institutions, high workload and additional duties generate stress, which may become a burnout, if not properly managed.

The problem statement – there are many factors in the scientific discussion stated by authors as the ones influencing burnout.

The aim of the research is to analyse different factors mentioned in the scientific literature in order to determine their relation to the symptoms of burnout and compare with real situation of academic staff in higher education institutions.

In the research, the following methods were used: the analysis of scientific publications and previous conducted research and a survey on the aspects related to burnout of educators in higher education institutions.

Main results indicate that COVID-19 pandemic has influenced the situation of academic staff in higher education institutions.

The main findings of the paper reveal that burnout aspects are influencing members of academic staff in many higher education institutions, especially there where information about different support aspects is less available.

Key words: burnout, higher education, educators, stress.

JEL code: A23; C83; I23; I25; O15

Introduction

Since the concept of burnout emerged in 1970s, scientific discussion on it continues in different fields and world-wide. Most of the professions are influenced by burnout and educators follow medical workers in the list of the professions most affected by the burnout. Social nature of the work of the educators of higher education institutions, high load and additional duties generate stress, which may become a burnout, if not properly managed.

The Problem statement – there are many factors in the scientific discussion stated by authors of academic research as the ones influencing burnout.

The aim of the research – to analyse different factors mentioned in the scientific literature in order to determine their relation to the symptoms of burnout and compare with real situation of academic staff in higher education institutions.

In the research, the following methods were used: analysis of scientific publication and previous conducted research and survey on the aspects related to burnout of educators in higher education institutions. For most of the analysed aspects, the authors applied evaluation scale 1-10 to get a deeper analysis of evaluations assigned by educators. Survey results are analysed by main indicators of descriptive statistics: indicators of central tendency or location (arithmetic mean, mode, median) and indicators of dispersion or variability (range, standard deviation, standard error of mean), cross-tabulations, testing of statistical hypotheses by t – test and analysis of variance – ANOVA, as well as correlation analysis.

Researchers have found several factors influencing burnout, among which many researchers have indicated support of the institution and supervisor as very important factor (Singh et al., 2021; Shahzad et al., 2022; Lau et al., 2023) to feel well at a workplace and not be influenced so much by the

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burnout. This aspect is considered as important in many countries around the globe, including the USA (Carrell et al., 2022). Several other aspects are considered as important, too (Braslina et al., 2021; Batraga et al., 2019; Seimuskane et al., 2017; Mironova & Sloka, 2022). Namely, engagement is one of the most important aspects to lower or avoid burnout (Raina & Khatri, 2015; Paul & Jena, 2022) as moral support from the supervisors and the motivating academic staff (Lau et al., 2022) in their involvement and satisfaction of the work as factors reducing the feelings of burnout. Researchers have found that university staff affiliation of respective institution is an important aspect for burnout lowering (Pemberton & Kisamore, 2023; Mula-Falcón et al., 2022; Mohammed et al., 2020; Pyhältö et al., 2023). Technologies and their successful application are important (Abu Farha et al., 2022; Chan, et al., 2018) as well as performance management has a big influence (Kairuz et al., 2022) on academic staff burnout level. Also, eating habits (Chui et al., 2020) have a significant influence on burnout. Furthermore, ethical aspects are considered as very important (Julmi et al, 2022) as well as contract time (Kovaleski & Arghode, 2021), which can lower the level of burnout. Several activities are suggested to recover (Semeijn et al., 2019) as well as prevent (Stuckey, et al., 2019) burnout. Students are also influenced (Kuittinen & Meriläinen, 2011), and there are suggested activities to prevent burnout for them. Also, online studies' influence on burnout have been evaluated in some researchers' works (Wu et al., 2022; Dixit & Upadhyay, 2021). Several professions have alike aspects for burnout (Byrne, et al., 2013).

Researchers have indicated that males and females are reacting differently on burnout and have different views (Gardiner & Finn 2023) on burnout influencing factors.

Research results and discussion

Taking into account the findings of the researchers reflected in their publications, the authors performed an empirical study by asking university academic staff for evaluations on the questions: "How supportive your organization is for your professional development?" and "How fair your workload and reward are in HEI in comparison with other industries?". Main statistical indicators of descriptive statistics on evaluations of analysed aspects assigned by the members of academic staff are presented in Table 1.

Table 1

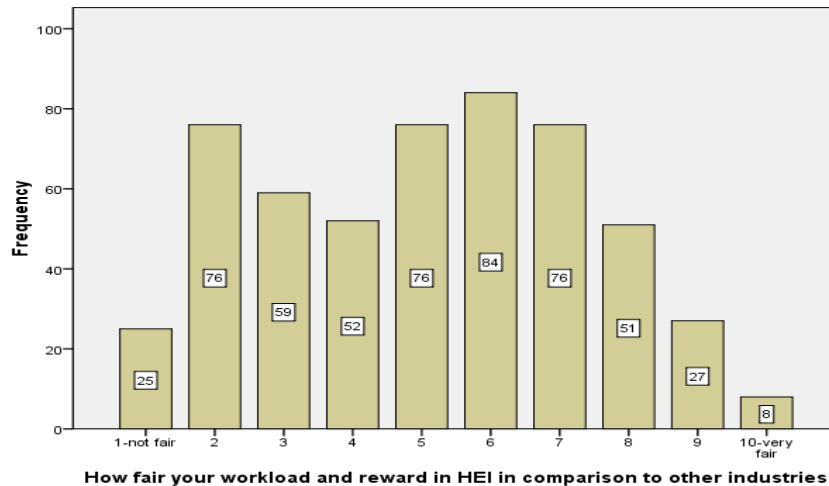
Main statistical indicators of descriptive statistics of academic staff evaluations

Statistical indicators		How fair your workload and reward are in HEI in comparison with other industries?	How supportive your organization is for your professional development?
N	Valid	534	551
	Missing	21	4
Mean		5.07	6.49
Standard Error of Mean		0.100	0.099
Median		5	7
Mode		6	8
Standard Deviation		2.312	2.317
Range		9	9
Minimum		1	1
Maximum		10	10

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The data indicate that arithmetic mean of the evaluations provided by the members of academic staff on "How fair your workload and reward in HEI in comparison to other industries" is just 5.07, which means

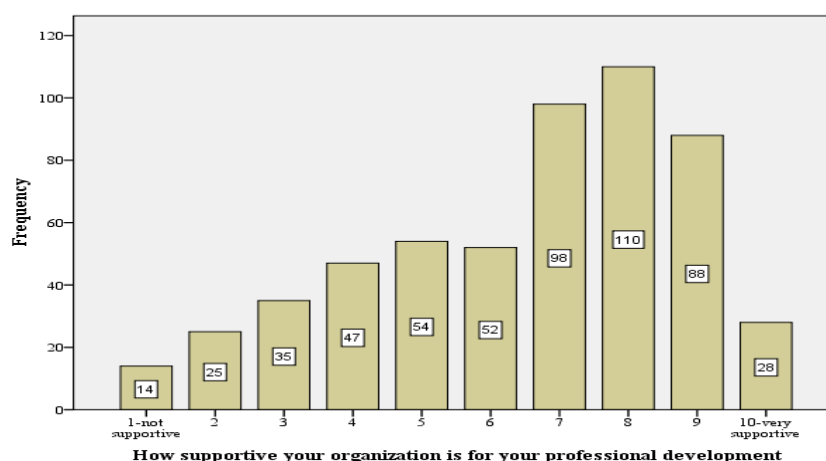
that representatives of higher education institutions think that the workload and remuneration are not very high in comparison with other industries. Half of the respondents have assigned evaluation 5 or lower and half of the respondents have evaluated this factor by 5 or higher, which is characterised by median. The data indicate that most often assigned evaluation was 6 (characterised by mode). Respondents have used all evaluation scale – distribution of evaluations is presented in Figure 1.



Source: author's calculations based on Julija Mironova conducted survey, n=555

Fig. 1. Distribution of evaluations on the question "How fair your workload in HEI is in comparison with other industries?"

The data indicate that the evaluations on the analysed question "How fair your workload and reward are in HEI in comparison with other industries?" were very different. Main indicators of descriptive statistics on the question "How supportive your organization is for your professional development?" indicate that the arithmetic mean of the evaluations was 6.49 with most often given evaluation 8 on this analysed aspect (characterised by mode); half of the respondents assigned evaluation 7 or less and half of respondents assigned evaluation 7 or more – characterised by median. In the evaluations, all evaluation scale was covered. Distribution of evaluations by respondents on this statement is revealed in Figure 2.



Source: author's calculations based on Julija Mironova conducted survey, n=555

Fig. 2. Distribution of evaluations on the question "How supportive your organisation is for your professional development?"

As it was indicated in several scientific publications that male and female members of academic staff have different views on the aspects related to burnout in higher education. We have tested the differences

of arithmetic means of the evaluations by gender by t-test. Main indicators of descriptive statistics by gender as group statistics are included in Table 2.

Table 2

Main statistical indicators of descriptive statistics of academic staff evaluations by gender

Evaluated aspect	Gender	N	Mean	Standard Deviation	Standard Error Mean
How fair your workload and reward in HEI are in comparison with other industries?	male	231	5.21	2.299	0.151
	female	269	4.93	2.333	0.142
How supportive your organization is for your professional development?	male	234	6.42	2.406	0.157
	female	281	6.62	2.224	0.133

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

Arithmetic means of the evaluations are different for male and female evaluations, but whether they differ statistically significant was tested by t-test on arithmetic means of independent samples. Results of t-test on testing statistical hypotheses on differences of arithmetic means on evaluations of the analysed aspects by gender are revealed in Table 3.

Table 3

Main statistical indicators of t-test of independent samples on academic staff evaluations by gender

Evaluated aspects	Variances	Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
How fair your workload and reward in HEI are in comparison with other industries	Equal variances assumed	0.,256	0.613	1.321	498	0.187	0.275	0.208
	Equal variances not assumed			1.323	488.7	0.186	0.275	0.208
How supportive your organization is for your professional development	Equal variances assumed	1.563	0.212	-0.964	513	0.336	-0.197	0.204
	Equal variances not assumed			-0.957	480.2	0.339	-0.197	0.206

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The data indicate that arithmetic means of the evaluations by academic staff by gender on both analysed aspects differ, but the differences in evaluations do not differ statistically significantly by high probability.

Academic publications have indicated that the age group has also influence on different aspects related to academic work, therefore there were made calculations using different statistical indicators of descriptive statistics for evaluations on "How supportive your organization is for your professional development?" and "How fair your workload and reward are in HEI in comparison with other industries?" by age group, and the results are reflected in Table 4.

Table 4

Main statistical indicators of descriptive statistics of academic staff evaluations by the age group

Age group	Statistical indicator	Analysed aspects	
		How fair your workload and reward in HEI are in comparison with other industries	How supportive your organization is for your professional development
less than 30	Mean	5.35	7.33
	N	17	18
	Standard Deviation	2.422	2.000
31-40	Mean	5.06	6.62
	N	131	134
	Standard Deviation	2.42	2.155
41-50	Mean	5.18	6.59
	N	154	160
	Standard Deviation	2.343	2.286
51-60	Mean	4.78	6.09
	N	136	139
	Standard Deviation	2.283	2.490
61-70	Mean	5.45	6.62
	N	77	79
	Standard Deviation	2.326	2.249
71-80	Mean	4.56	6.39
	N	16	18
	Standard Deviation	2.366	2.615
more than 80	Mean	5.00	8.00
	N	1	1
	Standard Deviation	.	.
Total	Mean	5.07	6.50
	N	532	549
	Standard Deviation	2.303	2.310

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The data indicate that the evaluations by age group are different but whether they differ statistically significantly is tested by analysis of variance ANOVA, and the results are revealed in Table 5.

Table 5

Main statistical indicators of ANOVA of independent samples on academic staff evaluations by the age group

Analysed aspect	Variance	Sum of Squares	df	Mean Square	F	Sig.
How fair your workload and reward in HEI are in comparison with other industries	Between Groups	30.070	6	5.012	0.944	0.463
	Within Groups	2786.071	525	5.307		
	Total	2816.141	531			
How supportive your organization is for your professional development	Between Groups	42.205	6	7.034	1.322	0.245
	Within Groups	2883.034	542	5.319		
	Total	2925.239	548			

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The results of the analysis of variance ANOVA indicate that differences of evaluations by age group are not statistically significant.

The authors performed analysis of evaluations by both analysed aspects in relation to teaching experience, for which the main results are included in Table 6.

Table 6

Main statistical indicators of descriptive statistics of academic staff evaluations by teaching experience in years group

Teaching experience in years	Statistical indicators	Analysed aspect	
		How fair your workload and reward in HEI are in comparison with other industries	How supportive your organization is for your professional development
less than 1	Mean	5.88	7.60
	N	8	10
	Standard Deviation	2.949	2.119
1-3	Mean	4.64	6.73
	N	25	26
	Standard Deviation	1.934	2.523
4-6	Mean	5.44	6.69
	N	48	48
	Standard Deviation	2.192	2.344
7-10	Mean	4.83	6.11
	N	53	54
	Standard Deviation	2.268	2.345
11-15	Mean	5.44	6.90
	N	79	81
	Standard Deviation	2.469	2.160
16-20	Mean	4.86	6.62
	N	86	89
	Standard Deviation	2.208	1.963
21-25	Mean	5.06	6.21
	N	94	95
	Standard Deviation	2.233	2.352
26-30	Mean	5.02	6.37
	N	52	54
	Standard Deviation	2.586	2.797
31-35	Mean	5.20	6.40
	N	45	47
	Standard Deviation	2.138	2.071
more than 35	Mean	4.77	6.20
	N	43	46
	Standard Deviation	2.534	2.613
Total	Mean	5.07	6.49
	N	533	550
	Standard Deviation	2.314	2.319

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The data indicate that the evaluations by teaching experience in age group are different but whether they differ statistically significantly is tested by analysis of variance ANOVA, the results are presented in Table 7.

Table 7

Main statistical indicators of ANOVA of independent samples on academic staff evaluations by teaching experience group

Analysed aspect	Variance	Sum of Squares	df	Mean Square	F	Sig.
How fair your workload and reward in HEI are in comparison with other industries	Between Groups	38.936	9	4.326	0.805	0.611
	Within Groups	2809.211	523	5.371		
	Total	2848.146	532			
How supportive your organization is for your professional development	Between Groups	51.132	9	5.681	1.058	0.393
	Within Groups	2900.323	540	5.371		
	Total	2951.455	549			

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lowest evaluation; 10 – highest evaluation, n=555

The results of analysis of variance ANOVA indicate that differences of evaluations by teaching experience in age group are not statistically significant.

Table 8

Main statistical indicators of correlation analysis on academic staff evaluations, gender, age group and teaching experience group

Analysed aspect	Statistical indicator	How fair your workload and reward in HEI in comparison to other industries	How supportive your organization is for your professional development	Gender	Age group	Teaching experience in years
How fair your workload and reward in HEI in comparison to other industries	Pearson Correlation	1	0.498**	-0.059	-0.010	-0.031
	Sig. (2-tailed)		0.000	0.187	0.824	0.473
	N	534	532	500	532	533
How supportive your organization is for your professional development	Pearson Correlation	0.498**	1	0.043	-0.055	-0.071
	Sig. (2-tailed)	0.000		0.336	0.200	0.095
	N	532	551	515	549	550
Gender	Pearson Correlation	-0.059	0.043	1	-0.087*	-0.066
	Sig. (2-tailed)	0.187	0,336		0.048	0.132
	N	500	515	517	516	517
Age group	Pearson Correlation	-0.010	-0.055	-0.087*	1	0.769**
	Sig. (2-tailed)	0.824	0.200	0.048		0.000
	N	532	549	516	551	550
Teaching experience in years	Pearson Correlation	-0.031	-0.071	-0.066	0.769**	1
	Sig. (2-tailed)	0.473	0.095	0.132	0.000	
	N	533	550	517	550	552

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Source: author's calculations based on Julija Mironova created and conducted survey in 2023, evaluation scale 1-10, where 1- lower evaluation; 10 – highest evaluation, n=555

Main statistical indicators of correlation analysis on evaluations "How supportive your organization is for your professional development" and "How fair your workload and reward in HEI are in comparison with other industries", gender, age group and teaching experience time are presented in Table 8.

The results of correlation analysis indicate that there is a statistically significant positive correlation between evaluations "How supportive your organization is for your professional development" and "How fair your workload and reward in HEI in comparison to other industries" and there is no correlation of those evaluations and gender, no correlation of those evaluations and age group and no correlation of those evaluations and teaching experience time.

Conclusions, proposals, recommendations

- 1) Burnout issues in higher education institutions are of special interest for researchers world-wide with attention to different aspects influencing burnout and how it is evaluated by academic staff by gender, by age group and by teaching experience as well as by other factors.
- 2) Main results indicate that COVID-19 pandemic has influenced the situation of academic staff in higher education institutions, and the factors influencing burn-out differ.
- 3) Burnout aspects are influencing members of academic staff in many higher education institutions, especially there where information about different support aspects is less available.
- 4) The evaluations of academic staff on the question "How supportive your organization is for your professional development" are relatively low, but they significantly differ by gender, by age group and by teaching experience; however, those differences are not statistically significant.
- 5) The evaluations of academic staff on "How fair your workload and reward in HEI are in comparison with other industries" are relatively high, but they significantly differ by gender, by age group and by teaching experience; however, those differences are not statistically significant.
- 6) There is a statistically significant positive correlation between evaluations "How supportive your organization is for your professional development" and "How fair your workload and reward in HEI in comparison to other industries", and there is no correlation of those evaluations and gender, no correlation of those evaluations and age group and no correlation of those evaluations and teaching experience time.
- 7) Authors' recommendation for higher education establishments is to note the current research results and support academic staff to avoid burn-out and involve them more in decision-making.

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FACTORS IMPACTING THE AMOUNT OF STATE SOCIAL INSURANCE BENEFITS IN LATVIA

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Abstract. State social insurance benefits play an essential role in situations where residents experience any of the social risks (unemployment, sickness, disability, maternity etc.), since the benefits partially compensate for the previous income of residents. State social insurance benefits in Latvia include benefits in case of unemployment (unemployment benefit and benefit in case of death of an unemployed person) and benefits and allowances for maternity and sickness insurance (maternity and paternity benefits, parental allowance, sickness benefit and funeral allowance). The defined research hypothesis states that the amount of social insurance benefit and wage remuneration are subject to the impact of the same factors. The research aim is to study factors impacting state social insurance benefits in Latvia. The authors have identified factors impacting work remuneration and respectively social insurance benefits based on the scientific literature and the research of the Ministry of Welfare of the Republic of Latvia. In the course of the research, seven experts were asked to evaluate the identified factors by means of the paired method and determine the most significant factors influencing the amount of social insurance benefits. The research results show that experience and education (personality-related factors) are among the most important factors influencing wage remuneration and, hence, the amount of social insurance benefits. The research highlighted a necessity to make a proposal to the State Employment Agency to continue organising various training courses and educational programmes that increase the qualification of an employed person. However, the influence of a region was noted by experts as the main factor when evaluating the impact of the workplace on the wage remuneration.

Key words: state social insurance benefits, work remuneration, impacting factors.

JEL code: J310, J380, I380

Introduction

The social security system and its sustainable development, which protects people in case of social risk, plays an essential role in ensuring the well-being of the population. The state implements social security through social insurance, state social benefits, social assistance and social services.

Social protection of the population as one of the priority areas has been marked by the strategic planning documents of Latvia already for several planning periods. The need to improve social security and increase funding for the social sphere is especially emphasised in order to increase the quality of life of the population and promote the birth rate in the country (Latvijas ilgtspējīgas attīstības ..., 2010). Promoting the birth rate and ensuring the provision of population regeneration are vitally important issues for Latvia, as the number of population has been continuing to decrease since 1990 (Kristapsone, Kantane, 2019). The long-term conceptual document "Latvia's Growth Model: People Come First" (2005) specifies that inhabitants and their welfare are the main resources of the country. Many closely related aspects such as awareness and education, employment, material well-being, environmental protection, human resources, social security, family etc. shall be taken into account when ensuring the level of well-being and security of the population in the long term. The growth model emphasises the increase of human resources as one of the priority long-term tasks, which can be implemented by promoting the birth rate in the country (Latvijas izaugsmes modelis ..., 2005). Based on the population survey Kristapsone and Kantane (2019) indicate that social insurance benefits, which provide parents with income during a child care, play an important role in promoting birth.

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According to the National Development Plan of Latvia 2021-2027 (2020), one of the course of actions is "Strong Families in Generations", which is aimed to improve the support system for families with children simultaneously promoting the birth of a second child and the formation of large families. It should be noted that the population of Latvia positively evaluates the system created so far to support families with children; however, they emphasise that improvements should be targeted so that the birth of a child in the family does not significantly reduce the level of income per family member (Latvijas Nacionālais attīstības ..., 2020).

Several researchers such as Grinfelde (2010), Latviete (2012), Cunska, Muravska (2008), Volskis (2008), Abolina (2016) and others have addressed the problematic issues of social security in Latvia. Social insurance issues have been analysed in several studies of the Ministry of Welfare (Labklājības ministrija, 2019). Mietule (2012) and Liepina (2012) have summarised the factors impacting wage remuneration and analysed trends in wage remuneration changes by sectors and regions in Latvia.

The defined research hypothesis states that the amount of social insurance benefit and wage remuneration are subject to the impact of the same factors. The research aim is to study factors impacting state social insurance benefits in Latvia.

The following tasks are subjected to the research aim:

- 1) to study the effect of wages on the amount of social insurance benefits;
- 2) to identify and evaluate the factors affecting wages.

Research methods: the monographic and descriptive methods, analysis and synthesis, graphical method, method of statistical analysis (analysis of chain increase, correlation), paired method as well as a method of sociological research – structured survey of experts – to find out the opinions of experts on the factors influencing wage remuneration and social insurance benefits.

The present research is based on various scientific publications, publicly available documents, information available in databases and other sources.

Research results and discussion

1. The impact of wages on the amount of social insurance benefits

State social insurance benefits play a significant role in situations where residents experience any of the social risks (unemployment, sickness, disability, maternity etc.), since social benefits partially compensate for the previous income of residents.

Vanaga and Sloka (2022) specify that social protection helps individuals and families manage risks and provides support in adverse situations as well as helps maintain and improve living standards.

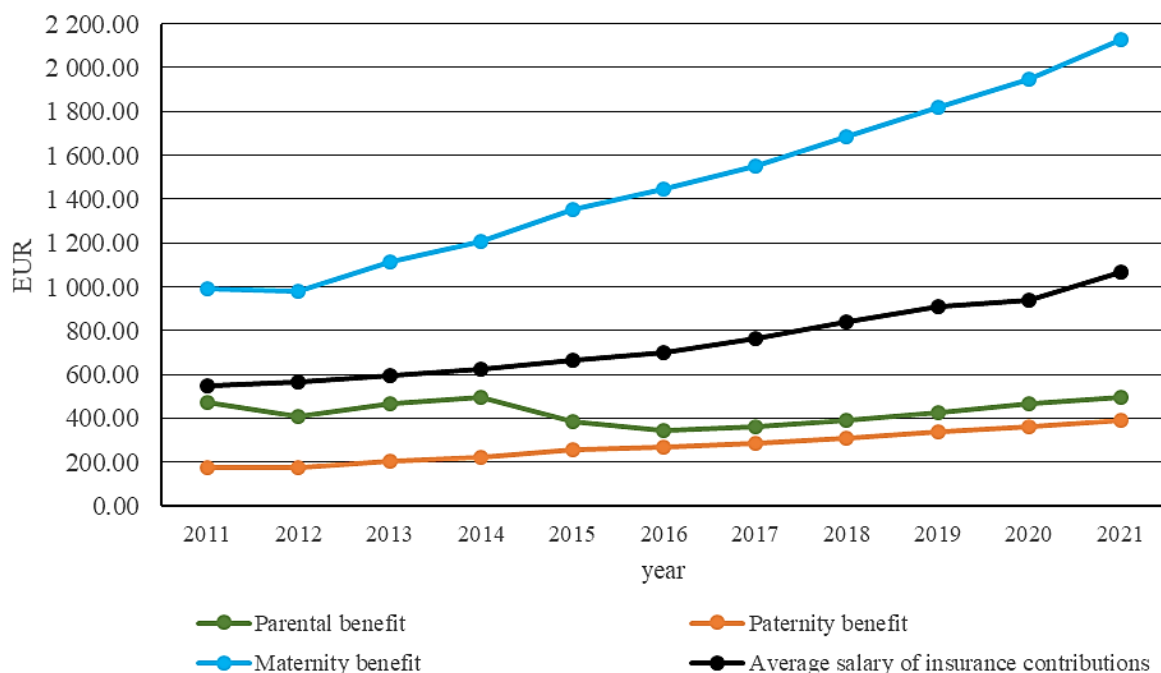
State social insurance is one of the areas of social security, which is based on social insurance contributions made by the population. The basic principles of state social insurance envisage solidarity between social insurance contributors and recipients of social insurance services, and the use of social insurance funds only for social insurance services consistent with the law (On State Social ..., 1997).

Based on the types of social insurance and consistent with the law "On Unemployment Insurance" (1999) and the law "On Maternity and Sickness Insurance" (1995), state social insurance benefits are divided into **unemployment benefits** (unemployment benefit and funeral benefit in case of death of an unemployed person) and **benefits for maternity and sickness insurance** (maternity, paternity, parental, sickness and funeral).

The research authors will concentrate only on a profound studies of maternity, paternity and parental benefits, since they directly relate with demographic processes in the country and serve as an essential support for parents in case of a child birth and care.

Under the law "On State Social Insurance" (1995), only persons who are socially insured and for whom mandatory state social insurance contributions have been made or had to be made for no less than three months of the last six months period or six months in the last 24-month period before the month in which the insured event occurred have the right to maternity, paternity, parental and sickness benefits.

The amount of state social insurance benefits depends on the salary or wage subject to a person's insurance contributions, as evidenced by the data of the State Social Insurance Agency. The average wage remuneration subject to insurance contributions and the amounts of social insurance benefits tended to increase within the period 2011-2021. The trend excluded the amount of parental benefit, as the period of receiving the benefit was changed due to the amendments in the regulatory enactments. From 1 October 2014, the recipients of the parental benefit were given the opportunity to choose the period of receiving the benefit: until the child reaches one year of age or until the child reaches the age of 1.5 years. The amount of benefit is higher if the recipient chooses to receive it for a shorter period; hence, the benefit equals to 60% of the wage or salary subject to contributions. Yet, the benefit equals to 43.75% of the wage or salary subject to contributions if the period of receipt is longer. The data show that the amount of parental benefit has a tendency to increase from 2016 (Fig. 1).



Source: data of the State Social Insurance Agency, 2023

Fig. 1. Amounts of the state social insurance benefits and the average wage remuneration subject to insurance contributions in Latvia within the period 2011-2021, EUR

The calculated chain increase rate shows that the fastest increase in the average wage remuneration subject to insurance contributions in the analysed period was observed in 2021, when it increased by EUR 127.59 or 13.57%. The increase of the minimum monthly wage from EUR 430 to EUR 500 in 2021 is one of the factors impacting the growth (Valsti noteikta minimala..., 2022). The calculated correlation coefficient ($r=0.976$) shows a close linear relationship between these indicators.

The main factor leaving an impact on the amount of state social insurance benefits is wage remuneration; thus, the factors directly influencing wage remuneration are studied hereinafter. It is

important that social contributions for a person are made from the entire work remuneration; otherwise, if any part of the income is paid unofficially (cash-in-hand), then it does not impact the person's social protection.

The study "Shadow Economy Index for the Baltic States 2009-2021" indicates that "envelope wages" in Latvia, Estonia and Lithuania constituted the most important component of the shadow economy in 2021 accounting for 46.2% of the total shadow economy in Latvia, 42.7% in Estonia, and 38.8% in Lithuania. In 2021, underreported business income in Latvia constituted 30%, while the component of underreported number of employees - 23.8% of the total shadow economy (Sauka, Putnins, 2022).

Researchers Sauka and Putnins (2015) emphasise that the shadow economy may create a vicious circle: individuals work illegally, and thus, they do not pay taxes, as a result of which revenue in the state budget decreases requiring an increase in tax rates, which further fosters unregistered activities and weakens the economic and social base.

Lately, more and more people become aware of the problems of social guarantees, which arise due to unmade social insurance contributions. Benkovskis and Vilerts (2021), economists of the Bank of Latvia, in their study on the shadow economy have confirmed that "envelope wages" mean lower social protection. In addition, the economists have also concluded that the COVID-19 pandemic proved how difficult it is to provide adequate support in crisis situations to the employees who work in industries and professions with a relatively high proportion of unreported wages. Also, Szewczyk-Jarocka (2022) in the study on the most important disadvantages of unregistered work, states that the most important is the lack of social security.

Although, as pointed out by Darzina, Brikmane and Dambe (2022) in their research almost one fifth of the population of Latvia would agree to receive part of their wage as cash-in-hand. Such a trend shall be evaluated negatively due to a frivolous attitude of part of the population towards social protection. When a person makes a decision to receive a wage as cash-in-hand, it does not think about the potential social risks that could happen and the social protection that could be required in such a situation (Zarina, Zvaigzne, Koldane, 2022). Often cash-in-hand wage earners have low income, and thus, the necessity for the state support becomes urgent. People with higher level of education and higher income have a more negative attitude towards unreported income (Darzina, Brikmane, Dambe, 2022).

Employees who officially receive at least the minimum monthly wage are more socially protected. Many authors have concluded in their studies that raising the minimum wage has a positive effect on the well-being of low-income earners. Ferraro, Merikull and Staehr (2018) in their research on the impact of minimum wage changes in Estonia have concluded that the minimum wage has contributed to the reduction of wage inequality, and this is especially true for those segments of the labour market with low wages. A study by Flavin and Shufeldt (2017) shows that subjective well-being increases among low-income citizens in countries that have decided to increase their minimum wage. The researchers demonstrated that this impact refers only to low-income citizens. Larger social insurance contributions are made with the increase of the minimum wage, consequently leading to the growth of the amounts of social insurance benefits.

Education is one of the most essential factors impacting work remuneration (Darba algas un..., 2006). The US Bureau of Labor Statistics has conducted a study confirming that the potential of an employee increases with each additional level of education obtained. For example, workers with a secondary education earn more than those without such a diploma. Also, employees with a master's degree earn more than those with a bachelor's degree etc. (Career Profiles, s.a.).

The effect of education on wages and salaries has been studied for a long time. In 1974, J. Mincer, conducting his regular study, created an analysis model in which the salary is a function of the number of

years spent in education and work experience of an individual. The main result of the model - the Mincer equation shows by what percentage each year of schooling increases the salary (Mincer, 1975). This model has also been used by Vilerts, Krasnopjorovs and Brekis (2015), experts of the Bank of Latvia, in their study on the impact of education on wages and salaries. The study demonstrates that a higher level of education in Latvia is associated with higher salaries.

Mistre, Zvaigzne, Mazure (2019) in their population survey in Latgale region recognised that education and the position held are one of the most important individual factors of people impacting the level of wages and salaries. Other important factors include the place of work either in an international or local company and the length of service.

The age of an employee is also an important factor for applying the salary size. In addition, this factor also has two effects. One of them is experience, as previous experience ensures additional productivity, and the employer is interested in employing an experienced employee and paying him a higher salary. Therefore, it could be concluded that the salary should increase with the employee's age. However, this is not the case, since productivity declines with the age due to the decline of an employee's physical and mental abilities. Consequently, the employer has a reason to pay a lower salary to an older employee (Darba algas un..., 2006). This fact indicates on a matter why people of pre-retirement age very often have difficulties finding a new job.

The international salary survey platform "Paylab" has collected information on salaries and wages in Latvia over a 10-year period and indicates several trends:

- companies operating in the most demanded sectors offer better remuneration (e.g., IT industries, banking and financial sector);
- the amount of money that could be earned also depends on the company size, as larger companies pay larger salaries;
- work remuneration is higher in the private sector than in the public sector;
- employees with higher education earn by 50% more on average than those with secondary education;
- work remuneration is higher in the capital and larger regional cities (Septini faktori, kas..., 2019).

The Ministry of Welfare indicates on work remuneration variations among representatives of different nationalities in Latvia. The conductors of the study believe that this is related with the proficiency level of the official language of these employees. Lower level of the official language reduces work productivity. An employee who does not know the official language at all is forced to accept any job offered by the employer for any specified wage (Darba algas un ..., 2006).

The survey data of the study "Language Situation in Latvia: 2016-2020" (2021) indicate an increase in the number of the Latvian language speakers in various population groups whose native language is not Latvian: in 1989, only 23% on average of members of ethnic minorities knew Latvian, while this number has risen to about 90% in 2019 and has been relatively constant over the latest ten years. Younger generation has higher self-assessment of the Latvian language skills (Valodas situacija Latvija..., 2021).

Erasmus+ funded study "Skills Required in the Labour Market: Opportunities to Use Information from Job Advertisements to Identify Skills Required by the Labour Market" (2018) indicates that the main skills of an employee required in job advertisements in Latvia and Estonia include specific personality-related skills, character traits, followed by language skills and previous work experience.

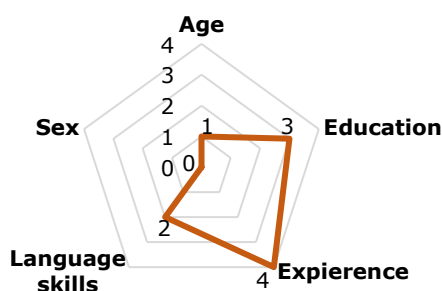
2. Assessment of factors impacting work remuneration

The research authors base their identification of the factors impacting work remuneration and, thus, state social insurance benefits on the scientific literature and studies done by the Ministry of Welfare. In the course of the research, seven experts were invited: two of them were chief accountants, two were representatives of the State Revenue Service: chief tax inspectors who deal with payroll tax issues. Three experts specialising in calculation of unemployment benefits and sick-leave benefits represented the State Social Insurance Agency departments of Valmiera, Daugavpils and Jelgava. The identity of the experts is not disclosed for confidentiality reasons and at the request of the experts.

After the evaluation of the factors identified in the structured survey and application of the paired method, the experts marked the factor that was superior to the other. The results of the expert survey questionnaires based on the questions of the paired methods are summarised in the form of a matrix (Fig. 2) determining the importance of each factor.

Factors impacting work remuneration are classified into two groups:

- 1) personality-related factors of an employee (experience, education, age, sex and language skills);
- 2) factors characterising workplace (region, industry, size of the company).



Source: authors' construction based on the structured survey of the experts (n=7) and the paired method

Fig. 2. Evaluation of the personality-related factors of an employee impacting work remuneration

Experts have assessed an employee's experience as the most important factor related with the employee's personality followed by the employee's level of education (Fig. 2).

Table 1

Average monthly gross wages and salaries by levels of education in Latvia for the period 2010-2018, EUR

Level of education	2010	2014	2018	Changes 2018/2010, %
Doctor's degree	1394	1934	1994	43.04
Academic education (Bachelor's, Master's degree) or professional, or second level professional higher education	907	1169	1566	72.66
First level professional higher education (college)	674	912	1222	81.31
Vocational education after general or vocational secondary education	538	707	967	79.74
Secondary education	518	681	956	84.56
Vocational education with pedagogical correction	...	665	896	-
Second stage of basic education (primary school education)	464	640	889	91.59
Without school education or lower than primary school education	400	564	815	103.75

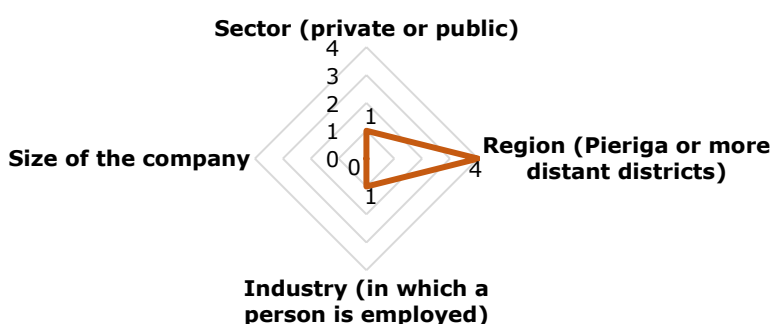
Source: authors' construction based on the data of the Official Statistics Portal, 2022

Statistical data indicating that employees with a higher level of education receive higher salaries also confirm the impact of an employee's level of education on work remuneration (Table 1).

The comparison of changes in average monthly gross wages and salaries (2018 vs 2010) show that employees with a doctor's degree have the lowest increase in salaries. Unfortunately, the data for the year 2018 are the latest available data on monthly average gross wage broken down by the levels of education.

Experts have ranked language skills in the third position, followed by the age of an employee. The analysis of the survey results leads to the conclusion that experts do not consider the issue of gender to be important and they believe that this factor has no influence on the wage or salary.

Nowadays, when there are so many problems with attracting qualified labour force, the employer highly values the employee's experience and accumulated knowledge. The practical work experience of the present research authors also confirms the importance of above-mentioned skills in determining work remuneration.



Source: authors' construction based on the structured survey of the experts (n=7) and the paired method

Fig. 3. Evaluation of the workplace characteristic factors impacting work remuneration

Experts distinguish the influence of the region as the main factor when evaluating the impact of the workplace on wage or salary (Fig. 3). Statistical data also confirm the impact of the region on wages and salaries. According to the statistics, employees in Riga region receive higher wages and salaries followed by Pieriga region, while the lowest wages and salaries are received in Latgale region. The comparison of wages and salaries in Riga region and Latgale region reveals that employees in Riga region receive significantly more, for example, in 2021, the difference was EUR 538 or 1.6 times (Table 2). This means that, in general, the residents of Riga region are better socially protected than the residents of Latgale region. Moreover, the increase rate does not indicate on the improvement of the situation.

Table 2

Average monthly gross wages and salaries in the regions of Latvia within 2017 and 2021, EUR

Region	Average monthly gross wages and salaries, EUR					Chain increase rate, %			
	2017	2018	2019	2020	2021	2018	2019	2020	2021
Riga	1044	1129	1206	1276	1434	8.14	6.82	5.80	12.38
Pieriga	871	949	1028	1108	1225	8.96	8.32	7.78	10.56
Vidzeme	739	803	860	914	1010	8.66	7.10	6.28	10.50
Kurzeme	775	858	922	971	1085	10.71	7.46	5.31	11.74
Zemgale	786	848	915	971	1089	7.89	7.90	6.12	12.15
Latgale	640	701	751	793	896	9.53	7.13	5.59	12.99
Latvia	926	1004	1076	1143	1277	8.42	7.17	6.23	11.72

Source: authors' construction based on the data of the Official Statistics Portal, 2022

The fastest increase in monthly wages and salaries of employees in all regions of Latvia was reported in 2021 due to the increase in the minimum wage.

According to the experts, the industry and the sector are the next important factors impacting wages and salaries.

Statistical data show that work remuneration in the public sector has exceeded work remuneration in the private sector; however, the differences in wages and salaries are small and tend to decrease. The data confirm that the type of activity sector influences the level of wages and salaries (Stradajoso menesa videja., 2022).

The research results confirm that the company size does not have a decisive impact on the level of wages and salaries.

Conclusions, proposals, recommendations

- 1) The amount of state social insurance benefits in Latvia depends on a person's wage or salary subject to social insurance contributions or the size of wage or salary.
- 2) The research results confirm that work experience, education and region are among the most important factors having an impact on wages and salaries and, hence, on the amount of state social insurance benefits.
- 3) Wages and salaries evidence a tendency to increase in all regions of Latvia during the analysed period. The highest wages and salaries are received by those working in Riga region, while the lowest ones are paid in Latgale region. In 2021, the work remuneration in Riga region was EUR 538 or 1.6 times higher than in Latgale region, which creates significant differences in the amount of social insurance benefits.
- 4) It is recommended for the State Employment Agency to continue to organise various training courses and educational programmes, especially in Latgale region, to increase the qualifications of employees, since education is one of the main factors influencing wages and salaries as well as the amount of social insurance benefits.

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CHARITABLE ACTIVITIES OF ECONOMIC ENTITIES DURING THE PERIOD OF MARTIAL LAW IN UKRAINE: ESSENCE AND REGULATORY AND ACCOUNTING ASPECTS

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Abstract. The full-scale invasion of Russia on the territory of Ukraine caused a significant need for additional resources, which began to come from foreign countries, international partners, and from the Ukrainians themselves. The purpose of the study is to develop a method of accounting for charity donations to the Armed Forces of Ukraine and to substantiate recommendations regarding their accounting display by business entities. The task of the article is to reveal of the content and research of the normative and legal framework for the regulation of charity activities, characteristics of the current system of accounting for charity expenses, with the aim of identifying problematic issues in the conditions of martial law. The forms of charity (volunteer, humanitarian, philanthropic) are characterized and the types (charitable donation, charitable grants, public collection of charitable donations, charitable servitudes and charitable endowments) and methods of charity activity are substantiated. The characteristic features of charitable assistance are substantiated: voluntariness, selflessness, purposeful activity. The need to regulate certain provisions and clarify the terminological apparatus in the field of charitable activities at the level of current legislation is substantiated. It is proposed to clarify the legislative definition of the content of the category "charitable activity (charity)" and introduce additions to the legislative documents of the terms "charitable assistance", "humanitarian activity", "patron", "patronage assistance". The revenues of the consolidated state budget of Ukraine in the period from 2014, from the beginning of the occupation of certain territories of Ukraine by the Russian Federation, until now have been analysed. Problematic aspects of the accounting of charitable assistance provided by business entities for the needs of the army are identified and the relevance of solving this methodological issue is substantiated. The obligation to document charitable donations for the benefit of the army with standard forms of documents and the Act of acceptance and transfer of humanitarian (charitable) aid is substantiated, which will confirm the fact of providing charitable aid, ensure the legitimacy of the operations carried out and reduce abuses in this area. The main accounting stages of the provision of charitable assistance are highlighted. The practical value of the study lies in the development of proposals regarding the accounting system for charitable donations to the Armed Forces of Ukraine, which will contribute to reducing the risks of erosion of the tax base by business entities, as well as increasing the level of information provision for stakeholders at various levels of management.

Key words: charitable activity, charitable assistance, documentation, accounting.

JEL code: M41

Introduction

Since the declaration of martial law in Ukraine, the charitable sector has become an important area of activity for business entities and ordinary citizens. The data of the State Statistical Service of Ukraine confirm the growth of charitable activity and new directions of its functioning. In order to replenish additional resources of the Armed Forces of Ukraine, business entities transfer resources to ensure the country's defense capability. This causes the emergence of a number of "unusual" economic transactions in the activities of enterprises and has become the subject of research by many foreign and domestic scientists. Thus, Xin Huang, Koichi Nakagawa and Jie Li (2019), investigating the role of charity of small and medium-sized enterprises (SMEs) in China, note that the companies that belong to high-tech industries

donate less to charity than those from other industries, since these high-tech firms are more willing to invest in product research and development rather than corporate philanthropic activity; the enterprises with high debt ratio inactively engage in charitable giving, as they may only have a small amount of cash; the firms that actively engage in innovation are also likely to participate in charitable activities, because they can gain competitive advantages from both of these activities. Salama A. Mostafa, Aida Mustapha, Palaniappan Shamala, Omar Ibrahim Obaid and Bashar Ahmed Khalaf (2020) suggest using mobile apps for organizing and facilitating charitable and voluntary works in Malaysia. The idea of the project appeared to provide a participatory service. On the one hand, it attracts entrepreneurs and associations by giving them the opportunity to identify themselves, the area of their interest, their latest activities, and announcing their needs. On the other hand, it attracts volunteers and donors by helping them reach and search for associations and volunteer opportunities appropriate to their skills, interests, time and places. All can be done using an application, both running to the link between these agencies. Nina Boberg-Fazlic and Paul Sharp (2013) examine the relationship between public spending and charity. The authors characterize a novel way of testing the 'crowding out hypothesis', making use of the fact that welfare provision under the Old Poor Laws was decided on the parish level, thus giving the heterogeneity we need to test for the impact of different levels of welfare support within a single country. Hudz A. O. (2019) analyses the normative and legal regulation of charitable activities and notes the use of various terms along with the concept of charity (charitable activity): patronage, volunteering, sponsorship, humanitarian aid, etc., which are called differently: forms, types, means of charity; makes proposals to enshrine in the Law of Ukraine "On Charitable Activities and Charitable Organizations" a separate article with a list of forms of charitable activity. Nasibova O.V. (2020) considers charity as a source of financial resources for social protection of the population. The author stipulates that the crisis trends in the socio-economic sphere prompt a rethinking of the role of the functioning of civil society institutions and cause the need to create favourable conditions for the revival and development of forms and methods of charity of various organizations, public associations and individuals, which in their activities complement the state socially protective function, and in some cases, fully compensate for the role of the state in the implementation of social measures. Sivak O. B. (2014) claims that the manager's decision to provide charitable assistance causes difficulties for the accountant when reflecting these transactions in accounting accounts. A significant number of scientific studies by scientists and their own publications (Gutsalenko, Marchuk, Hutsalenko & Tsaruk, 2020; Podolianchuk, Plakhtii & Gudzenko, 2019; Lovinska, Ozeran, Korshykova, 2022) confirm the importance of proper organization of accounting in the activities of business entities and the management system at the micro and macro levels. Paying tribute to the scientific achievements of scientists, it should be noted that most of them relate to the legal regulation of charitable activity and its social orientation, only in some studies the problems of accounting for charity at the level of economic entities are singled out. Therefore, the issue of accounting for charitable donations in wartime conditions is currently relevant. The study is aimed at the development and formation of specific proposals for business entities regarding the accounting of charitable donations for the needs of the army, which will contribute to the efficiency of assessing their condition and controlling movement at the micro and macro levels. A toolkit of scientific research methods was used to reveal general trends and accounting problems related to charitable activities. Methods of theoretical generalization and comparison were used to reveal the essence and content of charitable activity as an economic category. To identify the forms, types and methods of providing the benefit the abstract-logical method served as effective help. An economic-statistical method was used to estimate the revenues of the consolidated state budget of Ukraine for 2014-2022, and a graphic method was used to visualize the results of the study. In order to assess the

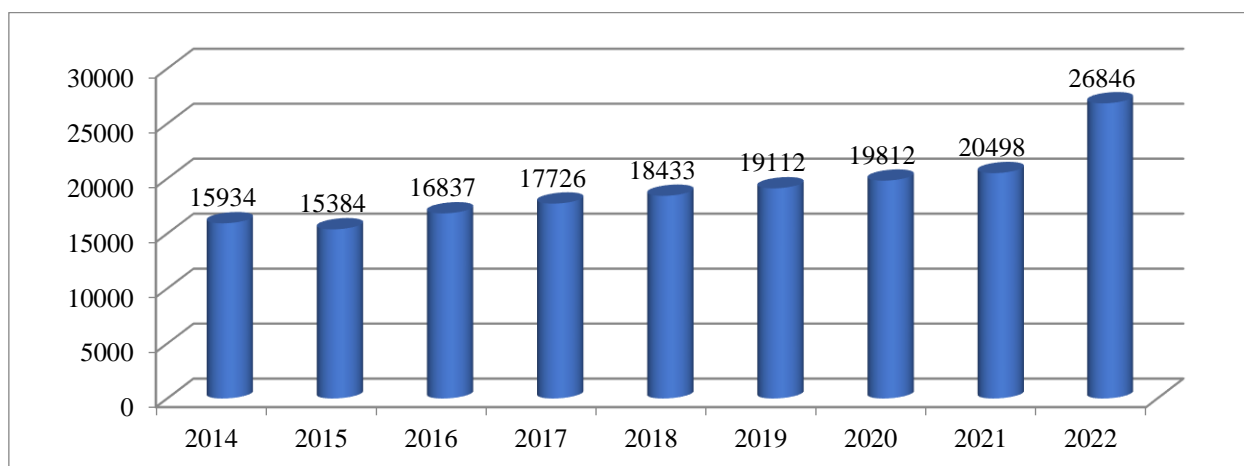
current state of charitable aid accounting by business entities, methods of complex and systematic approaches were used. The abstract-logical method and the concretization method were used to make proposals for improving the accounting system for charitable donations in wartime conditions.

Research results and discussion

In scientific literature and legislation, various terms are used to describe charity. This is due to the characteristic in a wide range of its manifestations: starting from the support of individuals (or their groups), continuing with volunteering, patronage, providing humanitarian aid and many others.

The idea of charity changed along with the evolutionary development of social relations. Under the influence of political, ideological, legal, economic, and social factors, the transformation of organizational forms, principles, mechanisms, directions, technologies, social priorities, and results of charitable activities took place (Nasibova, 2020).

The Russian Federation's aggression against Ukraine continues to have devastating consequences for the entire democratic world. The phenomenal resilience of the Ukrainian people has influenced the growth of the number of charitable organizations (Fig. 1), whose activities are aimed at supporting military personnel and people who have moved from areas of active hostilities and providing for their basic household needs.



Source: compiled by the authors based on "The number of active economic entities" (2022)

Fig. 1. Dynamics of the number of charitable organizations of Ukraine for 2014-2022, number

It is also worth noting that in recent years, Ukraine has taken top positions in the charity rating. Thus, according to research by the British charitable organization CAF (Charities Aid Foundation) in the World Giving Index - World Giving Index 2022, Ukraine rose to 10th place and became the only European country in the top ten (Ukraine is among the top 10 most generous countries in the world, 2022).

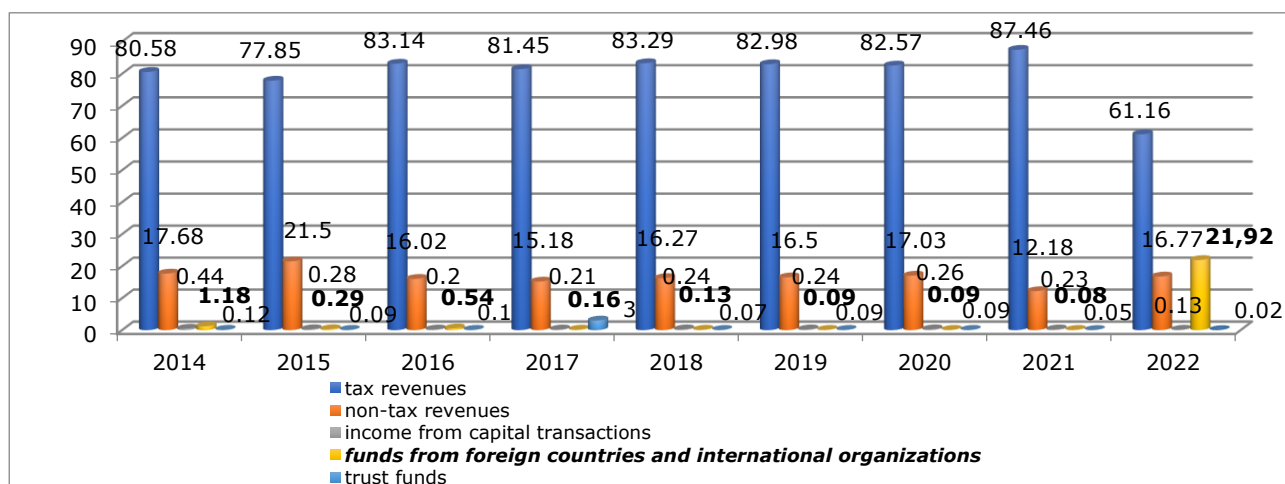
According to the Ukrainian Forum of Benefactors, the sources of financing the activities of charitable organizations are contributions from participants and founders, international and national grants, donations of individuals and legal entities, income from targeted state programs, and others (Ukrainian forum of benefactors. Statistics, 2022). Analysing the revenues of the consolidated state budget of Ukraine for the period 2014-2022 (Fig. 2), it shows the support of Western countries, including the United States of America and the member states of the European Union.

The legislation of Ukraine defines that the promotion of the defense capability and mobilization readiness of the country, the protection of the population in emergency situations of peace and war is one of the spheres of charitable activity (Law of Ukraine "On charitable activities and charitable organizations", 2012).

At the same time, the norms of the Law of Ukraine "On the Armed Forces of Ukraine" (2012) determine the possibility of financing the Armed Forces of Ukraine at the expense of charitable donations of individuals and legal entities in accordance with the procedure determined by the Cabinet of Ministers of Ukraine (Resolution of the Cabinet of Ministers of Ukraine "The procedure for financial provision of the needs of the national defense of the state, mobilization training, mobilization activities and the Armed Forces at the expense of charitable donations of individuals and legal entities", 2015).

It follows from the above that the charitable assistance of the Armed Forces of Ukraine is carried out in the form of charitable donations - the free transfer by the benefactor of funds, other property, property rights to the ownership of the beneficiaries in order to achieve certain, predetermined goals of charitable activity, in accordance with the Law "On Charitable Activities and Charitable Organizations" (Law of Ukraine "On charitable activities and charitable organizations", 2012).

According to the research by the Kiel Institute for the World Economy, the total amount of aid to Ukraine transferred by the governments of various countries as of November 20, 2022 is EUR 108,006.0 million: financial – EUR 53,377.2 million, humanitarian – EUR 16,760.9 million, military – EUR 37,868.0 million (Support of Ukraine in the world, 2022).



Source: compiled by the authors based on "Revenues of the consolidated state budget of Ukraine" (2022)

Fig. 2. Revenues of the consolidated state budget of Ukraine, %

When studying and characterizing the normative regulation of the field of charity, first of all, it is worth paying attention to the effect of the Laws of Ukraine, which determine the content, form and types of charitable activities: About the Red Cross Society of Ukraine (2002), About charitable activities and charitable organizations (2012), About volunteer activities (2011), On Humanitarian Aid (2022).

Analysing the normative regulation of the field of charity in Ukraine, we can come to the conclusion that the terms defined in the legislative base characterize the forms, types and varieties of charity, although no regulatory document contains the definition of "charity" and this wording is equated with charitable activity. There are gaps in the legislation regarding the forms, types and varieties of charitable activities, the legislator does not attach particular importance to the content and expediency of using these terms.

Having carried out the analysis of scientific publications, a conclusion follows regarding the lack of a unified approach to the list of forms and types of charitable activity among scientists. According to scientists, charity, volunteerism, patronage can act in two guises - as a form and type of charity (Serbyn, 2016).

The above-grounded studies confirm the need to regulate certain provisions and define terms in the field of charitable activities (Table 1).

Table 1

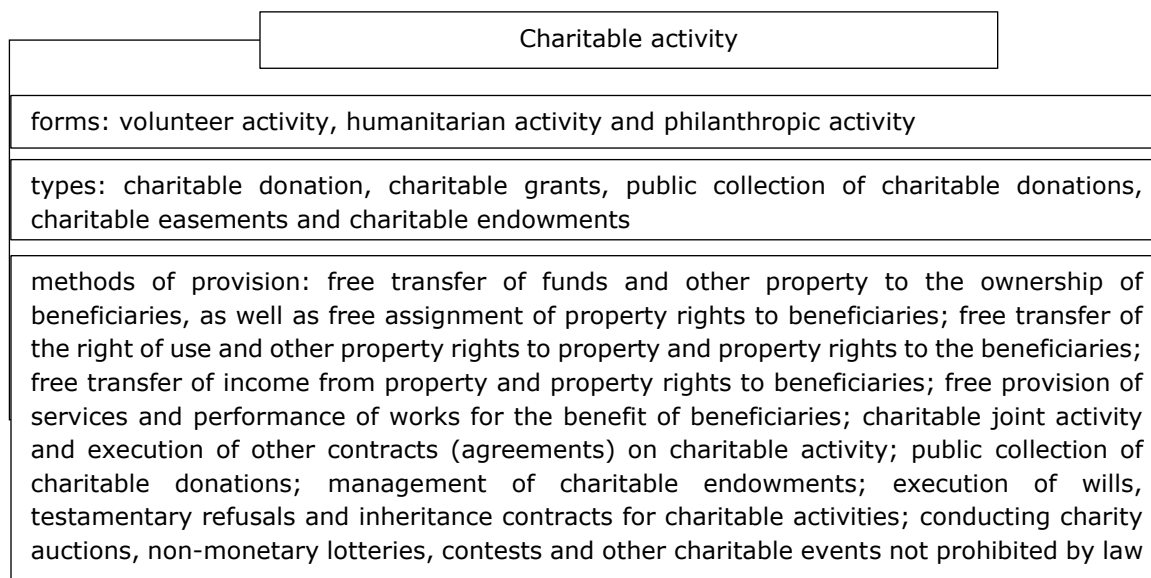
Normative and legal regulation of charitable activities and proposals for making changes in the terminological apparatus

Regulatory document	Definition	Offers
About the Red Cross Society of Ukraine: Law of Ukraine dated November 28, 2002 No. 330-IV	Charitable, charitable activity is an activity related to providing help and support to those who need it, based on universal principles of humanity and mutual assistance, which is carried out exclusively selflessly (without the goal of obtaining profit or other benefit).	<p>to clarify the legal definition:</p> <p>Charitable activity (charity) is a one-time or systematic participation of a benefactor in the provision of property (financial) assistance or the provision of services, the performance of other works to achieve the goals of charity defined by law, which does not involve the benefactor receiving a profit, as well as the payment of any remuneration or compensation to the benefactor on behalf of or on behalf of the beneficiary.</p>
On charitable activities and charitable organizations: Law of Ukraine dated 07/05/2012 No. 5073-VI	Charitable activity is voluntary personal or property assistance for the achievement of defined charitable goals, which does not involve the benefactor receiving a profit, as well as the payment of any reward or compensation to the benefactor on behalf of or on behalf of the beneficiary; philanthropic activity - charitable activity in the fields of education, physical culture and sports, culture and art, protection of cultural heritage, science and scientific research, which is carried out in the manner determined by this Law and other laws of Ukraine.	<p>to clarify the legal definition:</p> <p>Charitable activity (charity) is a one-time or systematic participation of a benefactor in the provision of property (financial) assistance or the provision of services, the performance of other works to achieve the goals of charity defined by law, which does not involve the benefactor receiving a profit, as well as the payment of any remuneration or compensation to the benefactor on behalf of or on behalf of the beneficiary.</p> <p>to make an addition:</p> <p>Charitable assistance - free property (financial) assistance, performance of works and services in the field of charity for the benefit of its recipients; patron - an able-bodied natural person or legal entity under private law (including charitable organization) that carries out philanthropic activities; philanthropic assistance - resource support for the development of culture, art, education, protection of cultural heritage, sports.</p>
On volunteering: Law of Ukraine dated April 19, 2011 No. 3236-VI	Volunteer activity - voluntary, socially oriented, non-profit activity carried out by volunteers through the provision of volunteer assistance; volunteer assistance - work and services performed and provided by volunteers free of charge.	
On humanitarian aid: Law of Ukraine dated October 22, 1999 No 1192-XIV	Humanitarian aid - targeted free aid in monetary or in-kind form, in the form of irrevocable financial aid or voluntary donations, or aid in the form of work, provision of services provided by foreign and domestic donors for humanitarian reasons to recipients of humanitarian aid in Ukraine or abroad, who need it in connection with social insecurity, material insecurity, a difficult financial situation, the emergence of a state of emergency, in particular as a result of a natural disaster, accidents, epidemics and epizootics, environmental, man-made and other disasters that pose a threat to the life and health of the population, or serious illness of specific individuals, as well as for preparation for armed defense of the state and its defense in the event of armed aggression or armed conflict.	<p>to make an addition:</p> <p>Humanitarian activity is a non-profit activity of legal entities registered in the Unified Register of Humanitarian Aid Recipients in accordance with the procedure established by the Cabinet of Ministers of Ukraine, related to the receipt of humanitarian aid and redistribution among its recipients to achieve the goals defined by the law.</p>

Source: summarized by the authors

Taking into account the results of the conducted research, it is possible to single out the main characteristic features of charitable assistance: voluntariness, selflessness, targeted purpose.

Taking into account the norms of the current legislation and the opinions of scientists, we believe that the forms, types and methods of providing charitable assistance are gaining new importance (Fig. 3).



Source: author's interpretation

Fig. 3. Forms, types and methods of providing charitable assistance

The main goal of charitable activities is to provide assistance to promote the legitimate interests of beneficiaries in the areas of charitable activities, as well as the development and support of these areas in the public interest (Law of Ukraine "On charitable activities and charitable organizations", 2012).

Thus, business entities - legal entities can directly provide charitable assistance to the Armed Forces, which include units, military units, military educational institutions, institutions and organizations, and which are entered in the Register of Non-Profit Institutions and Organizations. If a military organization is not included in the Register, the company cannot provide such assistance to it directly, but only through a charitable organization.

Charitable donations of the Armed Forces can be made both in cash and in kind, in particular from charitable organizations, legal entities and individuals, territorial communities. These donations in the form of charitable contributions, grants and gifts belong to the first subgroup of the second group of own revenues of budget institutions. The use of such funds is clearly regulated by the Budget Code of Ukraine to cover expenses related to the organization and provision of services provided by budget institutions in accordance with their main activity (Law of Ukraine "Budget Code of Ukraine", 2010).

Also, enterprises, institutions, organizations are obliged to provide buildings, structures, transport and other material and technical means during mobilization to the Armed Forces of Ukraine, other military formations, the Operational Rescue Service of Civil Defense in accordance with mobilization plans, with subsequent reimbursement of their cost in order, established by legislation (Law of Ukraine "On mobilization training and mobilization", 1993).

It is worth noting that in March 2022, the Government established that the requirements established by law regarding the receipt, use, accounting and reporting of charitable assistance from legal and natural persons - residents and non-residents do not apply in the conditions of martial law (Decree of the Cabinet of Ministers of Ukraine " Some issues of receipt, use, accounting and reporting of charitable assistance", 2022). We believe that this norm cannot be implemented in practice. After all, the norms of the current tax legislation determine the obligation to display the receivers of charitable assistance in separate forms of financial reporting (Balance sheet – separate funds (goods, works, services) received as

charitable assistance, Profit and loss statements – separately the value of the received charitable assistance). In the appendix to the annual report, the necessary explanations are made regarding the specified indicators of activities related to charitable assistance (Law of Ukraine "Tax Code of Ukraine", 2010).

A. Voloshenko rightly points out that "in the case of a charitable donation of funds, the flow of funds from the benefactor to the beneficiary is carried out through financial institutions, which simplifies state financial and public control, at the same time, the ability to control the receipt and expenditure of charitable donations in kind depends from the effective organization of accounting, in particular accounting..." (Voloshenko, 2022).

Therefore, properly organized accounting will affect the possibility of applying tax benefits in terms of taxation with value added tax, excise tax and income tax, and will also ensure control of the intended use of the provided property and reduce abuses in this area. The accounting aspect of charity by business entities is that it is a one-time or systematic action to provide charitable assistance to those who need it, in our study of AFU.

The primary actions of the enterprise are the adoption of a decision on the charitable donation of the Armed Forces as a type of charitable assistance, and its normative confirmation in the management document (order) of the manager. The content of this document will depend on whether it is an independent voluntary decision, or whether it is assistance at the request of an individual or a non-profit organization that has beneficiary rights. It is appropriate to provide in the order what kind of assistance will be provided and in what form (in money or property).

All the facts of the transfer of money or property to the army must be recorded in primary documents, which will confirm the legitimacy of the operations being carried out.

If the company transfers funds to a special account, then, of course, the documents confirming such charitable assistance are a payment order and a bank statement. If it will be a transfer of funds to a charitable organization, then a cooperation agreement and letters of request certifying the transfer of targeted assistance are also necessary documents.

When transferring objects of fixed assets or material assets to the army, it is necessary to take into account: whether it is a voluntary transfer - when the enterprise itself is the initiator; whether it is alienation or removal - according to the decision of the military command, taking into account the norms of the Law of Ukraine "On Transfer, Forced in alienation or seizure of property under the legal regime of martial law or state of emergency" dated 17.05.2012 No. 4765-VI (Law of Ukraine "On the transfer, forced alienation or seizure of property under the legal regime of martial law or state of emergency", 2012). The difference between expropriation and expropriation is that during expropriation private or communal property is expropriated, and during expropriation - state property without compensation of value. The difference between expropriation and voluntary transfer is that as a result of the former, the possibility of returning the seized property or the possibility of compensation for its value is assumed. Thus, alienation or removal with compensation for the value of the property or subsequent return cannot be considered as charitable assistance.

When transferring objects of fixed assets or material assets to the army, it is necessary to take into account: whether it is a voluntary transfer - when the enterprise itself is the initiator; whether it is alienation or confiscation - according to the decision of the military command, taking into account the provisions of the Law of Ukraine "On the transfer, forced alienation or confiscation of property under the legal regime of martial law or a state of emergency" dated 17.05.2012 No. 4765-VI (Law of Ukraine "On the transfer, forced alienation or seizure of property under the legal regime of martial law or state of emergency", 2012).

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Along with the formation of standard forms of primary documents, the transfer of charitable aid should be accompanied by the formation of the Act of acceptance and transfer of humanitarian (charitable) aid, which is currently used by charitable organizations. This document must be signed by both parties: the head of the enterprise on the one hand; a representative of a military unit, military formation, relevant unit, institution or organization for the needs of ensuring the defense of Ukraine, to whom charitable assistance is transferred from another party. The formation and written certification by both parties of this document is necessary to confirm the fact of transfer and receipt of assistance, and will also provide an opportunity to prove to the tax authorities the targeted direction of expenses related to the transfer of property or commodity values.

According to national regulations (standards) of accounting, charity expenses are expenses of the enterprise and two sub-accounts are provided in the system of accounts: 949 "Other expenses of operational activity" and 977 "Other expenses of activity". However, today there are no clear recommendations on the methodology of accounting for expenses related to charity (including charitable donations, as a type of charitable assistance, in various ways of providing (in cash or material assets)). The question remains open and the accounting system does not ensure the objectivity of information in the reporting of enterprises. In particular, in Form 2 "Report on financial results (Report on total income)" in article 2180 "Other operating expenses" other expenses arising in the course of the company's operational activities are reflected (except for expenses that are included in the cost of products, goods, works, services), and in Article 2270 "Other expenses" - other expenses arising in the course of economic activity (except financial expenses), but not related to the operational activities of enterprises. Thus, charity expenses can be attributed to each of the specified items.

We believe that in order to solve the problem of the researched issue, it is necessary to develop recommendations regarding the method of accounting and generalization of information about charity in reporting. After all, the reporting of a business entity is the main source of information support for management decisions at different levels of management.

In the conditions of martial law, it is extremely important to look at the information support of management decisions at the state level. In addition, the role of information about the government's activities, which reflects the use of state resources, the problem of filling the budget, the dynamics of the state debt, and is the basis of policy formation, primarily aimed at the economic stabilization of the state (Lovinska, Ozeran & Korshykova, 2022), is growing.

The proposed methodical approaches to accounting for charity expenses (Table 2) will influence the increase in objectivity and reliability of information on the implementation of such transactions.

Table 2

Methods of accounting for charity expenses

No	Operations	Correspondence of accounts	
		debit	credit
1.	The money was transferred as a charitable donation	377	311
	Expenses have been recognized as part of the transferred funds	949	377
2.	Goods and material values were transferred as a charitable donation	377	20,26, 28
	Expenses are recognized as part of the value of the transferred goods and material values	949	377
3.	An object of fixed assets was transferred as a charitable donation:		
	the residual (balance sheet) value is written off	377	10
	depreciation is written off	13	10
	expenses are recognized as part of the residual value	976	377
4.	Charitable expenses are included in the financial result of the activity	79	949, 976

Source: substantiated by the authors

The proposed correspondence of accounts does not contradict the requirements of accounting regulations. We believe that in the system of accounts, operations related to charitable assistance should be reflected using expense accounts in the correspondence of accounts for settlements with recipients of charitable assistance (subaccount 377 "Settlements with other debtors"). Also, the separation of charity expenses into two sub-accounts will increase the informativeness of accounting in terms of transferred objects (current or non-current assets). We believe that under the conditions of martial law, the transfer of the object of fixed assets to the composition of non-current assets held for sale (subaccount 286) is inappropriate, because the company does not plan the sale of objects of fixed assets. It is mandatory to detail the accounts of the analytical accounting of the operations carried out in terms of expenses, transferred objects and recipients of charitable assistance. The submitted proposals allow to expand the indicators of financial reporting in the part of the enterprise's provision of charitable assistance, will provide an opportunity to summarize at the level of statistical data information about the transferred objects for the army.

Conclusions

Therefore, the accounting of the provision of charitable assistance to the Armed Forces, regardless of those who provides it, must include the following mandatory stages: the 1st stage – formation of an internal normative document on the provision of a charitable donation; the 2nd stage – documenting the facts of the free transfer of a charitable donation; the 3rd stage – display of the content of economic transactions on accounting accounts; the 4th stage – taking into account the norms of tax legislation for taxation purposes; the 5th stage – summarization of information in the forms of financial and tax reporting.

According to the results of the conducted research, it can be concluded that charitable activities are gradually developing. However, a number of issues remain unresolved: the absence of a unified approach to the interpretation of the concept of "charitable activity (charity)" in regulatory and legislative documents; presence of gaps in the terminological apparatus of the sphere of charitable activity; ambiguity in defining the forms, types and methods of providing charitable assistance; lack of methodology for accounting operations of charitable assistance to the army.

The proposed method of accounting for charitable assistance of the Armed Forces of Ukraine will strengthen the informativeness of accounting and allow to expand the indicators of financial reporting in order to make reasonable management decisions at the level of the economic entity and the state.

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INSTITUTIONAL GOVERNANCE OF BIOMASS IN RELATION TO GLOBAL HEALTH AMONG FARMERS IN MADAGASCAR

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Abstract. In order to ensure its livelihoods, as many other all over the world, the population of Madagascar is increasing the pressure on resources, and in particular, on local biomass. This study examines how institutions are acting in the governance of biomass regarding to its potential impacts on global health. Thirty semi-structured interviews and twelve focus groups involving farmers and local institutional leaders were conducted in two disparate Communes near the capital Antananarivo. The purpose of these discussions was to gather information linking global health to the life of agrarian communities. As achievement of the methodological deployment, a mapping of institutions was set, showing the coexistence in the Malagasy highlands of traditional institutions: the household (*ankohonana*), the community (*fokonolona*) and the state (*fanjakana*), and new ones: the decentralised collectivity or Commune, religious communities and private enterprises or firms. Households, even though as mostly agrarian, are the most active in the production, consumption and transfer of biomass. However, their decision-making aptitude on biomass governance can be influenced by the authority of the state as a provider of public policies or by the holders of financial means as firms that favour certain productions over others. The activities of the interacting institutions maintain the power relations between them more than they preserve the regenerative capacity of biomass, the main source of well-being for agrarian societies.

Key words: smallholder farms, territory, well-being, authority, Malagasy highlands.

JEL code: I14; I31; Q15; O17

Introduction

The agrarian world has long been a reference in the socio-economic field for inspiring the study of resources and the understanding of organisations (Kalinowski, 2001). Its major role in the supply of food and raw materials has increased the interest in agricultural products as resources (Mazoyer and Roudart, 2002). Agricultural, forestry, wildlife, medicinal plants, fuelwood and other materials are central resources for food security and human health, but they mainly provide livelihoods for smallholder farms. The awareness that the issue of health, especially human health, is strongly threatened by various dimensions that go beyond the boundaries of the medical discipline has led to a consideration of global health (Koplan et al., 2009). Furthermore, the observation of the link between human health and that of animals or the ecosystem in general has led scientists to consider health as a whole (Rock et al., 2009). However, despite this integrated consideration of health, humans are still primarily responsible for the decrease in biomass, which is defined as the matter that makes active living organisms. While farmed animals account for 96% of the mammals in the animal kingdom and cultivated plants account for only 2% of the biomass in the plant kingdom, these two forms of biomass have declined by seven times less and by half, respectively, since the human era (Bar-on et al., 2018). In this growing human interest in satisfying biomass needs, the products of agriculture, woody plantations and livestock have become an issue of power and influence in the so-called hegemonic countries over the past millennium (Daviron, 2020).

In the Malagasy context, in one of the poorest countries according to UNDP indicators (Razafindrakoto et al., 2017), biomass has also been a power issue in the Malagasy highlands for the last two centuries. In Madagascar, biodiversity losses in vertebrate and in plant biomass are among the highest in the world (Sun et al., 2022). They are caused by both land-use and consumption patterns, which are largely made up of local biomass (agricultural, predation or gathering products). Whatever its origin,

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spontaneous or produced, biomass fate implies the responsibility of the human, through its actions or decisions. However, behind the term human, questions may arise about the degree of direct involvement of the individual and the degree of involvement of the institutions in which he or she is embedded. An institution is a set of rules that facilitate human interactions in a rational manner (Herath, 2005). In Madagascar, particularly in the highlands, institutional life has been organised at different levels since the 19th century through: the *ankohonana*, translated as the household; the *fokonolona* or community, which designates a group of people originally united by ancestry relationship, in this case associating with the extended family; the *Fanjakana* or State, established at the national level, which designates the central power governing all territories (Condominas, 1960). These different institutions can simultaneously exert their influence on the whole community and territory within the Communes, considered as an elementary unit to be assimilable to a socio-ecological system (Ostrom, 2009) in the framework of this study. Acemoglu and Robinson (2012) associate the failure of a nation with institutional weakness, particularly in Third World countries (Herath, 2005). The failure is assumed to be applicable to the national management of biomass. However, given the multiplicity of institutions likely to have an impact on the physical environment at the scale of a territory, it is not easy to specify the responsibility of each of them for this failure.

The problem we propose to address is related to its potential impacts on global health: How do institutions act in the governance of biomass production, access, use and reproduction? The aim of the study is to determine the level of responsibility of institutions with regard to the governance of biomass and its impacts on the preservation of global health. Two main hypotheses are associated with the central question. The first hypothesis assumes that the biomass is governed by the institution that is most involved in its management. The second hypothesis suggests that the diversity of institutions allows for a balance of overall health by mutually preserving the biomass. In order to verify the hypotheses in the context of the Malagasy highlands, which are still largely dominated by agricultural life, and where the purpose of the agrarian system revolves around biomass, two methods were developed:

- semi-structured interviews (number: 30): conducted towards resource persons, identified locally as people with responsibilities within an institution or whose concerns and activities relate to biomass or global health: Representatives of the Commune or Municipality (02), Chiefs of *Fokontany* (06 official chiefs of villages), members/leaders of farmers' associations (05), civil servant responsible of resource policy (01), community-based agents (04), chiefs of health centre (03), veterinary agents (02), community elders including a responsible in a religious community (06), and manager at confessional school (01);
- focus group discussion: carried out in 12 fokontany, each focus group was bringing each a maximum of 15 individuals including resource persons, chief of household previously surveyed (communitarian survey accompanying the interviews, hereafter called survey 2022).

The two Communes of the highlands chosen in the study have contrasting socio-ecological statuses: urban in the case of Arivonimamo and rural in Behenjy (Table 1).

The information collected through the focus group meetings as well as that provided by individual interviews with resource persons linked to local forms of institution feed the study database. From this database, a governance analysis model was developed in three successive steps:

- the first step is to identify the different institutions, as well as the different types of authority that accompany them (state or public etc.);
- the second step, raises the functional interest of the institutions by establishing the activities of the institutions with the ecological elements of the Commune, in particular with regard to biomass;

- finally, the third step focuses on identifying how the decision-making centre of each institution impacts on global health, taking into account the phenomena that contribute to its deterioration or to its preservation.

Table 1

Characteristics of the Communes of Arivonimamo and Behenjy

Socio-demographic indicators	Arivonimamo	Behenjy
Geographical coordinates	19°00'573"S 47°10'59"E	19°12'46"S 47°28'56"E
Status of the municipality	Urban	Rural
Number of <i>Fokontany</i> (Municipality's subdivision)	13	22
Population density (inhabitants/km ²)	411	142
People that refers to conventional health professionals	62%	53%
Number of hospital beds	30	0
Access to regular sanitation device (clean water)	65%	3%
Use of fuelwood as energy source	98%	100%

Source: *communitarian survey that accompanied interviews led by authors*

Research results and discussion

1. Multiple institutions coexist in a predominant agrarian-based community

During the interviews and group discussions, the traditional institutions that have existed for two centuries were mentioned, with some variability with regard to the *fokonolona*, whose structure is still recognised, but whose official functions have been integrated among the tasks of the staff of the *Fokontany*, the basic territorial unit where the central state power is established. New institutions are also growing alongside the old ones: the Commune or Municipality that represents the decentralised power, the religious community and the private/civil organisations or enterprises.

1.1. Traditional institutions have been existing since royal era

1.1.1. Ankohonana, the basic institution of society

The *ankohonana* refers to all individuals living under the same roof and sharing the same meals. It refers to the nuclear family, but can also include relatives who are temporarily away and are regularly supplied with food. It is established in 84% of cases through the institution of marriage. Monogamous marriage is established between a man and a woman, from two different families, 80% of whom are native to the studied localities. The couple forms the household and runs an agricultural farm in 87% of cases (surveys 2022). They share responsibilities and work inside the smallholder farm (SF) established by pooling their inheritances (if any) and their own resources: land, agricultural equipment, livestock, know-how, etc. A SF ensures both the production and consumption of goods derived from biomass as well as other related activities related to extraction (extraction of inert [abiotic] or living resources [from gathering and hunting]) or to small-scale transformation in order to generate, in particular, fiduciary income. The household defends the same interest, which is to ensure the subsistence of all members, even those who are far away, and even the descendants of children who are not yet emancipated (married but not independent in terms of farming or unmarried).

1.1.2. Fokonolona, the local community

The notion of *fokonolona* has evolved from its original conception to its current consideration. By its structure, a *fokonolona* is not anymore necessarily composed by native families linked by ancestry

relationship. Nowadays, it has extended to the whole community, including established migrants. Descendants among the diaspora who are living far away from their natal place may also be considered as members of the *fokonolona*. Through its functions, the *fokonolona* was intended to ensure social cohesion and to govern human interactions. Even though it has no formal status, the *fokonolona* has a moral value for the communities, particularly in terms of respect for elders, policing of resources and initiation of mutual aid. In its current configuration, the *fokonolona* automatically gathers the entire population, but each community organises itself the governance way at its own convenience.

1.1.3. *Fanjakana « masi-mandidy » or the state holding full power*

The *fanjakana* brings together all forms of institutional representation of central power at the country level down to the grassroots level. It is keen to govern as closely as possible to the population, so successive rulers have sought to establish the *fokonolona* as an official state institution. Since its consolidation by the King Andrianampoinimerina as a mode of organisation of the ramifications of royal power in the Imerina (former kingdom of the central highlands) at the beginning of the 19th century, forms of local aggregation have been exploited as means of conveying the policy of central power to the population (Condominas, 1960). Then, since the colonial rulers at the beginning of the 20th century, the *Fokontany* or the territorial space occupied by the *fokonolona*, has been set up as the basis for administrative divisions. The participants in the focus groups agreed that the State holds the prerogative as having the greatest notoriety among all existing institutions. The Head of the *Fokontany* is chosen by the *Fanjakana* from among the proposals of the *fokonolona*. The *Fanjakana*, which holds the public administration implements its authority, from the national to the village level, via the regional level. The constitution of the Fourth Malagasy Republic of 2010 confirmed this state hierarchy: the Central Government, the Province, the Region, the District, the Arrondissements, the *Fokontany*. At all levels, each branch of the State is endowed with designated public authority, except the Head of State, the President that is elected by universal suffrage.

1.2. Recently established institutions for human, economic or territorial development purposes

1.2.1. *Commune, as a decentralised authority*

Having had a vague outline during the period of royalty, the cantons, which became *Firaisam-pokontany* and thereafter Communes during the second part of the 20th century, were circumscribed by the colonial administration at the beginning of the 20th century (Rakoto Ramiarantsoa, 1995). In the absence of a faithful application of the constitution, the current decentralised authorities are only established at the level of the Communes where the mayors elected by universal suffrage have the primary role of contributing to economic, social, cultural and environmental development within their territorial circumscription. The mayor's office hosts the deconcentrated administrative and technical services, which are attached upstream to the regional directorates of the public ministries and downstream to the heads of the *Fokontany*. The Commune, a public institution, ensures the regalian functions of the State, in particular the regulation of citizen life through public services and the provision of common welfare facilities. In order to do this, it mobilises fees and taxes collected from the population and from certain institutions: taxes on profits (levied on private enterprises - especially trade), operating permits fees (private industrial enterprises), taxes on assets (households), taxes on traded products (farms), provision of services (all citizens), fees on administrative authorisations (religious community).

1.2.2. *Private enterprise as the only self-initiated institution*

Private enterprises have been established by their owners or members to serve essentially their own purposes. The financial issue remains crucial for them because the accumulation of funds, the constitution

of a profit, is the guarantee to perpetuate their entrepreneurial activities. It is notably thanks to the financial tool that such an entity can support activities that are out of their regular own duties (support for public schools, granting of safety nets, and participation in the social fund of the Communes during national or end-of-year celebrations) or environmental activities that are not profit-oriented. Some private firms (kept anonymous) from the capital Antananarivo have chosen the Commune of Behenjy for the Corporate Social Responsibility (CSR) programmes they undertake, mainly in reforestation activities. In the Commune of Arivonimamo, incentive of the diaspora advises an industrial farm producing chicks and chicken to set up there. Such establishments benefit both study sites by providing temporary or permanent work to the local population. Private companies working in the agricultural sector are also present. They mainly offer market opportunities for agricultural products (green beans, strawberries) and livestock (foie gras) instead of direct job.

1.2.3. Religious community, discreet in the concern for global health

Religious communities are meant to support and/or to regulate the spiritual life, and even to extend their ethics in their interpersonal relations of the faithful members with the rest of the community. However, as inserted in national structures, religious communities, in the Christian case, have a development section, similar to a non-governmental organization that is active in supporting communities. In our case study, a congregation of Catholic sisters in Arivonimamo maintains a vegetable garden that is set as a showcase of organic farming to provide food for their own consumption needs. The congregation also sells to the public phytotherapeutic products developed by their community (ointment, cream based on essential oils) and other small-scale products (soap, wine) to enable financial supplies to some of its members.

2. Activities of institutions towards biomass are maintaining mutual interactions between them

The set of the encountered institutions is as much represented in the urban as in the rural Commune. With regard to biomass governance, interaction differs from one institution to another and at different intensities (Table 2).

In terms of objectives, *ankohonana* or households have the most direct contact with biomass compared to other institutions. In both urban and rural areas, smallholder farms are the majority of the households that compose the population. The interaction of the household with the *fokonolona* extends beyond the personal links induced by family belonging. Their exploited resources, such as land (for cropping and livestock purposes), are adjacent to each other. Use of its own resource necessarily interferes to those of other ones. Community management and rules permit to individualise the resources specific to each household. Access to common areas such as pastureland or groves whose undergrowth provides ecological services to the communities (fuelwood, gathered products) is also regulated within the interaction between *ankohonana* and *fokonolona*.

Household interaction with the state administration is rare in terms of support for crop and livestock production. Despite communal bylaws that require agricultural production for sale to be subject to rebates or fees, farmers do not necessarily do so in practice, especially when it concern local sales. Land taxes are the most important tribute that the *ankohonana* has to pay to the state. In return for these various financial contributions, the *ankohonana* that were present at the focus group discussions deplore the fact that the state's responsibility does not meet their expectations. Knowledge that past development projects convey does not last, even among the beneficiary actors. As example, the ASA AVOTRA MIRINDRA, a national state programme in the area of capacity building for agricultural enterprises (agricultural advice, rural employment) has trained about organic biopesticides. When questioned, some of whom were present at a

meeting in Behenja were beneficiaries of the project but they had difficulty to remind the technological innovation. Moreover, in the Commune of Arivonimamo, the State is gradually organising the management transfer of the remnants natural tapia forest to the local grassroots communities (*fokonolona*). However, the head of the forestry cantonment admits that despite this, it is difficult to enforce the law, particularly to make the police role effective in the face of the poaching that continues by exploiting the tapia for charcoal.

Besides, in the context of contracts for the sale of agricultural production, the *ankohonana* must pay for the inputs that the private companies provide. So that the production they buy can meet the standards that the firms want. Regardless of the hazards encountered during the cropping season, the farms directly receive the difference between the gross product and the value of these subsidies. The most beneficial interaction from private enterprises for households is the opportunity to acquire gainful employment (preferably stable or permanent). Private companies are involved in CSR initiatives through reforestation activities or charitable works for the benefit of the Communal area where they are located or active. However, participants in the focus group discussions were unable to define the tenure of the land on which such afforestations are established, or the fate of the newly planted trees.

Table 2

Institutional architecture of biomass activities according to global health elements

Links to global health	<i>Ankohonana</i> (household)	<i>Fokonolona</i> (Community)	<i>Fanjakana</i> (Sttat)	Commune	Religious community	Private enterprise
Human health	Productive activity (food and commercial) Purchase or collection of consumer goods: food, phytotherapy, energy	Income activity: occasional sale of family groves	Health authority Project leader: - FAFY (health and nutrition of mothers and children) - ASA AVOTRA MIRINDRA: agricultural advice service	Community service through support to the Basic Health Centre	Solidarity networks Production and marketing of phytotherapeutic products	Care for employees whose health deteriorates or who are taken off sick
Animal health	Animal husbandry: feeding and care using local remedies	Community grazing and watering places regulation	Authority mandating veterinary activity	Raising awareness of cattle vaccination		Veterinary professional
Plant health	Technical route, gardening		Agricultural policies and afforestation Development project	Integration of gardening lessons and practices in public schools	Creation of an organic orchard and vegetable garden showcase	Commercial professional: Sale of pesticides, fertilizers, seeds
Ecosystem health	Mining of the fertility of the ecological environmen: water, wood, mineral elements in the soil	Bushfire police	Environmental policy Role in resource regulation	Community reforestation according to land availability Protection of natural resources		Private reforestation activity in the framework of corporate social responsibility

Sources: interviews and focus group discussions animated by the authors

As far as public institutions are concerned, their contribution lies in establishing National Policies and ensuring their implementation for the State, and Communal Development Plans for the Communes. At the national level, the State can provide incentives or support for biomass production, such as making tree seedlings available to citizens who wish to plant trees as part of the national reforestation policy; and

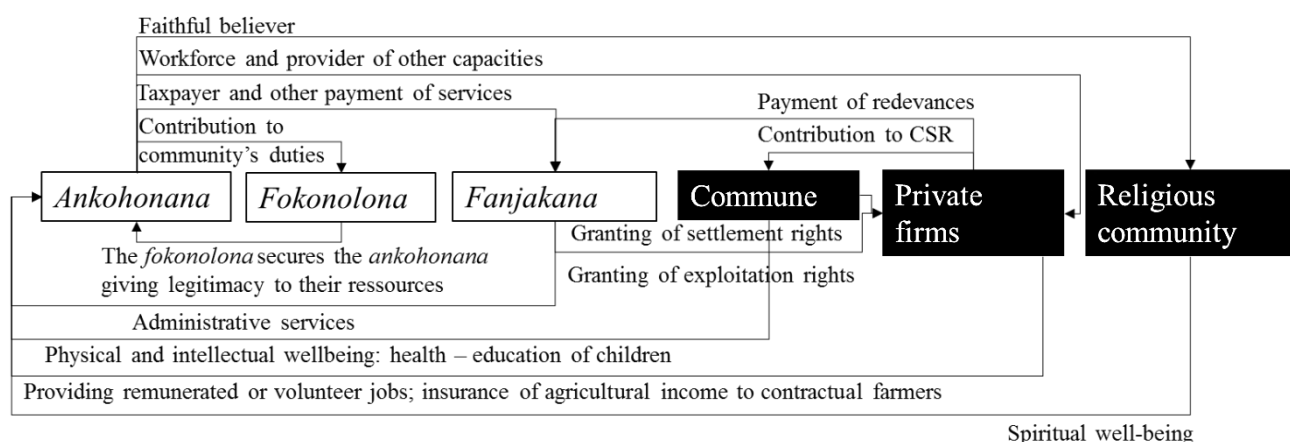
conducting development projects to strengthen the capacity of farms to produce. Depending on the financial capacities of the Communes, support for productive activities, mainly agricultural, within the local authority can only be engaged once the fixed costs related to the wages of employees of the Communes and related services are settled. Thus, as the slogan of the Commune of Behenjy team indicates, "the Mayor is open to all forms of partnership". That means that the Commune welcome any partnerships that may directly contribute to finance productive and security aspects of development. In the same Commune, handcrafters that were unified as SF inside associations that make handmade objects from vegetable fiber were outraged by the attitude of some central government officials. Instead of considering their request for help and support to struggle the lack of markets, the visiting state representatives blamed them for not making enough effort to produce sisal, the basic raw material for most of the local handicraft product lines.

Finally, not all religious communities contribute in the direct concern of biomass governance within the study areas. The specific activities in selling "natural" products create interactions with the local population, the *ankohonana*, who buy their products and sometimes provide them with raw material. Occasionally, discerning visitors can buy products at factory prices by taking advantage of a short marketing circuit. These locally branded products are exported and are known elsewhere, in the Capital city. As such, the religious community maintains solidarity-based interactions between its members.

3. Influence of the centre of decision-making centres within institutions

3.1. Decision-making centre and limit of influence of institutions

The institutions coexisting in the Malagasy highlands are interconnected throughout their mutual activities or duties (Figure 1). The State has the largest scope because the activities of all other institutions, exception to the *fokonolona* case, must be approved by its territorial branches. According to the participants in the discussions, the rules and directives established by the State remain sovereign despite the power of the decentralised authorities represented by the Communes, whose mayors and councillors are elected. These directives derive from the general policy of the State, executed by the government, appointed by the elected President. According to the testimony of a councillor of the Mayor of Arivonimamo, it is common that due to the lack of political cohesion between the state regime or *fanjakana* in place and the mayor of the Commune, decisions taken by the latter may be scuttled upstream by the District, which oversees it, or by the Heads of *Fokontany* downstream, who are supposed to implement them.



CSR: Corporate Social Responsibility

Sources : interviews and focus group discussions animated by the authors

Fig. 1. Intersections between the spheres of institutions coexisting in the Malagasy highlands

Within the *ankohonana*, the decision belongs to the "*teny ierana*" or the compromise of the couple when the parents are both present in the household. Decisions about the farming system and income-generating activities are taken, as well as the allocation of consumption expenses. Among these concerns where joint decisions are taken are those relating to health: human health (particularly the distribution of tasks), domestic animal health (daily care and eventual treatment), and the health of cultivated plants.

Although the elders have a privileged status within the *fokonolona*, decisions are taken by majority vote by a collegial leadership, through small committees representative of society, in case the whole community cannot be gathered together in a plenary assembly. In the Commune of Arivonimamo, committees composed of representatives of the local authorities (Head of the *Fokontany*), elders, and vigorous young men called mobile sentinels are established to discuss about security, environmental, or socio-economic concern at village level. In the Commune of Behenjy, places called "*kianja maitso*" have been established for the entire population of a village, where they have to attend regular assemblies to discuss similar issues than cited in Arivonimamo. In this pseudo-family structure of the *fokonolona*, which as in the past is keen to preserve social cohesion, authority belongs to the elders of the extended families who majoritarily represent them.

The centre of decision-making varies according to the religious communities. In particular, decision-making follows a top-down path for the Catholic Church, based on the recommendations of the Holy Father, the Pope at the Vatican, or according to the congregations of the Sisters or Brothers who work there. The latter carry out the appropriate assignments. The bottom-up path is applied for the Protestant community (local Calvinist, or Lutheran) where the general assembly (gathering faithful confirmed to take the Lord's Supper) makes the decisions that the church office carries out with the help of all the faithful members. However, the church leaders maintain moral authority for spiritual concern as part of human spiritual health.

In the case of private firms operating in the study Communes, which are of medium to small size, decisions are made by the owners, or the board of directors or members (in the case of non-profit associations). The decision to take part in CSR-related activities belongs to the managers of the companies, but they often result from commitments made when the factory was set up, in consultation with the host commune. The *fokonolona* deplores the fact that, at present, the socio-ecological damage likely to degrade health inside industrial site (employee's health) and outside (pollution from sludge and smoke), particularly in Behenjy, where they recycle metals or waste oil, is not accompanied by clear control and compensation measures. They call for the vigilance of the Commune and the advice of the researchers who conducted the current study.

3.2. Power relations between institutions, reducing the ability of agrarian households to govern over biomass

Although the decision-making centres within each institution are well defined, the forms of authority or prominence that individuals within institutions may have can influence decisions taken within them or against other institutions.

The *ankohonana* and the community or *fokonolona* take advantage of their proximity to the land to act directly on the biomass according to the resources at their disposal and conformingly or not to the global regulations established by the *Fanjakana*. Besides, the forms of support they receive can influence their decision: orienting production towards certain vegetables rather than others; protecting the *tapia* forest in accordance with the State regulations or contributing to plant fast-growing and invasive trees because of

the free status of plants or seedlings, even though they likely may compete with the native species to be protected (Kull et al., 2005).

Although the *Fokonolona* is not considered as an official institution in the constitution, its legitimacy among the *ankohonana* as well as among public authorities (*Fanjakana* or Commune) has no doubt. According to our observations, elders sit in the governance of the Commune as councillors or even as Mayor. In non-isolated cases, the Heads of *Fokontany* succeed each other from one extended family in particular, with handovers from father to son, with the endorsement of the *Fanjakana* and the consent of the Community. In exceptional cases, members of the Diaspora may also have responsibilities within the national structures of the State. These diaspora may, under the instinct of accountability, act in favour of their community of origin in development actions. This form of notoriety that certain "privileged" members of the *Fokonolona* display results either from respect for the caste hierarchy established since the royal era, or from recognition of the charisma of these elders in maintaining social peace.

Private firms that mobilise civil society or private investors do not have any authority. Instead, they use the financial means they manage to establish a kind of reputation to influence other institutions. By making inputs available to farm households, companies in charge to collect agricultural products push those who contract with them to allocate some of their own resources to produce the commodities the companies want. Similarly, through actions linked to CSR, private firms manage to occupy part of the community's land, with the approval of the decentralised authority. Even though the scope of action of these resource holders is limited (sectoral and spatio-temporal) and often timely, they are still very much solicited by the communities. The financial potentiality of firms attracts households' interests to which monetary resources was revealed by the focus group discussion as the limiting factor in the preservation of health in the study area. The financial limitations currently prevent them from ensuring subsistence agricultural production, which is exposed to the stresses of severe water deficiency, favouring the proliferation of plant pests (army worms) and certain animal diseases (undiagnosed vomiting in cattle species). The *ankohonana*, whose land resources are also limited as a result of generational inheritance games, are forced to look for more remunerative work in other sectors of activity: industrial, artisanal or trading. The financial income generated by these extra-agricultural activities helps to compensate for self-consumption on the farm. The state of food insufficiency degrades both human and animal health, while nutrient deficiency weakens crops.

Conclusions, propositions, recommendations

- 1) Whatever the status of the Communes, rural or urban, smallholder farms represent the majority of households or *ankohonana* among the population established as a community or *fokonolona* in the Malagasy highlands. Although they have control over the actual mobilisation of resources for productive purposes, their productive activities may be influenced by other institutions, notably the state, *Fanjakana*, and private enterprises. The first hypothesis is refuted insofar as the governance of biomass does not belong entirely to the one who manages it the most, i.e. the *ankohonana*. It is influenced by those with authoritarian or financial power.
- 2) Although they are not exempt from responsibility for biomass governance, the household bears most of the damage to overall health (disease, environmental hazards) in their interactions with other institutions. Interactions where the biomass status is beneficial to them exist but only evolve on a small scale, notably with religious communities or during short development projects. The second hypothesis is therefore invalidated because the balance of power maintains an institutional equilibrium in the agrarian-dominated area, but not a biomass equilibrium on which the global health of households in

particular depends. The situation highlights a lack of coordination between institutions that may help to appropriately manage a critical resource as biomass (Heikkila et al., 2011).

3) The difficulty of mobilising some actors was noticed during the focus group discussion. A lack of cohesion is therefore assumed in some communities. Actually, the associative life of exclusively farmer-based actors such as cooperatives does not endure despite the initiative of volunteers who take on the role of leaders, unlike the *fokonolona*, which regulates issues of the agrarian commons. However, productive interactions are still possible in the face of a common challenge between institutions with divergent interests (Andriamihaja et al., 2021). In order to work in diversity and at all scales, the proposal of Gupta et al. (2010) against current environmental uncertainties could be applied to global health concerns. To do this, institutions need to strengthen their capacity for learning, leadership and equitable governance of available resource. Coordination of all institutions implicated to the use of resources that satisfy fundamental needs (Gérard et al., 2022) is necessary.

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THE SPATIALITY OF CITIZENSHIP: A GOOD CITIZEN AND THE STATE

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Abstract. Although the concept of citizenship is usually linked to the state, societal processes (globalisation, migration, societal challenges (e.g., ecology), technological developments etc.) are forcing a reconsideration of this assumption. These new factors also affect the normative aspects of citizenship: what does it mean to be a good citizen in this new reality? This article focuses on the relationship between citizenship and space and whether and how these social processes change people's attitudes toward the role of the nation-state.

Based on in-depth interviews with Latvian citizens conducted in 2022, it can be concluded that the state is still the primary reference point for citizens when thinking about citizenship, civic duties, and virtues, but the aforementioned societal processes are changing the perception: technological developments make it possible to be a good citizen in several countries at the same time; globalisation makes it possible to get to know and accept diversity, even if global and national interests (and therefore the responsibilities of a good citizen) conflict (e.g. ecological and demographic issues). Latvia's population has also been affected by the transformation of the country's territory - the collapse of the USSR and accession to the European Union - which has had an impact on the sense of belonging and the perception of which countries are "close" and which are "distant." However, as in theoretical debates, this study shows that the nation-state continues to dominate the understanding of citizenship; rights, responsibilities, and political activities are all discussed in the context of the state.

Key words: citizenship, a good citizen, state, development of society, Latvia.

JEL code: P49

Introduction

In describing the development of society, attention must be paid to the impact of international social processes on the state, its institutions, and its citizens: how globalisation, migration, technological development, and the need to deal with environmental problems affect the understanding of political actors - citizens, their rights, duties, virtues, and activities.

It should be noted that the understanding of citizenship is a multifaceted term, but one of its essential attributes is its connection to a territory, most often a state (Walker N., 2020). However, considering the societal processes already mentioned, this connection is being reconsidered. For example, globalisation and migration are forcing a reassessment of belonging to one country, analysing how citizens see the possibility of being good citizens in several countries, how these processes are influenced by technological developments (and whether they reduce the connection to one country at all). In this context, it is reconsidered whether the territory to which they feel a sense of belonging and obligation is still a country and not a larger (or, on the contrary, a smaller) territory. The study of citizenship's relationship to the state also examines how the perception of citizens' duties is being changed by contemporary problems, which no longer can be solved by the activities of citizens of a single country.

The situation in Latvia is also influenced by political transformations that have taken place in the recent past (the collapse of the USSR leading to the restoration of Latvia's independence and accession to the European Union).

However, it is acknowledged that theoretical insights and people's views on what is going on may differ; therefore, to judge the public mood, it is necessary to know the thinking patterns of people themselves (especially as the topic is not often discussed in everyday life).

This article draws on the results of in-depth interviews conducted in 2022 with residents of Latvia, which addressed several themes related to the perception of a "good citizen" (30 persons aged 19-83 were

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interviewed in the first wave, 28 of them in the second wave. Several of the interviewees had migration experience themselves). In the first interview, interviewees were asked to describe their general perceptions of citizenship, being a good citizen, and their personal experiences. In the second interview, targeted questions were asked about the relationship between different societal processes and perceptions of good citizenship: globalisation (cosmopolitan citizen), migration (can migrants be good citizens, what is the relationship with the "old" and "new" state), digital citizens - is it possible to be a good citizen or a citizen at all on the internet, without being tied to a state), how people see the responsibilities of a good citizen concerning environmental and climate change.

Research results and discussion

It must be emphasised that this is qualitative research data - people's statements from in-depth interviews. To judge the situation in the country as a whole, a representative study would be needed to assess the strength of a citizen's perception of the state and how he or she sees his or her rights and obligations as a citizen.

Linking citizenship to the state

As already mentioned, in the classical understanding, citizenship refers to a formal relationship between a person and a nation-state, a notion of membership and being a member of a political community, formalised by documents (such as a passport) and most often obtained at birth (Hintz A., Dencik L., Wahl-Jorgensen K., 2019)

A brief description of citizenship is most commonly understood as a relationship between an individual and the state, where the individual shows loyalty to the state and receives its protection (Deth, Van J. W., 2008), distinguishing between behavioural, attitudinal, and normative aspects.

Delanty (1997) pointed out that citizenship implies membership in a political community and is defined by rights, responsibilities, participation, and identity. Traditionally, it has been subordinated to nationality, which determines the territorial limits of citizenship.

However, it also points to problems that arise from citizenship's close association with state divisions and exclusion (Smith W., 2019).

In the research conducted, a close connection with the state is observed: when asked to spontaneously describe what they understand by citizenship, the answers mention the state in various aspects (it should be noted here, however, that in Latvian the term "state" does not emphasize political structures, state administration - it can also be understood more broadly). Interviewees refer to both legal belonging (passport as a formal proof of citizenship) and the rights guaranteed by the state, as well as obligations towards the state and living in the state.

A citizen of a country who has obligations and some responsibility towards his country, that's the first thing that comes to mind. (Jana, 34 y.o.)

A citizen is a resident of a country and a member of a state, and someone who belongs to a particular country. By nationality or simply - living in that country or - well, yes, that's where the questions start. (Ilze, 52 y.o.)

A citizen is a resident of a country - I would say a state, because citizenship is already with the state - which has all the constitutional rights and, I would say, obligations. (Iveta, 59 y.o.)

A citizen who has been granted nationality in a certain country can enjoy the rights of a citizen. (Santa, 48 y.o.)

However, the opposite logic also emerged in the interviews - the community (people) form the state, territoriality is not mentioned at all.

A national is a person constituting a certain state. A state cannot exist without the people. A citizen is a person who participates in the creation and transformation of a state. And this, by which we can also say who is this state. (Andrejs, 24 y.o.)

In addition, in the view of what it means to be a good citizen, the connection to the state - the fulfilment of civic duties (typically, voting in elections) - appears most often, but also more broadly - not only political participation, but also attitudes towards the environment and care for the image of the country.

A good citizen is one who has an active life position, again if he considers and exercises his duty to vote, but might also want to participate in all sorts of other movements that support the state. Well, for example, sorting the rubbish, helping other people, being conscientious - buying a ticket every time you get on transport. Law-abiding. Supporting your fellow human beings. (Iveta, 59 y.o.)

There is a person who creates the image of this country in such a way that future generations of this country will be grateful to him. (Andrejs, 24 y.o.)

State and other territorial formations

In describing the link between citizenship and territory, it has been pointed out that the nation-state is by no means the only territorial formation to which citizenship can be linked. Delanty (1997) stresses that citizenship should be seen as multi-layered and can exist at regional, national, and supranational (for example, European) levels. Stokke (2017) also distinguishes between local, national, and global/international levels when analysing the territorial attachment of citizenship.

The territorial focus of citizenship changes in the processes of globalisation, internationalisation, and transnationalisation, which affect the autonomy of the nation-state and its capacity to confer rights.

Transnational and cosmopolitan forms of citizenship shift focus further away from the nation-state, responding to the role of transnational communities, global civil society, and international law. International agreements and institutions increasingly influence rights and responsibilities, leading to the emergence of transnational citizenship laws (Hintz A., Dencik L., & Wahl-Jorgensen K., 2019).

Without formal recognition, transnational citizenship remains speculative and aspirational (aspirational), but it points to a multiplicity of affiliations that interact with and potentially glue (superseding) the nation-state.

It has been pointed out that in the context of European integration, a new form of citizenship is gradually emerging since the Maastricht Treaty, but it is very unclear whether it will be an alternative to national citizenship or merely a derivative of it (Lister M. & Pia E., 2008)

Delanty (1997) also points out that supranational or transnational citizenship, such as that associated with European citizenship, is true post-national citizenship, and is therefore based on criteria different from national citizenship; for example, one of these criteria is residence rather than birth or consanguinity. It is pointed out that there is a possibility of developing a "cosmopolitan citizenship" or a "world citizenship" world citizenship' based on human rights. Such citizenship would not be territorially specific but would be based on universal personal rights.

However, it is recognised that global citizenship reduces other dimensions of citizenship (responsibility, participation, and identity) to a formal set of basic rights. Thus, Delanty (1997) stressed that European citizenship can become a formal form of citizenship.

The attitudes of the Latvian citizens interviewed for the study are not unambiguous when it comes to supranational/cosmopolitan citizens. It should be noted that the spontaneous perceptions of citizens and

good citizens do not show a connection on a global scale. In some cases, a good citizen is associated with concern for the environment and nature protection, but this concern for the whole world does not appear. There is also the view that it is age-related—as one sees the world, one's view of the reference point for citizenship - the country or the world - may change, but it may differ - some people start to feel a sense of belonging to one country, while others start to see more broadly.

When asked to comment on this topic, several viewed the term 'world citizen' with irony, and the lack of attachment to a country was seen as a disadvantage rather than an advantage or was viewed neutrally.

Many people already say, 'I am a citizen of the world.' Well, I do not know if people understand what they mean when they say. They probably think that is what he is, he is not very interested in politics. Wherever he goes, there he stays, there he does or does not do something... He buys a ticket, but there's nothing for him there - [as the poem says] "I have no homeland, no home, no heart that loves me..." (Marija, 80 y.o.)

Is it an absolute citizen of the world? This extreme, I think, is rare. A human being, by nature, must have some kind of attraction. However, now, a citizen of the world can never be a good citizen of a country. Rather, they are guests everywhere. Guests and takers everywhere. (Ina, 59 y.o.)

That is the main idea that you are American. But now globalisation—it is that citizenship remains less important too, I think, yes. Ten years ago, I did not see many Indians or black people. Today, I do not even notice them. They are just part of society, and the more globalised it seems to me, the more nobody will notice anything and you will not care what passport you have. The main thing is to be a good citizen of the world. (Georgijs, 29 y.o.)

I think that this view of a world citizen is healthy because he is much more open to the world. More understanding, looking, and empathetic in a way. He is more interested in what is going on in the world than in what is going on with himself. However, it is also important to get your own country in order at the beginning and to ensure that everything is good here. (...) A global citizen of the world, of course, he knows several languages, he already has that, so he can also communicate with other citizens of the world and keep up with other events. (Ruta, 25 y.o.)

It should be noted that the interviews also revealed different understandings of what a "global citizen" is - for example, it can be a person who upholds universal values.

(...) who is not afraid to speak out and wants to defend themselves, to fight, and some situations are utterly absurd, (...) they understand that what is happening in their country is utterly wrong. I think that a citizen of the world has fought for your country to change somehow, to make different decisions, and not to uproot some other country. (Ruta, 25 y.o.)

The interviews also suggested that duties and responsibilities to the nation-state can conflict with duties and responsibilities to the planet and all the people of the world in the areas of ecology, demography, etc.

You feel that you belong to humanity or the planet at once, not to the state. This immediately determines what you prioritise in the case of conflicting interests. (...) The easiest way to illustrate this is on ecological issues, because, let us say, as a good Latvian citizen you are more interested in all that waste not polluting the Latvian environment, but as a global citizen you understand that somewhere it all has to be utilised. And if let us say, you choose Latvia as Europe's trash. Well, then, on a global scale that will be very good for many millions of people, and I am all for that. Yes, because it is a minority, and when you weigh up how many winners and how many losers, it is a good thing. (Andrejs, 24 y.o.)

However, exceptions also emerged: the interview showed a reserved attitude towards the nation-state, suggesting that cosmopolitanism could remedy several existing problems. (The impact of the Russian invasion of Ukraine should also be noted, as well as the nervous and evasive attitude of Russian speakers

in the interviews and their reluctance to talk about political issues.) It is interesting to relate this to the "subnational" citizen, where a critical attitude towards the nation-state (Diener A. C., 2020) contributes to a willingness to talk about regional citizens (the case of Narva in Estonia, for example, should be mentioned, where the border area with Russia has a high proportion of Russian-speakers and there is a critical attitude, alienation from the state (Kaiser R. B., & Nikiforova, E. A., 2008). In this case, a similar phenomenon was observed concerning support for supranational formations and citizens.

I am in favour of a European federation. I think it would be the best option if we remained citizens of the European Union and were not just several countries, but one country with one big parliament. The smaller parliaments would have to have something in their pieces. A common budget and Latvia and Romania would also remain Afghane friendly (laughs). (Georgijs, 29 y.o.)

When asked about the possibility of regional or city-level citizenship in Latvia, interviewees associated it more with local forms of patriotism than citizenship (too few people, too small a territory, etc.)

I live here, I could not go anywhere, and if I did, I would be dragged back to Riga. [Riga exactly?] Yes, Riga exactly. (Biruta, 64 y.o.)

The growing role of global organisations (UN and EU, but also corporations and NGOs), it is argued, points to transnational forms of authority that confer rights and generate responsibilities, and link institutions and people through power networks and relations (Urry J., 1999, Hintz A., Dencik L., & Wahl-Jorgensen K., 2019).

When discussing Europe as a possible substitute for the nation-state, the interviewees' opinions differed. On one hand, it was stressed that EU citizens already exist in reality, and because of the commonality of values and culture, citizens of a European country can live in another European country without any particular discomfort. On the other hand, it was stressed that EU citizens only become EU citizens if they were citizens of a national state. Governance and activities (e.g., European Parliament elections) also occur through the nation-state.

Well, when I voted in the European Parliament elections, (...) I was still somehow reconciling all this with Latvia. (Marija, 80 y.o.)

Probably [the nation-state] is important, and that is why Brexit occurred. There was some kind of rebellion against Brussels, not there, for those old-fashioned brits. They want to keep themselves somewhere (...). However, they now need their own nationals. Everyone is benefiting in some way from globalisation and unification, but everyone is also standing guard for their nationality. (Ina, 59 y.o.)

Transformations of the national territory

Given that a large part of interviewees had experienced both the collapse of the USSR and Latvia's accession to the European Union, the study also asked them to describe the transformation of the national territory - how they perceived it. It should be noted that these transformations also influence the interpretation of migration. Several informants or their parents moved from another former republic of the USSR (Ukraine, Belarus, Russia) during the USSR period, and although they recognised this as migration, it appeared more as internal migration. It should be noted that this feeling also appears in the case of Latvians, who rather describe tourism, work trips, and visiting relatives as internal movements, albeit clearly distinguishable. Nowadays, although (due to the need for visas, etc.) the countries of the former USSR are recognised as foreign countries, several speakers, recounting their own or their friends' experiences, recognise them as psychologically closer (e.g., studying in Russia, which was justified not by language skills, but also by the fact that they knew specialists in the field and wanted to be like them).

Then, you go to the east side of the border, and then you see, let us say, this dilapidated farmhouse and houses that have been left as if.. Since they were built, nobody has done anything to them. I always thought, well, how did you teach these people? I don't want here, it's not to sound like some sort of a sense of superiority about it. (Marija, 80 y.o.)

Similar attitudes emerge towards the European Union, noting that one does not need a visa and can go to study and work, but the 'foreign feeling' is more pronounced: people recognise it as leaving the country, associating certain value judgements with it (attitudes differ as to whether one can be a good citizen at all after moving to another country).

Now everything is free, go where you want. (Jeļena, 50 y.o.)

It is so hard for me to remember what it was like before - that people could not travel so peacefully, or go wherever they wanted to study... now everything is so open - you just buy a ticket and fly away. It's hard to remember those times, it wasn't like that. (Alina, 38 y.o.)

What difference does it make, listen, and whether you were in the Soviet Union or European Union? Well, I say, the only difference is that the borders are open, and you can go all over Europe and work; I do not see any difference. (Biruta, 64 y.o.)

In this respect, we should point out the formal status of citizenship: although all Latvian citizens are citizens of the European Union, their status and identification with EU citizenship are different (Walker, 2020). People were the first and foremost citizens of the national state (passports), while in the case of the USSR, USSR citizenship took precedence.

Migration

Of course, it would be interesting to analyse the impact of migration, as people spontaneously indicate that a citizen is a resident of a country (i.e., lives in that country). Movement is not only associated with a change of environment, but often with a change of status - the possibility and/or necessity to change citizenship status, thus guaranteeing oneself access to various rights (Hintz A., Dencik L., & Wahl-Jorgensen K., 2019, Smith W., 2019).

As already mentioned, several participants in the study had migration experience: the participants included descendants of Latvians who left Latvia as refugees after WWII, descendants who returned to Latvia after independence, people who moved to Latvia during the USSR and their descendants, people who have moved to Latvia to live, although their origin is not connected to Latvia, and people who have spent more than three months abroad for work or other reasons. Several interviewees had dual citizenship or no Latvian citizenship. All the interviewees lived in Latvia at the time of the study.

It should be noted that the study shows both serial migration (experience of migration (for work or personal reasons) in different countries) and transnational migration (people stay both in Latvia and abroad, where their work is located). The impact of COVID-19, which expanded the possibilities for remote working, also emerged in the interviews, but interviewees also reported living in two countries at the same time for the period before that, noting that, thanks to technological developments, the costs and time spent commuting may not be very different from those spent travelling domestically.

However, from Berlin to Riga is a one-hour forty-minute flight and perhaps even a 30-50 euro return ticket, whereas to Rezekne it is three hours and probably costs the same in petrol. The boundaries are blurred now. (Kārlis, 39 y.o.)

The ability to fulfil the duties of a citizen (e.g., to be informed, to be involved) has been expanded by technological developments, including the exchange of information and the ability to keep in touch with

relatives, which is very different from the migration experience of the past, when keeping in touch with the country of origin was difficult, costly, and often time-delayed.

However, this transnational lifestyle is more likely to be reported by people with a fixed work situation (projects and opportunities to work remotely) and without school-age children. One interviewee described his situation in which work required him to work in different countries, migrating successively to the next country, but at some point, his wife and children were forced to stay in another country because they had to finish secondary school.

Most of them, however, move altogether, although they often retain the dual nationality of their previous country. In this case, contact and awareness of the previous country vary (depending on distance, relatives, etc.). Attitudes towards the possibility of being good citizens in both countries are also ambiguous. The situation is special for people whose parents or grandparents emigrated after WWII and who actively maintained their Latvian identity abroad, several of whom indicated that civic activities were less active in their home country. However, it should be pointed out that the interviewees may have been selected because after Latvia regained its independence, they moved to Latvia permanently - it is possible that those who stayed there were more integrated into the host country's life.

Yes, it was probably easier to maintain a more cohesive society, because there were those organisations that were exiled and let us say it was a political exile because there were refugees who found themselves in a foreign environment and wanted to maintain their identity and hoped to regain the freedom of the country and so on. (Ivars, 66 y.o.)

While emphasising that leaving Latvia after WWII was more of a forced thing, even if they acquired citizenship in the country they felt more like Latvian citizens, the attitude towards those leaving Latvia now (or not returning after independence) is not unambiguous.

Therefore, the question is whether those who have remained behind are good Latvian citizens. I would say that I do not feel like a good Latvian citizen. To still live in Australia and have your society, your juice there... That's my personal opinion. However, others feel - come to Latvia now and then. Well, if they invest, let us say some people come with the idea not just to relax, but to invest - to work-to invest here. Then, you can see that Latvian citizenship is important to them. (Ilze, 52 y.o.)

Digital citizen

Within the research, citizens' connections to the territory also emerged when discussing the perception of the digital citizen. When asked whether, given the role of technology in providing a wide range of opportunities for participation and the emergence of different communities in which people from all over the world can engage, there is a possibility of opting out of the state, the interviewees were rather negative. It was stressed that the outcomes of digital activities should also be accepted by legislators (most often the state).

I try to think of this as such. I understand that they have other lives, but they still go to their local shops and walk down their local streets. She lives well in her local environment, and they still enjoy the decisions of secular authorities. They can have that virtual group there decide something and live according to the decisions of that group, but they live in their local environment anyway; they cannot influence the decisions of that local environment and legitimise their decisions. I cannot think of the mechanism by which they can legitimise that. I can see that there can be such groups, but I do not know how they can be linked to real or local power. (Iveta, 59 y.o.)

I don't think so. If these people are, for example, from different countries and continents. For the time being, for me, the citizen could be, however, about what is on the ground, on the territory real, not some

digital things. Therefore, I would not say that this community could be like Latvian citizens. (Georgijs, 29 y.o.)

Eco-citizen

One of the areas that calls for rethinking the relationship between the rights and duties of the citizen and the nation-state and its territory is the protection of the environment (Walker N., 2020, Dobson A., 2007). As already mentioned, when it comes to ecology, the duties of a good citizen towards the state and its inhabitants and the planet and its inhabitants as a whole can come into conflict. In this context, the fairness of the measures to be implemented is sometimes questioned when comparing the situation of countries at different levels of development, as the proposals often imply the preservation of a poor quality of life and restrictions on economic development. Even a significant reduction in the ecological footprint of people in developed countries can be a blow to the well-being of people in poorer countries; for example, abandoning tourism (flights) can have a tangible impact on the well-being of a region (Karlsson R., 2012).

Although ecological problems and solutions go beyond the nation-state, the need to participate in national political life is also emphasised here, as the necessary political decisions are most often taken at the national level, and avoiding civic action at the national level can hinder the desired outcome (Karlsson R., 2012).

However, the interviewees were ambivalent about caring for the environment as a civic duty. For example, the view was expressed as a human rather than a civic duty. It should be noted that when analysing civic engagement, the overlap between personal and political is one of the themes discussed when assessing who is or is not a good citizen, what their duties are - whether responsibilities at home and in the family are linked to civic virtues (Micheletti M. & Stolle D., 2012).

However, I start to associate it more with a good person [than a citizen]. If you, well, I do not know, burn forests, peat, and I do not know what else. Others cut down forests, and so on. Then it shows you more as a bad person because you're just harming nature in general, let's say, but whether that makes you a bad citizen, I don't know, [on global impact]. (Alina, 38 y.o.)

There is also ambivalence towards climate change mitigation as an individual responsibility: accusing it of focusing more on consumption than on the damage caused by production (Karlsson R., 2012). This is also reflected in the responses of the Latvian citizens interviewed.

Let us begin by explaining why I do not separate my waste. Therefore, I think it does not make a difference on a global scale. I understand, of course, that there are 8 billion people, but a large part of the population still lives there and draws water from the well and eats what it grows. In my opinion, the biggest shit comes from huge companies, factories, and companies, and until they start thinking and moving towards some kind of green energy, towards recycling, towards, I do not know, pumping oil out of there for good. All those things. When large companies can change it globally, everyone can think and try something different. (Alina, 38 y.o.)

Others point out that a good citizen can be directly linked to activities at this level, even if the impact is small, and it is the solution of problems at a local (rather than global) level that people might find more interesting.

It's about being a good citizen and small things; it's not about being a good dictator - how can you make one person change a lot? (Andrejs, 24)

I also think that if we took care of each family and each family took care of their children well within the family, then we would not have orphanages. (...) Then, from those little things, as the English says, save

those pennies, those pounds will take care of themselves. So now, all these little, small, mundane things... You see that it often happens to people that they start talking about the melting of Arctic ice. Yes, they understand it: horror, horror, there will be some sea level rise, and so on, but I think it is in those environments that we pay very little attention to maybe educating people. Yes, it's not contemporary, 'we have to talk globally, we have to talk about the planet,' if. However, maybe we should talk about not throwing away tyres and not throwing away our manure in the forest. (Marija, 80)

Conclusions, proposals, recommendations

- 1) Similar to the theoretical findings, the interviews conducted in Latvia show that the nation-state remains the basis for the territorial attachment of citizenship; both rights, obligations, and political activities are discussed in the context of the state.
- 2) Technological developments are "shrinking" the world and may change the nature of migration (e.g. nowadays it is easier to maintain both physical and emotional contact with the country of origin after moving to another country), but they do not change the connection to a physical territory: members of internet communities also need a physical territory and a national (political) solution to various problems.
- 3) Attitudes towards global citizenship and world citizenship are ambiguous. Some participants associate it with openness, universal values (including democratic values), and tolerance, while others doubt that a good global citizen can also be a good citizen of the nation-state, a member of their community, because of the possibility of divergence between nation-state and global interests (e.g., demographics and ecology).
- 4) Membership of the European Union appears as a more or less desirable factor, but being a European citizen also depends first and foremost on being a citizen of a European nation-state. However, the interviews show that other EU countries are still perceived more as foreign (in comparison, older people perceive migration within the USSR more as internal migration).
- 5) It should be noted that the study sometimes showed a lack of interest and ignorance about different aspects of citizenship and their relation to social processes, which means that public opinion about them may be unstable, changing due to certain information campaigns (Zaller J. R., 1992).
- 6) In summarising the results of the study, it should be noted that they are based on qualitative research data, and future quantitative research, which could draw on the results of this study, is needed to draw representative conclusions about the impact of educational institutions on perceptions of good citizenship among different generations of citizens.

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THE ANALYSIS OF SUPPORT MECHANISMS FOR OCCUPATIONAL MOBILITY IN THE LATVIAN ADULT EDUCATION SYSTEM

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Abstract. With increasing occupational mobility in the Western societies, where, among other drivers, economic cycles and digital transformation brought changes in labour demand, adults' access to the education system is becoming increasingly important issue. This refers both for upgrading skills and for retraining with a view to occupational change if the labour market demand for the initial occupation has declined significantly. The aim of this article is to analyse the institutional framework of the Latvian adult education and related institutions to assess what opportunities and what obstacles it creates for individuals to undergo the necessary training to enter a new occupation. Theoretically, the article is based on institutionalism theory, which explains the impact of institutions on the economic behaviour of agents, and middle-range theories on the impact of the structure of the education and labour market institutions on occupational mobility prospects. The analysis is based on a systematic examination of the legal acts and their amendments introduced in Latvia since 2009. The data suggest that Latvian institutional environment is generally favourable for occupational change, but specially targeted public policy support is aimed at the upgrading and retraining of medium- and low-skilled workforce, leaving the occupational transition of high-skilled workforce largely to their own discretion.

Key words: occupational mobility, mobility regime, labour market institutions, adult education, Latvia.

JEL code: J62, J24

Introduction

Technological advances and economic turbulences of modern Western economy reverberate in the labour market generating changes in occupational structure – the decline of some occupations and the emergence of others (Murphy, 2014). This pushes individuals towards transition between occupations in search of opportunities to maintain employment (Murphy, 2014). Indeed, intragenerational occupational mobility rates have increased around the Western world (Jarvis & Song, 2017). This process challenges existing education and labour market institutions that have been formed over time to grant stability to social life (Scott, 2008). Within this framework, one presumes that an individual performs qualified professional work based on the mastering of a certain set of skills. They are acquired through intensive training within the educational system, linking the future working life to the chosen occupation (Bol et al., 2019). As education is a guarantee of an individual's productivity (Van de Werfhorst, 2011), intention to change occupation requires an individual to return fully or partially to an initial education system that has not been supposed before. In other words, occupational mobility requires more than updating skills, which is the target of adult learning system (Saar et al., 2013). It challenges existing institutional arrangements and requires institutions to be able to support more fundamental retraining of individuals. However, there are concerns about whether institutional adjustments are progressing adequately to match changing labour market needs. This also contributes to the interest of scholars to develop various analytical tools to identify the impact of institutional arrangements on individuals' ability to perform occupational change which serves as a basis for comparative studies to determine the level of institutional support across the countries. One of the most comprehensive frameworks is proposed by the American sociologist Thomas DiPrete and colleagues (DiPrete et al., 1997).

In the 1990s, Latvia, like other post-Soviet countries that later joined the EU, underwent through extensive institutional transformations. The reorganisation was not even across various domains of social life. It affected the economy, the labour market, and the welfare system more than the education system. Moreover, the new institutional arrangements were largely based on the vision of international

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organisations (Saar et al., 2013) that led to various inconsistencies between institutions. Thus, countries had to develop higher coherence between them in the following decades. The provision of further training opportunities for adults was also among the issues to be resolved (BISS, 2020; Saar et al., 2013).

Under new circumstances, the Latvian economy has become largely dependent on developments in the global economy, accordingly, the demand for occupations is constantly changing (OECD, 2016). This in turn requires a coordinated response from the relevant authorities to support the individuals' need to adapt to changing labour market demands. Although some studies have been conducted in Latvia on the performance of the adult education system (BISS, 2020), they have not yet provided an answer on how supportive the Latvian institutions are of occupational mobility. Solving existing knowledge gap is the aim of this study.

For this purpose, the author applies the model developed by DiPrete and colleagues (DiPrete et al., 1997), answering the following research questions: (1) which occupational mobility regime is specific to Latvia, and (2) what additional characteristics are recommended to be included in the model based on the Latvian experience? The author assumes that the constant need for adaptation felt by Latvian employers and employees has created some formal or informal institutions that facilitate rather than hinder occupational mobility.

The author's research work to determine a mobility regime which is specific to Latvia is based on qualitative research method – document analysis which provides a comprehensive review of Latvian legal framework. As a most important turning point in contemporary Latvian employment and education policy took place after the economic recession, the analysis overviews the institutional arrangements and their changes since 2009. An overview includes nine laws and seven Cabinet Regulations, supplemented with empirical evidence from studies on the effectiveness of these arrangements.

Research results and discussion

1. Theoretical background

Institutions-mobility nexus. Institutions, as Scott (2008, p. 48) states, "are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life". The role of institutions is to ensure the durability and therefore predictability in any domain of society's existence which strengthens the motivation of individuals to undertake activities not only with short-term, but also long-term returns. Laws and regulations are the primary source of institutions – they shape behaviours of individuals and organizations and act as a redistributor of material resources (Scott, 2008). Meanwhile, institutions are also less formal cognitive systems that take the form of a shared logic of action (Scott, 2008, p. 51) and which may conflict with formal arrangements, thus changing their manifestations (Nee, 2005).

Formation of occupational-specific skills is an activity where the interests of two institutions – education and the labour market – overlap (Reichelt & Abraham, 2017). In modern society, learning and training, including, occupation-specific skills development, is devolved to educational institutions, while "the end product" of this process is used by the labour market. Thus, both institutions try to align their activities to achieve greater coherence of the skills with the labour market needs. However, these institutional arrangements have developed under certain conditions, thus, various cross-country variations can be observed.

First, variations manifest in the specificity or stratification of initial education (Saar et al., 2013). This refers to several features of education institutions, including the degree to which the upper secondary curriculum is adapted to the training of specific skills (general versus vocational), the opportunities of

individuals to change the chosen educational path on a later stage (path dependence of sequent education levels), the role of credentials in obtaining a job, and the organisation of school-to-work transitions (Bol et al., 2019; DiPrete et al., 1997; Saar et al., 2013). Greater coherence with the labour market is ensured by credentialism and learning embedded in the work environment (Bol et al., 2019), which, in turn, decreases level of later transitions between jobs and occupations (DiPrete et al., 1997). Here, a clear pattern is evident: once having chosen a vocational training path, individuals must make a significant effort to move on to more general or another vocational education. In contrast, with more general educational degrees, labour force has higher opportunities of being mobile across occupations (Bol et al., 2019).

Secondly, since obtaining education has required investment from both individuals and institutions, various arrangements have been created to guarantee further stability of employment relations. This, in turn, is ensured by labour market institutions such as employment regulations (regarding entry and dismissal conditions) and trade unions (DiPrete et al., 1997).

Thirdly, the employed need perpetual skill development, which, unlike initial education, is also undertaken by labour market institutions, pursuing to delegate this responsibility to employers (Cedefop, 2015; Saar et al., 2013). However, employers' investments in employees' training tend to take some specific form such as emphasis on general versus occupation-specific skills, focus on employees with certain level of qualifications or employment contract forms (Saar et al., 2013).

Further, as the employment relations can be broken due to business failures or greater economic downturn, employees may face unemployment, accordingly, welfare institutions become involved (DiPrete et al., 1997). Becoming unemployed, individuals have lost not only income from work, but also their access to training opportunities previously provided by employer. In closing this gap, public institutions are involved to a different extent. When marking these variations, the duration and extent of support for the unemployed were among the measures considered by Esping-Andersen when developing the typology of welfare states (Esping-Andersen, 1999).

The workforce skills development offered by employers and public institutions is referred to as the adult learning, but it is focused mainly on upgrading skills rather than comprehensive retraining (Cedefop, 2015). However, in an unemployment situation caused by a long-term decline in the demand for occupations, upskilling may not be a sufficient solution to re-entering the labour market, and more substantial investments in reskilling is needed.

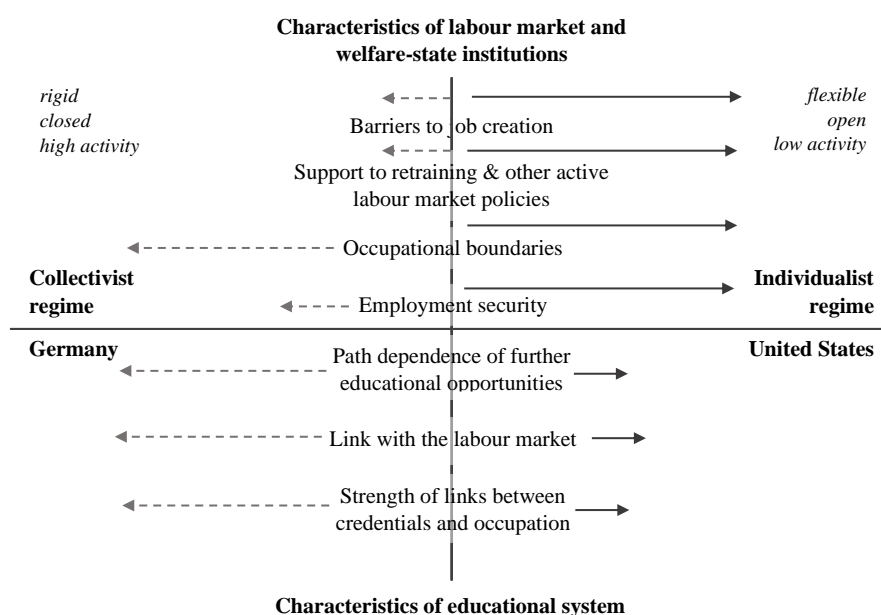
The above shows that institutions can be designed to support occupational mobility to varying degrees. Meanwhile, market processes that encourage the need to move across occupational boundaries are also increasing (DiPrete et al., 1997; Jarvis & Song, 2017; Murphy, 2014). Thus, the ability of institutions to support individuals in this transition may be important in reducing unemployment that is expected in the near or distant future. When assessing how institutions in different countries have been able to adapt to these needs, scholars classify them according to their mobility regimes. This allows to identify which institutions are coping with labour market challenges better (DiPrete et al., 1997).

Mobility regimes. When analysing the relationship between the amount of occupational mobility and education, labour market and welfare-state institutions, DiPrete and colleagues (DiPrete et al., 1997) have proposed a typology of mobility regimes. The authors connect the institutional framework for initial education with the arrangements to which the individuals are subjected in their later adult working life.

Figure 1 shows that each institutional arrangement is assessed in terms of rigidity or strength and flexibility or weakness. Accordingly, the lines going to the left show that the characteristic is expressed in a relatively strong way – the further the arrow goes, the more rigid the structure. Conversely, lines that tend to the right indicate the degree of flexibility of the institutional arrangement.

If institutional characteristics tend to be predominantly rigid, then DiPrete and colleagues call such a regime a collectivist regime; if characteristics tend to be flexible, then authors consider them individualist (1997). Figure 1 compares the German and the United States systems as examples of the extremes of these two regimes.

The collectivist regime is characterised by an impediment to occupational mobility, as the high protection of employment rights, stratified initial vocational education and credentialism create barriers to changes in further working life (DiPrete et al., 1997). Moreover, work-based learning, which dominates German vocational education, leads to both narrow specialisation (Bol et al., 2019) and development of the company-specific skill (see Tolbert, 1996) making them less portable across occupations (Murphy, 2014). Contrary, the United States are characterized by high mobility rates which steams out of lower employment protection and more general skills sets provided by the education system with weaker link to occupational structure (DiPrete et al., 1997).



Notes: The lines represent the manifestation of each respective institutional arrangement characteristic: rigidity/strength (towards left) or flexibility/weakness (towards right). Line length is relative, based on their assessment as provided by DiPrete and colleagues (1997). The dashed line shows the result of the evaluation of German institutional arrangements; the solid line shows the characteristic of institutional arrangements of the United States.

Source: author based on DiPrete et al., 1997, p. 326.

Fig. 1. Characteristics of institutional arrangements and mobility regimes

The cases discussed above do not indicate the role of active labour market policies and adults' retraining offers in determining mobility regimes. DiPrete and colleagues (1997) discuss Sweden as an example characterised by both high activity of labour market and welfare institutions and high mobility rates, concluding that despite the proximity of the characteristics of Swedish institutional arrangements to the collectivist regime, support for retraining encourages individuals to cross occupational boundaries.

2. Results

The results section is structured according to the types of institutional arrangements analysed by DiPrete and colleagues (1997).

Path dependence of further educational opportunities. Although the stratification in Latvian education system starts at upper secondary level, graduates of both general and vocational tracks have the same opportunities to shape their future educational path choosing between enrolling university and

entering the labour market. In the last case, they retain the option of returning to the formal education after the period spent in employment (Saeima, 1995; Saeima, 1998; Saeima, 1999).

Latvian education institutions have adapted to accommodate adults returning to formal education for retraining and upskilling. Favourable circumstances exist both in terms of flexibility of admission conditions and the possibility of applying for studies with state budget funds (Saeima, 2011). Flexibility in admission conditions manifests itself as exceptions for those applicants who completed secondary education before 2004 (Saeima, 2006) presuming no need to have passed the centralized examinations, which have been introduced as a general selection criterion after this date. Moreover, in 2011, the condition that first-time entrants to tertiary education receive priority for public funding was repealed. Thus, the access to study with state budget funds was increased for those who wish to re-enter university, for example to complete an interrupted degree or to pursue a degree in another field (Saeima, 2011).

Link of training with the labour market. Initial vocation training in Latvia predominantly is organised outside work environment (OECD, 2016) and the same pattern repeats regarding the upskilling of adults (Saar et al., 2013). Thus, the link with the labour market, both in initial and further skills development, is weak.

Occupational boundaries, strength of links between credentials and occupation. Since 2009, Latvia has experienced significant changes in the regulation that determines the development of the initial vocational curriculum and occupational structure. In 2011, Latvia has introduced Sectoral Expert Councils for strengthening link between vocational training and the labour market. Their duties are to develop the structure of sectoral qualifications, describe occupations and specialisations in the sector and develop their standards (Saeima, 2015).

Although new system of occupational standards has been gradually established in Latvia, it is mainly seen as a tool for the education sector to ensure coherent implementation of the curriculum (see Saeima, 2015). Apart from this stands the occupational structure, which is defined by the Classification of Occupations. It provides a description of the content of occupations, but since 2017 has excluded information on what qualifications an individual needs to be able to work in that occupation (Cabinet of Ministers, 2017). This means that employers are not obliged to recruit only those applicants who have appropriate credentials.

Besides, empirical studies indicate two major problems regarding effective delineation of occupational boundaries. First, a lack of a common understanding has been observed between different legal frameworks on how to define occupation-specific skills (Purmalis et al., 2019) which hinders the determination of boundaries at formal institutional level. Second, the occupational structure established in the Classification of Occupations in Latvia is followed to a significantly greater extent in the workplaces of the Riga economic area, while the occupational affiliation of labour force in the workplaces of more distant regions has become blurred (Rasnaca, 2011). Here, it becomes evident that informal arrangements, alongside formal institutions, play an important role in the definition of occupational boundaries. Meanwhile, such arrangements are favourable to occupational mobility.

Indeed, strength of the links between credentials and occupations are clearly observable only in the field of regulated occupations which refer to sectors whose activities affect the protection and safety of the society (Saeima, 2001b). These include various occupations in healthcare, legal and personal security services, transportation, construction, and energy (Cabinet of Ministers, 2006). Meanwhile, as monitoring whether employers fulfil the corresponding qualification requirements largely depends on the capacity of various supervisory institutions of the field (Ministry of Education and Sciences, 2019), and it has not been implemented transparently.

The State's efforts to introduce greater transparency and reduce skills mismatch rates are reflected in the new framework for the recognition of informally acquired skills. The creation of this procedure started in 2010 by adopting amendments to the relevant laws (Saeima, 2011; Cabinet of Ministers, 2012). Initially, since 2011, individuals had an opportunity to recognise skills corresponding to initial vocational training and college degree, but since 2018, corresponding procedure has been established to recognize university-level competences (Saeima, 2011; Cabinet of Ministers, 2018). This practice particularly supports the needs of working adults, as it enables them to ensure that their education is compliant with the formal arrangements. Even partial recognition of skills (as corresponding to certain tertiary education courses) reduces the time needed for adults to continue and complete their studies.

Latvia's employment security determined by the Labour Law is evaluated as relatively high, but empirical studies indicate difficulties in their compliance and the existence of various informal practices (OECD, 2016; Romele, 2017). However, the framework has become more flexible, with the adoption of amendments in 2021, that eased the procedure for dismissing workers with disabilities (Saeima, 2021).

Support to retraining and other active labour market policies. Two distinct long-established institutional support mechanisms for adult education and training have been provided through Latvian legal framework. They are, first, the obligation of employers to grant an employee a study leave; and second, upskilling or reskilling measures for the unemployed.

Obligation to grant study leave with or without salary retention is stipulated in the Labour Law (Saeima, 2001a). However, employers who have concluded collective agreements with the company's trade union usually offer more favourable conditions, including salary retention and systematically aligning working time with the employee's study regime (Zabko, 2020).

Public support for upskilling and retraining, including career counselling, has several restrictions (Cabinet of Ministers, 2011). First, the variation of occupations in which the unemployed can upskill or reskill are institutionally constrained. They are selected according to the short-term labour market forecasts prepared by the Ministry of Welfare (Paragraph 22, Cabinet of Ministers, 2011) with focus on medium-skilled occupations. Second, similar limitations can be observed for adults, who are primarily supported. The main target group is the unemployed without occupational credentials, as well as those whose occupation is no longer in demand on the labour market (Paragraph 26.1, Cabinet of Ministers, 2011). Although Latvia's spending on active labour market policies is considered low in international comparisons (OECD, 2019), support for upskilling and reskilling is considered significant in the subjective assessment of its beneficiaries (Hohlova & Rivza, 2022).

Barriers to job creation in Latvia are not directly related to business and employment regulation, but rather to negative demographic trends and skills mismatches (OECD, 2016). Since the growth in 2012-2013, which was associated with the recovery from the economic recession, the performance of economically active firms has been relatively stable (OECD, 2019).

Another public measure to support adult learning has recently been introduced in Latvia. The programme focuses on wide-scale skill development in both general and occupation-specific skills, leaving the choice of skill type and industry to be improved to the individual. However, the duration of the programme is currently limited to the period from 2016 to the end of 2023 (Cabinet of Ministers, 2016).

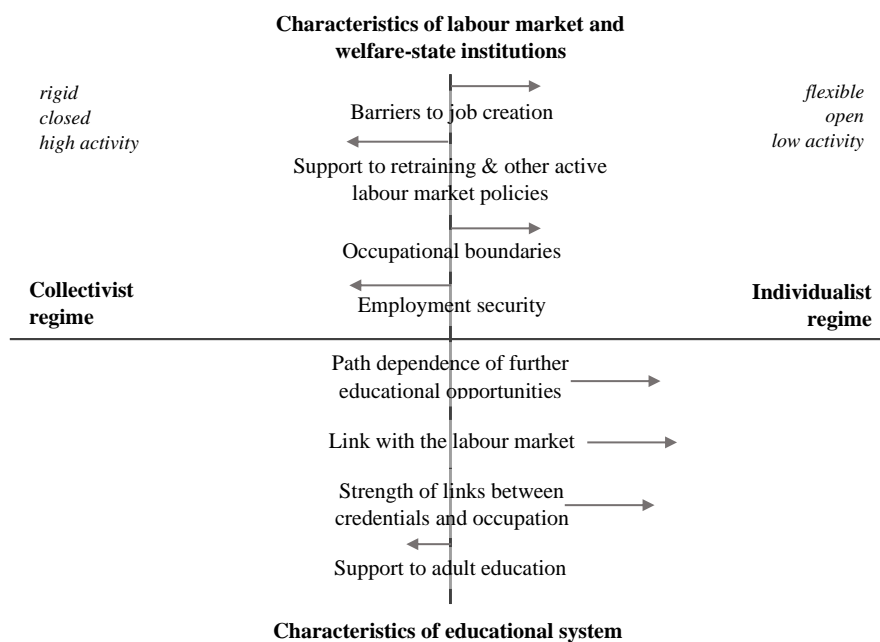
This programme can be considered as a substitute for the general reluctance of Latvian employers to provide on-job upskilling. The support was primarily targeted to working adults without credentials and those whose occupation was characterised by decline or oversupply. Besides, employees overeducated for their occupation or received recommendation to retrain due to their poor health condition were also eligible. It is evident that these conditions indirectly presume occupational mobility. However, the availability of the

programme was for several years limited to a single participation, regardless of the training type chosen (Cabinet of Ministers, 2016).

Despite the initial intention to provide training opportunities based on labour market forecasts, in practice, they were only partly considered. Thus, training was available both in occupations with high future labour demand and those that was expected to decline (BISS, 2020). Moreover, until mid-2020, support was available only once and the amendments to twice participation were adopted based on the need to reduce the decline of Latvian economy caused by the COVID-19 suppressing measures (Cabinet of Ministers, 2020; Ministry of Education and Sciences, 2020). From the lens of occupational mobility, these conditions are controversial. The restriction to participate in the programme is seen as a limitation on the opportunity of retraining, as an individual may need to undergo several consecutive training modules to reach the level of skills needed to work in a new occupation. Considering that working adults may not have been initially aware of the variety of options offered and the heavy reliance on the individual's own skills to guide their future learning, the support programme was too short to achieve the results originally intended by the policy.

3. Latvian mobility regime considered

Figure 2 summarises author's assessment of the performance of Latvian education, labour market and welfare institutions structuring the analysis around the domains evaluated by DiPrete and colleagues.



Notes: The lines represent the character of each respective institutional arrangement: rigidity/ strength (towards left) or flexibility/ weakness (towards right). Author has detected the length of line based on own assessment.

Source: author's own analysis based on institutional dimensions examined by DiPrete et al., 1997.

Fig. 2. Characteristics of education, labour market and welfare institutions in Latvia

On the labour market and welfare-state characteristics axis, employment security appears high and support to retraining is quite significant, as revealed in Figure 2. In turn, occupational boundaries appear weak and institutional barriers to job creation are rather low. On the axis of the characteristics of educational institutions, all the conditions that might otherwise be considered as barriers to occupational mobility are weak. Accordingly, it can be concluded that the institutional environment in Latvia is generally rather supportive to occupational mobility. Comparing Latvia's institutional arrangements with DiPrete and

colleagues (1997) model, it appears important to separate training support for working adults as measure standing outside specific work environment.

Conclusions, proposals, recommendations

- 1) Latvian formal and informal institutions tend to support occupational mobility, emphasising the role of the individual in the process, which corresponds to individualist regime.
- 2) At formal institutional level, upskilling and reskilling support is focused on the low- and medium-skilled. While institutional arrangements are also favourable for the retraining of the high-skilled, these issues were less important for public authorities.
- 3) As Latvian employers are rarely involved in upskilling of their employees, it is advisable to emphasise the role of public policy in the model of mobility regimes by introducing a new dimension – "(public) support to adult education". This dimension is further recommended to include as separate institutional arrangement to be measured in the theoretical model proposed by DiPrete and colleagues (1997).
- 4) The need for adult upskilling and reskilling is expected to prolong, so public policy needs to consider the extension of support programmes.

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RURAL DEVELOPMENT AND ENTREPRENEURSHIP

ECONOMIC ANALYSIS OF LAND USE IN EUROPEAN COUNTRIES

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Abstract. The main idea of the study is to substantiate the dependence of financial and economic indicators on the efficiency of the use of land and resource potential in the structure of land use in European countries. Research is aimed at determining the influence of the land use system on the sectoral components of the economy of European countries. To achieve the goal, land use was grouped taking into account the types of economic activity and institutional sectors of the economy. Typification of land uses was carried out, taking into account the types of economic activity and institutional sectors of the economy of countries, and the corresponding types of land uses were formed, namely, food-forming, ecologically stabilizing, social-infrastructure, production-commercial - economic-forming. The proposed grouping system consolidated the following types of economic activity: forestry, agriculture, construction, industry, transport, trade, IT, scientific and technical, financial and insurance activities, administrative activities, defense, government, management, education, health care and social services, other services (taxes, arts, entertainment and recreation). As part of the study, the relationship between economic indicators of profitability (average GDP per unit area) and the use of land resource potential was identified, taking into account the institutional sectors of the country's economy. The conducted analysis demonstrates to what extent the income of a certain sector of the economy depends on the area of land use, which participates in the formation of economic benefits. Based on the circle-centric model, it was established that the increase in economic efficiency from the use of land-resource potential is proportional to the distance from the centre of the model (mainly food security) to the top (economy-forming industries of production).

Key words: economic analysis, land use, land-resource, economic indicators.

JEL code: Q24, Q5

Introduction

The conditions of prevailing economic advantage, which lead to increasing intensity of nature use, have a negative impact on biodiversity, which has led to a reduction of global wild animal populations by more than 50% in the last four decades. In the content of the reports presented at the economic forum, it was indicated that the system of nature management of the planet Earth produces more than half of the total income. At the same time, one of the global challenges of humanity is the problem of intensive climate changes, which, together with the ever-growing number of the population on the planet, face the problems of food security, environmental degradation and, in fact, the economies of most countries fall into direct dependence on the surrounding environment and available natural resources (Eurostat, 2022; Kryvoviaz, E. et al., 2020).

Global regional trends show that the young economies of some countries significantly contribute to the degradation of natural resource potential and reduce its self-recovery functions (Fig. 1).

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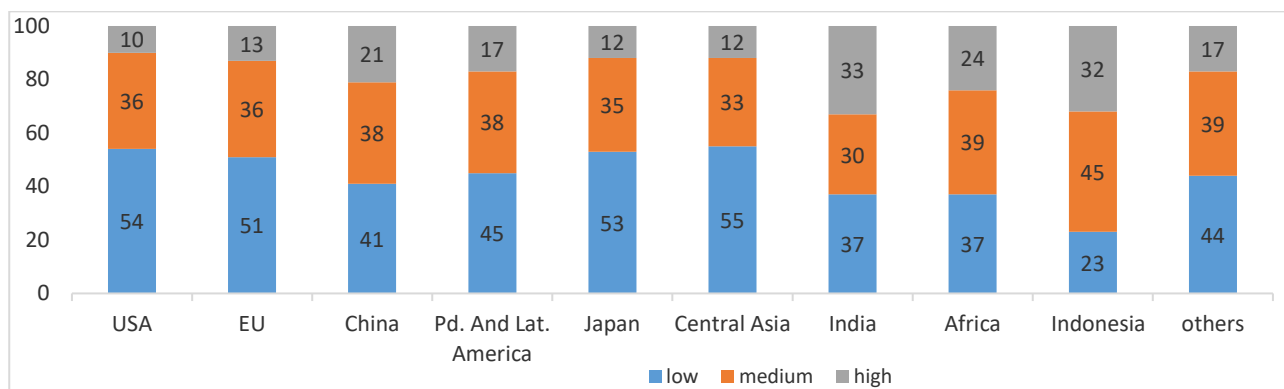


Fig. 1. **Regional nature dependence of GDP, % Eurostat, 2022**

Intensive use of nature in a number of countries in Southeast Asia and Africa forms a third part of the gross product. The economies of such countries as the USA, the EU and China are characterized by the largest absolute indicators of added value dependent on nature use, which is, respectively, 2.1 trillion dollars, 2.4 trillion dollars, and 2.7 trillion US dollars, which proves a significant impact on nature as a whole. The formation of industry indicators of added value arises from heterogeneity in the use and imbalance of the system of environmental protection as a whole (Tykhenko, R. et al., 2021). Analysing the structure of the economy, it becomes clear that in such industries as agriculture and forestry, fish breeding, water supply, energy, food industry, indicators of gross added value significantly depend on the use of natural resources. Relatively low dependence on natural resources is characteristic of such industries as banking, management and insurance activities, digital and information communications, machine building, trade, transport and logistics activities, processing industry, heavy and chemical industry etc. Being in the risk zone, natural assets provide the formation of more than 44 trillion. US dollars of world gross domestic product (Eurostat, 2022). After conducting an analysis of sectoral nature use, it becomes obvious that the economic efficiency of certain industries, which amount to about 13 trillion. USD (13%) of world GDP, significantly depends on available natural resources. About 37% (USD 31 trillion) of world GDP is formed by industries partially dependent on natural resources (Frolenkova, N. et al., 2022).

The food industry (USD 1.4 trillion), agriculture (USD 2.5 trillion) and construction (USD 4 trillion) have the highest level of natural resource consumption. The natural environment, losing its ecosystem functions and ability to recover, reduces its potential to support nature-intensive sectors of the economy and, as a result, reduces their economic efficiency. Today it is becoming clear that the limiting factor in the growth of indicators of gross added value and gross domestic product, and therefore the economic growth of states, is the rather high dependence on nature of a significant part of the vital branches of production. Land resources are the spatial basis of natural resources, at the same time they are capital and an irreplaceable production resource, and therefore a determining factor of economic growth. The basis of our research is the idea of assessing the economic efficiency of the use of land resources and their impact on the basic indicators of economic growth in European countries. gross domestic product (GDP) is one of the most important indicators of economic development, which highlights the summary of the production activity of resident economic units (people) in the field of material and non-material production. It is determined by the value of goods and services produced by society for final use. GDP is the sum of gross value added (GVA) of industries, plus net taxes on products not included (indirect taxes, NP):

$$GDP = \sum GVA + NP \quad (1)$$

The basis for determining GDP indicators was the production method (value-added method), the essence of which is to calculate the added values of all branches of the national economy, which will allow to reveal the relationship and role of individual branches in the creation of the gross national product, to reveal the dynamics of changes in the structure, to conduct a comparative analysis of the gross national product domestic product of the country with a similar indicator of other countries. The methodological basis of this study is national approaches to determining gross added value and gross domestic income. The method involves the calculation of gross added value (GVA) by types of economic activity (Ukrstat, 2023). This method makes it possible to estimate the contribution of a specific type of economic activity and economic sector to the formation of the gross domestic product (Ukrstat, 2022). With the help of this method, it becomes possible to carry out an analytical assessment of the effectiveness of the functioning of the country's economy. Using this approach, we will try to estimate the impact of economic sectors on the value of the gross domestic product of European countries. One of the main tasks of the study is to establish the strength of the relationship between GDP indicators and the use of land resources in the formation of indicators of gross added value in various sectors of the country's economy. The constructed multifactorial model allows establishing the strength of relationships between established variables and factors dependent on them. The proposed multiple (multifactorial) regression of the influence of factors on the outcome variable as a function of several independent (explanatory) variables x_1, x_2, \dots , i.e. it is a model of the type:

$$y = f(x_1, x_2, \dots, x_n) \quad (2)$$

The following methods were used during the scientific research: synthesis - in the part of identifying the dependence of the use of land resources and macroeconomic indicators; grouping - when forming types of land use in terms of types of economic activity.

Research results and discussion

In the modern world, the gross domestic product (GDP) indicator is an indicator of the nation's economic prosperity and a measure of the level of well-being of the country's population. Over the past 13 years (Shevchenko, O. et al., 2021), GDP indicators in the EU countries have grown annually. The economic recession (-6.1% of GDP) in the EU in 2019-2020 depended on the COVID-19 pandemic (Kryvoviaz, E. et al., 2020). Over the past 15 years, the average annual growth of the EU GDP was 0.8% on average (Fig. 2).

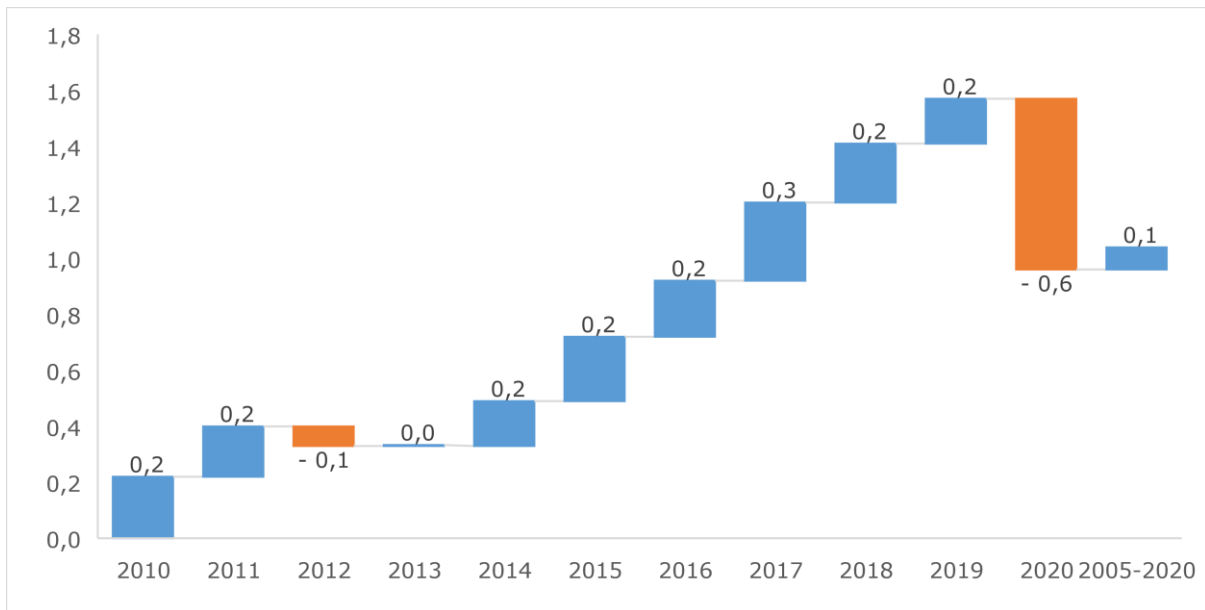
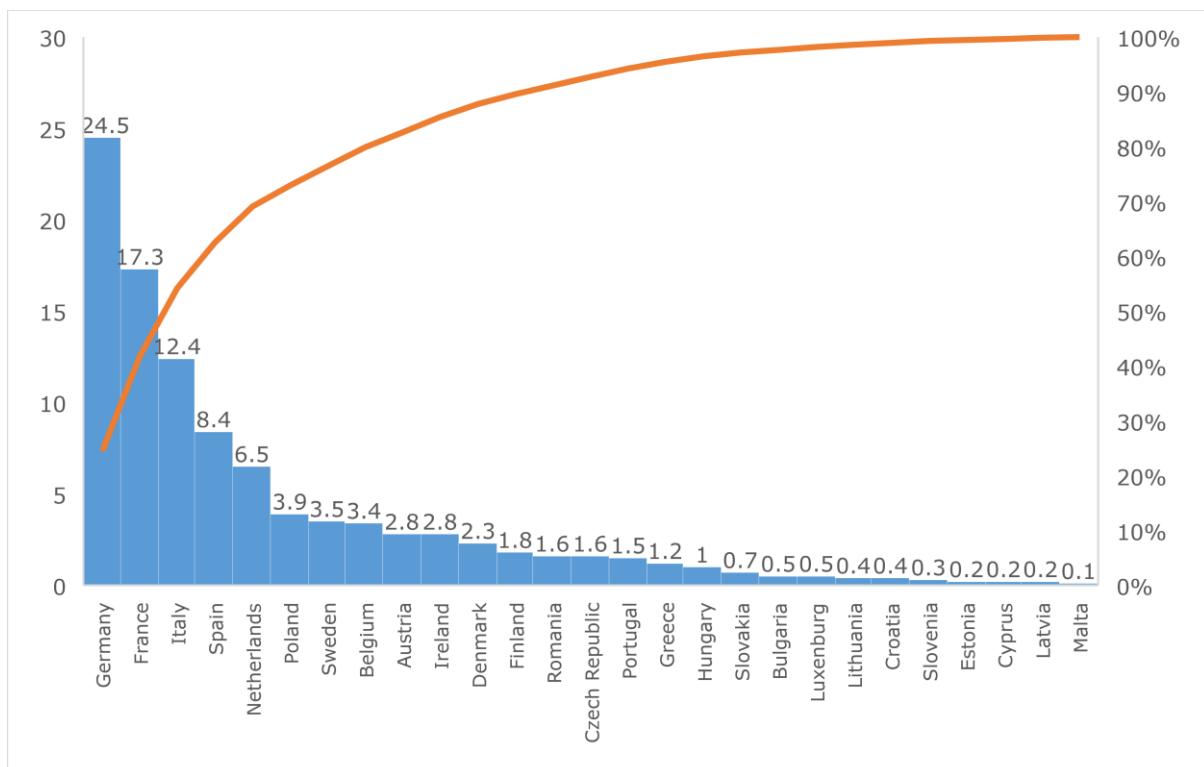


Fig. 2. **Change in the EU GDP, % compared to the previous year**
 (Kryvoviaz, E. et al., 2020)

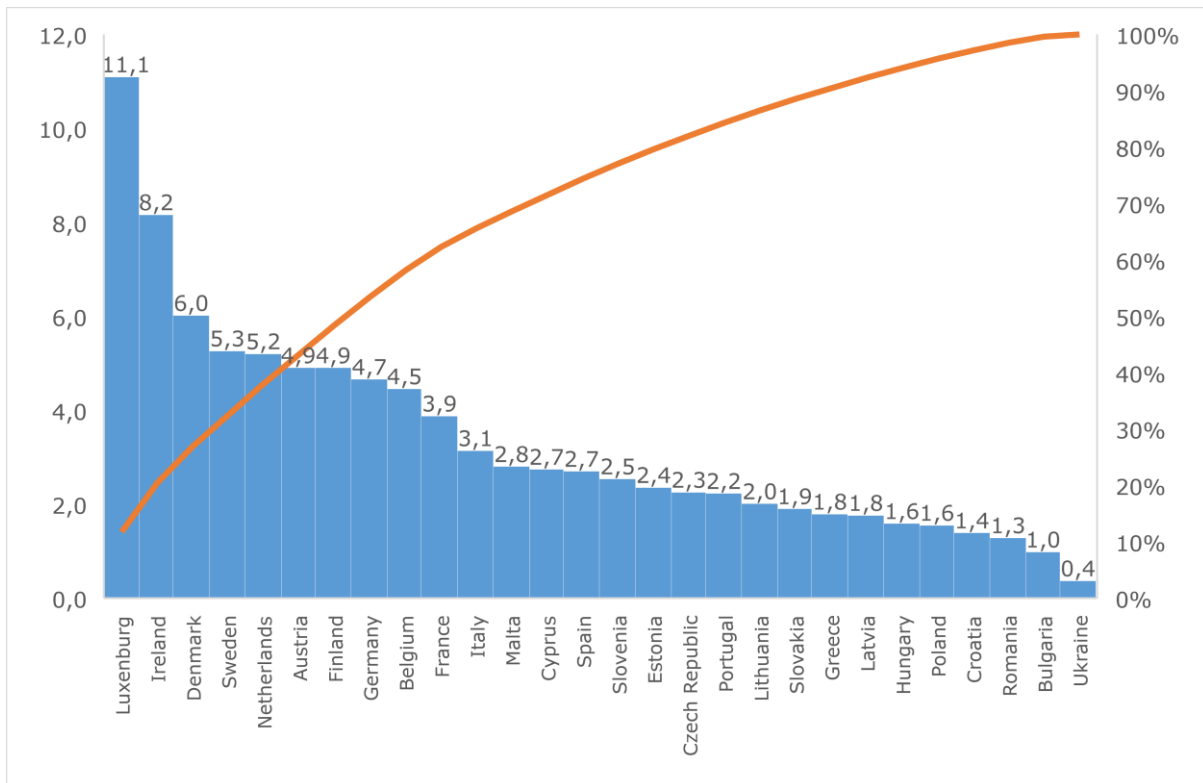
The growth of GDP indicators in the EU countries differs significantly. About 60% of the GDP of the European Union is formed thanks to the economies of Spain, Italy, France and Germany. As of 2020, the share of Germany's economy in the EU GDP structure is 24.5%, France's - 17.3%, Italy's - 12.4%, Spain's - 8.4% (Fig. 3).



Source: Kryvoviaz, E. et al., 2020

Fig. 3. **Structure of the EU GDP, billion dollars USA**

To conduct a comparative characterization of the level of well-being and differences in the quality of life of most countries, both in Europe and the world, the indicator of the share of GDP of a country's citizen is used.



Source: Kryvoviaz, E. et al., 2020

Fig. 4. Share of GDP of the EU and Ukraine (2020), USA dollars per person

As of 2020, our calculation shows that on average one resident of the EU accounts for USD 32.6 thousand. As it can be seen from Fig. 4, the indicators of GDP per capita of the EU countries are quite heterogeneous. The economies of Bulgaria (USD 9.8 thousand), Romania (USD 12.9 thousand), and Croatia (USD 13.9 thousand) are characterized by relatively low GDP indicators per person. A high standard of living is typical for Denmark (60.2 thousand dollars), Ireland (81.6 thousand dollars), and Luxembourg (111.0 thousand dollars). The GDP indicator in Ukraine before the full-scale invasion of Russian troops was 3.7 thousand dollars per person.

The next step of our research will be the substantiation of GDP and its heterogeneity in the studied countries. Determining the influence of sectoral production on the state of economic indicators, we will try to establish dependencies between GDP and sectoral types of economic activity, such as: forestry, agriculture, construction, industry, transport, trade, financial and insurance activities, information technologies, administrative and scientific and technical activity, social service and health care, education, defense sector, public administration and other benefits. The sectoral grouping is shown in the economic-statistical model in tabular form (Table 1). During the study, the grouping of types of economic activity was carried out, given on the website of the World Bank, Eurostat and the State Statistics Service of Ukraine with the aim of carrying out a comparative characterization of the impact of various sectors on absolute indicators of GDP.

Table 1

The structure of GDP of European countries (2020), billion US dollars

GDP billion US dollars										
value of GDP	total	Agriculture, water management	Forestry	Industry	Construction, residential development	Trade, transport	Insurance and financial activities, IT	Scientific and technical, administrative activities	Public administration, defense, education, health care and social services	other services (taxes, arts, entertainment)
country	Y	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9
Austria	435.7	4.5	1.2	92.8	79.7	88.0	35.7	41.0	81.0	11.8
Belgium	523.4	4.1	0.1	83.7	81.1	92.6	58.6	80.1	114.6	8.4
Bulgaria	70.3	2.4	0.3	15.3	10.6	13.4	10.0	4.8	12.0	1.5
Greece	192.4	9.0	0.1	27.3	36.9	44.4	16.9	9.2	42.9	5.6
Denmark	362.0	5.4	0.4	64.7	60.4	68.3	36.9	38.3	77.4	10.1
Estonia	31.5	0.4	0.3	5.9	4.9	6.5	4.3	3.0	5.5	0.8
Ireland	425.1	4.2	0.0	166.7	38.3	38.7	93.5	37.8	43.4	2.6
Spain	1302.5	44.4	1.1	212.1	245.9	257.6	108.0	114.5	266.7	52.0
Italy	1915.9	40.0	2.1	373.6	356.3	379.3	172.4	183.9	337.2	70.9
Cyprus	24.2	0.5	0.0	1.9	4.2	5.4	3.7	2.6	4.9	1.0
Latvia	34.0	0.8	0.6	5.1	6.7	7.9	2.9	2.9	6.1	1.0
Lithuania	56.8	1.8	0.3	11.5	7.9	17.1	3.6	4.1	9.2	1.2
Luxembourg	74.4	0.1	0.0	4.2	10.1	10.9	25.4	9.3	13.2	1.3
Malta	14.9	0.1	0.0	1.5	1.6	2.0	2.9	2.6	2.7	1.4
Netherlands	926.5	16.5	0.2	136.2	123.2	185.3	107.5	139.0	201.0	17.6
Germany	3869.3	27.3	3.6	885.2	664.8	610.7	347.9	432.9	757.6	139.2
Poland	606.7	14.5	1.9	149.3	81.9	151.1	51.0	56.4	92.8	7.9
Portugal	234.9	4.3	1.1	40.6	42.7	52.8	20.9	18.1	48.1	6.1
Romania	253.1	8.4	2.2	54.9	40.7	49.9	25.8	22.5	41.8	6.8
Slovakia	106.2	2.0	0.6	24.0	18.5	22.3	8.1	9.9	17.7	3.2
Slovenia	53.7	0.9	0.3	14.3	7.4	10.3	4.5	5.2	9.7	1.2
Hungary	157.7	6.2	0.3	38.2	24.4	27.1	14.5	15.3	27.4	4.3
Finland	275.5	2.9	4.8	53.2	58.9	40.2	25.9	25.1	56.7	7.7
France	2643.6	43.6	3.9	349.0	491.7	433.5	251.1	375.4	618.6	76.7
Croatia	57.2	2.0	0.2	11.1	9.1	11.4	6.7	4.6	10.0	2.0
C. Republic	247.8	3.8	1.4	71.1	38.7	43.1	25.5	17.3	41.6	5.2
Sweden	547.8	5.2	3.6	93.7	87.1	90.9	70.7	62.5	118.3	15.9
Ukraine	155.2	14.0	0.6	27.9	14.4	32.3	7.8	7.3	22.0	23.9
EU	15442.8	255.2	30.9	2987.0	2634.1	2761.1	1534.7	1718.2	3058.3	463.2

Source (WEF, 2020)

Using the data in Table 1, we established correlational dependences between GDP indicators and sectoral types of economic activity. As a result of substantiating the dependencies, a correlation-regression matrix of the influence of the components of the economy on the value of GDP was obtained (Table 2).

Table 2

Matrix of dependence of GDP indicators on economic sectors

Variable	Y	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9
Y	1									
x_1	0.79	1								
x_2	0.59	0.45	1							
x_3	0.97	0.68	0.54	1						
x_4	0.99	0.81	0.61	0.95	1					
x_5	0.99	0.84	0.58	0.95	0.99	1				
x_6	0.99	0.77	0.57	0.96	0.98	0.97	1			
x_7	0.98	0.77	0.58	0.92	0.98	0.97	0.98	1		
x_8	0.99	0.80	0.60	0.93	0.99	0.98	0.98	0.99	1	
x_9	0.98	0.79	0.56	0.96	0.98	0.97	0.95	0.94	0.96	1

Source: author's calculations

The coefficients of determination determined during the study indicate the strength of the relationship between the result Y and variables X1-9. Thus, relatively low dependencies were found between forestry, nature protection ($r = 0.59$) and rural and fishing activities ($r = 0.79$). The coefficients of determination are $R^2 = 0.64$ and $R^2 = 0.34$, respectively. This result indicates that these industries do not affect the indicators of the gross domestic product in the European Economic Area, and therefore the economic well-being of the population. In turn, the high correlation coefficient, and therefore the impact on economic indicators, is typical for the cultural and entertainment and fiscal spheres ($r = 0.98$, $R^2 = 0.98$), the system of education, defense, social sphere, health care and public administration ($r = 0.99$, $R^2 = 0.98$), administrative and research and technical work ($r = 0.98$, $R^2 = 0.96$), insurance, financial and information spheres of the economy ($r = 0.99$, $R^2 = 0.97$), trade and logistics industry ($r = 0.99$, $R^2 = 0.98$), construction ($r = 0.99$, $R^2 = 0.99$) and industrial manufacturing ($r = 0.97$, $R^2 = 0.93$). The conducted analysis proves that all sectors of the economy have a high economic effect, except for forestry, environmental protection, and agricultural activities. Taking into account that the spatial basis of any activity is land resources, we will establish patterns and mutual influences of the land use system and economic sectors of European countries. Within the framework of the study, we carried out the typification of land uses taking into account the peculiarities of economic activity on the basis of data and formed the types of land uses (Ukrstat, 2023; Kryvoviaz, E. et al., 2020). Thus, within the framework of the conducted research, the following groups of land use were identified: food-producing - agricultural and water management lands; ecologically stabilizing (nature-preserving) - nature reserves, forest, dry, swampy, abandoned and unused territories; social and infrastructural - includes residential buildings, public areas, areas earmarked for development and real estate transactions; production - trade - economy-forming - territories under industrial facilities, warehouse and treatment facilities, facilities of transport, logistics and trade enterprises, financial, insurance, IT institutions, scientific and technical, administrative, managerial, defense, educational, medical and social, tax, cultural and artistic, entertainment, recreational and other services.

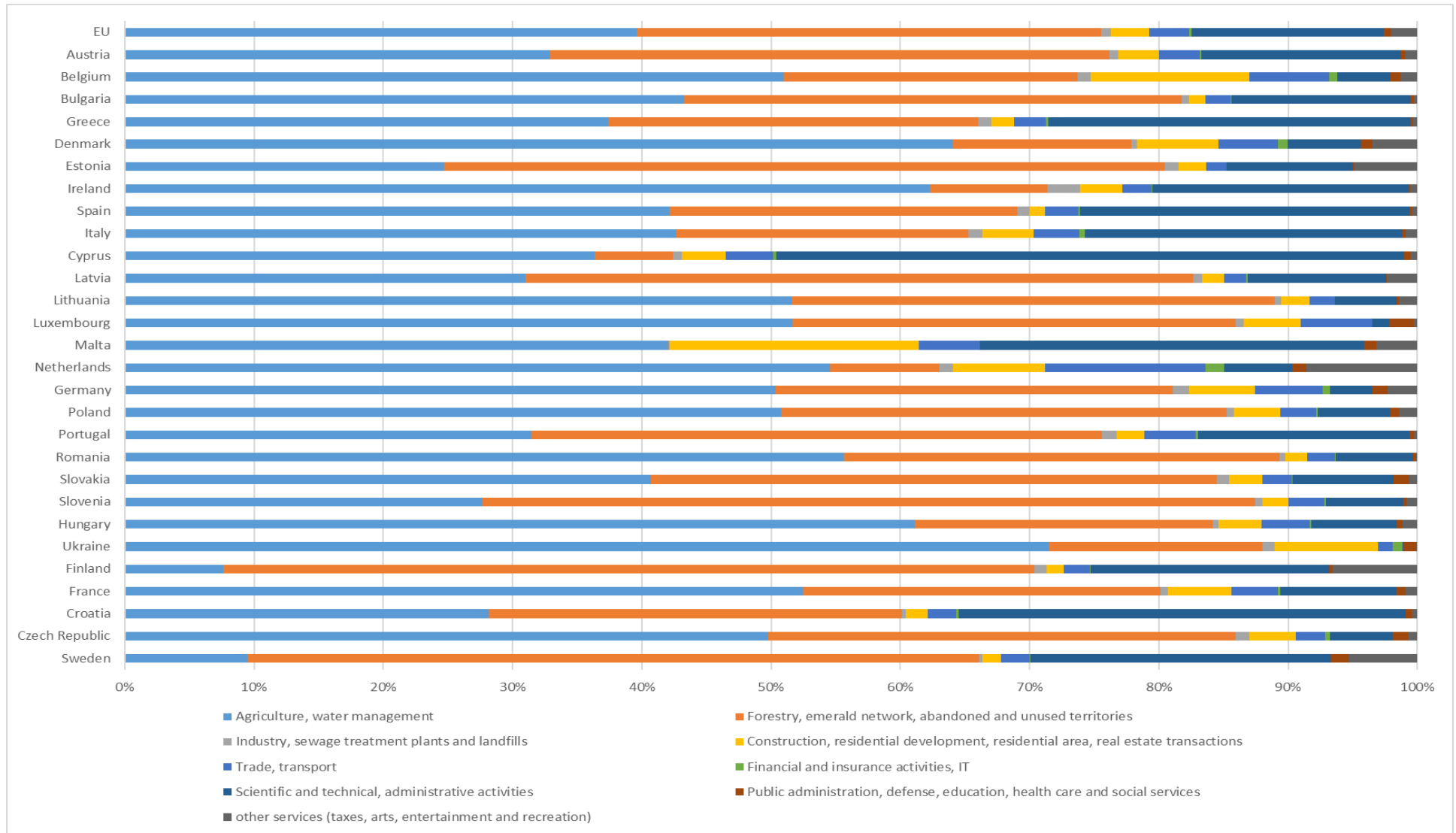
Analysis of the diagram shows that the area of food-producing land uses in the EU is 39.6% of the total (Fig. 5). Not a significant share of such land in Finland (7.6%), Sweden (9.5%), Estonia (24.7%). Denmark (64.1%), Ireland (62.3%), Hungary (61.1%), Romania (55.6%) have a rather high share in the land use system. In the structure of land use in Ukraine, food-producing lands make up more than 70%.

Ecologically stabilizing territories of the EU make up about 36%. Significant areas of this type of land use are located in Estonia (55.8%), Sweden (56.6%), Slovenia (59.8%) and Finland (62.7%), the smallest indicators in the structure of land use in Denmark (13.8%), Ireland (9.1%), the Netherlands (8.4%), Cyprus (6%) and Malta (0.1%). The territory of Ukraine has a given 16.5% of such lands in its structure.

In the EU land use structure, only 3% of the territory is under social infrastructure facilities. This type of land use is closely related to population displacement, so it can indicate the level of urbanization. The lowest share of such land uses is in Sweden (1.4%), Finland (1.3%), Bulgaria (1.2%), high level of urbanism is characterized by land use in the Netherlands (7.3%), Belgium (12.3%), Malta (19.3%). In the land use structure of Ukraine, such lands are 8%.

Territories in the structure of which were allocated production - trade - economic types of land use have a rather complex structure. One of the components is land under industrial facilities, which in the EU make up 0.8% of the total area. The lowest share of land is in Denmark (0.4%), Romania (0.4%), Croatia (0.3%), Malta (0.1%), and significant areas in the Netherlands (1.1%), Estonia (1.1%), Germany (1.2%), Jordan (2.4%). In the land use structure of Ukraine, such lands make up about 0.9%. The share of land under transport, logistics and trade facilities in the EU is 3.0%. Fairly high indicators in Germany (5.3%), Belgium (6.2%), the Netherlands (12.4%), the lowest in Bulgaria (1.9%), Latvia (1.7%) and Estonia (1.1%). The national indicator is 1.1%. Low land security (0.21% for the EU) is characterized by insurance, financial activities and the field of information technologies. The most such lands are in Germany (0.57%), Belgium (0.63%), Denmark (0.73%) and the Netherlands (1.4%), and the least in Luxembourg (0.004%), Slovakia (0.03%), Lithuania (0.05%). In the land use structure of Ukraine, the share of such lands is quite high and amounts to 0.74%. Land use under objects of administrative and scientific and technical activity in the EU land use structure is quite high, which is justified by the high level of stimulation of the development of scientific and technical potential and the development of territorial administration. The highest indicators are in Sweden (23.2%), Italy (24.5%), Spain (25.5%), Greece (28.02%), Croatia (34.6%), Cyprus (48.5%). The smallest share among European countries is in Belgium (4.14%), Germany (3.28%), Luxembourg (1.35%), Ukraine (0.02%). Land use of education, health care, public administration, defense, social sphere in the EU land use structure is 0.59%, in Ukraine this figure is 1.06%. Land use with objects of recreational economy, fiscal services and objects of cultural and mass events in the structure of land use in the EU is 2.02%, in Ukraine this indicator is only 0.07%. The above analysis of the structure of land use in European countries in terms of sectors of the economy makes it possible to determine the contribution of each sector to the formation of the gross domestic product.

As part of the study, we will find a connection between the use of land resources and the average GDP per unit area, taking into account the above sectors of the economy of European countries. The research data are given in Table 3.



Source: author's compiling

Fig. 5. Land use by economic sectors of European countries, %

Table 3

**Profitability of land resources used by sectors of the economy,
 thousand US dollars / ha**

Country	Agriculture, water management	Forestry, emerald network, abandoned and unused territories	Industry, sewage treatment plants and landfills	Construction, residential development, residential area, real estate transactions	Trade, transport	Financial and insurance activities, IT	Scientific and technical, administrative activities	Public administration, defense, education, health care and social services	other services (taxes, arts, entertainment and recreation)
Austria	1.6	0.3	1636.6	298.3	338.3	2686.0	31.6	3294.0	145.2
Belgium	2.6	0.1	2810.0	215.2	489.9	3021.5	630.0	4898.2	208.3
Bulgaria	0.5	0.1	228.2	77.6	62.3	1135.1	3.1	369.0	56.5
Greece	1.8	0.0	216.1	158.8	135.7	829.8	2.5	1600.6	120.2
Denmark	2.0	0.7	3424.7	223.0	343.4	1182.2	158.0	1984.2	67.6
Estonia	0.4	0.1	121.1	51.6	90.1	2659.0	6.8	924.0	3.7
Ireland	1.0	0.0	946.9	167.3	245.2	21751.7	27.2	6472.4	68.8
Spain	2.1	0.1	437.9	404.7	199.5	3068.1	9.0	2796.0	260.6
Italy	3.1	0.3	1147.7	295.9	356.5	1369.6	24.8	3681.1	265.5
Cyprus	1.5	0.0	289.4	132.4	160.2	1597.7	5.8	1017.4	202.3
Latvia	0.4	0.2	117.6	60.5	71.2	519.7	4.1	1914.0	6.3
Lithuania	0.5	0.1	362.3	54.4	137.1	1100.8	13.1	884.1	12.8
Luxembourg	0.8	0.5	2422.5	896.3	754.4	2537240.5	2649.8	2687.7	1807.0
Malta	5.6	148.8	51073.7	266.3	1358.7	285616.1	276.6	9074.3	1428.1
Netherlands	8.1	0.6	3413.3	463.1	399.0	2050.9	703.3	4821.2	55.0
Germany	1.5	0.3	1988.7	363.9	324.7	1719.6	369.1	1790.6	169.7
Poland	0.9	0.2	825.1	73.7	175.1	1068.4	32.4	432.2	17.7
Portugal	1.5	0.3	407.1	218.6	149.7	1236.8	12.4	1965.2	226.2
Romania	0.6	0.3	527.0	100.9	97.3	1253.1	15.9	877.2	170.8
Slovakia	1.0	0.3	506.4	146.3	198.4	4747.9	25.7	313.4	97.1
Slovenia	1.6	0.3	1303.6	180.0	181.2	1832.3	42.7	1972.8	67.1
Hungary	1.1	0.1	902.1	79.7	78.2	993.6	24.8	696.3	40.0
Finland	1.1	0.2	166.0	129.9	59.1	1056.9	4.0	636.9	3.5
France	1.5	0.3	1148.6	181.7	223.3	1889.7	76.1	1632.2	153.0
Croatia	1.3	0.1	606.0	96.3	90.0	704.1	2.4	357.3	87.0
C. Republic	1.0	0.5	869.6	137.1	237.0	959.7	44.8	448.7	93.4
Sweden	1.2	0.1	756.7	138.2	91.1	2317.0	6.0	194.9	6.7
EU	1.7	5.7	2913.1	207.8	261.0	106874.4	192.7	2138.4	216.3
Ukraine	0.3	0.1	51.7	3.0	47.1	17.4	561.0	34.6	570.0

Author's compiling

As part of the study, the dependence of profitability of institutional sectors of the economy on sectoral land use was established (Table 4). The correlation matrix establishes the dependence of gross domestic income indicators on land use areas.

Table 4

Matrix of influence of land use on economic indicators

Variable	Y	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9
x_1	1									
x_2	0.47	1								
x_3	0.52	1.00	1							
x_4	0.38	0.08	0.13	1						
x_5	0.58	0.81	0.85	0.56	1					
x_6	0.05	0.08	0.10	0.78	0.46	1				
x_7	0.13	0.03	0.08	0.81	0.48	0.92	1			
x_8	0.67	0.65	0.69	0.40	0.79	0.13	0.20	1		
x_9	0.20	0.57	0.59	0.66	0.78	0.81	0.77	0.45	1	
Y	0.69	0.75	0.79	0.62	0.96	0.49	0.57	0.78	0.76	1

Source: Author's calculations

Analysing the results of correlation-regression relationships of GDP and the sectoral land use system, we can say that with r equal to 0.7 and more, the indicators have a relatively strong dependence. Thus, land use under trade and transport and logistics facilities significantly affects GDP, as indicated by the correlation coefficient $r = 0.96$ with variable x_5 . A fairly high level of influence on GDP indicators is demonstrated by the forestry type of land use $r = 0.75$ with the variable x_2 , the industrial type of land use $r = 0.79$ with the variable x_3 , land under health care, education, defense and the public sector $r = 0.78$ with the variable x_8 , recreational and cultural and entertainment type of land use $r = 0.76$ with variable x_9 . Food-producing territories have $r = 0.69$ with variable x_1 , which indicates a lower level of dependence of GDP on the sector. Other types of land use (residential, $r = 0.62$ with variable x_4 ; financial, insurance, IT, $r = 0.49$ with changes x_6 ; administrative and scientific and technical, $r = 0.57$ with variable x_7) have weak connections with a productive sign of the economic sector from the use of land resources. That is, there is a weak dependence of income as part of the total, on the areas used in the production or provision of services by the industry. Calculations carried out as part of the study show that the land used in the financial, insurance and IT sectors has the highest profitability per hectare (Luxembourg - 2537240.51 thousand dollars; Malta - 285616.13 thousand dollars), for Ukraine this indicator is 17.4 thousand of dollars per hectare. Agricultural lands have the lowest economic weight. However, the most efficient hectare of agricultural land is used in: the Netherlands - 8.08 thousand dollars, Italy - 3.11 thousand dollars. The agricultural sector has a low impact on GDP formation in: Latvia - 0.41, Estonia - 0.36 thousand dollars. For Ukraine, this indicator is 0.33 thousand US dollars, which proves the low economic efficiency of the agricultural sector. In the structure of land use in the EU countries, it is most profitable to use land under financial, insurance and IT institutions (106,874.36 UAH/ha), industry (2,913,1 thousand dollars) and public administration (2,138,4 thousand dollars). Low efficiency is noted for the food-forming type of land use (1.71 thousand dollars) and the ecologically stabilizing (nature-preserving) type (3.94 thousand dollars).

Conclusions, proposals, recommendations

Summarizing the research findings, the authors have noted the following.

- 1) With a decrease in the "r" indicator, the dependence of GDP on land resources is lost. Formation of national wealth (GDP) is advisable to support those sectors of the economy that significantly affect its growth. At the same time, one should not limit oneself to economic growth, because the quality of

society's life lies not only in the plane of economic benefits. Developing a system of nature-preserving land uses ensures acceptable ecological conditions and the provision of ecosystem functions of territories.

2) Investments in the system of agricultural land use form a stable and high-quality food base of society and contribute to the extension of life. The development of social infrastructure facilities provides development and new communication opportunities to society, which generally raises the level of living in society to a high level.

3) The growth of economic efficiency from the use of land resources is proportional to the distance from the centre of the model (primary - food security) to the top (the economy of the forming sectors of production).

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THE DIGITAL MARKETING AS A MARKETING COMMUNICATION TOOL FOR SUSTAINABLE PROMOTION OF PAID SERVICES OF HEALTHCARE INSTITUTIONS IN LATVIA

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Abstract. The article highlights the importance of digital marketing in consumer behaviour choosing paid health services. The promotion of health care and paid services is complicated, dependent on several ethical, legal etc. factors. Digital marketing enables healthcare specialists to demonstrate their competence to potential patients, expand their professional domain, and improve the image of the healthcare industry. But we must not forget about sustainability - ensuring a healthy life and promoting well-being for all society. The aim of the study is to identify digital marketing tools that positively influence consumer choices in the purchase process of paid health services. To achieve the goal, the following research methods were used - monographic, secondary data analysis and quantitative research (survey) methods. The consumption of digital tool changes depending on level of education – higher educated respondents use more tools than lower educated respondents. Irrespective of gender, income and education, respondents aged between 18 and 27 are more affected by digital tools than other age groups. In contrast, respondents aged over 65 are practically unaffected by digital tools, except some cases at a certain level of education and income or depending on gender. The article deals with UN Sustainable Development Goals, especially SDGs 3 (Good health and well-being). The results of the study have both theoretical and practical significance.

Key words: consumer behaviour, digital marketing, healthcare, marketing communication, service promotion, sustainability, wellbeing.

JEL code: M31; M10

Introduction

The digital environment continues its development, and digital marketing appears on a daily basis in an increasing variety of ways. The digital technologies and software applications of next generations will transform the market and the daily life of people even further (Rindfleisch A., Malter A. J., 2019). One of the main factors of its influence is the extensive development of information and communication technologies in the private and public sector which has given rise to a new digital marketing environment. Around 90% of the available global data have been created within the last two years (Miklosik A. et al., 2019), which proves the rapidity of the changes. The COVID-19 pandemic, too, has unexpectedly become a digital accelerator worldwide. Businesses and markets were forced to adapt to the limited mobility and therefore relied much on the digital technology (Kotler P. et al., 2021). This also served as an impetus for businesses to stop hesitating with the implementation of digitalisation. Although the Internet is already part of the daily life, some groups of people are still excluded from the digital world due to the lack of digital skills and knowledge (Hetman O., Schaefer M., 2019). The number of Internet users keeps increasing worldwide. In January 2022 it was 4.95 billion – 6.2% more than the year before, the sharpest increase since 2019 (Oberlo, 2022a). The number of social media users is increasing as well. According to the latest data, there are now estimated to be 3.96 billion social media users in the world, 4.8% more than the year before, and researchers predict a further increase going forward. Between 2023 and 2025, an average increase of 3.7% per year is expected. Social media will also remain a part of the consumers' daily life because of smartphones being their main driver. According to the current social media usage statistics, more than nine out of ten (91%) social media users use mobile devices to access social media (Oberlo, 2022b). Importantly, as regards digitalisation, there is no one approach that fits all. Each industry and each player are at a different stage of digital maturity. An organisation ready for digital

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operation assesses the digital readiness of the customer base they compete for. Also, important is the organisation's self-assessment of digital capabilities. Depending on the readiness assessment, businesses need to develop and implement various strategies that may include customer migration as well as digital transformation strategies (Kotler P. et al., 2021). Using digital marketing, it is now possible for healthcare institutions to advertise their services to people worldwide, not just in their immediate vicinity. Digital marketing enables healthcare specialists to demonstrate their competence to potential patients, expand their professional domain, and improve the image of the healthcare industry. With the help of digital marketing, one can access a variety of professional tools and technologies that can help develop the strategy, achieve maximum efficiency, and give an outlook of high quality to healthcare institutions. The topicality of the research topic is related to the growing advantages of using digital marketing, which allows to reach consumers more conveniently and quickly, including regarding paid healthcare services. The goal of the research is to identify which digital marketing tools positively influence consumer choice and promote the purchase of paid healthcare services. The main research question is: Which digital marketing tools resonate the most with consumers? The main tasks of the research are: to analyse theoretical aspects and scientific literature on digital marketing as a marketing communication tool and to conduct a consumer survey on the impact of digital marketing tools on decision-making regarding paid health care services. The research used the monographic method, the secondary data analysis method, the quantitative analysis method by surveying respondents online. A total of 27 sources of information have been used, including literature, scientific papers, laws, internet resources. The research data were analysed in four cross-sections – by age, gender, education and income level. The limitation of the study is the age of the respondents, only respondents aged 18 years or older took part in the study, when they have the opportunity to independently make decisions related to their health. The study is still in progress. Based on the opinion given by the respondents so far (sample set n=793), it is possible to determine a trend and formulate a hypothesis for further research. The consumption of digital tools changes as the respondents' level of education increases, respondents with a higher education choose more tools than respondents with a lower level of education. Regardless of gender, income and education, respondents in the 18-27 age group are more influenced by digital tools than other age groups.

Research results and discussion

The authors have analysed theoretical aspects of digital marketing as a marketing communication tool and advantages of using digital marketing. As technologies become available to a larger number of people, digital marketing has changed the consumers' buying habits, giving them the following benefits. (1) Staying up to date. The digital marketing technologies allow consumers to follow a company's information. (2) Higher involvement. Thanks to digital marketing, consumers can engage in various activities of a company – for instance, visit the company's website, read information about products or services, make purchases online, provide feedback etc. (3) Clear information about products and services. Using digital marketing, consumers obtain clear information about products and services. The Internet provides comprehensive product information that consumers can rely on in making their buying decision. (4) Easier product comparison. Many businesses try to advertise their products or services using digital marketing to the greatest benefit for customers as they can compare different suppliers' products or services in a cost- and time-effective way (Bala M., Verma D., 2018). Customers do not need to visit multiple retail outlets to learn about products or services. As the digital marketing environment rapidly changes and develops, previous research related to this topic becomes irrelevant (Nikunen T., 2017). Unlike digital marketing, other types of marketing activities do not allow posting as much textual, analytical, graphical and visual

information about a company, its products or services in one place as necessary for building a positive image (Rosokhata A. et al., 2020).

The Internet as a means of communication is the best way to exchange information with consumers in a full-fledged way, generate demand, and set up a data exchange system – hence, the digitalisation of the business world has resulted in the emergence of digital marketing which is a key component in the adaptation of businesses to these changes. The purpose of using digital marketing is to respond to changes quickly and flexibly in the market and in the consumer needs through digital channels and tools. (Peter M. K., Vecchia M. D., 2021) Specifically, digital marketing communication deals with what is needed by or what needs to be advertised to the audience, and where the people to be addressed are (Wynne P., 2011).

Digital marketing communication has emerged as a natural response of businesses to take advantage of the dense concentration of consumers on the Internet. Some businesses are also able to use their own e-commerce platform but for the most part they use the Internet as a channel/environment within the framework of their communication strategy (Miklosik A. et al., 2019). Digital marketing makes it easier to make an educated, informed choice, as decisions are taken based on information (Tamal M. et al., 2021). For instance, one in every twenty Google search queries is information about health services, such as tips for health and wellbeing, symptoms of illnesses, nutrition tips etc. In order to appear on the first page of the Google search, one uses effective search engine optimisation (Cuomo M. T. et al., 2020).

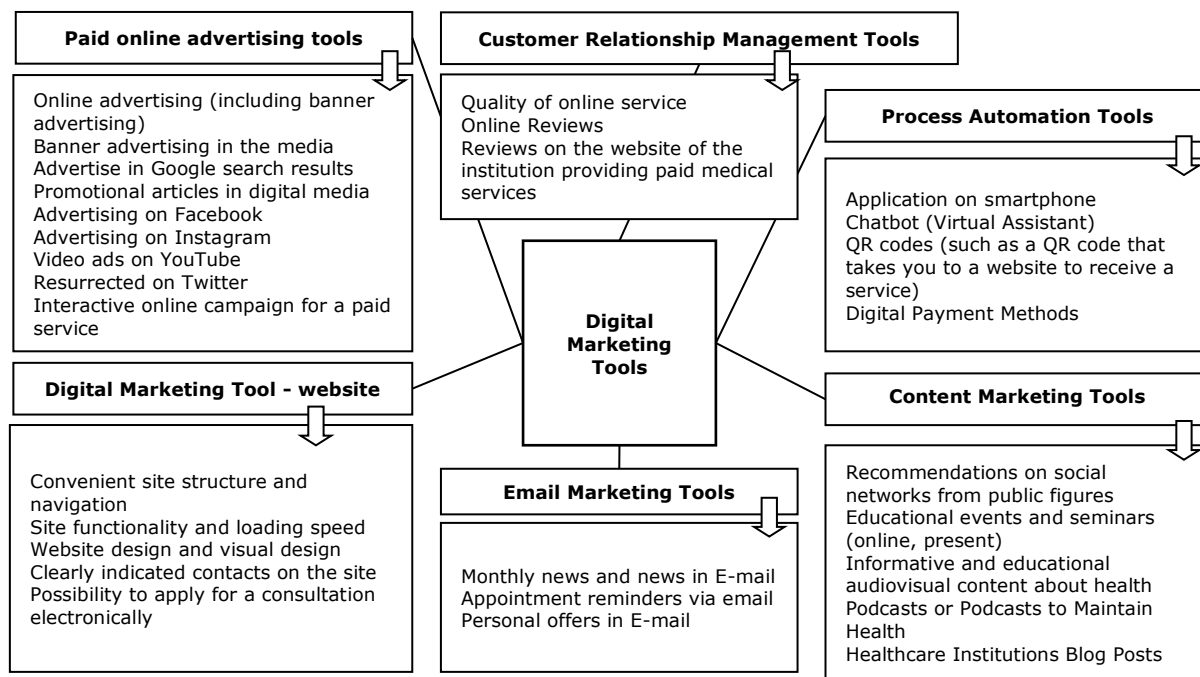
Nowadays, various organisations, including enterprises, hospitals, schools, professional associations, councils, and NGOs, use digital marketing as part of their marketing strategies and implementation programmes. Previous research shows that digital marketing gives businesses benefits and each digital marketing tool positively correlates with a sales increase (Yasmin A. et al., 2015). This indicates that all digital marketing tools contribute to an increase in the company's sales. Online advertising, e-mail marketing, social media and search engine optimisation (SEO) correlates very positively with a sales increase, whereas messages, branch marketing and pay-per-click (PPC) shows little positive correlation with a sales increase (Yasmin A. et al., 2015). While digital marketing has numerous advantages, there is a vast variety of digital marketing tools and, in order to choose the most appropriate digital marketing tools for a company, one needs to familiarise oneself with their classification and characteristics. The division of digital tools is extensive nowadays. Some authors divide them by content into paid and proactive, believing that marketing tools that create paid digital content (such as search engines, e-mail communication etc.) are currently more influential than those that create proactive content (such as social media) (Ercan T., Cizmeci F., 2015).

For marketing communication tools that create paid digital content, as with traditional marketing communication tools (television, radio, newspaper, magazine etc.), a certain space in the digital environment is rented for a certain period at a certain fee. For digital marketing tools that create proactive content, there is a relatively high degree of interaction between businesses and consumers (Ercan T., Cizmeci F., 2015). These tools generate an environment where users can post their comments, criticism, or suggestions regarding specific issues. For this reason, it is necessary to continuously manage and check the proactive content.

The main benefits of social media for healthcare institutions are: 1) the possibility to give prompt answers to patients' questions; 2) a better understanding of patients, the problems they face in daily activities, their concerns, and outstanding needs; 3) the possibility to reach a large audience potentially interested in the organisation's services (Alma P. et al., 2015). In this context, most healthcare companies

have Facebook pages where tips for a healthy lifestyle, studies on new treatment methods or even interactive games are posted.

As Figure 1 shows, the review of scientific literature yielded a total of 29 digital marketing tools which were split into 6 groups (paid online advertising tools, website, customer relationship management tools, process automation tools, e-mail marketing, content marketing) (Bormane S., Putans R., 2022; Bormane S., Batraga A., 2018) by applicability to healthcare institutions for the promotion of paid services.



Source: authors' created based on theoretical findings

Fig. 1. Distribution of the identified digital marketing tools into groups according to the possibility of their use in health care institutions

Materials and methods

Use of digital marketing tools in promoting paid healthcare services. Trends of consumer behaviour. Next, based on the digital marketing tools identified in scientific literature, the study used the quantitative research method – a survey run online. The goal of the survey was to find out what digital marketing tools would substantially affect the patient's choice in regard to paid healthcare services, what communication channels would be the most convenient to patients for receiving information, and by what criteria patients choose paid healthcare services. The survey data were analysed in four cross-sections – age, gender, monthly income level (net), education, with a particular attention paid to generational differences, assuming that the preferred digital tools vary among generations: 1) Generation Z – aged 18-27 (starting from 18 because that is the age of majority when one can independently make decisions related to one's health); 2) Generation Y – aged 28-42; 3) Generation X – aged 43-64; 4) aged over 65 (the current age of retirement in the country) (Klauss K., 2020; Beresford Research, 2022; Youth Law, 2009; Law On State Pensions, 1996).

Income level was categorised on the basis that: 1) the minimum wage in the country in January 2021 is 500 EUR gross for normal working hours (Darzina L., 2020); 2) the median wage in the country as at 2021 is 940 EUR net (CV-online.lv, 2022); 3) the average wage (gross) is 1,280 EUR (LV portals [LV portal], 2021); 4) the minimum retirement pension is 149.60 EUR (VSAA, 2021). The respondents are working-age inhabitants of the Latvian capital Riga which, according to Riga city economic profile in January 2021 (Riga.lv, 2021), consist of 388,614 persons (the population). The sample with a confidence

level of 95% and a confidence interval 5% is 384 respondents whose opinion in the further research can be based on to find out the trends of consumer behaviour in terms of choosing paid health services.

The study is still in progress. Based on the opinion given by the respondents so far (sample set $n=793$), it is possible to determine a trend and formulate a hypothesis for further research; 59% women and 41% men took part in the survey. More than a half of the respondents have higher education (bachelor's and/or master's degree) and an income level above the minimum wage in Latvia, i.e. is in the ranges of 501-1,000 EUR and 1,001-1,499 EUR.

The study reveals that 94% of the respondents have received paid healthcare services at least once in their life, which means that paid healthcare services are in demand, mostly based on the recommendation and availability of a certain specialist doctor. Price, too, affects the choice, but, according to the respondents, it is only the second most important criterion behind the specialist doctor who provides the service.

The results as to the impact of digital marketing tools on the choice of paid healthcare services show differences among respondent groups. For instance, for consumers aged 65 and above, the choice of paid health services is mostly unaffected by digital marketing tools.

Paid online advertising does not affect most respondents whereas, for instance, interactive online campaigns on paid health services positively affect respondents aged 18-27 and respondents with elementary education and higher education. It should be added that a cross-sectional analysis of the data by level of education shows that respondents with elementary education are affected by online advertisements, advertising banners in mass media, advertisements on social media (Facebook and Instagram). Furthermore, men are attracted by the aforementioned digital marketing tools more than women.

The results of the study indicate a trend that some respondent groups are affected negatively, deterred and dissuaded from purchasing paid healthcare services by digital marketing tools. For instance, within the digital marketing tool subgroup of paid online advertising tools, advertising banners negatively affect respondents aged 43-64 with income above 1,500 EUR, while advertising banners in mass media negatively affect respondents aged 18-27 with income below 500 EUR, and those aged 18-27 with income between 501 and 1,000 EUR are negatively affected by advertising on Google, and advertising articles in mass media. Interestingly, those of the same age group (18-27 years) but with higher income (over 1,500 EUR) are deterred in their choice of paid healthcare services by advertising on Instagram, online advertising etc. It should be added that online advertising tools – advertising banners, advertising on Google, advertising articles, and advertising on YouTube – particularly deter the purchase of paid health services for women aged 18-27 with income above 1,500 EUR.

In contrast, e-mail marketing tools and reminders of appointment positively affect the choice of the respondents as regards paid healthcare services. It can be concluded from the study that personalised offers and monthly newsletters by e-mail encourage the purchase of paid healthcare services for respondents with secondary and higher education and those aged 28-42, especially men. Older women with higher education, in turn, are affected positively in their choice of paid health services by reminders of appointment and personalised offers. Overall, for women of all ages regardless of income level, the choice of paid healthcare services is positively affected by reminders of appointment by e-mail. Online service quality and online reviews particularly encourage the purchase of paid healthcare services for respondents with higher education. Customer relationship management tools affect the choice of paid healthcare services for men aged 18-27 with income between 1,001 and 1,499 EUR, and online service quality encourages men aged 43-64 with income above 1,500 EUR. Overall, regardless of gender, online

reviews positively affect the respondents more than reviews on the institution's website. The study identified the option to book appointment online, website functionality/loading speed and convenient website structure and navigation as the most conducive to the choice of paid healthcare services. As concerns process automation tools, the respondents (especially those with secondary and higher education) have indicated mobile application, QR codes and digital payment options as tools conducive to the choice of paid health services. The respondents (especially men with higher income across all age groups) are sceptical towards the impact of chatbots or virtual assistants on their choice. Women, in turn, see the impact of process automation tools as neutral and rather positive.

The overall trend is that as the channel through which it is most convenient to receive information about paid health care services, respondents choose the website of the health care institution, e-mail and social networks, while the least respondents choose such channels as text messages, online advertising, incl. on various websites, etc., as well as in the mass media. Some respondents indicated that they do not like to be bothered unnecessarily, and if necessary, they search for the information of interest on paid health care services themselves.

The most important criteria for respondents when choosing paid health care services are a specific doctor-specialist who performs paid health care services, the price of the paid health care service and a recommendation from a doctor-specialist. As the least important criteria, the respondents indicated advertising (TV, radio, newspapers, outdoor advertising), health care facility environment, online reviews, online reviews of a paid service.

Mainly, the trend shows that the use of digital tools does not negatively affect the choice of paid services offered by the hospital – the usage of digital tools improves the choice of paid healthcare services, so the use of various digital tools in the digital marketing activities of healthcare institutions is evaluated positively. It can be concluded that the influence of digital tools on the choice of paid healthcare services for men and women varies in different age groups, which should be taken into account when promoting a particular paid healthcare service using digital marketing tools. The consumption of digital tools changes as the respondents' level of education increases, respondents with a higher education choose more tools than respondents with a lower level of education. Regardless of gender, income and education, respondents in the 18-27 age group are more influenced by digital tools than other age groups.

Conclusions, proposals, recommendations

- 1) The results of the study show that the respondents are least affected in their choice by paid online advertising tools, followed by process automation tools and content marketing tools, and most affected by website, followed by customer relationship management tools and e-mail marketing tools. Importantly, across the four respondent groups (gender, age, education, income), there are differences as to the impact of digital tools on the choice of paid healthcare.
- 2) Digital marketing continues to develop and expand its presence in the daily life of people. Specifically, one of the main impact factors is the extensive development of information and communication technologies in the private and public sector. Furthermore, the COVID-19 pandemic has unexpectedly become a digital accelerator, as businesses and markets were forced to adapt to the limited mobility. In the course of time, the concept of digital marketing has evolved and developed. Currently, digital marketing is a complex of philosophy, strategies and tools for marketing activities and interaction with computer networks that allows to conduct market survey as well as transport, sell and purchase goods and ideas. The use of digital marketing enables businesses to be flexible and adapt to

changes in the external environment, build effective relationships with their consumers, and respond more to their needs and understanding.

3) It has been identified that businesses use such digital marketing tools as search engine optimisation (SEO), content marketing, process automation, e-commerce marketing, campaign marketing and social media marketing, social media optimisation, direct marketing by e-mail, e-books, QR codes, applications, optical discs and games etc., and those were split into six groups – online advertising, content marketing, website, e-mail marketing, customer management tools, and process automation tools.

4) The use of digital tools does not negatively affect the choice of services offered by hospitals – digital tools are rather neutral or conducive to the choice of paid healthcare services. Thus, their use in digital marketing activities of a hospital is rated positively. Most healthcare institutions actively use their website, much fewer of them pursue communication in the digital environment. Private clinics, especially health centres, use much more digital tools than municipal and state healthcare institutions – paid online advertising, podcasts.

5) The most important criteria for the respondents when choosing paid healthcare services is the specialist doctor who provides the paid healthcare service, the price of the paid healthcare service, and recommendation from a specialist doctor. The criteria indicated as the least important are advertising (TV, radio, newspapers, outdoor advertising), healthcare institution environment, online reviews. 94% of the respondents have at least once used paid healthcare services. 36% of those have visited a specialist doctor for a consultation, 31% have had a medical examination (RTG, USG etc.), 20% have used rehabilitation services, 10% have had operations, and 2% have used other services, such as dentistry, laboratory tests, obstetrics.

6) The consumption of digital tool changes depending on level of education – higher educated respondents use more tools than lower educated respondents. Irrespective of gender, income and education, respondents aged between 18 and 27 are more affected by digital tools than other age groups. In contrast, respondents aged over 65 are practically unaffected by digital tools, except some cases at a certain level of education and income or depending on gender.

7) The impact of digital tools on the choice of paid healthcare services varies for men and women of different age groups. For men, the choice of positively affected by content marketing tools, whereas women are more affected by paid online advertising tools. The respondents' choice of paid healthcare services is positively affected the most by clearly indicated contact details, the option to book an appointment on the website, online service quality, and website functionality and speed, and the least by such tools as advertising on Twitter and advertising banners in mass media.

8) The most preferred channel for receiving information about paid healthcare services is the healthcare institution website, e-mail, and social media, while channels like messages, online advertising (including various websites etc.) and advertising in mass media are the least preferred. Some respondents indicate that they prefer not to be disturbed and look for information about paid healthcare services themselves when necessary.

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PROPERTY AND CASUALTY INSURANCE MARKET: ASSESSMENT OF TRENDS AND FRAUD CASES IN LATVIA VS EUROPE

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Abstract. Property and casualty insurance as an umbrella term encompasses various insurance products that cover the risks of damage caused to the assets and provide the liability insurance. As insurance business is related with money people have always tried to perform illegal activities to earn extra income. Insurance fraud as a type of financial crime has existed since the origination of commercial business. Therefore, insurance fraud, its identification and prevention is one of the most topical and essential problems in the insurance industry. The research aim is to assess property and casualty insurance market trends in line with the insurance fraud. The research mainly applies the monographic descriptive method as well as the methods of analysis and synthesis. Content analysis is used to study case laws and analyse insurance fraud cases. The research results demonstrate that in Latvia, the annual amount of compensations paid by insurance companies due to fraudulent claims may range between EUR 7.55 million (in case of 5% fraud) and EUR 30.10 million (in case of 20% fraud). Yet, 20% of fraudulent cases might basically refer to the recent pandemic years like 2021 and 2022. The most popular and serious insurance fraud cases relate to a car theft, staged accidents, submission of false documents and hidden actual causes of the fire in property insurance. The analysed court cases report fine, forced labour and even imprisonment as penalty measures for the committed insurance fraud.

Key words: property and casualty, gross premiums written, gross claims paid, insurance fraud.

JEL code: G22, G52

Introduction

The insurance business is a significant segment not only of the financial system but also social, economic and legal systems. The essence of insurance is to overtake risks from policyholders and eliminate financial uncertainty in case of occurrence of unforeseen circumstances. Insurance being a financial system indirectly promotes dishonest customers to perform illegal activities to earn extra income. More often fraud attempts occur in motor and property insurance business lines, as they are the most popular ones. Trends in insurance fraud vary consistent with the economic situation. In Latvia, there are few studies on insurance fraud; though, some relate to the research on illegal activities in insurance sector (Alfejeva, 2012, 2016). Spilbergs et al. have studied impact of COVID-19 on the dynamics of MTPL (motor third-party liability) insurance premiums and claims (Spilbergs, Fomins, Krastins, 2021), while foreign researchers have more concentrated on insurance fraud studies (Bieberstein, Schiller, 2018; Derrig, Johnston, Sprinkel, 2006; Weisberg, Derrig, 1991). Viaene et al. (2007) have studied strategies for detecting fraudulent claims especially in motor insurance sector but Adams et al. (2019) have emphasised underwriting performance in property and casualty insurance market. The present research is seen as a contribution to the research studies on property and casualty insurance market trends and fraud cases trying to fill in the gap in respective studies in Latvia. The research hypothesis is that insurance fraud as a serious criminal offence causes losses to insurance companies and increases the cost of insurance policies. The research aim is to assess property and casualty insurance market trends in line with the insurance fraud. Research tasks subject to the research aim are as follows: 1) to study the property and casualty insurance development trends; 2) to characterise insurance fraud and possible insurance fraud estimation; 3) to describe some fraud cases in Latvia.

The research mainly applies the monographic descriptive method as well as the methods of analysis and synthesis are used to study the trends and formulate regularities. Content analysis is used to study case

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laws and analyse insurance fraud cases. The information provided by Latvian Insurers Association, Insurance Europe and publications of foreign and national researchers and practitioners are widely employed for the purpose of the present research.

Research results and discussion

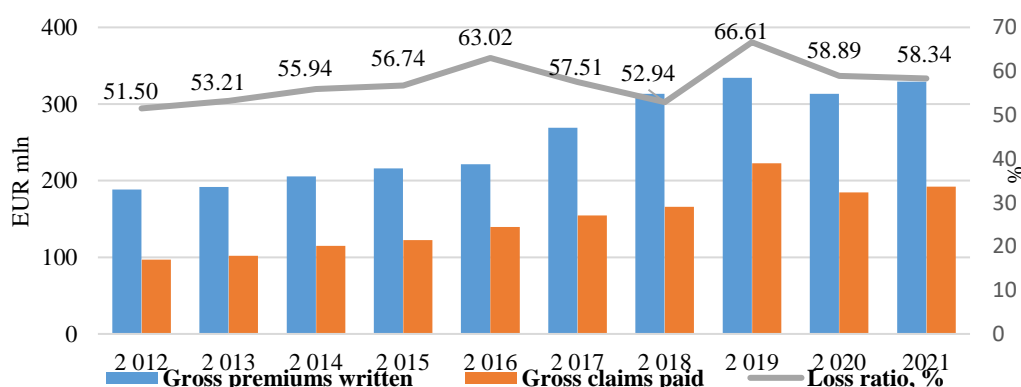
Property and casualty insurance development trends

The European Insurance and Reinsurance Federation or Insurance Europe defines property and casualty (P&C) insurance as an umbrella term which encompasses various insurance products that cover the risks of damage caused to the assets and provide the liability insurance (European Insurance, 2021). The basic groups of the P&C insurance include:

- 1) motor, incl. motor third party liability (MTPL) and motor own damage (CASCO);
- 2) property;
- 3) general liability;
- 4) marine, aviation and transport (MAT), incl. railway rolling stock, aircraft and ship ownership liability, aircraft hull and goods in transit;
- 5) other types of insurance such as legal expenses, credit and surety, assistance (travel) and miscellaneous financial losses.

MTPL is a compulsory insurance for all owners of transport vehicles, while CASCO is a voluntary type of insurance. In 2020, the three main insurance business lines in Europe as well as in Latvia were motor, property and general liability which accounted for 73%-91% of the P&C gross premiums written (Latvian Insurers Association, s.a.; European Insurance, 2021). The breakdown or classification of P&C groups may differ among the insurance associations or companies collecting statistics on insurance. Gross premiums written and gross claims paid are the main indicators demonstrating the demand for insurance services and activities of insurance companies. Gross premiums written are total amount of premiums written by an insurer including reinsurance and other commissions, while gross claims paid mean total amount of claims paid including proportion of claims paid by reinsurers and changes in technical reserves (Glossary, s.a.).

Figure 1 reflects the dynamics of gross premiums written, gross claims paid and loss ratio in P&C business line in Latvia.



Source: Latvian Insurers Association, s.a. and authors' calculations

Fig. 1. **Gross premiums written and gross claims paid (EUR mln), and loss ratio (%) in P&C insurance in Latvia for 2012-2021**

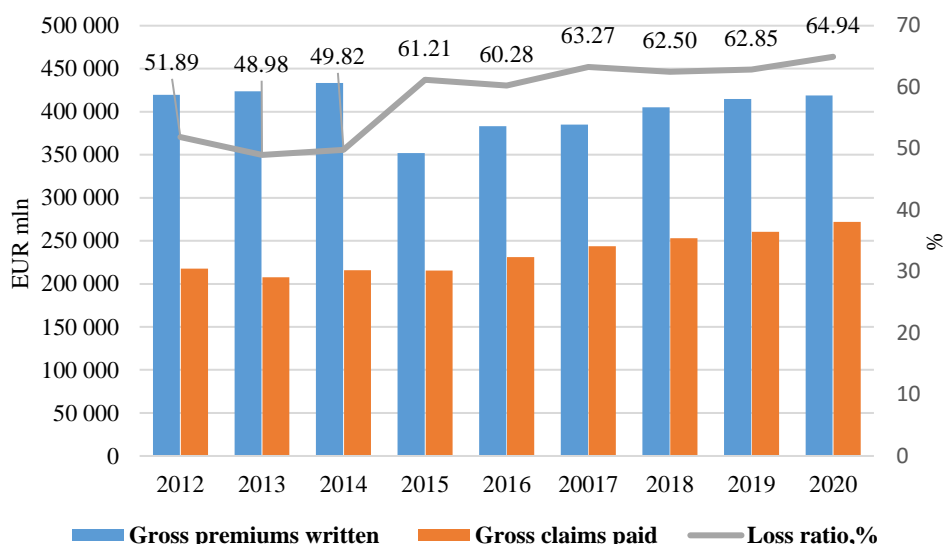
The amount of gross premiums written has quite steadily increased till 2016 with an annual rate of increase 4.14% on average. In 2017, gross premiums written experienced the fastest increase within the

period analysed by 21.50% compared with the previous year. The increase was mainly achieved thanks to the growth in marine and motor insurance (81.68% and 42.86%, respectively). The year 2022 was the only year when insurance sector reported a drop in gross premiums written. Total decrease in the P&C insurance sector accounted for 6.28% basically due to a big drop in assistance (travel) insurance – by 44.68%, marine insurance – by 44.52%, railway rolling stock insurance – by 25.71% and motor insurance – by 13.64%. The COVID-19 pandemic has been the most significant factor impacting the decline in travel insurance. In contrast, the amounts of ship ownership liability, aircraft ownership liability and aircraft hull have grown by 198.22%, 61.94% and 47.89%, respectively. However, the percentage of these business lines in total P&C insurance are small and the increase in their amounts of premiums cannot compensate for the decrease in the major business lines. In 2021, the decline continued in marine insurance (43.56%), railway rolling stock insurance (12.14%) and motor insurance (11.49%). After softening of the COVID-19 restrictions in summer, people resumed travelling, and thus, assistance (travel) insurance increased by 30.42% compared with the year before. The proportion of travel insurance is approximately 1.5% of total insurance market. Latvia is among those European countries that experienced a moderate negative impact of the COVID-19 pandemic in 2020 (COVID-19 negatīva ietekme ..., 2022).

The amount of claims paid has also increased during the period analysed; though, the growth has been uneven reaching the highest rate of increase in 2019 (34.31%) and equalling to EUR 222.62 million. The largest increase was reported in property insurance, where the amount of claims paid grew by 163.25% compared with the previous year. In 2019, historically the largest property compensation in the amount of EUR 36.9 million was paid to an IT company SIA "Mikrotikls" for the warehouse building and the goods in it destroyed by the fire (Balta 2019. gadu nosledz ..., 2020). This was an unprecedented case, since it was the largest indemnity case ever registered to any insurance company in the Baltic States (Apdrošināšanas nozāres krīzes ..., 2020). Large increase was demonstrated also in marine insurance sector where the amount of claims paid grew by 188.77%. However, in absolute figures the increase was EUR 2.55 million. After such tremendous increases, insurance statistics show a decrease in the following year. In 2020, EUR 184.48 million were paid out in compensations which is a decrease by 17.13%. The largest decline was reported in property insurance by EUR 32.24 million or 41.59%, suretyship – by EUR 9.75 million or 89.75%, while credit insurance experienced even a rocketing growth 5.6 times. In general, credit insurance sector demonstrates very fluctuating trend by years, so sharp increases or decreases in this sector have to be evaluated with a precaution. In 2021, total amount of claims paid has increased by 4.12% amounting to EUR 192 million.

Gross loss ratio is expressed as percentage of the gross claims paid divided by gross written or earned premiums (Glossary, s.a.). In property and casualty insurance, loss ratio ranges between 40% and 60% (Brown, Gottlieb, 2007). The lower the gross ratio, the greater potential profitability of the insurance company, since the amount of money paid as claims is less than the amount of written insurance premiums or money to be received. In Latvia, the gross loss ratio has ranged between 51.50% (in 2012) and 66.61% (in 2019) which means that the ratio has been within the theoretical limits the entire period analysed, except for 2019, when the historically highest compensation was paid out in the property insurance business line. The average gross loss ratio has been 57.47% meaning that a bit more than 50% of gross written premiums are paid out as compensations.

Gross premiums written and claims paid in the P&C sector in Europe are reflected in Figure 2. Similar to the analysis of the respective indicators for Latvia, the figure also shows the dynamics of the gross loss ratio.



Source: *European Insurance ...*, 2022, *P&C Insurance, 2022* and authors' calculations

Fig. 2. **Gross premiums written and gross claims paid (EUR mln), and loss ratio (%) in P&C insurance in Europe for 2012-2020**

In Europe, a sharp decrease in gross premiums written was observed in 2015, when the indicator dropped by EUR 81.40 billion or 18.78%. Liechtenstein, the Netherlands and Ireland are the three countries which have reported the largest decline in gross premiums written (99.89%, 73.65% and 42.53%, respectively). The only explanation for the extreme drop in total gross premiums written in Liechtenstein from EUR 865 billion to almost EUR 1 billion might be the lack of data. The largest positive growth was registered in Latvia (37.69%) and Iceland (17.19%). According to Insurance Europe, in 2015, Germany, the UK, France and Italy which are among the largest insurance markets have increased their share of total P&C insurance in Europe from 64.1% to 64.5% (European Insurance ..., 2016). In Italy, the decline in motor premiums by 5.26% led to a decrease in total gross P&C premiums by 25.69%. The motor insurance line is a very significant P&C business line in Italy, since its proportion is almost 56% of all non-life insurance premiums (European Insurance ..., 2016). The following year, the amount of gross premiums written grew by 8.90% mainly thanks to the market improvement in the UK (41.38%), Denmark (40.86%) and Iceland (23.89%). The other European countries have experienced a smaller growth from 0.37% (Sweden) to 19.57% (Turkiva). Some countries like France and Latvia have reported decline in 2016 (European Insurance ..., 2016, 2022).

Gross claims paid have demonstrated the largest increase in 2016 by 7.25%. Luxembourg and the UK were the biggest contributors to this growth, where the compensations paid increased by EUR 1.63 billion or 350.45% and EUR 27.94 billion or 107.95% respectively due to the increased amounts of claims paid in motor and property business lines.

In 2020, both gross premiums written and gross claims paid have increased compared with the previous year (by 1.06% and 4.44%, respectively) and slightly over the average rate of increase (0.30% and 2.83%, respectively) during the analysed period. Higher demand for insurance has been one of the reasons for growth. Another reason related to the growth in premiums was the increase in the value of buildings and assets (European Insurance ..., 2022). Although, the total amount of gross claims paid grew in 2020, the changes per business lines varied: so, the largest decrease was observed in the motor insurance, while the largest increase – in the property insurance. The changes were basically related to the Covid pandemic, since people were forced to stay at home due to the COVID-19 restrictions and they less used transport; yet, spending time at home resulted in higher property damage and performed home repairs.

The gross loss ratio in Europe has fluctuated between 48.98% in 2013 to 64.94% in 2020 which means that 58.42% of gross premiums on average were paid as compensations within the entire period. Another reason for a high loss ratio in 2020 is the fact that many natural disasters (floods and storms) happened this year causing growth in the property insurance claims.

Insurance fraud classification and estimation

Insurance fraud as a type of financial crime has existed since the origination of commercial business. The European Insurance and Reinsurance Federation indicates that insurance fraud is a victim crime (The Impact of ..., 2013). It is a significant crime that affects not only insurers but also policyholders, since the latter have to pay more for their policies to cover the losses incurred by insurance companies due to fraudulent activities committed by dishonest customers.

Fraudulent activities in insurance may be various depending on the development of insurance services and they may be encountered in any of insurance business lines. Nevertheless its long history, there is no single or uniform insurance fraud definition. Insurance Information Institute states that insurance fraud is any deliberate deception performed either by a customer, an insurance company or insurance agent in order to gain financial interest (Background on ..., s.a.). Many Internet sources and insurance companies define insurance fraud as a dishonest action when a person submits a false information to an insurance company to gain financial profit.

Insurance fraud includes:

- 1) provision of false or incomplete information when filling in insurance applications;
- 2) submission of an insurance claim containing misleading or false information (also exaggeration);
- 3) other untruthful or misleading activities (The Impact of ..., 2013).

The International Association of Insurers Supervision defines insurance fraud as activity which is intended to gain either dishonest or unlawful benefit (Application Paper ..., 2011). In general, the term *fraud* means an illegal act the consequences of which lead to sanctions. Regardless of possible serious outcomes in case of insurance fraud, insurers encounter suspicious and really fraudulent claims for insurance indemnities.

The consequences of insurance fraud may encompass:

- refusal to pay indemnity;
- cancellation of the insurance policy prior to the policy expiration date;
- reporting to the police;
- demand for covering extra expenses related with the involvement of experts for investigation of the case;
- restrictions or prohibition to obtain further insurance;
- prosecution and imprisonment;
- criminal record (The Impact of ..., 2013).

Insurance fraud is nothing unique; yet, the previous years with various restrictions due to the pandemic have broaden the activities and creativity of insurance frauduleuses.

The Insurance Information Institute has evaluated the COVID-19 impact on insurance business and concluded that the pandemic has caused reduction in fraud inspections and more cases of fraud due to increased amount of work of insurance companies (Insurance Fraud Report, 2023). The Institute releases biennial reports on insurance fraud analysis, including statistics on fraud detection. Hence, according to the

Report, if 18% of claims were suspected to be fraudulent in 2020, then the percentage of fraudulent cases has grown to 20% in 2022 (Insurance Fraud Report, 2023). The most common fraudulent claims included:

- false injuries;
- hiding or unrevealing of significant information;
- fake accidents;
- several claims on the same injury or accident;
- violation of employee claims (Insurance Fraud Report, 2023).

Insurers recognise that policyholders become more and more creative investing various fraud schemes to gain profit from insurance policies. So, in 2021, the most uncommon fraud schemes related to the theft of identity to submit unemployment claim, self-caused injuries, theft of a non-existing food cargo and damages caused by roofers to roofing materials or the whole roof covering in order to create situation so that the roof needs either be repaired or even fully replaced (Insurance Fraud Report, 2023).

Fraud and fraudulent claims are difficult to disclose; thus, estimates on insurance fraud may be disputable (Derrig, 2002). Bieberstein and Schiller (2018) in their study after the analysis of different authors have concluded that insurance fraud may range between 8% and 10% of all claims. Most frequently these estimates refer to motor insurance.

According to Insurance Europe, the number and extent of fraudulent cases vary among countries; yet, it may be estimated that up to 10% of all insurance claims are fraud cases (The Impact of ..., 2013). There have been no extensive studies on insurance fraud conducted in Latvia; yet, insurers also estimate that 10% of all claims paid are fraudulent (Abasins, 2016). Also, a representative of the insurance company "BTA Baltic Insurance Company" has admitted that the amount of fraudulent claims equals to 10% on average of all paid indemnities, while a representative from "Compensa Vienna Insurance Group UADB" remarks that cases where fraud has been detected account for no more than 1% of all claims (Cik izplatita ir ..., 2016). In general, most European countries estimate fraud between 5% and 10% of all annual paid indemnities.

Insurance Europe has collected data on several countries that aggregate information on insurance fraud and consistent with the statistics 1-3% of insurance claims are investigated for fraud in Belgium, 5-10% in Finland, 1% in Denmark, under 1% in motor insurance and under 1.5% in other P&C lines in France, around 1.9% in Italy and 2.1% in Portugal (Insurance Fraud ..., 2019). However, these are figures on claims investigated for fraud which does not say that they have been real fraudulent claims. The German Insurance Association estimates that fraud equals to 10% of expenditure of all claims and 7-16% of claims are treated as suspicious: the highest percentage of 16% relates to the general liability claims. Moreover, the average amount of fraudulent claims is very often larger than the average amount of real or honest claims (Insurance Fraud ..., 2019).

Alfejeva (2012) in her PhD Thesis "Criminal Law and Criminological Aspects of Insurance Fraud" states that the assessment of fraudulent claims may be based only on subjective or biased opinions of insurers. Every insurance company identifies fraud consistent with the fraudulent cases met in their practice; hence, the estimates differ. Alfejeva (2012) has calculated the possible amount of fraudulent claims of gross claims paid and possible costs of fraud to other policyholders based on minimum (10%) and maximum (33%) possible percentage of fraudulent claims. Table 1 reflects calculations and estimations based on Alfejeva sample (2012); though, the percentage of fraudulent cases ranges between 5% and 20% consistent with the recent estimations of insurers.

Table 1

Possible fraud estimation based on theoretical percentage of fraudulent claims in Latvia for the period 2012-Q3 of 2022

	Gross premiums written, EUR mln	Gross claims paid, EUR mln	Insurance fraud estimates 5% of gross claims, EUR mln	% of gross premiums written	Insurance fraud estimates 10% of gross claims, EUR mln	% of gross premiums written	Insurance fraud estimates 20% of gross claims, EUR mln	% of gross premiums written
2012	188.37	97.00	4.85	2.57	9.70	5.15	19.40	10.30
2013	191.75	102.03	5.10	2.66	10.20	5.32	20.41	10.64
2014	205.47	114.94	5.75	2.80	11.49	5.59	22.99	11.19
2015	215.91	122.52	6.13	2.84	12.25	5.67	24.50	11.35
2016	221.37	139.50	6.98	3.15	13.95	6.30	27.90	12.60
2017	268.98	154.69	7.74	2.88	15.47	5.75	30.94	11.5
2018	313.11	165.75	8.29	2.65	16.58	5.29	33.15	10.59
2019	334.22	222.62	11.13	3.33	22.26	6.66	44.52	13.32
2020	313.24	184.48	9.22	2.94	18.45	5.89	36.90	11.78
2021	329.24	192.09	9.60	2.92	19.21	5.83	38.42	11.67
2022 Q 3	284.41	165.04	8.25	2.90	16.50	5.80	33.01	11.61
Total	2 866.07	1 660.66	83.03	2.90	166.07	5.79	332.13	11.59
Average	260.55	150.97	7.55	2.88	15.10	5.75	30.19	11.50

Note: data for 2022 include information only for three quarters and data are preliminary

Source: authors' calculations based on Latvian Insurers Association, 2013-2022

According to the data of Table 1, the amount of compensations paid by insurance companies due to fraudulent claims may range between EUR 83.03 million to EUR 332.13 million for the entire period analysed with the average annual fluctuations from EUR 7.55 million (in case of 5% fraud) to EUR 30.10 million (in case of 20% fraud). Yet, 20% of fraudulent cases might basically refer to the recent pandemic years like 2021 and 2022. Insurers that have paid indemnities for fraudulent claims incur losses and to compensate for them very often other policyholders have to pay higher insurance premiums. The calculated percentage of fraudulent claims against gross premiums written demonstrates that honest policyholders may have to pay 2.88-11.50% on average more for their insurance policies.

Janis Abasins, the president of Latvian Insurers Association, suggests a different estimation of costs due to fraudulent claims. The year 2015 and all insurance business lines are taken as an example. Hence, consistent with the insurers estimates that 10% of all claims paid are fraudulent and EUR 217 million were paid as compensations, then EUR 21.7 million were defrauded. Next, assuming that approximately one-third of population (650 000 natural entities) have bought insurance services, each of these 650 000 insurance clients would have to donate almost EUR 34 (EUR 21.7 million divided by 650 000 policyholders) to cover the defrauded money (Abasins, 2016). This example truly shows how much any of us indirectly might pay to cover insurers losses.

Insurance fraud is a criminal and punishable activity. Insurance Europe distinguishes two categories of insurance fraud: soft such as exaggeration of the scale of damage or injury or provision of false information

and hard which is, for example, staged accident (Insurance Fraud ..., 2019). Every year in Latvia some cases are filed in court for insurance fraud. In 2016, Janis Abasins, the president of Latvian Insurers Association, indicates that the lack of separate article on insurance fraud in the Criminal Law hampers the effectiveness of insurance fraud investigation (Abasins, 2016). However, since this statement is the interpretation of a journalist it should be assessed with a precaution as the Criminal Law of the Republic of Latvia stipulates the liability for insurance fraud. Namely, Article 178 "Insurance fraud" directly prescribes criminal liability for "deliberate destruction, damage or concealment of one's own property" or "forcing or persuading another person to destroy, damage or conceal insured property or otherwise affecting it" in order to receive insurance compensation (Kriminallikums, 1998). This article regulates criminal offenses against property. Lawyers providing profound comments on Article 178 explain insurance fraud as a special type of fraud which is an intentional activity to destruct, damage or conceal one's property to receive the sum of insurance (Krastins, Liholaja et al., 2019). Though, the authors of present research indicate on inaccuracies in the before-mentioned comments, namely, submitting an insurance application, a person is applying for the insurance indemnity or compensation not the sum of insurance. In addition, the lawyers emphasise that it is essential to determine the ownership of property under this specific norm, since only fraud that is committed with one's own property may be considered as an insurance fraud (Krastins, Liholaja et al., 2019). In other cases, the committed action is qualified as fraud consistent with Article 177 or 180 of the Criminal Law. Kolomijceva (2016) points an attention to the fact that in the case of insurance fraud, criminally acquired property will be only the property related to the offense but not legally obtained and hidden belongings of the perpetrator.

Alfejeva (2012) in her PhD Thesis concludes that the objective side of insurance fraud has been very narrowly defined in Article 178 of the Criminal Law. Moreover, the researcher indicates on the situation when insurance fraud may not be qualified as fraudulent case if there has been an attempt to defraud compensation in the insurance of a person. Nevertheless, worldwide this is considered to be an insurance fraud (Alfejeva, 2012). Summarising the previously analysed facts on insurance fraud, it shall be admitted that the submission of the insurance application is the only unbiased factor indicating on the intention to defraud insurance indemnity.

Analysis of fraudulent cases

In Latvia, there is very few information in mass media on insurance fraud cases, the most recent information dates back to 2016. Representatives from several insurance companies have indicated that most popular and at the same time most serious insurance fraud cases relate to a car theft, staged accidents, submission of false documents, hidden real causes of the fire in property insurance, taking damaged cars to false places of accidents and spreading around extra glasses to imitate car accident, deliberate pushing of a car into the water etc. (Cik izplatita ir ..., 2016). A representative from the insurance company ERGO specifies that most frequently the company encounters fraud attempts in MTPL business line, especially when an insurance claim has been submitted some days after the purchasing of the compulsory third-party motor liability insurance policy. In such situations, more than 50% of cases raise suspicions on possible insurance fraud (Cik izplatita ir ..., 2016).

Dr.iur. Jelena Alfejeva emphasises that lately very few court proceedings have been initiated due to insufficiency of evidence or statute of limitations. Insurers are not interested in reporting of detected insurance fraud cases and starting a criminal proceeding. Instead, they refuse paying the compensation (Alfejeva, 2016). This means that information on fraudulent cases becomes unpublished statistics of insurers and unavailable to public for the analysis.

However, the cases which have been subject to legal proceedings and the court has pronounced a sentence are available as anonymised court judgments. The research authors have described some of the cases. The most recent one refers to March 2023 when Person A being the owner of insured property persuaded another person to destroy this property and later the accused person deliberately destroyed the property itself by setting fire to the insured property in order to receive a large insurance indemnity (Senata Kriminallietu ..., 2023).

Another case refers to Person K who concluded an insurance agreement for the insurance of a residential house. The insurance agreement stipulated that the insurance indemnity of EUR 10 000 should be paid out in the event of a fire to Person K who, promising to pay, persuaded another person to burn down its residential house. Person K did not inform the hired arsonist that the fire was done with the intention of being able to receive insurance indemnity from the insurance company ERGO. Person K was found guilty of the crime under Part 2 of Article 178 of the Criminal Law and sentenced to imprisonment for five months (Gulbenes rajona tiesas ..., 2017).

The most widespread insurance fraud cases are encountered in motor insurance. Hence, Person B who had insured a passenger car registered on its name agreed with two other persons to commit a fraud on a large scale, i.e. to stage the theft of a passenger car Mitsubishi Pajero (pledged to the JSC "GE Money") and later report to the police and the insurance company on the theft. The insurance agreement prescribed the payment of the insurance compensation to the JSC "GE Money". It was envisaged to dismantle the car itself into spare parts. As a result of the fraudulent actions, Person B would be exempted from the loan payment to the JSC "GE Money" (as the loan was taken to purchase the car) and other persons involved in the crime would receive payment for committing fraudulent activities and income from selling spare parts. All persons were found guilty in accordance with Part 3 of Article 178 of the Criminal Law. Person B was sentenced to imprisonment for 2 years and 5 months as well as the other persons were sentenced to imprisonment (Rigas apgabaltiesas ..., 2015).

Person C had concluded a motor insurance agreement with the insurance company "Balta" for the insurance of a car Mercedes Benz CLK 320. The insurance agreement provided for the payment of an insurance indemnity of EUR 5 700 in case of the car theft. Person C persuaded person D to hide the car. Person C was found guilty of committing a criminal offense provided for in Part 1 of Article 178 of the Criminal Law (for concealing one's property in order to receive the insurance indemnity) and Person D was found guilty of committing a criminal offense provided for in Part 4 of Article 20 and Part 1 of Article 178 of the Criminal Law (for supporting another person to intentionally destroy its property in order to receive the insurance indemnity). The court decided to recover compensation for the damage in favour of the insurance company "BALTA" jointly and in solidarity from both persons. Person C was sentenced to forced labour for 200 hours and Person D was sentenced to temporary imprisonment for three months (Jelgavas tiesa ..., 2015).

Similar insurance fraud was committed by Person S who had concluded a motor insurance agreement with the insurance company "Baltijas Apdrošināšanas Nams" or BAN for the insurance of a car VW Passat. In this case, the insurance agreement provided for the payment of an insurance indemnity of EUR 12 000 in case of the car theft. After having hid its car, Person S reported to the police on the theft of the car and submitted an insurance claim application to the insurance company in order to receive the insurance indemnity. Person S was found guilty under Part 1 of Article 178 of the Criminal Law and fined in the amount of seven minimum monthly wages (Kraslavas rajona tiesas ..., 2013).

The analysis of court decisions reveals that there are cases when a guilty person has been encouraged and advised by other persons to commit a crime in order to claim for the insurance compensation. So

Person E in order to receive the insurance indemnity of EUR 8 537 in case of the theft of a car handed over the car to its acquaintance and reported to the police for the car theft. Person E also submitted an insurance claim application to the insurance company "Baltikums". Person E was found guilty of committing a criminal offense under Part 1 of Article 178 of the Criminal Law and sentenced with forced labour for 60 hours (Liepajas tiesas ..., 2014).

Types of sentences imposed by the court differ on previously committed crimes, law violations and whether the insurance fraud was committed under extenuating or aggravating circumstances.

Conclusions, proposals, recommendations

- 1) Property and casualty insurance includes insurance products that cover the risks of damage caused to the assets and provide the liability insurance.
- 2) Gross loss ratio determining the relation between gross premiums written and gross claims paid shows that 57.47% on average of gross written premiums are paid as compensations in Latvia. The respective figure in Europe accounts for 58.42% for the period of 2012-2020.
- 3) In Latvia, the annual amount of compensations paid by insurance companies due to fraudulent claims may range between EUR 7.55 million (in case of 5% fraud) and EUR 30.10 million (in case of 20% fraud). Yet, 20% of fraudulent cases might basically refer to the recent pandemic years like 2021 and 2022.
- 4) The calculated percentage of fraudulent claims against gross premiums written in Latvia demonstrate that honest policyholders might have to pay 2.88-11.50% on average more for their insurance policies.
- 5) The most popular and serious insurance fraud cases relate to a car theft, staged accidents, submission of false documents and hidden actual causes of the fire in property insurance. Insurance fraud is a victim crime and a criminal liability is prescribed for it. The analysed court cases evidence fine, forced labour and even imprisonment for the committed insurance fraud.
- 6) The research hypothesis has been proved as the insurance fraud causes losses to insurance companies and costs of insurance policies may increase due to fraudulent insurance claims.
- 7) Latvian Insurers Association should collect information on fraud insurance cases from the insurance companies and provide information either in annual reports or mass media to inform the policyholders on possible consequences of intentional fraud activities.

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IMPLEMENTATION OF PROJECT MANAGEMENT STAKEHOLDER MATRIX IN SOCIAL ENTERPRISES IN LATVIA

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Abstract. Over the past decade, the role of social entrepreneurship has increased rapidly. The driving force of the social enterprises is the successful project management and ability to use various tools to further improve the work with stakeholders. Project management, unlike management in general, is a continuous process that has a specific end result that is limited in time and finance and is the key differentiator of project management from management. There are many project management programs and tools available; however, social entrepreneurs are unaware of or reluctant to implement them. It is estimated that there are altogether approximately 300 management tools available in the world (Rudder, 2022). One of such tools is project management stakeholder matrix.

The aim of the paper is to determine the awareness of the project management stakeholder matrix in social enterprises in Latvia. To achieve this aim, the following steps are determined: to provide a theoretical explanation of project management in the context of social entrepreneurship and empirically obtained information to identify the awareness about project management stakeholder matrix in social enterprises in Latvia. The paper employed quantitative research - surveying social enterprise project managers in Latvia. One of the tools that helps improve social entrepreneurs project management and achieve project goals is a stakeholder analysis of the project. The knowledge about the project management stakeholder matrix helps social entrepreneurs to increase the security to deal with low use of digital tools capacity in the team and allows better management of the project team.

Key words: project management, social enterprise, social entrepreneurship, project management tools.

JEL code: L32, O22

Introduction

Social entrepreneurship has evolved as a research domain of great significance for organizations and researchers. Several issues such as poverty and human welfare have motivated various organizations to conduct business with an embedded social drive (Gupta et al., 2020).

Social entrepreneurship brings social change, and social entrepreneurs do not expect direct financial benefit from their clients. Persons involved in the entrepreneurship have a social function, they have a mission to create social value rather than generate private income. Economic value created by an entrepreneurial venture cannot be easily separated from the social benefits, as social and commercial activities unite and become intertwined in the "real typical" center of the continuum. Moreover, as defined within the larger system, entrepreneurship, opportunity, and philanthropy generate a sustainable cycle for social as well as economic, institutional development. Social enterprises merge the pursuit of public social goods with the market-aligned tools and techniques of for-profit organisations. Thus, social enterprises essentially function at the boundaries of the traditional philosophies of those organisations (Gupta et al., 2020).

Due to lack of resources, including human resources, administrative capacity and funding social enterprise managers often act as social project managers in Latvia. In accordance with the latest data on social entrepreneurship in Latvia, almost half of social companies are small companies - 44% of social companies employ two or more up to five employees (Informative report on..., 2022). Therefore, project managers of social enterprises need more than just knowledge of the project management in its classical sense and the skills to apply it in practice, but must also consider the unique features that are most often characteristic of social enterprise projects - creating social change or helping certain groups of society while being able to follow targeted project management methods and steps.

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"Public policy center PROVIDUS" and "Civil Alliance of Latvia" association in the study "Latvia on the road to social entrepreneurship" concluded that the biggest development challenges of Latvian social entrepreneurs are that social entrepreneurs have an idea and a social problem they want to solve, but they have insufficient management skills and business thinking (Lesinska et al., 2012), which can be attributed not only to social business management, but also to social enterprise project management. As a support and assistant for the management of social enterprise projects, various tools can be used like - Google Drive/Docs, Goal Tree, Problem tree, Stakeholder Map, Gant chart, information platforms, project management stakeholder matrix etc. International standard providing guidance on social responsibility (ISO 26000) defines a stakeholder as "an individual or group interested in any decision or in action" (What are stakeholders..., 2022). University of Virginia professor F. E. Freeman, who is considered the founder of the theory of the parties involved, expresses opinion that businesses and projects can only be considered successful if they deliver value to their stakeholders (Wright, 2022), and the company or project have the opportunity to create a long-term value only by considering the needs of all parties involved (Gregg, 2021). There are several methods of stakeholder analysis and visualization of the results, but the basis is to know identify and knowing the involved parties, which is also called a map or grid of the stakeholder parties involved, with different interpretations of it. Therefore, the paper states that embedding the stakeholder matrix in the social enterprise projects management of Latvian would help plan the progress of the project and predict its success points and potential failure, as well as improve social enterprise project management in general.

The aim of the paper is to determine the awareness of the project management stakeholder matrix in social enterprises in Latvia. To achieve this aim, the following steps are determined: to provide a theoretical explanation of project management in the context of social entrepreneurship and empirically obtained information to identify the awareness about project management stakeholder matrix in social enterprises in Latvia. For this reason, there are following research questions of the paper.

- How do Latvian social enterprise project managers evaluate the importance of stakeholder matrix in achieving project goals?
- To what extent do social enterprises use the stakeholder matrix in their projects' management?

The paper employed quantitative research - surveying 80 social enterprise project managers in Latvia with the aim to find out the extent to which social enterprise project managers are using stakeholder matrix or other tools available for them and how social enterprise project managers generally evaluate the importance of the stakeholder matrix in achieving project goals.

Research results and discussion

Theoretical discussion on project management role in social enterprises

Project management, unlike management in general is a continuous process and it has a specific final result that is limited in time and finance and distinguishes project management from management. Project management implies processes, methods, skills, knowledge and application of experience to achieve specific project goals in accordance with the project acceptance criteria within agreed parameters (Harned, 2022). A project is a unique, temporary measure that is carried out to achieve the planned objectives that can be defined as an outcome, result or benefit and the project usually is considered successful if it achieves the objectives according to their acceptance criteria within an agreed time frame and budget. Time constraint, cost and quality are basic elements of the project:

- Time: start and end date of the project;

- Costs: how the necessary funds will be obtained and finances managed;
- Quality: how the conformity of results and project management processes will be ensured for the purpose (Harned, 2022).

The quality of the project management and investment in its provision are advantages that provide the achievement of the desired result more likely, ensuring the efficient and most beneficial use of resources as well as meeting the needs of the parties involved in the project. There is not one way or one specific method to manage all projects. Many organizations spend a lot of time making mistakes and adjusting their project management approaches to be most effective for a given project. Changing project needs and goals, new employees and knowledge are just some of the reasons why processes of the project implementation have to be adapted for each project individually. For this reason, a project manager needs a wide range of skills; often technical skills and certainly people management skills and good business acumen. It is important to follow the basic project management framework and steps that anyone should follow in project management. When researching sources for project management, most project management activities are organized in basic phases, with different names, tasks and results.

To successfully implement a social enterprise project and make it sustainable, it is essential to combine the efficiency of business sector projects with social entrepreneurship values (Pierce, 2019). And both paradigms - social and business - must be able to interact in one organizational unit, which can lead to different management challenges such as:

- in matters related to human resource management, for example, whether to choose more effective employees with experience in social enterprise projects or professionals with experience in commercial projects;
- how to define and evaluate the success of the social enterprise project - the social goal achievement is usually assessed using qualitative measures, which often makes it difficult to measure and compare achievements;
- the unique pressure faced by social enterprise projects - social purpose and business identity can be a source of conflict and even lead to competition between employees, especially when there are differences of opinion about the business importance in relation to social goals (Yaari et al., 2020).

These unique challenges could be overcome following 4 principles of social projects in business management:

- precise definition of social enterprise project goals;
- business defining goals;
- structuring activities that contribute to the achievement of these goals and selection of appropriate personnel and promotion of socialization processes of new employees, through training, pay;
- creating informal interactions between different employee profiles (Battilana, 2018).

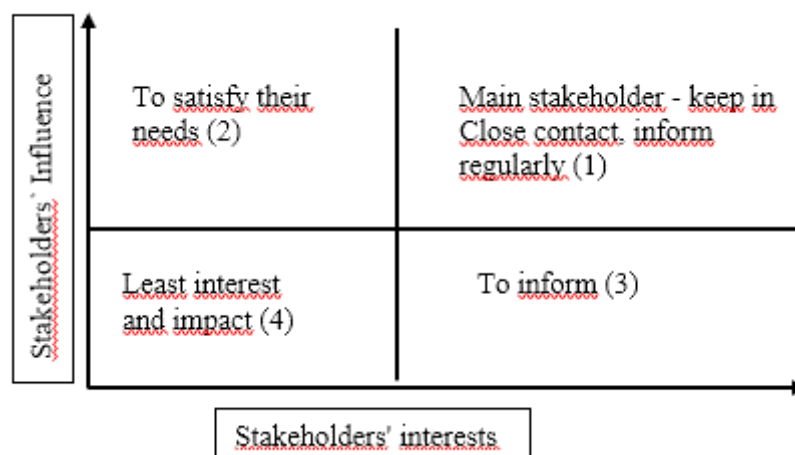
Creating a social enterprise or managing a social enterprise project is often an activity motivated by a specific person – a social entrepreneur - and centered on a social entrepreneur, his or her enthusiasm and initiative. There are few available studies in the sources that have been examined within the framework of the paper discussing which management style would be the most suitable for a social enterprise projects manager and would help overcome the challenges of social enterprise projects more successfully. For example, a project manager who is motivated and enthusiastic about formulating a project idea does not always appropriately manage the project in a way that is effective both in the short term and in the long term; therefore, social enterprise project management requires creative and innovative management

models and leadership styles characterized by understanding and competence in both areas – social and business (Yaari et al., 2020). Only relatively recent project management research has broadened its perspective, starting to look and analyze social impact-oriented projects in more detail; however, research in this area is still in its infancy, thus there is little empirical data on social enterprise project management. Running social enterprise projects requires experimentation; society must be involved as co-creators of the project and must be able to turn ideas into practice - participation is very important not only to share information about the project, but also to create social relationships between project team members and project stakeholders. Project managers of social enterprises also need to change their role from specific tasks leading to interaction and collaborative management (Constantinides, 2011).

Social enterprise project management requires a unique set of knowledge and skills in order to be able to effectively combine the achievement of social goals and quality of the project management-oriented activities within the project. It requires integrating appropriate stakeholders and proper analysis of them, starting with creating a list of stakeholders and proper analysis at a later stage. It is recommended to include the maximum of all possible stakeholders; this should primarily be done at the beginning of the project, but it is an ongoing process that should also be done during the project, because the parties involved in the project may change their priorities or opinion.

Each stakeholders' analysis is a snapshot of a particular point project timeline and by regularly repeating the analysis it is possible to see how the team (content) of the involved parties develops over time - who are the main parties involved; how do the needs of different parties are changed and also the relationship among them (Smith, 2020). The stakeholder matrix is one of the most frequently discussed analysis tool used to analyze project stakeholders and their priority to identify the activities that are necessary to align their goals.

A stakeholder matrix is a graphical version of stakeholder analysis and includes plotting stakeholders on the X and Y axis using two intersecting variables. The matrix lists each stakeholder in one of the quadrants of the four categories. Stakeholder analysis uses different X and Y axis definitions, depending on the purpose and content of the project (What Is ..., 2021). Commonly used X and Y axes that include the set of variables and show interests and impact of stakeholders on the project. (Fig. 1)



Source: Rozniece A., 2023

Fig. 1. Influence of the Impacts - Interests matrix

As can be seen in the Figure 1, in the Impacts-Interests matrix of the involved parties, it is necessary to identify stakeholders in the stakeholder listing phase by impact on the project in the 4 quadrants and plan stakeholder management accordingly and involving:

- which of the engaged parties can both help and hinder the achievement of the goal, and is really interested in the outcome of the project. They need to be most involved, and if this party can interfere with the achievement of the goal, the risks should be recognized and actions planned to prevent them in time;
- which stakeholders can help or hinder the achievement of the goal, but do not have an interest in the results of the project. It should be recognised that this person or organization needs are met, but too much effort may not be invested in informing;
- which stakeholders cannot help and cannot hinder, but are interested in achieving the project results. Because there is an interest, there is a need to inform them but not invest too much effort in informing these parties and in creating cooperation;
- which involved parties cannot help and cannot hinder, and are not interested in a results of the project - this stakeholder should be kept in mind, but invest a lot of effort in the creating of relationships is not priority (Handbook of social effects ..., 2022).

Latvian Social Entrepreneurship association has developed the Manual of nine practical tools for social entrepreneurs to analyze stakeholders and for effective planning of their social impact. The Manual distinguishes 9 methods that can be used to identify the range of stakeholders: problem tree, solution tree, stakeholder map, user experience research, theory of change, list of impact indicators, list of research methods, social impact management plan and organizations model canvas.

Overall, the stakeholder matrix is a simple tool that can make the involved stakeholder analysis easier to understand; the use of stakeholder matrix in project management has several advantages.

- The matrix visualizes the most important criterion of the main stakeholders for the project and such a visual aid can be a useful stopping point for the project management team to manage the project.
- It allows to structure the stakeholders involved using only a few variables and thus using the matrix is easy - although only two are used in the matrix variables, the quadrants and spacing of the parties involved can be adjusted between coordinates - this also allows to get a more accurate and customizable side representation without adding additional notes to the stakeholders involved.
- Creating a matrix requires minimal time and effort through various computer programs or online applications. (What Is ..., 2021).

Whatever the way and techniques of analysis and reflection of the parties involved is selected - in the form of a matrix or a table; created on the computer using standard document tools, online or in special programs, or drawn by hand, its purpose does not change - it is an analysis of priority stakeholders based on the needs of a specific project and criteria. Conducting stakeholder analysis is a way to ensure high quality project implementation and is often included in the company's quality management plans as one of quality requirements and standards that companies should use in project management to evaluate the quality of the results according to the documented requirements and demonstrate how the project shows this quality compliance (Taurina, 2010).

Empirical considerations of project management role in social enterprises

The paper employed quantitative research - surveying 80 social enterprise project managers in Latvia with the aim to find out how social enterprise project managers generally evaluate the importance of the stakeholder matrix in achieving project goals. An invitation to fill an online questionnaire was sent to 174 social enterprises. According to the register of social enterprises of Latvia, as of 10.11.2022, there are 217 active social enterprises in Latvia. Analyzing the social enterprises available in the register contact

information, it was concluded that the general set - 217 should be reduced by at least 22 companies that cannot be reached using the specified contact information by e-mail. Accordingly, 195 companies are considered as the size of the general population in the analysis below. The invitation to fill the online questionnaire was sent out three times – on 07.11.2022, 14.11.2022 and 17.11.2022. Sending three times increased the chances of participating in the survey for a larger number of respondents; after the first and second mailings, respondents who had not completed the questionnaire were additionally contacted by phone to further increase the surveys reachability. As a result, 80 completed questionnaires were obtained. The number of respondents obtained in the survey, which is 41% of the general group, is sufficient for drawing conclusions with a certain margin of error.

As research data shows, there is a statistically significant difference in the use of project management tools between those project managers who use the Stakeholder matrix and others. As research data shows, only 10 of 80 project managers use the stakeholder matrix in their professional activities; most of those who use the Stakeholder matrix more often use the project management tools in general. Thereby one aspect that was confirmed by the research and that needs to be addressed is that large number of project managers do not use the project management tools – despite their positive attitude towards them.

Table 1

The relationship between the use of the stakeholder matrix and the use of project management tools

Name of tool	Chi-square value	p value
Google Drive/Docs	3.83	.429
Goal Tree	27.37	.000
Problem Tree	36.71	.000
Involvement Matrix	80.00	.000
Stakeholder Map	35.46	.000
Online meeting tools (Zoom, Google, Meet)	11.71	.019
Online blackboards (Miro)	10.71	.030
Specialized programs (Zoho, Asana)	23.05	.000

Source: Rozniece A., 2023

The most significant differences in the use of project management tools are in the use of Goal tree, Problem tree, Involvement Matrix and Stakeholder Map – these are used mainly by those project managers who use Stakeholder matrix.

Survey data of social enterprise project managers show that knowledge of the Stakeholder matrix is weak - 71% (57 respondents) of project managers of social enterprises have just heard about it for the first time and only 23 of 80 have heard about or know about it. The knowledge of the Stakeholder matrix is significantly related to the use of other tools – goal tree, problem tree and stakeholder road map, meeting tools, online boards, specialized programs; paid seminars, specific project using management websites and blogs to obtain information about project management tools. It was important to discover an awareness of stakeholder knowledge matrix with comparison of frequency of use of other tools.

Table 2

Awareness of the knowledge on the Stakeholder matrix with the frequency of use of different tools

		Knowledge of stakeholder matrix	
		Heard it for the first time	Knows, has heard
		Number of responses	Number of responses
Goal Tree	Once a month	2	1
	Rare	3	6
	Never	52	16
Problem Tree	Once a month	2	2
	Rare	4	8
	Never	51	13
Involvement matrix	Once a month	0	1
	Once a month	1	1
	Rare	2	5
	Never	54	16
Stakeholder matrix	Once a month	2	0
	Rare	3	5
	Never	52	18

Source: Rozniece A., 2023

As research data shows, project management stakeholder analysis tools are used very passively, even among project managers who have knowledge on this tool. The situation is alarming, because most of the surveyed project managers have never used stakeholder analysis tools.

Based on research data, those social enterprise project managers who know the stakeholder matrix, have obtained the information about it from project management tools websites.

Research data shows that knowledge of the stakeholder matrix improves social enterprises project manager's safety in dealing with employee motivation, low digital capacity to use tools in the team, as well as with the low risk tolerance in the project. Overall knowledge about the stakeholder matrix provides wider possibilities for the project management team itself as well as motivates those employees for whom social projects are very important - through this benefit, the added value of the stakeholder matrix can be explained in the implementation of the projects. The knowledge of the stakeholder matrix increases security in dealing with low capacity in use of digital tools by the team as well as low risk tolerance in the project in general.

Therefore, it was important to determine how social enterprise project managers generally evaluate the importance of the stakeholder matrix in achieving project goals.

Table 3

The role of knowledge about the Stakeholder Matrix in the evaluation of various attitudinal issues

Statements	Chi-square value	p value
Project management tools you are using improve the quality of the project.	3.71	.446
There are benefits of using project management tools in the project.	4.51	.341
It is important during the project to identify all the needs of involved stakeholders.	6.57	0.37
It is important during the project to implement all the needs of involved stakeholders.	3.60	.308
It is important that organization has its own guidelines for working with stakeholders within projects.	0.01	.994
It is important for social entrepreneurs that Latvian Social Entrepreneurship Association provide educational content.	1.76	.414
It would be interesting to visit Latvian Social Entrepreneurship Association if they form an educational workshop on project management tools.	2.92	.405
It is important to get updates of news provided by Latvian Social Entrepreneurship Association.	8.93	.258

Source: Rozniece A., 2023

Because the p-value in none of the statements shows statistically significant differences (not less than 0.05) between those project managers who have knowledge on the Stakeholder matrix and those who do not, there is a reason to conclude that there are no statistically significant differences between these target groups in terms of attitudinal statements.

The study concluded that the knowledge of the Stakeholder matrix is related to the one of the education level indicators - attending courses and obtaining independent information about project management from specific project management tool websites, as well as the level of formal education.

Conclusions, proposals, recommendations

- 1) According to social entrepreneurship sector experts in the sources examined within the scope of the work, in publications and studies, in the development of Latvian social entrepreneurs, the challenge is the lack of knowledge and skills of social entrepreneurs in business, in company management and financial management, which to some extent also covers social enterprise project management.
- 2) In 2020, 44% of social enterprises in Latvia employed between two and five employees, therefore, almost half of social enterprises in Latvia are small and often the manager of a social enterprise is also the manager of the projects implemented by the social enterprise - at the same time, he thinks about achieving the goals of the project and takes care of the team and finance, and solves the day-to-day problems of the company, which create obstacles to equally qualitatively manage the project in all stages of its implementation.
- 3) Although social enterprise projects have unique characteristics, but fundamentally, the nature of social enterprise projects is no different from any project management.
- 4) A specific goal, time and financial constraints, and project management are each basic elements of the project. One of the tools that help improve project management and achieve project goals is a stakeholder analysis of the project. The essence of stakeholder theory states that projects can achieve success only if they consider and provide value to the parties that are involved.
- 5) The conducted research allows us to conclude that as the knowledge about the matrix of the parties involved increases, social entrepreneurs increase the security in dealing with low use of digital tools

capacity in the team as well as low risk tolerance in the project. In general, knowledge alone about the stakeholder matrix allows better management of the project team itself.

6) Likewise, based on the research conducted, it can be concluded that respondents consider it important to identify all the needs of involved stakeholders during the project. Overall stakeholder matrix can be beneficial and improve the quality of project management.

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THE ROLE OF COOPERATIVES IN THE PROCESS OF DEVELOPMENT OF AGRICULTURE AND INTEGRATION INTO TRADE AREA OF THE EUROPEAN UNION CASE OF GEORGIA

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Abstract. In terms of agricultural development, Georgia, taking into account its biodiversity and soil and climatic conditions, is a country with significant potential in the Caucasus region. Despite the mentioned natural advantages, Georgia's agriculture has been facing significant challenges, in particular local production is underdeveloped, food safety is not protected and the food self-sufficiency ratio is low.

In the context of agricultural development support programs, legislative regulation of cooperative activities and an association agreement signed with the European Union, the development and revival of agriculture was expected, which should have been a prerequisite for the possibility of opening the European Union market for Georgian agricultural products; however, in the context of land fragmentation, it's still not possible to stimulate the production and export of agricultural products.

The aim of the article is to assess the role of cooperatives in the process of development of agriculture and integration into the trade area of the European Union.

The main reason for the failure of ongoing reforms in the field of agriculture is its inconsistency and imperfect laws, which leads to the inability of individual state programs to support agricultural value chain.

Thus, in order to ensure the success of the reform, it is necessary to stimulate cooperatives using systematic and integrated approaches, which means, first of all, increasing the access of cooperatives to land, providing training services, technological, marketing support, providing preferences in public procurement, ensuring compliance with the conditions of product standardization and continuity of supply to enter the EU market.

Key words: agriculture, cooperatives, development of agriculture.

JEL code: Q15, P13

Introduction

In order to ensure food security in Georgia and increase the export of agro-food products, it's important effectively use the potential of agricultural development, which is impossible without the union of material, labor, and intellectual resources of business entities in the mentioned field and state support. In order to support the development of agriculture and agricultural cooperatives, the Law "On Agricultural Cooperatives" was adopted. State programs supporting cooperatives were also approved; however, it was found that the majority of cooperatives, including those supported by state funding, have lost their status and the vast majority of cooperatives listed in the register are not economically active. This shows that the reform was not consistent, it failed to ensure cooperation in the field of agriculture and accordingly to promote development.

In the research process, the following hypothesis is put forward: the existence of programs supporting agricultural cooperatives and tax privileges for them doesn't uniquely determine their development and increase in the production of agricultural products.

The aim of the article is to assess the role of cooperatives in the process of development of agriculture and integration into the trade area of the European Union.

The tasks are formulated as follows:

- analysis and evaluation of the reform after the adoption of the Law on Agricultural Cooperatives;
- determination of the impact of state financing of agricultural cooperatives on their incomes and the number of employees;

- determination of the role of agricultural cooperatives in the export of agro-food products;
- determination of the correlation between income, assets and employees in different groups of cooperatives;
- determination of the correlation between the plots of land owned by cooperatives with an active status and their exports;
- to investigate if total output of agribusiness products has a significant impact on amount of exported products to the European Union;
- development of proposals to overcome existing challenges.

The following methods are used in the research process: review of scientific literature, statistical and comparative analysis, correlation-regression analysis.

Novelty and topicality of the research: state support programs and law regulations for agricultural cooperatives are not result-oriented, accordingly they failed to ensure significant increase in the export of agro-food products to the EU markets.

The main problematic questions of the research are as follows.

- 1) What was the main reason for the failure of the reform?
- 2) What are the recommended ways to correct the current situation?

The following information sources were used in the research process: scientific articles, official information published by the National Statistical Service of Georgia, reports of the Ministry of Environment Protection and Agriculture of Georgia, information provided by the Rural Development Agency, Revenue Service and Service for Accounting, Reporting and Auditing Supervision, Legislative and sub-legal normative acts of Georgia about agricultural cooperatives.

Research results and discussion

Agriculture is considered one of the strategic sectors in Georgia, however, its potential is not properly utilized, due to which the country cannot meet its own needs for wheat, corn, vegetables, meat, milk and milk products, accordingly, food imports have been increasing recently, which are approximately three times higher than exports (Agriculture and Food..., 2014-2021). Exports are dominated by: wine, non-alcoholic drinks, mineral waters and fruits, and in imports - wheat, bread flour, sugar, meat, fish, condensed milk, milk powder, vegetable oil and vegetables. In this situation, it is noteworthy that the country has both the natural-climatic conditions and the resources to completely replace the largest part of the imported product and increase the export.

In Georgia, agriculture is represented by 40% of the population, and 43.4% of the total area of the country's territory is occupied by agricultural fields and amounts to 3 million 30 thousand hectares (Georgia Agriculture and..., 2019). From this, according to the 2014 agricultural census, about a quarter (787.7 thousand hectares) is privatized, i.e. owned by farms. Among them 86.5% (681.1 thousand hectares) are used by households and 13.5% (106.6 thousand hectares) by legal entities (Agricultural Census 2014). Agricultural census has not been conducted in Georgia since 2014, although the reform of agricultural land in Georgia started in 1992, but it is still unfinished. On 1 August 2016, the State Program of Land Registration was divided into two stages. Stage 1, comprising sporadic registration of land titles based on the citizens' applications. Systemic registration included in Stage 2 envisages the registration of land plots based on the systemically collected and processed data (Verulidze V., 2022). The reform has been extended and it is planned to be completed by 2024.

Despite significant advances in property registration systems and simplification of procedures, 28 percent of land nationwide, predominantly agricultural, is yet to be registered. Weak rural land markets create endogenous limitations to both growth and entry (AGRICULTURE, WATER, AND..., 2022).

Small and medium-sized farms find it difficult to compete with the competition (large farms), so the only solution is to join forces (Dumitru E. A. et al., 2022). In Georgia, it's necessary to unite forces not only to overcome competition, but also because, it's impossible increase the production of agricultural products without the encouragement and motivation of the cooperation of farmers engaged in small land and natural farming (which involves the pooling of labor resources and assets). As experience shows, Agricultural Cooperatives (ACs) have empowered farmers to develop resources sustainably. They transfer traditional subsistence agriculture to diversify crops and develop a value chain (Chhinh N. et al., 2022).

Agricultural land in Georgia is characterized by highly fragmented, small-scale plots in private ownership (36 percent of all agricultural registered land) and agricultural plots of larger sizes in State ownership and management (64 percent of all registered agricultural land). The average agricultural land area operated by an agricultural holding is 1.37 hectares. Most of the agricultural holdings are small-scale family farms under 1.37 hectares, which is the country's average (AGRICULTURE, WATER, AND..., 2022).

In order to stimulate the development of agriculture, the Law "On Agricultural Cooperatives" was adopted in Georgia in 2013, the main purpose of its adoption was to promote the development and revival of agriculture in the country, which should have become the most important factor both in terms of ensuring food security and employment of the population living in rural areas. The introduction of the law should also be facilitated in order to harmonize it with the legislation of the European Union, in the conditions of divided agricultural land plots, for the expansion and development of the entities employed in the field of weakened Georgian agriculture, which should have become an opportunity to increase the export of Georgian agricultural products to the European Union market.

The aforementioned law together with the legal issues of the functioning of the agricultural cooperative determined the state supporting measures, including: development and implementation of projects and programs for the development of agricultural cooperatives, provision of the possibility of receiving preferential credit resources and grants, training of personnel, promotion of qualification improvement of the heads of cooperatives, etc. In addition, agricultural cooperatives were also given tax benefits in accordance with Tax Code of Georgia, namely, until 1 January 2026, they are exempted from profit tax and property tax.

In order to promote the development of agricultural cooperatives, the state programs were approved by the Ordinance of the Government of Georgia in 2015-2022, which provides co-financing for the purchase of machinery for grape processing, beekeeping equipment, tractors, raw milk processing enterprises, new, dry and refrigerating storage enterprises main means.

The state support programs, on the one hand, provided for co-financing in the part of providing agricultural cooperatives with fixed assets, but it was not determined how the state would support the sale of manufactured products, including export, except for the benefits established by the tax code, which also did not have a stimulating effect. During the research process, it became clear that only the provision of the material and technical base, without the support of the appropriate technological processes, cannot ensure the high quality of the manufactured products and accordingly compliance with the standards for entering and establishing the EU market.

Based on the analysis of the state programs for the development of cooperatives, the inconsistency and inefficiency of the co-financing process was revealed, which is confirmed by the following circumstances.

1) Within the framework of the "State Program for the Rational Use of Mowing and Pastures in the Mountainous Regions", a milk processing plant equipped with advanced technological equipment was built in the village of Shuafkho, Dusheti Municipality, which was supposed to receive milk from the population of the villages of Aksapshavi, Barisakho and Magharoskar, but unfortunately the enterprise was not put into operation, and in the municipalities of Tsalki, Dmanis and Akhalkalaki, where there is a real potential to increase the incomes of the population involved in the cooperative process through livestock development, the construction of milk processing enterprises was not started at all (Koghuashvili P., 2022).

2) Part of the farmers benefited from co-financing only in 2017-2019, with that, within the framework of state programs supporting agricultural cooperatives, 3 372 964 EUR of financing was granted to a total of 130 cooperatives for the purchase of various equipment, 47 of them or 36.15% (whose total amount of financing in the same years was 251 669 EUR) today it no longer has the status of an agricultural cooperative.

3) The Law "On Agricultural Cooperatives" was adopted in 2013, and the "State Program for the Rational Use of Mowing and Pastures in the Mountainous Regions" was approved only after four years in 2017, the purpose of which was to help the selection of agricultural land for leasing to cooperatives.

As of 26 February 2023, according to the data of the Rural Development Agency, a total of 644 cooperatives are included in the register of agricultural cooperatives. According to the data of the search system of economic entities of the National Statistics Service of Georgia, only 91 cooperatives are engaged in agricultural activities as active economic entities, of which 21 are not included in the register of agricultural cooperatives. Based on the information requested from the accounting, reporting and audit supervision service, active economic subjects were grouped, presented in the form of tables and used for correlation-regression analysis. In addition, only 12 of the 21 cooperatives non-included in the register of agricultural cooperatives have submitted financial statements for 2021, 42 of the 70 included in the register, and only 21 of the cooperatives financed by state programs in 2017-2019.

Based on the presented data (Table 1, 2, 3) all of cooperatives we separated in 3 groups: 1 group, which are registered in the register of agricultural cooperatives, 2 group which aren't registered and 3 group, which are financed by government. We want to know has a significant influence or not cooperative's difference status on main indicators, such as INCOME, ASSETS and NUMBER OF EMPLOYEES. To analyze the cooperative's data, we used the correlation analysis within the groups and regression analysis by the ANOVA method. The results of the correlation analyses are presented in the table 4, where indexed (1, 2, 3) values of Income, Assets and Employees denotes their values for three groups of cooperatives respectively.

Table 1

2021 data of agricultural cooperatives with an active economic status, which are not included in the register of agricultural cooperatives

N	Cooperatives	Income (EUR)	Assets (EUR)	Employees
1	A	47620.62	78422.97	1
2	B	2036.55	3061.09	3
3	C	0	0	0
4	D	99404.17	408959.26	7
5	E	13580.9	10520.88	6
6	F	1810.96	2556.13	0
7	G	6832.63	34520.1	4
8	H	35848.56	243177.28	5
9	I	0	442927.93	0
10	J	0	40831.07	1
11	K	20081.98	31509.39	3
12	L	1675.19	0	1

Source: author's calculations based on data provided by the Service for Accounting, Reporting and Audit Supervision

Table 2

2021 data of active economic status agricultural cooperatives included in the register of cooperatives

N	Cooperatives	Income (EUR)	Assets (EUR)	Employees	N	Cooperatives	Income (EUR)	Assets (EUR)	Employees
1	A	127352.48	1276343.9	15	23	W	0	253036.81	2
2-3-4	B, C, D	0	0	0	24	X	0	35856.39	1
5	E	62771.01	445534.2	2	25	Y	207791.12	36137.33	6
6	F	7223.75	122965.79	1	26	Z	16101.82	304833.68	6
7	G	0	65577.02	3	27	AA	0	0	2
8	H	0	209447.25	2	28	CC	0	1005.22	0
9	I	0	5500.78	0	29	DD	130548.3	184422.19	5
10	J	908.61	17498.43	3	30	EE	8390.07	38499.47	0
11	K	783.28	117063.96	4	31	FF	66415.14	202704.43	1
12	L	109288.51	169707.04	6	32	GG	6024.8	103683.81	0
13	M	0	123742.81	2	33	HH	5688.51	4877.28	4
14	N	0	18163.18	0	34	II	9161.35	178806.52	2
15	O	55391.9	42355.09	5	35	JJ	681.46	358039.94	5
16	P	8532.63	20965.27	1	36	KK	24378.06	82098.69	5
17	Q	0	78792.16	2	37	LL	316904.96	267824.02	7
18	R	218850.65	182767.62	4	38	MM	44193.73	42725.84	12
19	S	0	65426.89	4	39	NN	816023.23	924631.85	2
20	T	73495.82	221591.9	5	40	OO	6527.41	11749.34	0
21	U	51525.84	197521.93	0	41	PP	0	360436.03	4
22	V	5613.57	66109.92	1	42	QQ	0	69713.05	0

Source: author's calculations based on data from the Service for Accounting, Reporting and Audit Supervision

Table 3

2021 data of agricultural cooperatives financed within the framework of state programs in 2017-2019

N	Cooperatives	Amount of financing (EUR)	Year of financing	Income (EUR)	Assets (EUR)	Employees
1	A	5400	2017	0	5731.59	0
2	B	139805.65	2017	97061.61	399796.34	3
3	C	159127.09	2018	0	182512.53	0
4	D	159127.09	2018	66625.06	244985.11	3
5	E	157123.74	2018	335286.42	352316.71	1
6	F	159113.71	2018	2721.67	544360.31	8
7	G	157123.74	2018	23036.55	166372.32	20
8	H	159113.71	2018	0	177069.45	2
9	I	157123.74	2018	49273.62	34773.62	3
10	J	157123.74	2018	0	764643.86	1
11	K	139805.65	2017	6527.41	11749.34	0
12	L	931.8	2017	0	123742.81	2
13	M	931.8	2017	63728.45	93848.04	5
14	N	931.8	2017	25501.04	61443.34	5
15	O	34701.76	2017	0	118818.27	1
16	P	34701.76	2017	64748.3	108463.18	6
17	Q	56586.92	2017	87201.3	139403.13	8
18	R	40893.99	2017	0	16845.95	1
19	S	40893.99	2017	0	0	2
20	T	40893.99	2017	0	58348.3	5
21	U	38705.68	2018-2019	0	0	0

Source: author's calculations based on data provided by the Service for Accounting, Reporting and Audit Supervision and from <http://cooperatives.rda.gov.ge/registry>.

Table 4

Coefficients of correlation

Pairs	Coefficient of Correlation	Strength and direction of a relationship	Pairs	Coefficient of Correlation	Strength and direction of a relationship
Income1-Assets1	0.55	Moderate positive	Income1-employees1	0.63	Moderate positive
Income2-Assets2	0.57	Moderate positive	Income2-employees2	0.22	Weak positive
Income3 - Assets3	0.22	Weak positive	Income3-employees3	0.002	Weak positive

Source: calculated by authors in SPSS

We calculated the coefficients of correlation between amount of financing and main indicators for third group of cooperatives.

Table 5

Coefficients of correlations for sponsored cooperatives

Pairs	Coefficient of Correlation	Strength and direction of a relationship
financing- Income3	0.25	Weak positive
financing- Assets3	0.57	Moderate positive
financing- Employees3	0.13	Weak positive

Source: estimated by the author in SPSS

According to the results of correlation analyses, we can conclude the following.

- Financing doesn't impact on income and number of employees, rather it is more directed on purchase of assets and not on production. Therefore, quite a large number of cooperatives have assets, but no income, because they do not carry out economic activities.
- For registered and non-registered cooperatives income and assets are moderately correlated, which means that the assets are partly directed on producing process. Therefore, the motivation to be included in the register of agricultural cooperatives is weak for cooperatives which do not have this status.

We have also presented information on the area of agricultural land declared by cooperatives implementing agricultural activities with an active economic status and exports (Table 6), as well as on the total output of agribusiness products, exports of agro-food products, including exports to the European Union (in percentage) (Table 7).

Table 6

Aggregate indicators of 91 cooperatives with active economic status

Year	Declared agricultural land (Hectare)	Declared value of exported goods (EUR)
2017	490.78	2107.68
2018	1386.84	1090.92
2019	2370.50	29609.57
2020	2392.36	119366.43
2021	1011.44	63851.79

Source: author's calculations based on data provided by the Revenue Service

Table 7

Indicators of the agro sector

Year	Total output of agribusiness products (million EUR)	Export of agro-food products (million EUR)	Share of agricultural products exported to the EU (%)
2017	3033.21	690.02	15
2018	3279.26	817.38	15
2019	3351.74	795.87	15
2020	3327.32	825.24	17
2021	3466.92	960.589	16

Source: compiled by authors based on data from <https://mepa.gov.ge/Ge/Reports?page=2&pageSize=9>

For evaluating of international trade activities of agribusiness enterprises we estimated the following aspects.

- 1) The correlation between land areas owned by active cooperatives and exports (including export to the European Union), which indicates on moderately correlation (=0,55). It should be noted that the

share of agricultural product exports to the European Union increased insignificantly - from 15% to 17% in 2020-2021 compared to 2017-2019.

2) The simple linear regression model was used to investigate if total output of agribusiness products has a significant impact on amount of exported products to the European Union (Table 8).

Table 8

Results of regression analysis (for 2017-2021 years' data)

ANOVA						
Variables	Coeff.	Stand. Error	t-stat	p-value	R ²	Significance F
Intercept	-219.5	114.68	-1.91	0.152	0.75	0.056
Total_Product	0.105	0.03	3.03	0.056		

Source: estimated by the authors in SPSS

The estimated simple regression model with R²=0.75 is not statistically significant at the 5% level (p-value of F-statistics >0,05) with no statistically significant export factor (p-value of t-statistics > 0.05). The null hypothesis H₀: there is no significant impact of total output on export. So, we can conclude that the total output of agribusiness products does not fully affect the export of these products to the EU. This is explained by the fact that agricultural products do not meet the requirements of the European Union.

Thus, the linear regression model is expressed as:

$$y = 219.5 + 0.1 * x \quad (1)$$

where the dependent variable is Export and explanatory variable is Total Product.

The results clearly direct the positive affect, that every unit increase in the total output of agricultural products (by one million EUR) will leads to increase of their export to the European Union about by 105529 EUR.

Georgia turned out to be a country where some of the problems faced by agricultural cooperatives have been, among others, unclear and inadequate government policies on the development of agricultural cooperatives, high fragmentation of land holdings, and weak linkages among the activities of the cooperatives e.g., production, credit, marketing etc. (FAO. 2010; Chiyoge B. S., 2010).

According to the information provided by the Rural Development Agency, it is clear that the owners of agricultural cooperatives own about 8 thousand hectares of agricultural land, and cooperative activities involve up to 3500 hectares of land, including 1500 hectares of perennial crops. Therefore, more than half of the land owned by the cooperatives is not used as intended, which is a significant obstacle to the development of the sector. This is in the conditions when the said cooperatives own 0.26% of the country's total agricultural land, and 1.01% of the privatized agricultural land.

The introduction of the law on cooperatives, the implementation of relevant programs and tax privileges did not ensure the development of the cooperative and its proper place in the EU market. The share of products exported by cooperatives with an active economic status in the total export of agro-food products is insignificant (0.01%). Therefore, the role of agricultural cooperatives in the European integration process is virtually zero (does not exist). The total output of agribusiness products grows by only 3.45% on average in 2017-2021, which is insufficient even to meet domestic consumer demands (especially in the food sector), and thus the country remains import-dependent. Based on this, the role of agricultural cooperatives in the development of agriculture is insignificant. In addition, cooperatives do not fully use their agricultural land and agricultural equipment in their agricultural activities, which indicates the ineffectiveness of state programs. The failure of the reforms is confirmed by the draft submitted to the Parliament of Georgia on

the amendment of the Law of Georgia "On Agricultural Cooperatives", where the main reason for the change is the fact that the implemented reform was unsustainable and most of the cooperatives did not actually serve the purpose for which the relevant laws were created. Statistical information is provided as proof of this, according to which, from 2013 to November 2022, the status of agricultural cooperatives was terminated for 1605 out of 2274 cooperatives, or 70%.

Since the food value chain is an organized connection of groups of manufacturer, intermediaries, processors and suppliers of raw materials (services), it is appropriate to unite these groups in a consumer cooperative. Cooperatives can form larger cooperatives linking one to the other for the purpose of supply, distribution, and credit, for example, to capture economies of scale (Altman M., 2015).

It should be noted that Service cooperatives in many countries account for a large share of transactions, particularly in agriculture. For instance, agricultural marketing, processing, and supply cooperatives are major players in markets for farm products and farm inputs in North America, Western Europe, Japan, and South-East Asia (Lerman Z., 2014). Besides, an inadequate marketing facility by the state is another challenge to entering the national and international market (Dhungana J., 2022).

The analysis of the current situation reveals that the food value chain development in all spheres of agriculture (primary production, processing and storage infrastructure, marketing and sales) was the weakest link and it could not react to intense competition, so it can be said that Georgia does not have a unified and coherent vision of rural development at this stage. There is no state marketing. The effect of scale, state support, access to credits and subsidies in the case of cooperation is not properly understood by the farmers. This continuous process can be ensured only by using complex approaches and not by fragmented support, which is mainly aimed at creating a material-technical base.

Conclusions, proposals, recommendations

- 1) Financing cooperatives has no impact on income and number of employees, rather it is more directed on purchase of assets and not on production. That's why most of cooperatives have assets, but no income, and they are stopped their economic activities.
- 2) For registered and non-registered cooperatives income and assets are moderately correlated, which means that the assets are partly directed on producing process. Therefore, the motivation to be included in the register of agricultural cooperatives is weak for cooperatives which do not have this status.
- 3) The total output of agribusiness products does not fully affect the export of these products to the EU. This is explained by the fact that agricultural products do not meet the requirements of the European Union.
- 4) In the absence of a correct strategy and coherent vision for the development of agriculture, including agricultural cooperatives, cooperative co-financing programs, tax privileges or certain types of regulatory normative acts become ineffective.
- 5) The undeveloped food value chain, in all branches of agriculture creates an important barrier in the process of stimulating farmers' cooperation and integration into the European Union trade space, for the production of products of the appropriate standard and quality.
- 6) In order to promote the development of agricultural cooperatives, it is particularly important to complete the land registration process.
- 7) An organized connection of all links of the food value chain, manufacturers, intermediaries, processors and groups of raw material (service) suppliers can be achieved by uniting them in a consumer cooperative. It is necessary to stimulate this process from the state.

8) It is necessary to develop a state support policy for the sale of products produced by agricultural cooperatives in the domestic and foreign markets.

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DEVELOPMENT TRENDS AND CHALLENGES IN BEEF CATTLE BREEDING IN LATVIA

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Abstract. In the European Union (EU), the cattle sector is made up of meat and dairy farming. These sectors are closely interlinked, as a significant proportion of dairy cows are slaughtered for meat. In the mid-1990s, as market conditions changed in Latvia's agricultural sector, the development of specialised breeds of beef cattle began, so the aim of the research is to examine trends in the development of beef cattle breeding in Latvia. Dairy farming is still one of the largest agricultural sectors in Latvia, but between 2003 and 2023 the total number of specialised beef cattle herds in Latvia has decreased by 46.9%, while the number of specialised beef cattle themselves has increased almost four times compared to 2003. The results of the study show, in 2023, the most popular beef cattle breeds were Charolais, Limousine, Hereford and Aberdin Angus, and these breeds accounted for 87% of the total number of beef cattle. The beef cattle industry showed a positive trend in the development of specialized beef cattle breeds with an increase in the number of herds of 3-49 and 50-199 cattle in 2023, which accounted for 86% of the total number of beef cattle. In Latvia, beef cattle are concentrated in certain districts in the eastern, western, and northern parts of the country where favourable conditions (pastures) are available for rearing them. Authors conclude that in the future, farms producing cattle of specialized beef breeds will have to review their production practices in order to adapt to environmentally friendly solutions and contribute to the achievement of the objectives of the European Green Deal.

Key words: beef cattle herds, beef cattle breeds, breeding, Latvia, development, farming.

JEL code: Q13, Q18

Introduction

In the world, there is a lot of public and scientific discussion on the further development of farming, especially livestock farming, as the sustainability of livestock farming is affected by concerns about the negative changes in climate, an increase in the global population and the quality of agroecosystem services provided to society (Bernués A. et al., 2011). Over the last few decades, European Union (EU) agricultural policies have supported extensive livestock farming systems as a sustainable way of agricultural production to meet urban consumer needs related not only to food supply but also to a wide range of public benefits and positive externalities, e.g., the preservation of rural cultural heritage, landscape, and biodiversity (Resano H. & Sanjuán A. I., 2018). Food of livestock origin is very important to sustainability, as it plays a critical role in providing good nutrition, reducing poverty, contributing to gender equality, increasing livelihoods and food security, as well as improving health (Adesogan, A. T. et al., 2020; Perry B. & Dijkman J., 2010). In the USA, for example, there is growing interest in producing beef by grazing the cattle on pasture rather than by feeding grain to the cattle, as it is believed to be more environmentally friendly and sustainable (Hayek M. et al., 2018). In Europe, extensive farming practices based on cattle grazing have been encouraged in recent decades, which provide healthier nutrients in the meat produced (Resano H. et al., 2018; Jamieson A., 2013). Usually, the origin of locally produced meat serves as the key indicator of quality for consumers (Kühl S. et al., 2021). However, maintaining domestic output requires making and adopting effective decisions that can deal with and solve some serious problems, in particular to reduce the negative environmental impacts of livestock farming (Cozzi G., 2007; Bernués A. et al., 2011). It is necessary to increase production efficiency, which reduces the impact on the environment, improves the economic viability of farms and social support to society (White R. R. & Capper J. L., 2013). In recent years, and especially during the coronavirus disease (COVID-19) pandemic, the important role of agricultural production, especially red meat, in household consumption has increased (Dorcheh R. F. et al., 2021). Global beef output is expected to grow by 8% (6 Mt) by 2031 and account for

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12% of total global meat output growth. Beef output in Europe is expected to decline by 8% over the next decade, as herd sizes are projected to decline in response to limited export opportunities and the high cost of stricter GHG mitigation measures (OECD/FAO, 2022). The beef industry in Europe faces unprecedented challenges related to animal welfare, environmental impacts, the origin, authenticity, and nutritional benefits of beef products, as well as effects of nutritional quality. These problems can affect the development of the industry, especially beef cattle farms. Therefore, it is important to conduct research studies to deal with the problems in order to maintain and develop an economically viable and sustainable beef cattle industry (Smith S. B. et al., 2018). The cattle sector consists of meat and dairy farming in Latvia. In the EU, dairy cattle account for two thirds of the total herd structure, and this has implications for the formation and development of specialised beef cattle herds (Vinci C., 2022). An overview of trends in the development of beef cattle farming in Latvia suggests that the beef industry is mostly export driven (Grinberga-Zalite G. et al., 2021; Pilvere I. et al., 2022a). After regaining independence in 1991, the production of cattle of specialized beef breeds in Latvia became an independent industry, but in European countries such as France, Spain, Ireland and Germany (Hocquette J. F. et al., 2018), and in countries around the world such as Argentina, Uruguay, the USA and Australia, the beef cattle breeding industry has long been highly developed (Scholtz M.M et al., 2011). In Latvia, dairy farming is still one of the largest agricultural sectors, with dairy cow quality meat still having a relatively high share in the total supply of this product compared to specialised beef breeds (Lujane B. et al., 2013). In Latvia, the specialised beef cattle breeding sector is a new industry. Therefore, **the aim of the research** is to examine trends in the development of beef cattle breeding in Latvia. However, there is a number of challenges for the industry, as it is fragmented, the supply of domestically produced quality carcasses of cattle of specialized beef breeds are not sufficient in the market and high energy prices and unfavourable external economic conditions in 2022 hindered the further development of the industry.

Research methods

Data and information from the Agricultural Data Centre (ADC), an authority supervised by the Ministry of Agriculture, have been collected and analysed to identify trends in the development of beef cattle breeding in Latvia. The ADC was established in 1997 as the State Animal Breeding Information and Data Processing Centre (SABIDPC) and was transformed into the state agency Agricultural Data Centre (ADC) in 2004. The analysis was carried out using the data available in the information system of the authority for the period from 1996 to 2023 on: 1) the number of beef cattle herds, 2) the distribution of beef cattle breeds, 3) the distribution of holdings by herd size, 4) the distribution of holdings in Latvia by region (ADC, 2023). The research employed the comprehensive analysis and synthesis methods, as well as performed a comprehensive analysis of ADC data, which meant collecting the data, analysing, and interpreting them, and presenting the data in a visually readable format.

The novelty of the research involves using the information obtained from the data analysis to determine whether, historically, conditions have been economically favourable for the development of the beef cattle breeding industry in Latvia, maintaining the authenticity of the origin of beef cattle breeds to ensure the supply of and demand for quality beef in the domestic and foreign markets in the future.

Research results and discussion

After the Soviet Union collapsed in the early 1990s, the livestock industry in Latvia lost its status of priority agricultural industry, and the output of livestock products decreased rapidly. As market conditions changed and it was possible to obtain government support in the form of subsidies in the mid-1990s, the

production of cattle of specialized beef breeds by farms began to expand. In 2004 when Latvia became an EU Member State and began receiving the diverse support of the EU Common Agricultural Policy (CAP), beef production continued increasing after a significant decrease in 2004-2010. Therefore, the development of this industry in Latvia after regaining independence could be divided into two main periods: 1) until 2003 – rapid development of the industry before joining the EU; 2) from 2004 onwards when after joining the EU, the industry experienced a significant decrease, adapting to the requirements of the EU single market, and slow growth since 2011.

1. Trends in the development of beef cattle farming in Latvia before joining the EU

The first official data on specialized beef cattle farms and beef cattle breeds in Latvia were published in 2000 for the period from 1996 to 1999, which were included in reports by the SABIDPC (2000; 2001) (Table 1).

Table 1

Distribution of beef cattle herds by breed in Latvia in 1996-1999

Breeds	1996		1997		1998		1999	
	Number of cattle	Number of herds	Number of cattle	Number of herds	Number of cattle	Number of herds	Number of cattle	Number of herds
Hereford	71	6	93	8	139	16	388	20
Charolais	28	9	67	16	101	21	348	24
Limousin	0	0	16	2	38	3	42	3
*Aberdin Angus	0	0	0	0	10	1	9	1
Total beef breed herds	99	15	176	26	288	41	787	48

*Angus (Red, Black) Breed

Source: SABIDPC, 2000; 2001

Table 1 shows that in 1996, 15 specialized beef cattle herds with a total of 99 cattle were registered in Latvia (on average 7 cattle per herd; besides, the herds consisted of the cattle of the Charolais and Hereford breeds). In 1997, the number of herds increased to 26 (by 73%) with a total of 176 cattle (an increase of 78%), while the average number of cattle per herd was still low at only 7 cattle. In 1999, there were already 48 such herds with 787 cattle (on average 16 cattle per herd), which was an increase of 3.2 times in the number of herds and 7.9 times in the number of cattle compared with 1996. In the period 1996-1999 in Latvia, the most popular breed among beef cattle farmers was the Hereford breed (Table 1), which accounted for 51% of the total number of beef cattle, followed by the Charolais breed with 40%, the Limousine breed with 7% and the Aberdin Angus breed with 2%.

An important day for beef cattle farmers was 14 May 1998, as the Latvian Association of Beef Cattle Breeders was established; its main purpose was and still is to foster the production of beef cattle in the country, develop the market for breeding cattle and high-quality beef and contribute to beef cattle production monitoring (The annual report..., 2002).



Source: SABIDPC, 2000

Fig. 1. Distribution of beef breed cattle by district in Latvia at the beginning of 1999

Figure 1 shows data on the number and locations of cattle of specialized beef breeds in the territory of the Republic of Latvia at the beginning of 1999 – the beef cattle was produced in 16 districts out of 26, and there were totally 48 herds with a total of 787 cattle. The herds of this size were appropriate at the beginning of the development of the beef cattle breeding industry. However, for the industry of specialized beef cattle to become a profitable one that would generate incomes from agricultural production, the herds had to be increased to at least 30-50 producing cows (SABIDPC, 2000). In Latvia, the largest populations of cattle of specialized beef breeds began to emerge in the regions of Vidzeme and Latgale – in areas with moderately fertile soils and enough fodder.

Table 2

Distribution of cattle of the most popular beef cattle breeds in Latvia in 2000-2003

Breeds	2000	2001	2002	2003	2003/2000, %	2003/1999, times
Hereford	3943	3762	4281	4798	122	12
Charolais	3264	3336	3641	3862	118	11
Limousin	348	628	1285	1791	515	43
Aberdinangus*	484	888	1388	2125	439	236
Highland Cattle	1	1	5	6	600	x
Total cattle of beef breeds	7556	8615	10600	12582	167	16

*Angus (Red, Black) Breed

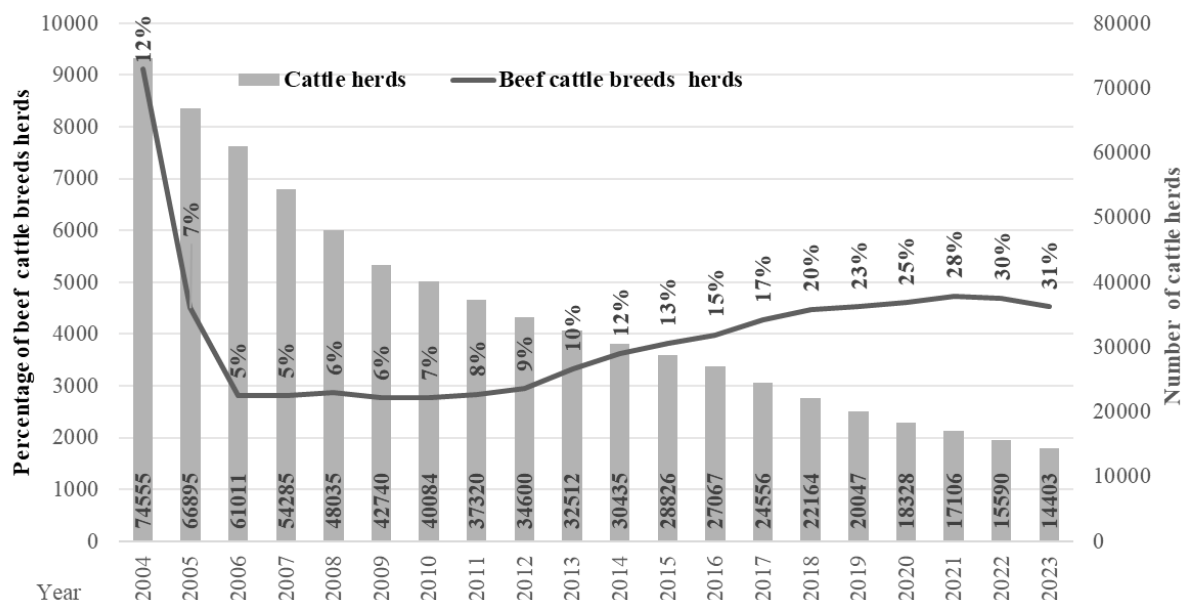
Source: authors' calculations based on ADC data, 2023

Before joining the EU, the number of beef cattle herds increased significantly in Latvia in 2000 compared with 1999, on average 16-fold, and for the Limousine breed even 43-fold. After that, in the period 2000-2003, an increase was smaller, although the number of Limousine and Aberdinangus cattle increased 5.2-fold and 4.4-fold, respectively (Table 2). In 2003, the total number of beef cattle herds was 9667 with a total of 25003 cattle. An analysis of the distribution of cattle by herd reveals that small herds with on average 1-2 cattle per farm prevailed. According to data for 1 January 2003, the beef cattle of the Charolais and Hereford breeds were still the most popular in Latvia; however, Limousine and Angus beef breed cattle were also farmed, with a total of 12576 cattle (Table 2), as these breeds could be well crossed with dairy cattle ones. Before joining the EU, farmers in Latvia were worried about how competitive the beef cattle breeding industry would be, considering the support of the CAP provided to the "old" EU Member States and the strict requirements of EU legislation for livestock farming.

2. Trends in the development of beef cattle breeding in Latvia after joining the EU.

2.1. The number of cattle herds, including specialized beef cattle herds, in Latvia

After the accession of Latvia to the EU, agriculture, including cattle farming, had access to CAP support from both pillars, which helped the industry to become technologically modernized and increase productivity, and a significant restructuring of the agricultural industry occurred (Upite I. & Pilvere I., 2011). On 1 January 2004, 74555 cattle herds were registered in Latvia, of which 9110 or 12% were specialized in beef cattle production (Figure 2). In 2005, the number of beef cattle herds decreased to 4509 or 7% of the total cattle herds because there were a lot of insects (gnats) in summer due to excessive humidity and because of the insects a lot of grazing cattle perished on pastures. The hot and dry summer of 2006 continued to negatively impact the livestock industry, and the number of beef cattle herds decreased to 2812 or 5% of the total cattle herds. Until 2013, the number of beef cattle herds was volatile, not exceeding 6% of the total cattle herds. Since 2011, the number of beef cattle herds has slightly increased every year, reaching 4536 herds at the beginning of 2023 or 60% more than in 2011, accounting for 31% of the total herds (Figure 2). This was due to CAP support payments, especially direct payments, including voluntary coupled support for cattle available from 2015 (Pilvere I. et al., 2022b).



Source: author's calculations based on ADC data, 2023

Fig. 2. Changes in the number of cattle herds and a percentage of beef cattle breeds herds in Latvia in 2004-2023

In 2016, there were 1.3 million herds in the EU (excluding herds in the UK). Of these, 370.3 thousand were specialised beef cattle breeding and fattening herds. More than 57% of specialised beef herds (212.6 thousand) were in just four Member States - Ireland, France, Spain, and Germany - while the remaining 43% were distributed among the other EU Member States (Portugal, Romania, Denmark, Slovenia, Latvia, Lithuania, Estonia, etc.), with a total of 99.1 thousand herds. (Vinci C. et.al 2022). In 2016, the number of herds of specialised beef cattle breeds registered in Latvia was only 1.1% or 3988 herds of the EU total. This means that the number of registered beef cattle breeders in Latvia is small, that efficient performance in the beef sector depends on herd size, structure, economic profitability, income level and the country's geographical and natural conditions.

2.2. Distribution of herds of beef pure breeds, crossbreeds and mixed breeds and changes in the number of the herds

At EU entry in 2004, Latvia had 4194 Hereford, 3563 Charolais, 2611 Aberdin Angus and 1914 Limousin herds, for a total of 12282 animals of these meat breeds (Figure 3). An analysis of Figure 3 data on the distribution of beef cattle herds by breed and the changes in the period 2004-2023 reveals that the most popular breeds were Charolais, Limousine, Hereford and Aberdin Angus; in total, there were 3926 herds with 56416 cattle of the mentioned breeds in 2023. The number of herds of the mentioned beef cattle breeds increased, which could be explained by government subsidies granted to the beef industry and aimed at increasing the proportion of domestically produced, high-quality beef in the market and implementing a breeding programme to shape beef cattle production as an independent industry (Agriculture and Rural..., 2004).

This was also facilitated by additional national direct payments available from 2004: 1) a slaughter premium was paid for cattle (older than 8 months); 2) a premium for suckling cows. However, the main problem was a lack of purebred breeding beef cattle (Agriculture and Rural..., 2005). In Latvia, beef cattle farming was impacted by the global financial crisis in 2008-2009, as the purchase price of milk in the related industry (milk production) decreased and the exports of dairy products decreased.

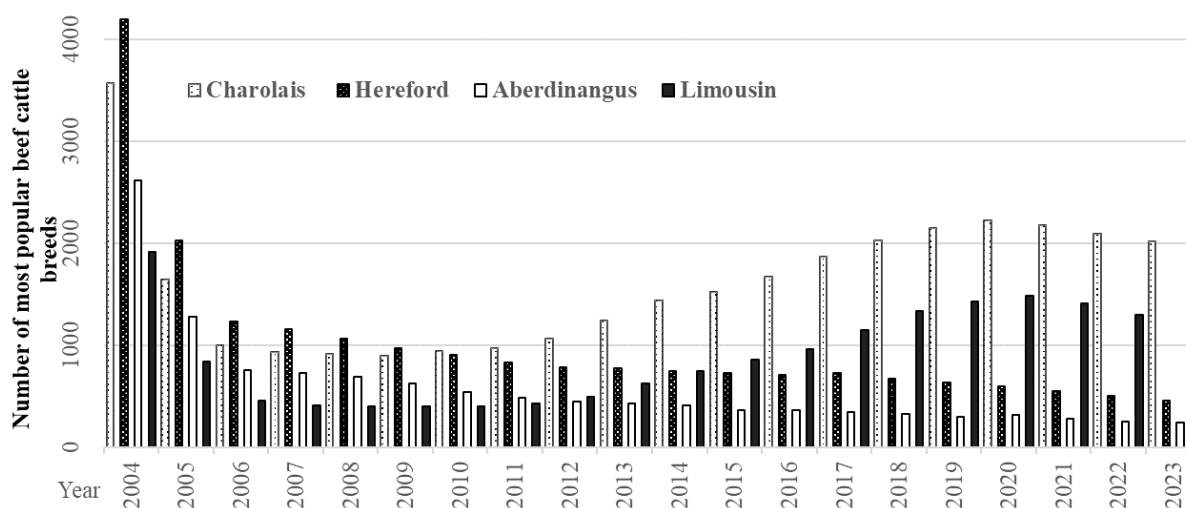
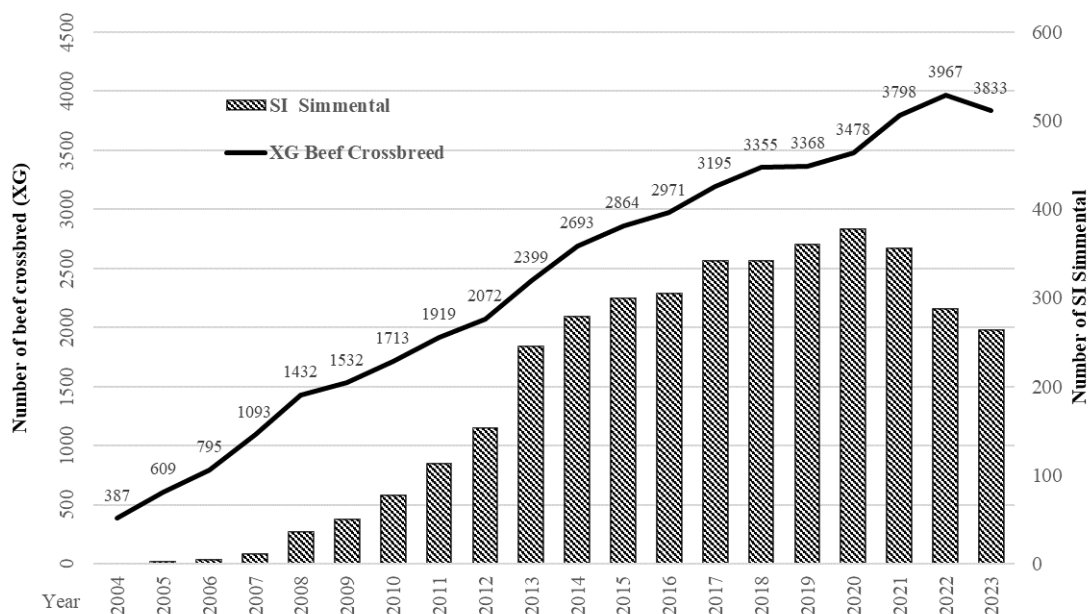


Fig. 3. Distribution of the most popular beef cattle breeds in herds in Latvia in 2004-2023

An analysis of data (Figure 4) on beef cattle crossbreeds and the breed of dual-purpose cattle (e.g., Simmental) reveals that from 1 January 2008 to 1 January 2023, the number of herds of beef cattle crossed with Latvian brown breed cattle and the number of herds that raised mixed breed cattle (Simmental) increased rapidly in Latvia, as dairy farms shifted to meat production (Figure 4).



Source: author's calculations based on ADC data, 2023

Fig. 4. Number of beef crossbreed (XG) and Simmental breed in Latvia in 2004-2023

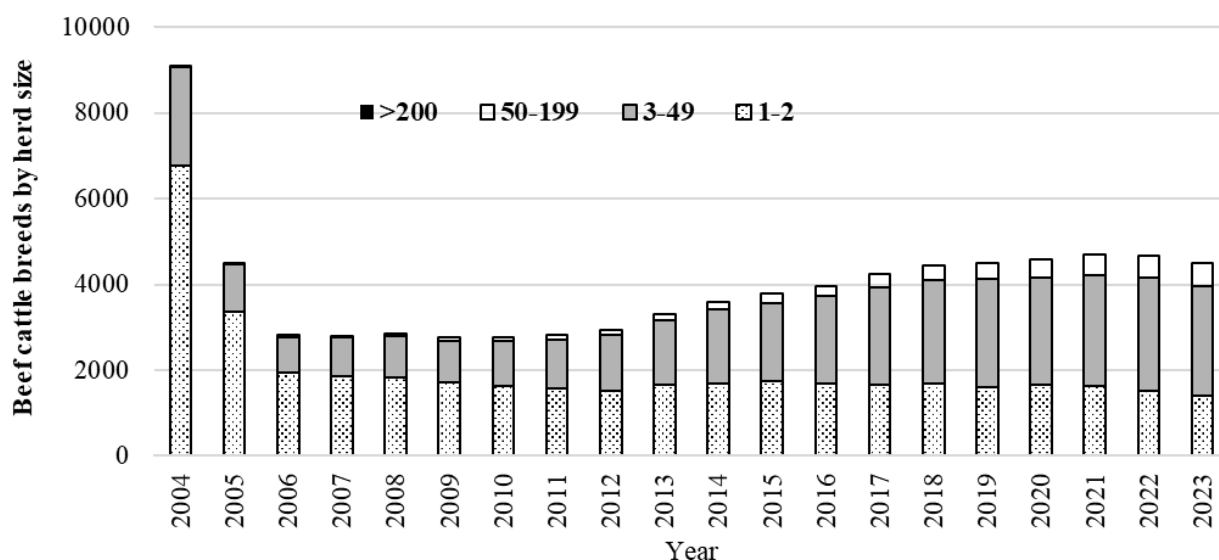
In 2008, there were 36 herds of Simmental dual-purpose breed cattle; the other herds continued to be restructured towards meat production so that the farms could continue farming in rural areas. From 2011 to 2023, the number of herds of dual-purpose breed cattle (Simmental) continued to increase, reaching a total of 264. This could be explained by government support for a suckling cow of a beef breed or a suckling cow that represented a breed crossed with a beef breed, as well as for cows of dairy breeds in order to support and promote the development of the beef cattle industry. Over 15 years since 2008, the number of beef crossbreed (XG) and Simmental dual-purpose breed cattle has increased from 1468 to 4097 cattle at the beginning of 2023.

This trend could also be explained by the fact that many farms, especially small ones, could not supply quality milk to the milk processor because the quality requirements for milk to be purchased increased; therefore, they sought alternative solutions to continue farming profitably. In Europe has diverse range of beef production system depending on factors including widely varying agro-climatic regions, the scale of dairy production within regions, and market requirements. Most European beef is produced as a by product from dairy farms which have two-thirds of European cattle (Greenwood P.L, 2021). Crossbreeding has been shown to be the most productive system for commercial beef production, and the use of crossbred cows give the biggest boost to the program. Crossbred cows exceed straightbreds by up to 30% in productivity, such differences cannot long be ignored to fit into a viable crossbreeding program and that should have the best chance of retaining a place in the industry (Berg R.T.,1984).

A solution was to keep suckling cows, as it required less investment and partly gave an opportunity to preserve the usual way of farming – to keep cattle of beef crossbreds and of mixed breeds.

3. Changes in the distribution of herds of beef breeds

An analysis of data on changes in the distribution of cattle of specialized beef breeds by herd size (Figure 5) reveals that in 2004 beef cattle herds were heterogeneous and the largest number of herds had a total of 3-49 cattle, accounting for 57% of the total cattle, and together with small farms (1-2 cattle) accounted for 91% of the total beef cattle. Despite the problem caused by the drought to livestock farming in 2005 and 2006, there was still a large number of farms with 1 to 2 cattle used for self-consumption.

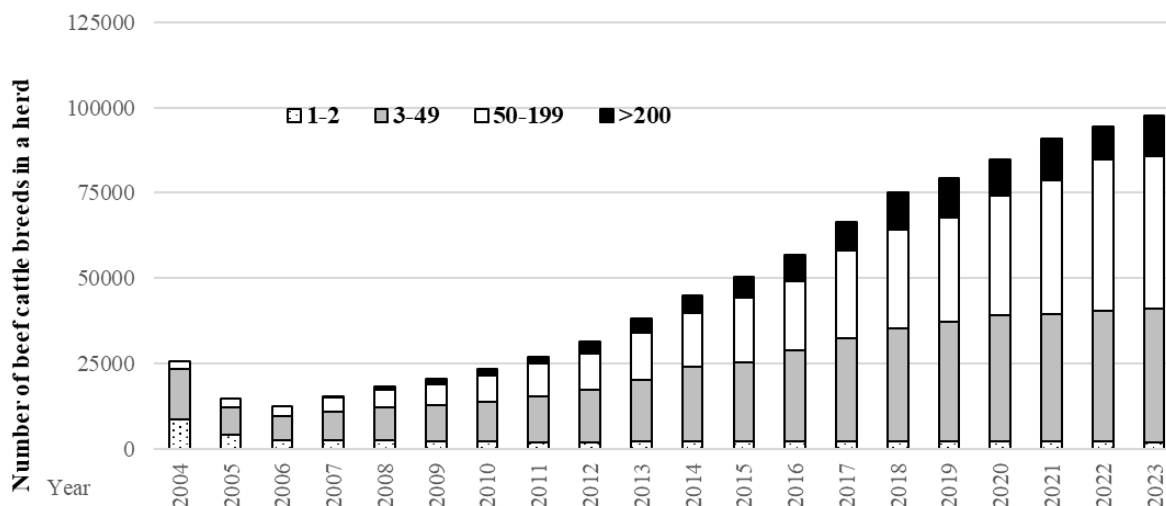


Source: author's calculations based on ADC data, 2023

Fig. 5. Distribution of beef cattle breeds herds by size in Latvia in 2004-2023

Since 2013, there has been a positive trend in the number of herds of specialized beef breeds in Latvia, as the herds with the number of cattle from 3 to 49 and 50 to 199 increased, while the number of herds with one or two cattle decreased. During the period of analysis, there was a positive trend in the number of beef cattle herds. According to data for 1 January 2023, specialized beef cattle herds with 1-2 cattle represented only 31%, herds with 3-49 cattle made up 57%, herds with 50-199 cattle accounted for 11% and herds with >200 animals represented 1 % of the total herds. On 1 January 2004, the herds of specialized beef breeds with 1-2 cattle totalled 6765, while on 1 January 2023, the number of the herds has decreased to 1398 or by 79%. However, as the number of small herds decreased, the number of medium-sized herds with 3-49 cattle (2575 herds or 258 more than in 2004) and the number of herds with 50-199 beef cattle (522 herds or a 19-fold increase) tended to increase (Figure 5). In 2023 in Latvia, there were 41 herds with >200 cattle, while in 2004 there were none at all, meaning that there was a small but upward trend.

An analysis of data on changes in the number of herds of specialized beef breeds by size (Figure 6) reveals that in 2004 the largest number of cattle (14661) was in herds with 3-49 cattle. In 2023, the number of herds with 3-49 cattle was larger, which raised a total of 39287 beef cattle, and herds with 50-199 cattle raised 44492 beef cattle. The number of large herds has increased, i.e., 11937 beef cattle were raised in herds of more than 200 cattle.



Source: author's calculations based on ADC data, 2023

Fig. 6. Distribution of beef cattle breeds in a herd in Latvia in 2004-2023

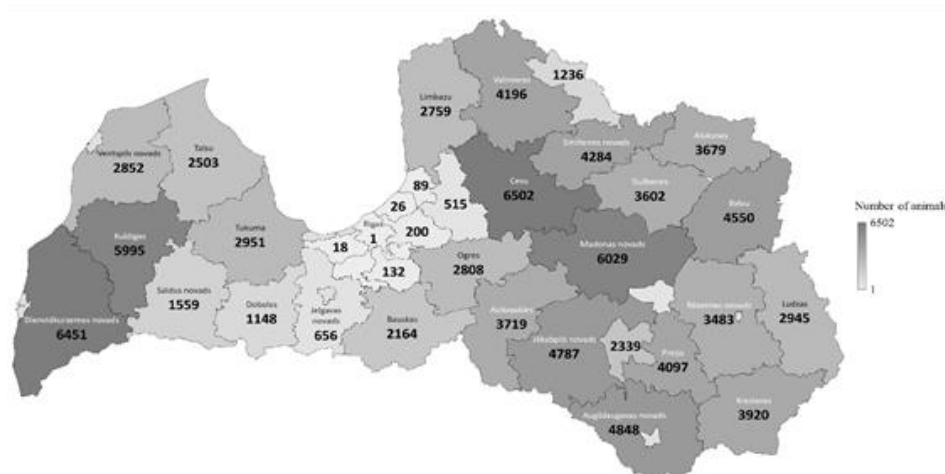
Such changes indicate more efficient management in the beef cattle industry, the ability to adapt to endogenous factors and create an opportunity for long-term growth for the industry as a whole. From an economic point of view, one of the major problems and challenges facing the specialised beef cattle sector in Europe is its heterogeneity. There are significant differences in per capita beef consumption and in the distribution of beef breeds, farm size and economic profitability between EU countries (Hocquette J.F et.al. 2018). The competitiveness of specialised meat breeds in the EU is also linked to herd structure. The smaller and more uneven the development of the beef cattle sector, the more vulnerable it becomes. The sector has fewer opportunities for investment and innovation and may face economic difficulties. The market is also affected by changes in the flow of dairy cattle to slaughter (Vinci C., 2022).

3.1. Distribution of pure breed and crossbreed beef cattle by municipality in Latvia

A comparison of data on the locations of beef cattle in 1999 and at the beginning of 2023 (Figures 1 and 7) reveals how the geographical distribution of pure breed and crossbreed beef cattle has changed over a period of 24 years. In 2023 in Latvia, the largest number of beef cattle was reported in some municipalities of Vidzeme region (northern part of Latvia): Cesis and Madona, Latgale region (eastern part of Latvia) – Augsdaugava municipality and Kurzeme region (western part of Latvia) – South Kurzeme and Kuldīga municipalities because the mentioned municipalities had suitable conditions for pastures, smaller areas of fertile agricultural land used for growing fodder for dairy farming, as well as vast, still unused land areas suitable for beef cattle farming. The beef industry is suitable for organic farming. Herds of specialized beef breeds play an important role in the preservation of natural and perennial grasslands. They have high scenic, biodiversity and recreational value. They form important buffer zones between arable land and water, absorbing plant nutrients leached from arable land and protecting rivers, lakes, and the sea from eutrophication.

The beef industry should share responsibility for contributing to climate change, as a relatively large amount of greenhouse gases are released during the digestion process in cattle and from the manure. Therefore, it is important to identify where and how cattle of specialized beef breeds that we consume in our diet have been raised (Jamieson A., 2013; Bernués A. et al., 2011; Resano H. & Sanjuán A.I., 2018). Livestock farming can reduce poverty in rural areas by contributing to GDP and employment, which benefits consumers, traders, and other actors of the value chain more than meat producers (Perry B. & Dijkman J.,

2010). The CAP Strategic Plan of Latvia for 2023–2027 also states that it is necessary for beef cattle farmers to increase value added by cooperating and producing competitive products for the domestic and export markets, as well as to create and maintain a healthier and sustainable EU food system (CAP Strategic Plan for..., 2022).



Source: author's calculations based on ADC data, 2023

Fig. 7. Distribution of beef pure breed and crossbreed cattle by municipality in Latvia on 1 January 2023

Future challenges for livestock farming are biodiversity, traceability of products, reduced delivery time and environmental protection. This is in line with the objective of the European Green Deal – to increase biodiversity by developing beef cattle breeds, protecting unique genetic resources, as livestock farming no longer serves only to provide food but also performs very important environmental and nature-related functions, especially by reducing emissions from cattle farming (Pilvere I. et al., 2022b). From Farm to Fork Strategy states that by 2030, the EU must reduce the use of fertilizers by 20%, the amount of pesticides by half and the amount of antibiotics used in livestock farming by 50%. Beef cattle farmers will have to count on the European Green Deal to further increase biodiversity and reduce greenhouse gas emissions and environmental impacts. This is a response to new consumer needs (European Commission, 2020).

Economic aspects: the livestock industries are mostly located in areas adversely affected by economic globalisation and by the opening of borders in the agri-food industry and beyond. Often isolated, they do not immediately benefit from the economic dynamics generated by the opening of new markets and the development of new technologies. They face a multifaceted challenge: The difficulty the sector faces in controlling its own destiny, given the competition posed by the dairy herd on the beef market, which provides around 60% of the beef consumed in Europe (Farm Europe ..., 2018). Economic and trade globalization will affect the beef cattle industry, especially small farms, which will not benefit equally from market opening. Consequently, a paradox arises for meat cattle breeders - they have to look for opportunities in the world market, but at the same time they are weakened by the strong competition in this market (Vinci C., 2022).

Conclusions, proposals, recommendations

1. Before joining the EU.

- the first official data on specialized beef cattle farms and beef cattle breeds in Latvia were published in 2000 for the period from 1996 to 1999. In 1999, there were already 48 such herds with 787 cattle (on

average 16 cattle per herd), which was an increase of 3.2 times in the number of herds and 7.9 times in the number of cattle compared with 1996.

- an important day for beef cattle sector was 14 May 1998, as the Latvian Association of Beef Cattle Breeders was established; its main purpose was and still is to foster the production of beef cattle in the country, develop the market for breeding cattle and high-quality beef and contribute to beef cattle production monitoring.

2. After joining the EU:

- the number of herds and the number of cattle in them significant decreased; however, since 2011, a slow growth of the industry was reported, which was influenced by the CAP and national support payments. At the beginning of 2023, there were 4536 beef cattle herds in Latvia, or 31% of the total cattle herds;
- from 2004 to 2023, Charolais, Limousine, Hereford and Aberdinangus were the most popular beef breeds. At the beginning of 2023, there were 3926 herds of the mentioned beef breeds with a total of 56416 cattle, accounting for 87% of the total cattle herds;
- the beef cattle industry showed a positive trend in the development of specialized beef cattle farms, as the number of herds with 3-49 and 50-199 cattle increased in 2023, accounting for 86% of the total beef cattle;
- beef cattle herds are located in several municipalities in the eastern, western, and northern parts of Latvia, where favourable conditions (pastures) are available for beef cattle.

3. In the future,

specialized beef cattle farms need to revise their farming practice: review animal welfare requirements in the country in relation to the production of beef breeds or beef meat, draw up a strategy for the development of the specialised beef breeds sector in order to focus on better market organisation and segmentation and to promote the development of the sector towards a more sustainable model , in order to be able to successfully implement environmentally friendly farming and contribute to the objectives of the European Green Deal, including reducing greenhouse gas emissions.

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SUSTAINABLE BIOECONOMY

AN OVERVIEW OF BIOFUEL POTENTIAL FROM ENERGY CROPS WASTE BIOMASS

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Abstract. In order to mitigate climate change, reduce greenhouse gas emissions, and ensure the security of energy independence, it is important to expand immediately the energy crop waste biomass utilization in the agricultural sector. The aim of the study is to assess the potential of energy crop waste biomass with particular focus on biofuels in the case of Lithuania. The posed research question is: what type of energy crop waste biomass is considerable for the consumption of biofuel production. The results of analysis showed that the dominant position was associated with biodiesel production in Lithuania's transport sector, followed by bioethanol production. Biogas production has taken the lowest position in the biofuel industry. It was determined that the highest potential of biofuel was associated with four based energy crops. Unfortunately, the biofuel potential is still not used by utilization of other energy crops. The recommendation is to promote the cultivation of energy crops, such as miscanthus, hemp, switchgrass, reed canary grass, and others energy crops in the agricultural sector of Lithuania.

Key words: biofuel, agricultural, waste biomass, perennial crops.

JEL code: Q1, Q2, Q3, and Q4

Introduction

European Union's attention is paid to developing biofuel potential from energy crop waste biomass. The expansion of energy crop waste biomass resources is important for reducing climate change and ensuring energy sector's security in Lithuania. The expansion of energy crop waste biomass resources is important for reducing climate change and increasing energy sector's security. One of the priorities of the National Energy Independence Strategy is to ensure the security of energy in Lithuania's state. The main purpose is to use renewable sources for not less than 80 percent of the energy needs' production of the country (International Energy Agency, 2015). The measures that are now provided for in the legislation make it possible to save energy, but the main problem that is associated with increasing energy productivity remains. Hence, the changing part of the energy produced from fossil fuels to energy produced from energy crop waste biomass sources can ensure energy efficiency and seek to contribute to the implementation of climate change mitigation (Gaigalis V., Skema R., 2017; John S., 2004). Biomass waste of energy crops can supplement biofuel potential in Lithuania. Produced biofuel is suitable for the use in internal combustion engines as fuel, and its use reduces environmental pollution. Biofuel can be produced from energy crops waste biomass, mixed with conventional fuel for transport, domestic or industrial use. It is the only renewable resource that replaces the use of fossil fuels in the transport sector. The main types of biofuels used in Lithuania are: *bioethanol*, produced from raw materials containing sugar (sugarcane, sugar beet) and starch (potatoes, grains), and *biodiesel*, produced from vegetable oil (rapeseed, linseed, soybean, rye, wheat, triticale, sunflower). Biodiesel can be used as a fuel in conventional diesel engines. Bioethanol is used in internal combustion engines, replacing part of gasoline with it. However, the possibility of using bioethanol in a diesel engine is recently being explored. This is aimed at expanding the base of raw materials and increasing the share of renewable energy in diesel fuel (Katinas V., Savickas J., 2012). Another type of biofuel is biogas. Energy crop waste biomass waste generated in agriculture can be efficiently used to produce biogas. Waste biomass of energy crops, such as straw of rapeseed or wheat can replace or partially complement traditional types of energy and water and wind energy resources. The energy crops waste biomass utilization for biofuel production should be a top priority for the sustainable bioeconomy. It is economically beneficial and ensures absolute independence of the supply of primary energy resources.

Lithuania has an unexploited energy crop waste biomass potential in the agricultural industry (Hagen K., 2016; Marciukaitis M. et al., 2016).

According to the EU directive 2015/1513, as a priority, it is planned to promote to use of biofuel-biomethane production in the transport sector. However, in recent years, biogas is increasingly being used to produce electricity. The biofuel production from energy crop waste biomass is important in helping Lithuania to meet its greenhouse gas reduction targets. Typically, it is proposed to use biofuel production in other agricultural lands, which are not suitable for growing food or feed. This study applied analysis of three main biofuel families: biodiesel, bioethanol, and biogas production.

The aim of the study is to assess the potential of energy crop waste biomass with particular focus on biofuels in the case of Lithuania.

Research question: What type of energy crop waste biomass is considerable for the consumption of biofuel production?

Tasks of the research:

- 1) to perform the analysis of energy crop waste biomass prepared according to statistical data;
- 2) to estimate the biofuel potential of energy crop waste biomass by indicating the role of waste biomass consumption for biofuel production.

The novelty of this study includes significant aspects of research: it combines an assessment potential of energy crop waste biomass with biofuel consumption efficiency and addresses the need to increase the use of more kinds of agricultural resources.

Research methods. Statistical analysis was applied by collecting the data from the database of the International Energy Agency, Biomass Energy Europe, the European Commission and others. Literature analysis was conducted by general methods: systematization, grouping, graphical presentation, summarization and others.

Research results and discussion

Energy crops biomass has an important role to play in helping to achieve the renewable energy targets. The classification of energy crops biomass for production of biofuels is shown in Table 1.

Table 1

Classification of energy crops biomass for production of biofuels

Oil crops	Solid energy crops	Cereals	Starch and sugar crops	Cellulose crops
Oilseed rape, linseed, field mustard, hemp, sunflower, safflower, castor oil, olive, palm, coconut and groundnut	Cardoon, sorghum, kenaf, prickly pear, whole crop maize, reed canary grass, miscanthus, willow, poplar and eucalyptus	Barley, Buckwheat triticale wheat, oats, maize, rye	Potato, sugar beet, Jerusalem artichoke, sugarcane	Straw, wood, short rotation coppice (SRC)

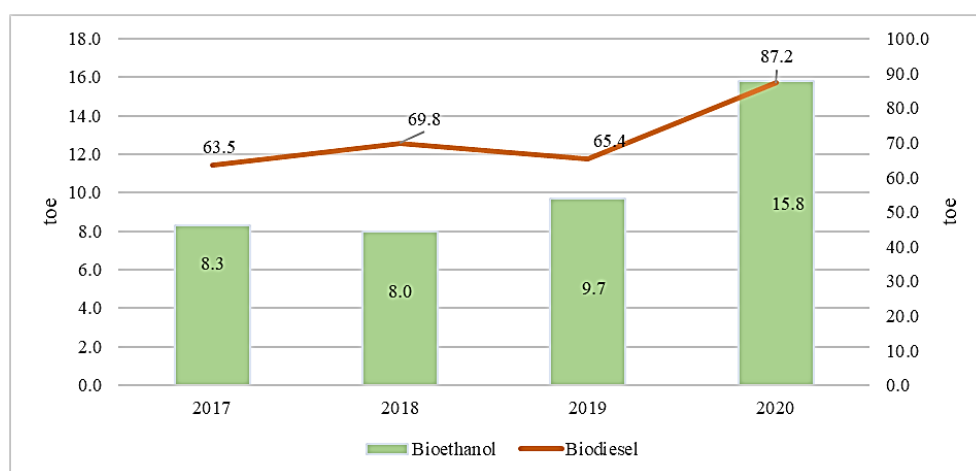
Source: Sims R.H. et al., 2006; Koçar G., Civaş N., 2013

There are many kinds of energy crop biomass that can produce three kinds of biofuels, such as emp (both oil and solid biomass) and cereals (ethanol and solid biomass from straw). Cereals can be used to produce ethanol, for example, barley, wheat, oats, maize and rye. Also, the straw of these cereals can be used as a solid fuel. Starch and sugar crops make used for the production of ethanol, such as potato, sugar beet, Jerusalem artichoke and sugarcane. Oil crops can be used directly as heating fuels or refined to transport biofuels such as biodiesel esters. Cellulose crops can be reduced to sugar by acid or hydrolysis and then fermented to produce ethanol (Kosar G., Civas N., 2013).

Energy crop waste biomass can be used in many ways. First, the utilization of crop residue provides many kinds of products, such as starch, sugar, cellulose, and oil. Second, this waste biomass can be used for biogas production to generate heat/electricity. Third, for biofuel production which incorporates ethanol, methanol, biodiesel, and their derivatives (Demirbas A., 2001). In Lithuania, the most developed biofuels are the ones that belong to the first generation, which is produced from food or fodder plants. Bioethanol made from wheat and rye is added to gasoline, and biofuels made from various vegetable oils (rape grains, rapeseed oil, and other vegetable oils) are added to diesel. However, the future belongs to the second-generation biofuels, which are produced from agricultural and other waste biomass such as straw, manure and sewage raw materials (Miezyz A., 2016). In the world, there are already produced fourth-generation biofuels – genetically modified microorganisms, for example, microalgae, yeast, fungi or cyanobacteria (Alalwan H., Alminshid A., Aljaafari H., 2019).

According to the Sustainable Transport Fund's report submitted to the European Commission, second-generation biofuels, which can replace diesel, are currently only in the development stage, and it will take at least 5 years to develop reliable technologies that will allow the commercialization of scientists' inventions to the point where businesses can start investing in them. Some of these technologies will likely take more than 5 years to develop and will have a negligible impact on greenhouse gas emissions by 2030 (Biofuels Association, 2023). To reach 7 percent, in 2020, an indicator of biofuel consumption, 200 thousand hectares of rapeseed and cereal area would be enough for Lithuania or 5% agricultural land. 2019 was the first year in Lithuania when production of second-generation fuel started. This will encourage increasing the share of renewable resources in the transport sector and the obligation to offer even less polluting fuels (Energetics, 2019).

Based on statistical data, the increasing trend of biofuels' consumption for transport in Lithuania from 2017 to 2020 is shown in Figure 1.



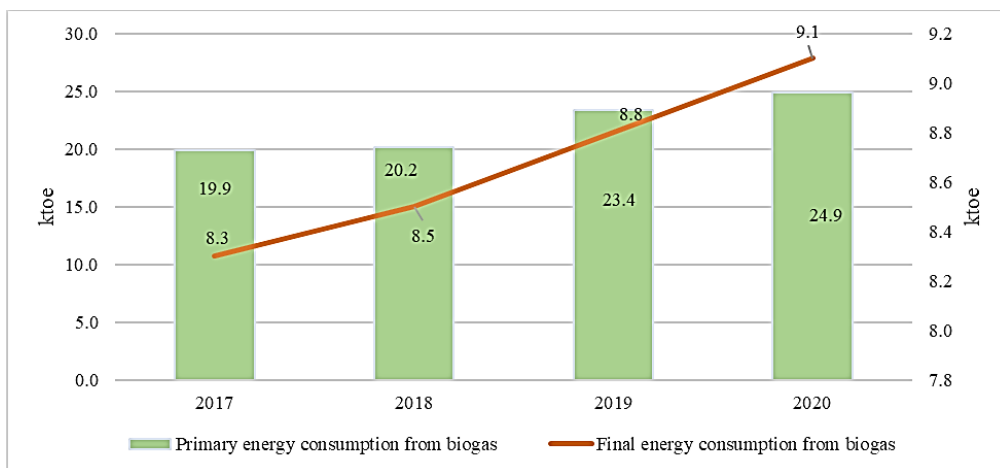
Source: author's calculations based on the European Commission reports, 2020 and 2022

Fig. 1. Bioethanol and Biodiesel consumption for transport in Lithuania

In 2020, Lithuania bioethanol consumption in transport increased to reach 7.5 ton of oil equivalent (toe) in 2017 (90.4%); compared to 7.8 toe in 2018 (97.5%); compared to 6.1 toe in 2019 (63%). In 2020 biodiesel consumption in transport made growth to reach 23.7 toe in 2017 (37.3%); compared to 17.4 toe in 2018 (25%); compared 21.8 toe in 2019 (33.3%). The comparative analysis shows that the use of bioethanol and biodiesel in the transport sector has the potential to grow in Lithuania.

Based on recast Renewable Energy – Recast to 2030 (RED II), the overall EU target for Renewable Energy Sources consumption by 2030 has been raised to 32% (Directive (EU) 2018/2001). Hence, the European biogas association suggests that two specific targets should be integrated into the amended

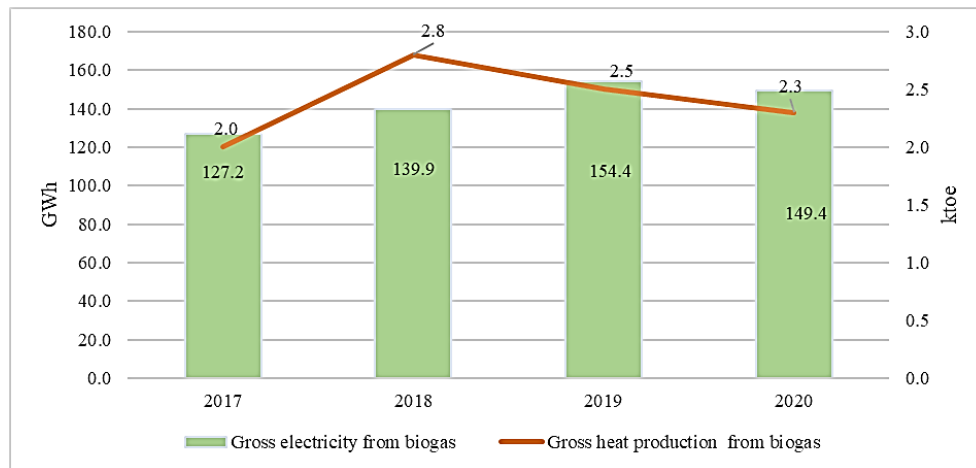
RED II: a target on the consumption of renewable gas of at least 11% in terms of energy content by 2030 and a target to reduce the greenhouse gas emission intensity of gas consumption by at least 20% compared to 2018 levels by 2030. In Europe, primary energy output growth has steadily declined ever since it peaked in 2011 (with a year-on-year rise of 21.9%). The main reason for this stagnation is the growing apprehension about the use of food crops as energy crops (European Commission, 2021). The situation of Lithuania with regard to biogas consumption is shown in Figure 2. Primary energy output from biogas in Lithuania has remained stable. According to the data, it rose to 24.9 kilo tonnes of oil equivalent (ktoe) in 2020, from 19.9 ktoe in 2017 (25%). Yet, biogas still enjoyed good growth, for example in 2019 (17.6%, with output at 23.4 ktoe). In 2018, biogas output increased, but it happened at a slower pace (1.5%, from 19.5 ktoe to 20.25 ktoe).



Source: author's calculations based on the European Commission reports, 2020 and 2022

Fig. 2. Primary energy and final energy consumption from biogas in Lithuania

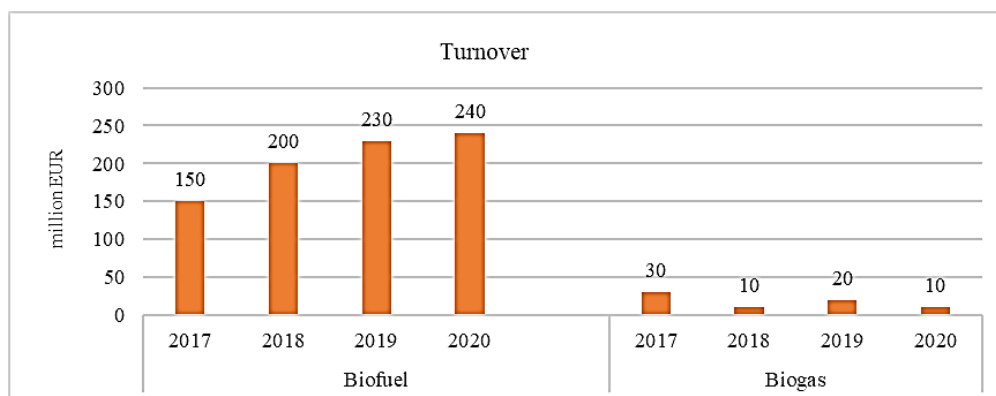
In 2020, concerning final energy consumption directly used in industry and other sectors, it increased from 8.3 ktoe to 9.1 ktoe (9.6%) compared to 6% in 2019 and 2.4% in 2018. The summarized data lead to the conclusion that distribution between them is heavily dominated by the biodiesel sector, which has approximately 90% share compared to 37% for bioethanol and 25% for the biogas fuel sectors respectively. Biogas can also be purified to be transformed into biomethane. It can then either be injected into the network after purification and valued in the same way as can be natural gas, in the form of electricity and or heat, or either be used by natural gas vehicles. However, in Lithuania, there is still no biogas plant, which would transform biogas into biomethane. It is expected, that the first biogas plant should start to work at end of 2023. Lithuania's gross electricity increased the most in 2019 (by 154.4 Gigawatt hours (GWh)) primarily because of the build-up of biogas production from thermal processes (Figure 3).



Source: author's calculations based on the European Commission reports, 2020 and 2022

Fig. 3. Gross electricity and heat production from biogas in Lithuania

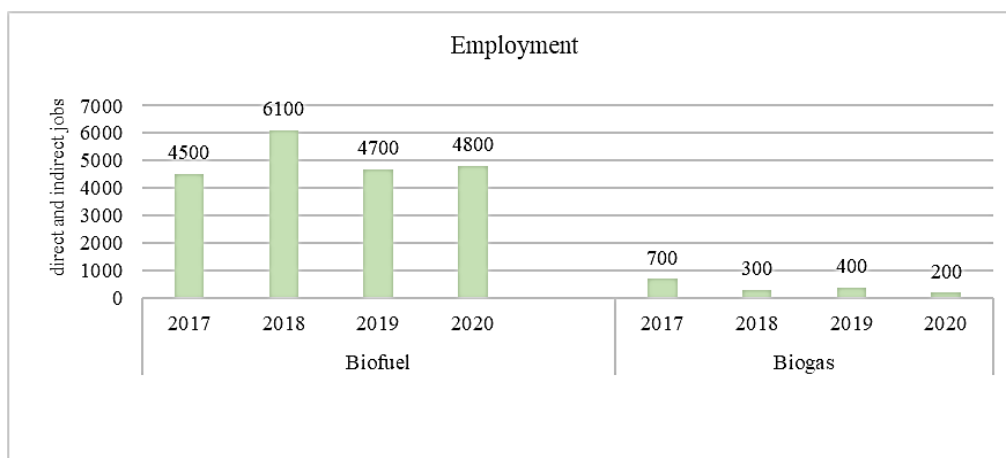
As revealed in Figure 3, biogas produced in 2020 by biogas plants amounted to 22.2 GWh of gross electrical energy, or by 17.5 percent more than in 2017. Gross electricity production from biogas increased to reach 27.2 GWh in 2019 compared to 2017 (21.4%); compared to 12,7 GWh in 2018 (10%). However, biogas electricity output contracted slightly (by 3.2%) between 2019 and 2020, from 154.4 to 149.4 GWh. Gross heat production from biogas made growth to reach 0,3 ktoe in 2020 compared to 2017 (15%). However, biogas heat output contracted slightly (by 17.9%) between 2018 and 2020, from 2.8 to 2.3 ktoe and (by 8%) between 2019 and 2020, from 2.5 to 2.3 ktoe. The Lithuania's biofuels sector subsumes biodiesel and bioethanol for transport, and the biofuels technologies saw the biggest turnover rise in 2020 (60%). The biogas sector, which applies electricity and heat in the biogas technologies, saw the highest turnover decrease in 2020 (67%) (Figure 4).



Source: author's calculations based on the European Commission reports, 2020 and 2022

Fig. 4. Biofuel and biogas turnover in Lithuania

The economic volume of the biofuel industry is estimated at around 240 million euros, and the employment level increased to considerable number – 4800 persons (in 2020). The turnover of the biogas industry amounted to 10 million euros, and the employment level decreased to 200 persons (2020) (Figure 5).



Source: author's calculations based on the European Commission reports, 2020 and 2022

Fig. 5. Biofuel and biogas sectors' employment in Lithuania

As revealed in Figures 4 and 5, the biofuel industry turnover and employment in 2020 increased to 90 million euro and 300 employees more than in 2017, respectively. The biogas industry turnover and employment in 2020 decreased to 20 million euro and 500 employees less than in 2017, respectively.

Determining the potential of energy crop biomass waste involves many limitations factors, such as the complexity of production and consumption, difficulty in determining the energy sources of biomass, the sustainability of long-term productivity and economic aspects of production (Papilo P., Kusumanto I., Kunaifi K., 2017). Also, there are more factors limiting the access of energy crop biomass: topography, law or local regulation, and local traditions. The potential of energy crop biomass can be measured by conducting three main methods of geospatial technology, field surveys, and modelling. Geospatial technology is used to estimate the growth of biomass and productivity estimates. The field survey is used to collect data as part of an evaluation of a specific location. Currently, the field survey in the assessment of biomass resources is used when other methods are not effective or when the ability to use other methods does not exist. A model is a framework that is simplified and designed to visualize a system or process. Both static (analytical) and dynamic (simulation) models are used in the assessment of biomass resources, for several variables such as crop production, the resulting residues, labour costs, and the price (chemical, fertilizer, fuel, and planting (Rosillo-Calle F. et al., 2015).

The area of land dedicated to biomass and energy crop growth is a fundamental driver in determining the potential availability of the grown resources. Because bioenergy crop production is not allowed to compete with food crops, only surplus agricultural land and land that is not suitable for food or feed production are considered. To avoid the competition between energy crops which are used both for food and renewable energy, it is preferred to use less fertile and other land located near roads and polluting objects for the cultivation of agricultural products intended for the biomass of energy crops. In Lithuania, for these crops it would be possible to allocate from 10% to 15% of agricultural land (Kadziuliene Z. et. al., 2013). In Lithuania, maize, sorghum, rye, wheat, sugar beet, Jerusalem artichoke, and reed canary grass are the most suitable for biogas production. Maize, wheat, rye, sugar beet, and rapeseed are suitable for biodiesel production. Bioethanol is usually produced from starchy (triticale, rye, winter wheat, potatoes) and sugary (sugar beet) energy crops. A significant part of biofuels in the world is also produced from the waste biomass of food crops - cereals, beets, soybeans, sugar cane, rapeseed, palm trees etc. (Styps E. et al., 2016). The theoretical potential of energy crops waste biomass might be calculated referred to the guidelines developed by Biomass Energy (Biomass Energy Europe, 2010):

$$THP_PAR = \sum(CAixAPixPtRixAxi) \quad (1)$$

Where:

THP_{PAR} - theoretical potential of agricultural residues (e.g., straw, stalks), in tons;

CA_i – the cultivated area for i-th crop, in hectares (ha);

AP_i – the agricultural residue for the i-th crop, in tons per hectare ($t\ ha^{-1}$);

PtR_i – ratio of agricultural residue for i-th crop;

Av_i – the availability of residues for i-th crop.

Each agricultural residue can be converted into energy units 60% of the waste values of the total energy crops biomass, using a low heating value of 13.63 to 14.63 GJ t^{-1} with a water content of about 15%. Energy units were converted from tons of agricultural residues by multiplying the lower calorific value of a particular residue. The ratio of agricultural residue is shown in Table 2. The availability of residues for each crop according to the current harvesting system was assumed to equal 1 (Papilo P. et al., 2017). This study assumed that energy crops waste biomass belongs to used 60% of biofuel production in 2022. The data on cultivation of energy crops waste biomass is shown in Table 2.

Table 2

Data of cultivation of energy crops waste biomass

Sources	Residue ratio	Cultivated area (ha)	Harvesting yield (t/ha)
Oil crops			
Oilseed rape	2	352 249	2
Linseed	0.3	809	1.35
Field mustard	1	4 559	13.5
Hemp	1	5 334	5
Sunflower	1.5	242	2.6
Solid energy crop			
Sorghum	2.5	183	6
Maize	2.5	52 859	6
Clover	1	36 572	14
Miscanthus	1	6	11
Sainfoin	1	262	16
Switchgrass	1	737	11.3
Lucerne	2	15 060	6
Meadow of perennial energy crops till 5 years	1	159 799	20
Cereals			
Wheat	1.4	940 514	4.4
Barley	1.1	136 480	3.8
Oats	1.3	81 901	2.6
Rye	1.8	29 722	2.1
Triticale	1.2	64 021	3.3
Starch and sugar crops			
Sugar beet	0.6	11 843	58
Jerusalem artichoke	1	37	11.7

Source: author's calculations based on Wright et al., 2009; Clarke et al., 2011 Sakalauskas, 2012; Iye, Bilsborrow, 2013; Papilo et al., 2017; Alhassan et al., 2019

Table 2 shows the data for the study which was used for calculating potential energy crop waste biomass. The data include the kind of sources, residue ratio of waste calculation, the cultivation area of energy crops and their harvesting yield. Potential energies yield from energy crops waste biomass is shown in Table 3. Additionally, the results of energy crop waste biomass by type classification are shown in Figure 6.

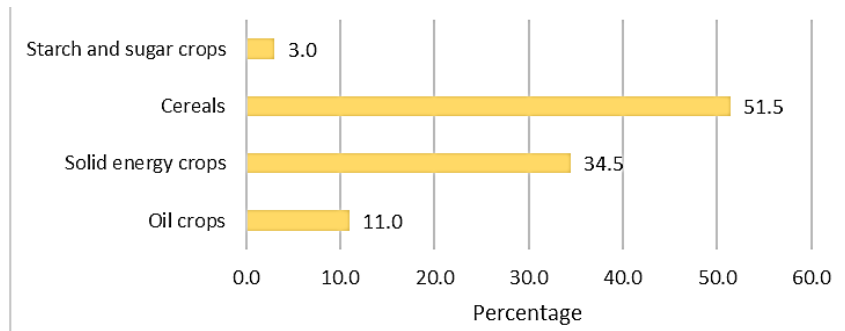
Table 3

Potential energies yield from energy crops waste biomass for 2022 year

Sources	Energy crops waste thsd. t/ha	Energies yield thsd. GJ/ha 13.63	Energies yield thsd. GJ/ha 14.63
Oil crops, total:	899.1	14088.6	15124.5
Oilseed rape	845.4	13247.1	14221.2
Linseed	0.2	3.1	3.3
Field mustard	36.9	578.7	621.3
Hemp	16.0	250.8	269.2
Sunflower	0.6	8.9	9.5
Solid energy crops, total:	2818.2	44159.8	47406.8
Sorghum	1.6	25.8	27.7
Maize	475.7	7454.6	8002.8
Clover	307.2	4813.9	5167.8
Miscanthus	0.04	0.6	0.7
Sainfoin	2.5	39.4	42.3
Switchgrass	5.0	78.3	84.0
Lucerne	108.4	1699.1	1824.0
Meadow of perennial energy crops	1917.6	30048.1	32257.5
Cereals, total:	4204.0	65876.2	70720.1
Wheat	3476.1	54470.1	58475.3
Barley	342.3	5363.6	5758.0
Oats	166.1	2602.6	2794.0
Rye	67.4	1056.3	1134.0
Triticale	152.1	2383.6	2558.8
Starch and sugar crops, total:	247.5	3878.8	4164.0
Sugar beet	247.3	3874.7	4159.6
Jerusalem artichoke	0.3	4.1	4.4

Source: author's calculations based on the data of Lithuanian Department of Statistics

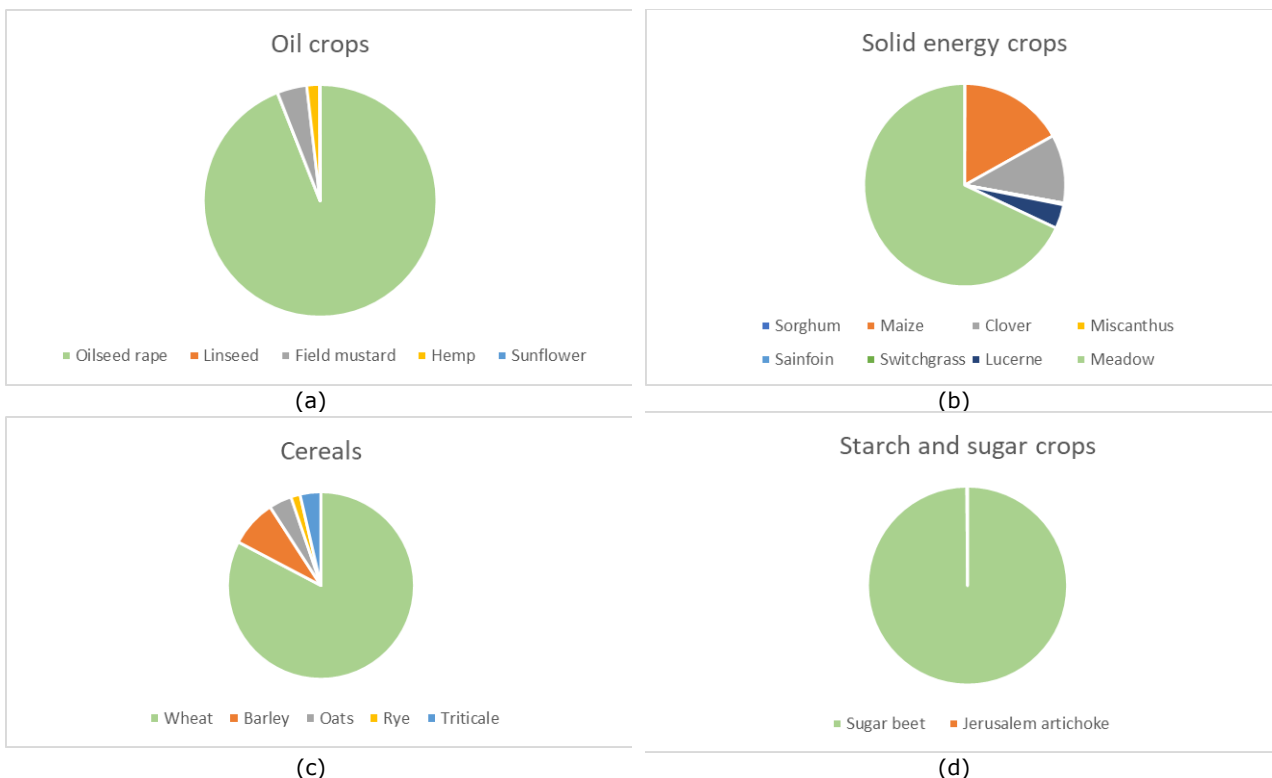
The results show, that the highest potential of energy crop waste biomass was determined in cereals, ranging from 14089 to 15125 thsd. GJ/ha (51.5%); followed by solid energy crops and oil crops, ranging from 44160 to 47407 thsd. GJ/ha (34.5%) and from 65876 to 70720 thsd. GJ/ha (11%), respectively. The lowest potential of energy crop waste biomass amounted to starch and sugar crops, ranging from 3879 to 4164 thsd. GJ/ha (3%).



Source: author's calculations based on the data of Lithuanian Department of Statistics

Fig. 6. The results of energy crops waste biomass by type classification, percentage

According to the results of various kinds of energy crop waste biomass, it can be noticed that four energy crops have a significant role in the agriculture of Lithuania (Figure 7).



Source: author's calculations based on the data of Lithuanian Department of Statistics

Fig. 7. The results of energy crops waste biomass, percentage: (a) Oil crops; (b) Solid energy crops; (c) Cereals; (d) Starch and sugar crops

Based on the data on the structure of the waste biomass related to perennial energy crops, the first highest potential of energy crops amounted to sugar beet (99.8%), followed by oilseed rape (94.9%), wheat (82.7%) and meadow (68.1%). The second lowest potential of energy crops was identified as maize (17%), clover (11%), barley (8.2%), field mustard (4.1%), lucerne, oats and triticale (4%). The smallest significance in the agricultural role have the cultivation of energy crops of hemp and rye (2%); followed by linseed, sunflower, sorghum, miscanthus, sainfoin, switchgrass and Jerusalem artichoke, ranging from 0.001 to 0.06%.

Conclusions

- 1) The analysis of energy crop waste biomass according to statistical data revealed that bioethanol and biodiesel utilization for the transport sector still has a possibility to increase in Lithuania. The reason is the need to find a balance between the use of food crops and energy crops. The statistical results

showed that biogas production is still insufficiently used for gross heat production. Additionally, biogas production includes the lowest energy production compared to biodiesel and bioethanol. The dominant position was taken by biodiesel production in the transport sector. The economic volume (turnover) and employment level in the biogas sector were smaller than in the biofuels industry, as well.

2) The estimation of the biofuel potential of energy crops disclosed that in the biofuel industry there might be included different types of energy crop waste biomass. The highest position applied to cereal crops, followed by solid energy crops and oil crops. The lowest position applied to starch and sugar crops. Also, it was determined that sugar beet, oilseed rape, wheat, and meadows have an important role in the agriculture of Lithuania. There is still an untapped biofuel potential energy for perennial crops, such as hemp, rye, linseed, sunflower, sorghum, miscanthus, sainfoin, switchgrass and Jerusalem artichoke.

Recommendations

According to the results, it would be sensible to cultivate energy perennial crops such as miscanthus, reed canary grass, switchgrass, sorghum, sainfoin and other energy crops, which are suitable for biofuel production. It is necessary to encourage farmers to use uncultivated lands to cultivate the aforementioned energy-perennial crops. For this reason, it is necessary to activate appropriate financial and educational mechanisms.

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MODELLING THE STATE OF AGRARIAN ENTERPRISES' ECONOMIC SECURITY WITH MANAGEMENT ACCOUNTING TOOLS

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Abstract. The purpose of the research is to develop a modified version of a risk-oriented approach for assessing the state of economic security of agricultural enterprises, which is based on the management accounting methodological tools and involves the formation of a system of indicators that determine the impact of risk factors on changes in the results of the enterprise's activities. The usage of the following methods was the methodological basis of the research: analysis and synthesis to establish the interrelationship of analytical indicators applied in models for assessing the state of economic security of business entities; theoretical generalization and grouping to substantiate management accounting tools that serve as risk indicators for lowering the level of economic security; comparison in conducting an analytical assessment of actual performance indicators of agricultural enterprises with their indicators.

The paper puts forward a hypothesis about the priority of management accounting in information support for safety-oriented management and forms a system of indicators used as risk assessment indicators for the activities of agricultural enterprises, including the C/S ratio, the margin of safety, the breakeven point, and the operating leverage factor.

The practical value of the scientific research is justified by the proposed approach for assessing the state of economic security of agricultural enterprises, which methodologically expands the toolkit of security specialists and contributes to strengthening the argumentation for funding protective measures to reduce the impact of critical risks and threats.

The testing of the proposed approach to modelling the state of economic security has revealed catastrophic risks associated with the inefficient cost structure of domestic agricultural enterprises. In conditions of a decrease in the market volume for agricultural products, this leads to a sharp increase in the losses of activities and a decline in the level of economic security.

Key words: economic security, modelling, management accounting, risk, margin of safety.

JEL code: M49; N5

Introduction

Security is a necessary condition for the existence of any enterprise. It ensures the protection of its vital interests from the influence of internal and external threats and serves as the basis for sustainable functioning. The increased public attention to security issues is due to the existence of full-scale military operations in Ukraine, which is characterized by an increase in threats and risks in social and economic life, both at the local and global level, and affects the activities of domestic agricultural enterprises.

Taking into account the fact that the majority of large enterprises in the agrarian sector of the Ukrainian economy were characterized by stable profitability and competitiveness in the pre-war period, their loss of these features poses a direct threat to the economy and social stability of the state as a whole, as well as to the staff of each particular enterprise. After all, business entities, being the main structural element of the economy, perform not only a production function but also bear a social burden and responsibility.

Against the backdrop of the mentioned problems, domestic agricultural enterprises face the urgent task of internal self-assessment in terms of their ability to withstand threats from both the internal and external environment. This will enable the management to have a better understanding of the subject's ability to function effectively under conditions of limited resources and maintain competitiveness in the near and distant future.

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Moreover, the assessment of the state of the enterprise's economic security also has a macroeconomic character, since its financial, technical, and human resources' potential is a decisive stabilizing factor for the economic independence of the state and a key condition for preserving its sovereignty.

A significant number of scientific publications by both foreign and domestic scholars and practitioners are devoted to justifying the optimal model for assessing the state of economic security of business entities and its information support characteristics. In particular, L. Hnylytska (2021; 2022) considers a risk-oriented approach to building a model for assessing the state of economic security. L. Honcharenko focuses on an indicator-based approach (2010), H. Kozachenko and O. Liashenko (2003) are followers of the profit-investment-based approach, whereas O. Kravchuk (2008) and I. Ternavska (2015) insist on a resource-functional-based approach. In turn, the works of E. Atkinson and R. Banker (2003), A. Azudin, N. Mansor (2018), D. H. Pham, T. H. Dao, T. D. Bui (2020), D. D. Cuzdriorean (2017), and others are dedicated to the search for optimal information support for assessing the state of economic security. As a result, their scientific achievements have resulted in a considerable range of approaches (often opposed) that differ in the methodology of calculating safety assessment criteria, industry focus, directions for implementing safety measures, etc. These approaches are summarized in Table 1.

Table 1

Classification of methodological approaches to assessing the state of economic security of business entities

No	Classification feature	Types of approaches
1.	By areas of security measures	<ul style="list-style-type: none"> • approaches based on bankruptcy techniques • approaches based on methods of comprehensive risk assessment • approaches based on methods of the comprehensive assessment of the economic potential of the enterprise
2.	By methodology for calculating the evaluation criteria	<ul style="list-style-type: none"> • indicator-based • resource-functional-based • profit-investment-based • cost- based
3.	By field of application	<ul style="list-style-type: none"> • for enterprises of the real sector of the economy • - for financial institutions

Source: compiled by the authors

At the same time, a thorough analysis of the proposed approaches makes it possible to assert that most of them are focused exclusively on historical information on the results of the enterprise's activities when assessing the state of economic security of business entities. Instead, the high level of uncertainty in the modern business environment requires forecast information that is flexible to changes in case of deviation of the actual activities of a business entity from its strategic goals.

In addition, in most cases, these approaches are often characterized by an extensive analytical framework and a low balance of indicators that describe the impact of internal and external threats on the safe state of the business entity's activities, which significantly complicates their use in the practical activities of agrarian enterprises.

The multifaceted nature of the problems faced by domestic agricultural enterprises in the practical application of existing models for assessing the state of economic security proves the need for further scientific research in the direction of their improvement.

Under these conditions, there is a growing need, on the one hand, to improve the information basis for the formation of assessment indicators that determine the security status of agricultural enterprises, and on the other hand, to simplify and standardize analytical procedures for their understandability when used by security specialists.

The study of security-oriented management concepts, covered in domestic scientific publications (I. Ternavska 2015; V. Horbulin 2005, V. Kuzomko 2013), allowed formulating the hypothesis that the central place in the information support of such management is assigned to the methods and techniques of management accounting. At the same time, the theoretical basis for the use of methodological tools of management accounting in assessing the state of security of agricultural enterprises is its conceptualization as an information basis for efficient resource utilization and a subsystem of strategic management.

Taking into account the above-mentioned provisions, the most common management accounting techniques that can be used as an information basis for managing the economic security of agricultural enterprises include:

- a balanced system of economic indicators (when assessing the implementation of the enterprise's strategy in the field of its development and security);
- budgeting and control (when developing the measures to ensure the economic security strategy and further monitoring of their implementation);
- cost-benefit analysis (when assessing the effectiveness of security measures by comparing the resources used and the benefits obtained as a result of threats prevention);
- break-even analysis (when assessing the state of security and forecasting changes in its level under the influence of entrepreneurial risk factors).

Thus, the purpose of the study is to develop a modified version of the risk-oriented approach to assessing the state of economic security of agrarian enterprises, which is based on the methodological tools of management accounting and provides for the formation of a system of indicators that determine the impact of risk factors on changes in the results of the enterprise, formalization of their calculation, and standardization of analytical procedures used in security assessment.

Materials and methods

The following methods were used in the research: analysis and synthesis to establish the interrelation of analytical indicators used in models for assessing the state of economic security of business entities; theoretical generalization and grouping to substantiate management accounting tools that serve as risk indicators for reducing the level of economic security; comparison when conducting an analytical assessment of actual performance indicators of agricultural enterprises with their benchmarks; logical generalization of results when formulating conclusions and recommendations.

Results and discussion

The proposed approach is a modification of the risk-oriented approach and involves modelling the state of security of agricultural enterprises based on the actual values of certain performance indicators that serve as risk indicators, comparing them with the benchmark, and establishing a trend in the future.

The practical implementation of this approach includes the following stages:

- 1) identification of management accounting tools as assessment indicators that serve as risk indicators of reducing the level of economic security and formalization of their calculation;
- 2) formation of boundary values of the assessment indicators;

3) standardization of analytical procedures aimed at assessing the level of entrepreneurial risks' impact on the state of owners' capital of agricultural enterprises and reducing the level of their economic security.

When justifying the management accounting tools, one should proceed from the following positions:

- maximum satisfaction of the information needs of security specialists when assessing the level of enterprise protection against risks and threats;
- expediency and the possibility of using the tools based on the existing information base of the enterprise;
- consistency of the tools with each other;
- the ability to compare agricultural enterprises of different sizes.

We believe that the management accounting tools that can be used in modelling the security state of agricultural enterprises should include the following elements of breakeven analysis (CVP analysis): breakeven point (critical volume of activity); contribution margin; margin of safety (margin of safety ratio); operating leverage (operating leverage ratio).

The breakeven point is the level of activity at which the sales revenue equals the total costs of the enterprise, i.e., the level of sales at which the enterprise has neither profit nor loss. In practice, this indicator is called the starting point of a business, emphasizing that it is advisable to start a business only if revenues cover costs, even though there will be no profit.

The higher the breakeven point is, the fewer opportunities the company has to increase its profit. Therefore, from the perspective of increasing the level of economic security, the activities of agricultural enterprises should be characterized by a low breakeven point.

The contribution margin is a relative indicator of evaluating the profitability of a company's activities. It reflects the share of contribution in the sales revenue. This indicator is considered to be a risk indicator for loss of enterprise financial stability, as its value below 0.5 signals a high probability of such a risk.

The margin of safety is the level of the company's current activity that exceeds the breakeven volume. Despite the variety of names of this indicator found in the literature (financial safety margin, financial strength margin, safety zone, etc.), the margin of safety always shows the maximum allowable decrease in the actual volume of activities without threatening the company to enter into the loss zone. In addition, the margin of safety can be used as a mechanism for determining operating profit, because it shows the sales volume above the breakeven point, and, therefore, this volume will certainly bring profit to the company.

The safety margin can also be expressed as a relative indicator - the safety of margin ratio, the value of which allows estimating the percentage by which the activity of the enterprise can decrease before it enters the loss zone. Therefore, the safety of margin ratio is considered to be one of the key indicators of the risk of loss of profitability, guided by the following rules: the higher its value is, the more reliable the financial position of the company will be. It is also true to say that this will cause less negative consequences for the enterprise if such unfavourable trends as a decrease in demand for products, changes in market conditions, changes in resource prices, and so on occur. Some scientists (Adu-Gyamfi J., Chipwere K. Y. W., 2020), based on the results of practical research, note that if the safety factor is below 30%, this is a sign of a high risk of loss of profitability.

Equally important for assessing the impact of structural risk on the performance of agricultural enterprises is the use of operating leverage (production leverage, production leverage). It is a mechanism for correlating fixed and variable costs, which ensures that the percentage of profit growth (decline) exceeds the corresponding percentage of sales growth (decline).

In other words, the operating leverage ensures profit management in the context of changes in the volume of the company's activities based on the optimization of the fixed cost/variable costs ratio. The economic meaning of this indicator is as follows: the lower the specific weight of fixed costs in the total amount of the company's cost is, the lower the amount of contribution required to cover them, and therefore the lower the impact of changes in the volume of activities on changes in the enterprise's profit will be, and vice versa (Hansen D. R., 2002).

The impact of operating leverage on the change in operating profit of agricultural enterprises can be assessed using the operating leverage factor, which shows a percentage change in the enterprise's profit in case of a one percent change in business volume.

Therefore, using the operating leverage factor as an indicator of structural risk, agricultural enterprises should remember that in the face of a decline in their production, they should strive to reduce the operating leverage factor, which will help slow the rate of decline in profits compared to the rate of decline in the volume of activities. The reverse is also true: a higher level of operating leverage results in a greater impact on profit due to changes in activity. Therefore, when the agricultural market conditions improve, the security policy of agrarian enterprises should be aimed at increasing the operating leverage factor.

Table 2

Composition and procedure for calculating analytical indicators used in modelling the economic security of agricultural enterprises

No	Analytical indicators	Purpose	Calculation formula
1.	Total contribution, monetary unit	It allows estimating the margin generated by the company's production activities. Shows the contribution of each segment to covering the fixed costs of the enterprise and generating operating profit.	Revenue - Variable costs or Fixed costs + Operating profit
2.	Contribution margin, ratio	It allows estimating the share of contribution in each monetary unit of sales revenue. If the contribution margin is below 0.5, it is a sign of a high risk of losing financial stability.	<u>Total contribution</u> Sales revenue Прибуток від операційної діяльності Середня вартість власного капіталу + середня вартість довгострокових зобов'язань
3.	Breakeven point, units	It allows estimating the volume of activities when sales revenue is equal to the total costs of the enterprise, i.e. the volume of sales in which the enterprise has neither profit nor loss.	<u>Fixed costs</u> Contribution per unit
4.	Breakeven point, monetary unit	It allows estimating the volume of activities when sales revenue is equal to the total costs of the enterprise, i.e. the volume of sales in which the enterprise has neither profit nor loss.	<u>Fixed costs</u> Contribution margin
5.	Margin of safety, units	It allows determining the level of current (planned) activity of the enterprise that exceeds the breakeven volume.	Actual (planned) volume of activities - Breakeven point
6.	Margin of safety, ratio	It allows estimating the possible decline in actual (planned) volumes of activity before the company reaches the breakeven point. Its value below 0.3% is a sign of a high risk of loss of profitability.	<u>Margin of safety</u> Actual (planned) volumes of activity
7.	Operational leverage factor, ratio	It allows to estimate by what percentage the company's profit will change if the volume of activities changes by one percent.	<u>Operating profit</u> Total contribution

Source: compiled by the authors

Based on the above considerations, Table 2 proposes the composition and formalization of analytical indicators that can be used in modelling the economic security of agricultural enterprises.

As already mentioned, assessing the state of economic security requires not only calculating the actual meanings of the ratios that characterize the riskiness of agricultural enterprises but also comparing them with the established benchmark (limiting) values. The absence of assessment benchmarks precludes comparison of indicators characterizing the security of agricultural enterprises in terms of cluster groups, regions, and countries, while the assessment is limited to determining the trend of their change over several periods. This significantly reduces the reliability of the assessment conducted, especially when it comes to the rating of the competitiveness of domestic agricultural enterprises in the world economic markets.

We believe that when setting reference (limiting) values, it is advisable to be guided by the following rules:

- for financial performance indicators, their industry average values should be chosen, which most accurately reflect the specifics of enterprises of a certain type of economic activity or average normative values;
- for non-financial indicators, as well as financial indicators for which it is impossible to establish normative or industry average values, a benchmarking approach should be applied to justify them.

The practical implementation of the proposed approach to assessing the state of security of agricultural enterprises actualizes the need to standardize analytical procedures for such an assessment.

The methodological basis for these analytical procedures is a comparative analysis of the actual indicators of the riskiness of an enterprise's activities, carried out in three interdependent directions:

- 1) comparison with their limit values (comparison with expected results);
- 2) comparison with previous periods;
- 3) comparison in branch and regional sections.

The use of a risk-oriented approach to assessing the state of economic security of agricultural enterprises actualizes the issue of establishing the significance of the impact of the level of entrepreneurial risk on the state of economic security. Depending on this influence, a normal (stable) state, a crisis (critical) state and a catastrophic state of economic security are distinguished.

The characteristics of the impact of entrepreneurial risk on the financial condition and economic security of agricultural enterprises are presented in Table 3.

Table 3

Characteristics of the risk impact on the financial condition and economic security of agricultural enterprises

No	Level of risk	Impact on the company's financial position and the cost of capital	Impact on the state of economic security
1.	Acceptable risk (characteristic of the stable activity of the enterprise under conditions of uncertainty)	The impact is defined as small and is characterized by the loss of part of the expected profit and impairment of assets.	At this level of risk, the enterprise functions stably and develops, and its activities retain economic feasibility. The deviation of the achieved evaluation indicators does not exceed 15% of their limit values. The state of security is assessed as normal (<i>stable</i>).
2.	Critical risk (this mode is typical for enterprises that manage their resources inefficiently)	The impact is defined as large and is characterized by financial losses in the amount of the expected sale revenue and by a decrease in the initial value of assets, which leads to a loss of part of owners' equity and, as a result, a decrease in the financial stability of the enterprise.	At this level of risk, the company operates with significant losses but does not lose its financial stability and economic independence. The main assessment indicators show a decrease in their value by 30-60% compared to the benchmark. The state of economic security is assessed as <i>critical</i> .
3.	Catastrophic risk (this mode is typical for enterprises that are potential bankrupts or are in force majeure circumstances)	The impact is defined as catastrophic and is characterized by losses exceeding the owners' equity of the company	At this level of risk, the company's activity is characterized not only by financial losses, but also by reputational losses. There is a decline in production, and irreversible losses of the company's potential, which indicates its potential bankruptcy. The values for all assessment indicators are lower than the standard by more than 60%. The state of economic security is assessed as <i>catastrophic</i> .

Source: compiled by the authors

The author's approach to modelling the security state of agricultural enterprises was tested on one of the largest agro-industrial enterprises in Ukraine - Kernel-Trade LLC, which is a leading exporter of agricultural products and is among the TOP-5 producers of unrefined sunflower oil.

The practical implementation of the methodological developments was carried out in three stages. Thus, at the preparatory stage, a system of information sources was formed and the composition of indicators that determine the level of economic security (or the riskiness of activities) was substantiated. The main sources of data used as an information basis for assessing the riskiness of activities were the financial statements of Kernel-Trade LLC for 2021-2022 (Financial statements of Kernel-Trade LLC for 2021-2022).

An extract from the financial statements containing generalised indicators of income and costs for assessing the riskiness of Kernel-Trade LLC is given in Table 4.

Table 4

Structure of income and costs for risk analysis of Kernel-Trade LLC for 2021-2022

No	Indicator	2021	2022	Deviation	
				absolute, thousand UAH	relative, %
1.	Sales volume, million tonnes	12.249	12.204	- 0.045	- 0.4
2.	Revenue (sales and other operating income, thousand UAH)	175 170 000	162 270 000	- 12 900 000	- 7.4
3.	Variable costs (production and selling), thousand UAH	144 660 000	140 760 000	- 3 900 000	- 2.7
4.	Specific weight of variable costs in revenue, %	82.6	86,7	+ 4.1	+ 5
5.	Contribution, thousand UAH	30 510 000	21 510 000	- 9 000 000	- 29.5
6.	Fixed costs (production and operating), thousand UAH	9 840 000	18 750 000	+ 8 910 000	+ 90,5
7.	Specific weight of fixed costs in revenue, %	5.6	11.6	+ 6.0	+ 107.1
8.	Operating profit, thousand UAH	20 670 000	2 700 000	- 17 970 000	- 86.9
9.	Specific weight of operating profit in revenue, %	11.8	1.7	- 10.1	- 85.6

Source: compiled by authors

According to the information presented in Table 4, the company reduced its sales by 45 thousand tonnes in 2022, which constitutes a decrease 0.4% compared to the previous year, although it planned to sell 20 million tonnes of grains and oilseeds. The main factor behind this decline was the full-scale military actions in Ukraine resulting in difficulties with exporting the products. Against the backdrop of a 0.4% decline in sales, Kernel-Trade's revenues in 2022 decreased by 7.4%, while variable costs fell by only 2.7%. Such a disproportion in the composition of revenues, costs, and volumes of activities led to a 29.5% drop in contribution compared to the indicators of 2021.

Meanwhile, Kernel-Trade's fixed costs in 2022 increased by 90.5% compared to 2021. The growth was caused, on the one hand, by a decrease in the net realisable value of inventories to a level below cost, and, on the other hand, by a sharp increase in provisions for doubtful debts, which is typical for a business in wartime, when business contacts are significantly disrupted. This, in turn, led to a sharp decline (by 86.9%) in the company's operating profit.

Considering the cost structure of Kernel-Trade LLC, a high share of variable costs (82.6% in 2021 and 86.7% in 2022 respectively) should be highlighted, which is quite justified for agro-industrial enterprises.

In return, in 2022 the share of fixed costs increased significantly and amounted to 11.6% compared to 5.6% in 2021. During periods of production decline, restructuring the cost structure in favour of increasing the share of fixed costs is absolutely justified. However, in Kernel-Trade LLC, the growth in the share of fixed costs was not due to a decrease in the share of variable costs, but due to a sharp drop in the share of profit in sales revenue.

The analytical stage involves the direct conduct of analytical procedures to assess the riskiness of Kernel-Trade LLC's activities for 2021-2022. The results of the assessment are presented in Table 5.

Table 5

Risk assessment of Kernel-Trade LLC for 2021-2022

Risk indicator	A benchmark or a trend	Actual value		Deviations from 2021, %	Assessment of the risk level
		in 2021	in 2022		
Contribution to sales ratio	0.5	0.17	0.13	-23.5	Critical level of risk of financial stability decline
Breakeven point, thousand UAH	should strive to reduce	57 882 353	144 230 769	+149	Critical level of risk of profitability reduction
Margin of safety, thousand UAH	should strive for growth	117 287 647	039 231	-99.9	Critical level of risk of profitability reduction
Margin of safety, ratio	0.3	0.67	0.11	-63.3	Critical level of risk of profitability reduction
Operational leverage factor, ratio	with a decrease in the volume of activities should decrease	1.5	8.0	+433.3	Catastrophic level of structural risk

Source: compiled by the authors

The results of the analysis presented in Table 5 indicate that there is a negative trend in all indicators characterising the riskiness of Kernel-Trade LLC's activities, with no exception. The level of structural risk is particularly high, as the operating leverage factor increased by more than 4 times in 2022 compared to 2021 data due to the decrease in business activity. In addition, in 2022, the company's activities are characterised by a catastrophic level of risk of declining profitability, confirmed by an increase in the breakeven point by more than 2.5 times compared to 2021 data, as well as a 63% drop in the margin of safety ratio compared to the benchmark and almost 6 times drop compared to the 2021 indicator.

At the final (assessment) stage, the level of economic security of Kernel-Trade LLC was determined. According to the scale of interpretation of the impact of risk on the state of economic security of agricultural enterprises, presented in Table 3, the studied enterprise is characterised by a catastrophic level of economic security in 2022.

Therefore, if Kernel-Trade LLC does not reformat its costs in the context of reducing the share of their variable component, with a further decline in activity level in 2023, the losses of the enterprise will be even more significant, and the level of security will be even lower.

Without pretending to be perfect, we believe that the proposed approach to assessing the state of economic security of agricultural enterprises will methodologically expand the toolkit of security professionals and help strengthen the arguments for financing protective measures to offset the impact of critical risks and threats on the to the enterprise's operations.

Conclusions, suggestions, recommendations

The carried-out research allows to formulate a number of generalising provisions on the use of management accounting instruments in modelling the economic security of agricultural enterprises as follows.

- 1) A prerequisite for the activities of agricultural enterprises and a social requirement of today is assessment of the state of their economic security. In order to eliminate subjectivity in decision-making in the field of security and to strengthen the arguments for financing protective measures, it is important to choose a model for assessing the state of economic security and its information basis.
- 2) To model the state of economic security of agricultural enterprises, a modification of the risk-oriented approach is proposed, the practical implementation of which includes the following stages:

1) defining the management accounting tools as evaluating indicators that serve as indicators of the risk of reducing the level of economic security and formalising their calculation; 2) forming the boundary values of evaluating indicators; 3) standardising analytical procedures aimed at assessing the level of impact of business risks on the capital of agricultural enterprises and reducing the level of their economic security.

3) When substantiating the management accounting tools, we proceed from the following positions: maximum satisfaction of the information needs of security specialists in assessing the level of protection of a company from the impact of risks and threats; expediency and the possibility of using the tools, taking into account the existing information base of the company; consistency of the tools with each other.

Thus, the key management tools used as indicators for assessing the riskiness of agricultural enterprises include: contribution margin, margin of safety, breakeven point, and operating leverage factor.

4) The use of the proposed approach to assessing the state of economic security of agricultural enterprises actualizes the issue of establishing the significance of the impact of the level of entrepreneurial risk on the state of economic security. Depending on this influence, a normal (stable) state, a crisis (critical) state and a catastrophic state of economic security are distinguished.

5) Approbation of the proposed approach to modelling the state of economic security allowed to identify catastrophic risks associated with the inefficient cost structure of domestic agrarian enterprises, which, in the condition of a decline in the market for agricultural products, leads to a sharp increase in the unprofitability of their activities and a drop in the level of economic security.

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BIOECONOMY CONCEPT AND POSSIBILITIES OF ITS IMPLEMENTATION IN UZBEKISTAN AGRICULTURE FOR MAKING IT MORE ATTRACTIVE FOR INVESTMENTS

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Abstract. One of the most crucial elements in the development of Uzbekistan's agricultural sector is investment. When compared to 2002, the monetary number of investments in agriculture increased by 176.7 times, which had a beneficial impact on agricultural exports, value added, gross output, and food manufacturing. However, for more rapid and dynamic agricultural development even bigger investments are needed. This study analyses possibilities of implementing bioeconomy concept in Uzbekistan agriculture for making this sector more attractive for investments. In this study authors explain bioeconomy concept as set of activities where renewable bioresources are basis for all economic processes in agriculture, agricultural production is promoted by research and innovation, and where broad cross-sectoral and institutional focus is present. In this study, the authors have identified agricultural priorities in Uzbekistan, analysed direction and character of agriculture development in Uzbekistan depending on the number of investments, identified Uzbekistan's needs for bioeconomy development. In order to make agricultural sector more attractive for investments this study authors recommend that it is necessary to develop and implement a state program for the development of bioeconomy, containing a set of its goals and priorities, mechanisms for achieving and ensuring them, principles for selecting participants in the production process, as well as determining their powers and degree of responsibility.

Key words: agriculture, investments, bioeconomy, development, Uzbekistan.

JEL code: Q57

Introduction

Natural and environmental problems are extremely dangerous and global. No doubt they provide direct and strongest impact on the economy, which is directly based on the use of natural resources. However, natural resources (together with labour) form the basis of the national wealth of the country. These problems, together with population growth, as well as several other factors have created the need to search for new ways to save resources and develop the economy. One of them is bioeconomy.

Today, bioeconomy and biotechnology is one of the most dynamically developing and investment-attractive sectors of the world economy (Barañano L. et al., 2021). As rated by leading industry experts by 2030, biotechnology will provide 2.7% of the GDP of the developed countries. For developing countries, the contribution of biotechnology is even greater. By 2030, biotechnology will provide 80% of medical products, 35% of chemical industry and 50% of agricultural production. By 2050, the global bioenergy market will be 150 billion USD. 30% of the total world energy demand will fall on the use of renewable sources. The biomass market to meet the demand will amount to 150 billion USD by 2050. According to experts, the global biotechnology market in 2025 will reach USD 2 trillion level (Zharashuyeva L. M., Bischekova F. R., 2015). Advanced biotechnologies can play a significant role in improving the quality of life and human health, ensuring the economic and social growth of states (especially in developing countries). Modern biotechnologies can be applied in industry, energy, agriculture economy, medicine, ecology etc.

Bioeconomy and biotechnology it is the most highly technological part of the economy. In many countries, it has become widespread and developed (Frisvold G. B. et al., 2021; Muska A. et al., 2023; McCormick K., Kautto N., 2013); however, in Uzbekistan, it is only at the stage of formation, although our country has huge opportunities to succeed in this, but this will require investments.

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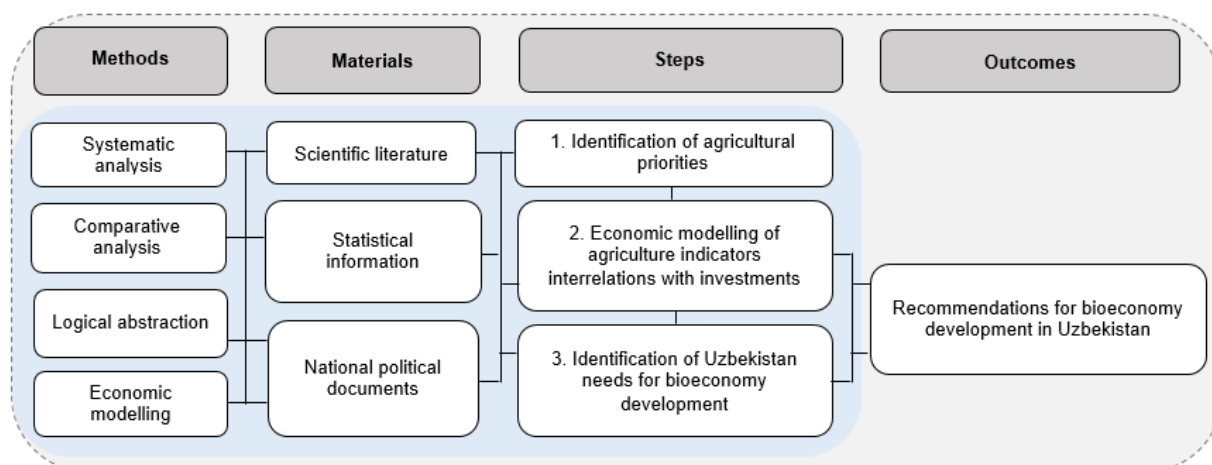
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In recent years, some authors (Babaeva N.M., 2019) have already highlighted the topicality of reforms needed in the Uzbekistan agricultural sector and the distribution of investments within the sector and offers scientific recommendations on the effective organization of the agricultural economy. There can be also observed very active scientific discussion (Maksumkhonova A. M., 2019) on the concept of "investment" in the agricultural sector, and A. M. Maksumkhonova discloses the structure of investment in the agro-industrial complex. She determines investment potential on the basis of a factor approach, where as the most important factors affecting success of investments she has identified:

- the district's economic potential (natural and climatic factors, infrastructure etc.);
- efficiency indicators (labour resources, fixed and working capital, fertilizers etc.);
- anticipated effects of capital investments.

However, so far in Uzbekistan little attention has been paid on promoting and understanding agriculture as one of the bioeconomy sectors that promises technical and productive solutions for regional agricultural development and activities based on biological resources (Mez L. E., Rodriguez A. G., 2022).

Such situation analysis sets the aim for this study - to analyse possibilities of implementing bioeconomy concept in Uzbekistan agriculture for making this sector more attractive for investments. In order to reach this aim, the study was carried out by the following steps: identification of agricultural priorities in Uzbekistan; determination of direction and character of agriculture development in Uzbekistan depending on the amount of investments; identification of Uzbekistan needs for bioeconomy development (Fig. 1).



Source: authors' construction

Fig. 1. Schematic overview of methodological steps and planning of this study

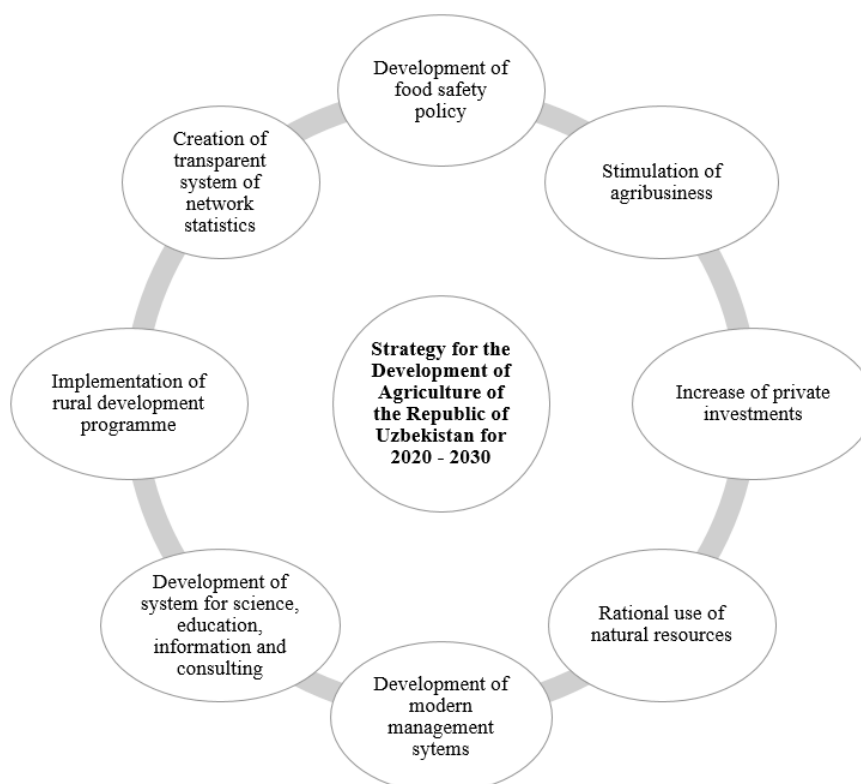
This study was based on systematic analysis, comparative analysis, logical abstraction techniques, and economic modelling were widely used. The main materials used in this study were: scientific literature; Uzbekistan political documents and statistical information from Agency of statistics under the President of the Republic of Uzbekistan (stat.uz); the World Bank data (<https://data.worldbank.org/indicator>) and trade statistics for international business (trademap.org). The main outcomes of this study are the recommendations for bioeconomy development in Uzbekistan from the perspective of promoting private investments in agricultural business.

Research results and discussion

1. Agriculture development priorities in Uzbekistan

Any sector of the national economy, including the recovery and development of the agricultural sector, can expand and flourish with the help of investments. Investments in the agricultural industry are seen as an important tool for fostering consistent, long-term growth and revenue growth while enhancing the value of agricultural products. As a result, investments in the agricultural industry are the most effective and crucial tool for the growth of the current economy. The Uzbek government is creating a number of initiatives to draw both domestic and foreign investors to this significant area of the country's economy. Investments in the agriculture sector do not yield immediate income. For example, land needs preparation, planting, cultivation, harvesting, storage, and possibly processing. Invested funds can make a profit, but not as quickly as, for example, trade investments.

Investment in agriculture can have a variety of effects, such as diversifying production, bettering land and water allocation for irrigation, producing a chain with a higher value added, fostering the growth of cooperative relationships, widely introducing market mechanisms and information and communication technologies into the sector, and utilizing scientific advancements to boost employees' potential. Recognition of these investment impacts were presented and approved under the Decree of the President of the Republic of Uzbekistan "On Approving the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020 - 2030 years" No. PD-5853, 23 October 2019 (Decree of the President of the Republic..., 2019).



Source: author's summarization based on the Decree of the President of the Republic..., 2019

Fig. 2. Priority directions of Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020 - 2030

In Figure 2, the authors reveal the priority directions of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020 – 2030. As one of the priority directions is set the goal to create the mechanisms that increase the inflow of private investments to support the modernization, diversification

and sustainable growth of agri-food industry. In this regard, the President of Uzbekistan, Shavkat Mirziyoyev Miromonovich on 24 January 2020 in his yearly message to lawmakers and the Uzbek government declared his understanding of the value of agricultural investment. He said: "...agriculture, which is one of the most crucial sectors for ensuring economic expansion, job creation, and population incomes, must be developed on the basis of a strategic approach".

Given the significance of agriculture to the Uzbekistan economy, special steps will be made to greatly expand production, resulting in fruit and vegetable exports valued at USD 2 billion, and to grow this amount by a factor of three to four over the course of the following five to seven years. Additionally, 3 trillion UZS will be set aside in the state budget for 2023 to support the growth of horticulture, viticulture, seed production, animal husbandry, agronomy, the broad adoption of water-saving technology, research, and the training of trained employees in the area (Majlis M.F., 2020).

To identify the role of investments in the current rate of agricultural growth, further the authors have analysed the direction and character of agriculture depending on amount of investments.

Table 1

The impact of investments on agricultural development in Uzbekistan, 2002-2022

Year	Investments in agriculture, bln.UZS	Agriculture gross output, bln.UZS	Agriculture, value added, bln.UZS	Food production index, %	Agriculture export, thousand USD
2002	102.2	3255.3	2244.2	38.51	140486.0
2003	98.5	4083.3	2801.8	41.76	194784.0
2004	113.6	4615.8	3242.3	43.61	368258.0
2005	138.2	5978.3	4192.8	46.62	431318.0
2006	164.4	7538.8	5298.0	52.03	592249.0
2007	200.9	9304.9	6550.2	53.7	546679.0
2008	261.2	11310.7	7673.0	56.6	400335.0
2009	385.9	13628.6	9200.0	61.42	459742.0
2010	531.0	30856.7	21251.3	66.01	689232.0
2011	942.5	45285.9	30658.6	70.84	894713.0
2012	1089.2	55750.0	36954.7	76.81	639746
2013	1335.6	66435.3	42636.8	83.27	741783.0
2014	1448.0	81794.3	53613.2	89.15	733675.0
2015	1375.5	99604.6	64680.3	96.22	562049.0
2016	1646.4	115599.2	74779.0	114.63	746812.0
2017	2004.3	148199.3	90983.9	102.93	973350.0
2018	3561.1	187425.6	113660.7	105.03	1128751.0
2019	15141.0	216283.1	130306.9	104.36	1533268.0
2020	18025.5	250250.6	151250.9	106.28	1481928.0
2021	18934.9	303415.5	183518.5	N/A	1456421.0
2022	19900.0	347600.0	N/A	N/A	1631600.0

Source: authors' calculations based on the data from www.stat.uz; <https://data.worldbank.org/indicator> and <https://www.trademap.org/>

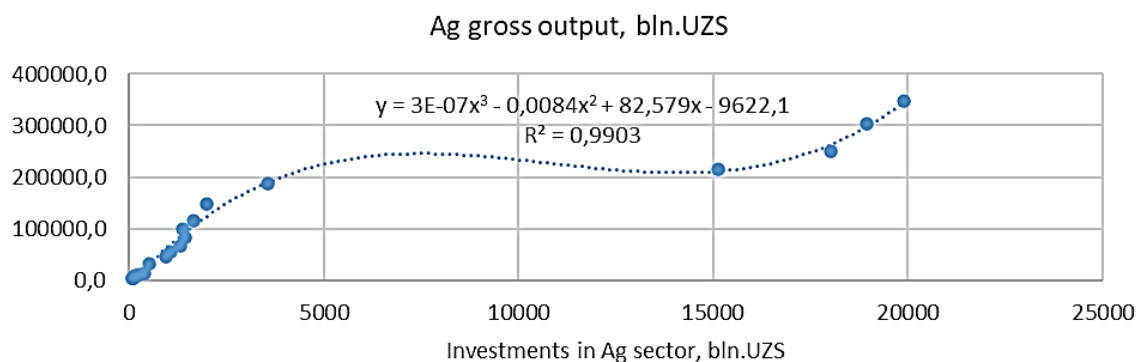
Direction and character of agriculture development in Uzbekistan depending on the amount of investments

In Table 1 the authors have summarized the data that reflect the impact of investments on main agricultural development indicators, such as agriculture gross output, value added, export and food production.

As shown in Table 1, the number of investments in agriculture increased five times between 2002 and 2010, from 102.2 billion UZS to 531 billion UZS. This sum reached 18,025.5 billion UZS in 2020, which means it increased 33.9 times compared to 2010 levels.

One of the most crucial reasons for the development of Uzbekistan's agricultural sector is investments in the processing industry, agriculture, and the industries that provide equipment for the first and second agricultural sectors (The Third agricultural sector). Among the agro-industrial complex listed sectors, agriculture holds a distinctive place because it provides the raw materials for processing industries and thus forms the backbone of the sector's steady activity.

In this study, the relationship between agricultural investment and gross agricultural product was examined (Fig.3). The entire value of gross agricultural output in 2020 amounted to 250,250.6 billion Uzbek som and increased by 76 times compared to 2002, while investments in agriculture increased by 176.7 times between 2002 and 2020.



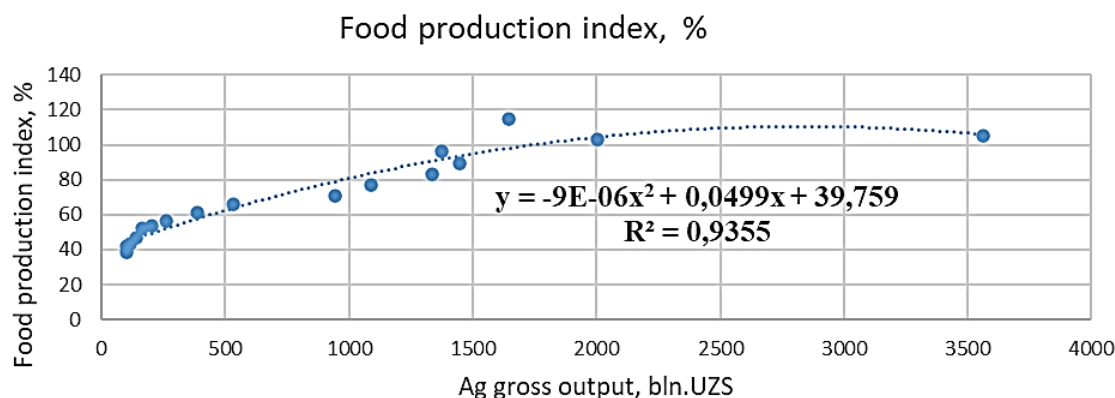
Source: authors' calculations based on the data from Table 1

Fig. 3. **Economic model of gross output of agriculture in Uzbekistan, 2002-2022**

As it can be seen from the model in Figure 3, $R^2=0.9903$ implies a very high correlation between investment in agricultural sector and gross agricultural output.

The main reason for the development of the agrarian sector, which is a crucial part of the economy of Uzbekistan, is providing the domestic market with food products, thus achieving independence in production and ensuring food security. Effective implementation of a food security strategy solves social problems such as providing the population with jobs, improving the welfare of the population and improving urban and rural areas. The development and implementation of the state policy on food security is underway in Uzbekistan thus providing food safety, improving the diet, and producing food products in the required quantity.

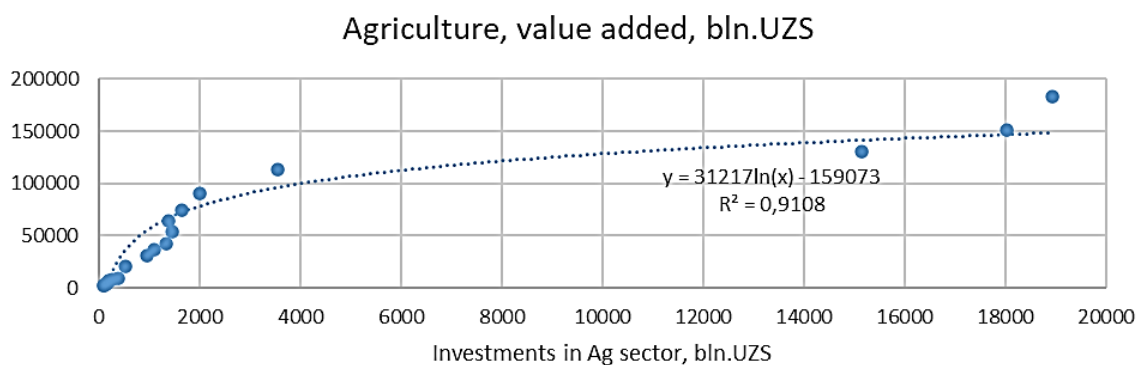
Figure 4 implies a strong correlation ($R^2=0.9355$) between investment in agriculture and food production. It is crucial for Uzbekistan to create a conducive environment for agribusiness and a solid value chain. Accordingly, agricultural products must be bought and sold according to market principles, quality control infrastructure must be built, exports must be promoted, and competitive high-value agri-food products must be produced. The economic model shows a very strong correlation ($R^2=0.9108$) between investment in agriculture and value added in agriculture, which is represented in Figure 5. The impact of investment in agriculture and the value chain created in agriculture is very high implying that investment in agriculture is paying off.



Source: authors' calculations based on the data from Table 1

Fig. 4. Economic model of food production index in Uzbekistan, 2002-2022

The economic model of agricultural production export of Uzbekistan (Fig. 6) shows that investments in agricultural sector so far have played a clearly contributing role that is confirmed by a very strong correlation ($R^2=0.9082$) between these two indicators.

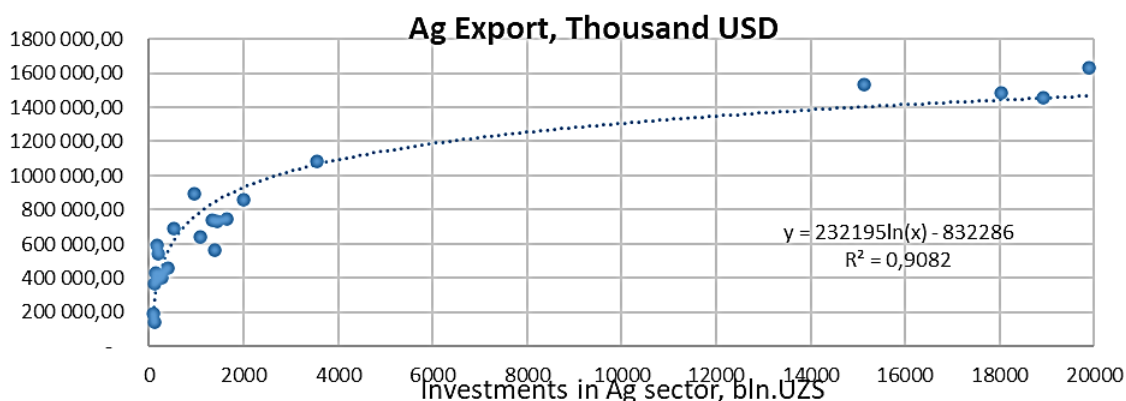


Source: authors' calculations based on the data from Table 1; <https://data.worldbank.org/indicator> and <https://www.trademap.org/>

Fig. 5. Economic model of value added in agriculture of Uzbekistan, 2002-2022

All generated economic models (Fig. 3-6) confirm that the amount of investments positively correlates with main indicators characterizing agricultural development - agriculture gross output, agriculture value added, agriculture export and food manufacturing. However, the authors foresee that for more rapid and dynamic agricultural development even bigger investments are needed.

To achieve this aim, Uzbekistan has implemented market mechanisms and a cluster approach to the agricultural sector, thus giving priority to the rapid development of key industries, like modern greenhouse farms, fish farming, beekeeping, poultry farming and others. Additionally, the practice of secondary autumn planting of vegetable crops and homestead farming has been expanded. These priority areas support comprehensive structural reform and will attract both domestic and international investors.



Source: authors' calculations based on the data from Table 1; <https://data.worldbank.org/indicator> and <https://www.trademap.org/>

Fig. 6. Economic model of agricultural product export of Uzbekistan, 2002-2022

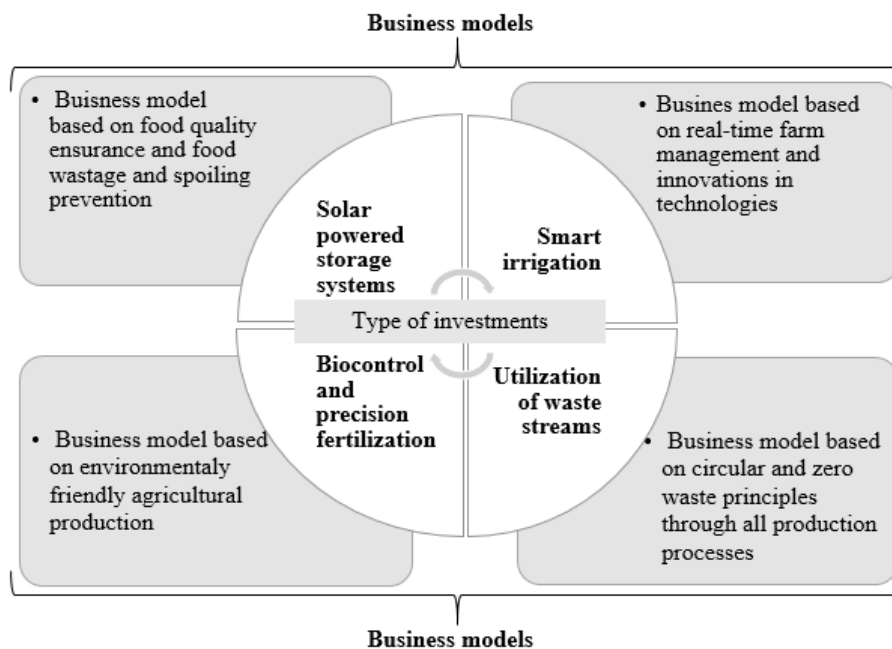
In addition, according to the experience of other countries (Giger M., et al., 2022; German, L. et al., 2016; Henson S. and Humphrey J., 2010) in developing business environment in agriculture that is attractive for private and foreign investors, more attention should be paid to promoting such types of investments that help to achieve the goals set by Uzbekistan. According to the findings of M. Giger and co-authors (2022), some researchers see the future in large-scale mechanized, high-input commercial agriculture, while others emphasize the importance of small-scale family agriculture that can easily adopt to climate change and local food system changes. However, there is a group of researchers and initiatives that believe that agriculture needs to meet the challenges of decarbonizing the sector, thus enabling it to adapt to climate change and to function in a nature-positive way, where investments in technology innovations are playing critical and potentially catalytic role (Casey J. et al., 2021). In this context, the authors suggest that investments in bioeconomy – as a set of activities where renewable bioresources are the basis for all economic processes in agriculture and agricultural production are promoted by research and innovation – could be a special type of investments suitable for sustainable and dynamic agricultural development in Uzbekistan. For this purpose, the authors suggest to identify those focus areas and business models for investments in Uzbekistan agriculture that will attract private investors looking for solution-oriented technology investments.

According to situation analysis in Uzbekistan (Babaeva N.M., 2019; Maksumkhonova A.M., 2019; Rashidov O.I., 2010; Zharashuyeva L.M., Bischekova F.R., 2015) and study results from other similar studies (Casey J. et al., 2021; German L. et al., 2016; Giger M. et al., 2020; Meza L.E. and Rodríguez A.G., 2022), the authors have identified potential types of investments and appropriate business models for promoting agriculture development in Uzbekistan (Fig. 7). These types of investments are targeted for more active sustainable bioeconomy concept incorporation in agriculture.

- **Investments in solar powered storage systems**, like cooling, drying, ventilation of harvested agricultural production during its storage time. Such type of investments will give contribution in developing such business model that is based on food quality assurance and food wastage and spoiling prevention.
- **Investments in smart irrigation development** will give contribution in developing business model based on real-time farm management and innovations in sensors, control instruments of irrigation equipment.
- **Investments in biocontrol and precision fertilization** will foster development of business model based on environmentally friendly agricultural production. This type of investments is targeted for

finding solutions how to minimize inputs for crop protection and how to respond for consumer growing demand for healthy food.

- **Investments in utilization of waste streams** through all agricultural value chain stages. This type of investments will give contribution in developing business model based on circular and zero waste principles in different production stages.



Source: authors' construction based on Casey J. et al., 2021

Fig. 7. Potential types of investments and business models for promoting agriculture development in Uzbekistan

Main findings of this study reveal that bioeconomy concept can serve as a background for setting targeted types of innovations and business models that will be responsible for utilization of investments and returns for investors. In order to make it happen this study authors recommend that it is necessary to develop and implement a state program for the development of bioeconomy, containing a set of its goals and priorities, including types on investments and new business models, mechanisms for achieving and ensuring them, principles for selecting participants in the production process, as well as determining their powers and degree of responsibility.

Conclusions, proposals, recommendations

- 1) Under the present conditions prevailing in the agro-industrial complex in Uzbekistan, especially in the rural regions, most interest is focused on finding investments that would stimulate the development of agriculture.
- 2) During the previous years, work has been done to reform Uzbekistan's agricultural sector. For instance, the public administration system has been improved, market relations have been widely implemented, the legal foundations of relationships between entities that produce, process, and sell agricultural products have been strengthened, the industry has attracted investments, resource-saving technologies have been introduced, and modern equipment has been provided for agricultural producers.
- 3) Contemporary methods, such as the adoption of sustainable bioeconomy concepts in agricultural production, can help to address critical issues relating to investment in Uzbekistan's agricultural industry and create appropriate conditions for stable, effective, and expanding agricultural production. The

existing forms and techniques of investment must be improved in order to maximize the investment potential in Uzbekistan's agricultural industry. The proposals expressed for improving the present mechanism of financing agricultural investments aim to effectively address the issues at hand and recommend that agricultural producers attain a substantially new level of investment activity that guarantees cost-effective production.

4) In order to develop bioeconomy in Uzbekistan, the authors have identified the following needs:

- a clear understanding of the need to support and develop biotechnology at the level of government, business and society, the formation of a legislative, institutional and social framework that will support bioeconomy;
- demonstrating the advantages of bioeconomy for humans and nature, using the advantages of bioeconomy to increase competitiveness, improve ecology and development of agriculture;
- close interaction of participants through all bioeconomy chain – agricultural workers, industry, legislators, end-consumers.

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