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Foreword

The Journal of Regional Economic and Social Development emerged owing to cooperation between the Research Institute for Business and Social Processes of Rezekne Academy of Technologies and City Unity College Nicosia and represents a peer-reviewed serial journal with a new single ISSN number. The journal is focusing on the topics covered by the previous journal Latgale National Economy Research (Print ISSN 1691-5828 Online ISSN 2256-0955).

A total of 10 research papers have been accepted for publication in the 2022 issue of the Journal of Regional Economic and Social Development, covering wide range of topics, theoretical concepts and analysis from various parts of the world.

In this issue, several papers provide in-depth theoretical and literature reviews, exploring topical research areas. Business process greening and digitalization were explored, providing an insight on how moving several operations to digital platforms can make businesses more sustainable. The concept of a circular economy, which aims to minimize the waste created and promotes sharing, leasing, reusing, repairing and recycling of the materials in the supply chain, were explored in the context of the food sector. Finally, also the concept of a shadow economy was explored.

The journal also covers the topic of evolution of the irrigated agriculture sector in Morocco. Irrigated agriculture provides water via artificial means of irrigation for the areas that do not have access to water. Irrigation provides several benefits, among which stable income for local farmers is the main one, as well as high yields of crops which are not disturbed by dry weather impact. Since irrigated agriculture is available in Morocco, it has enchased the productivity and profitability of the agricultural sector.

The topic of Covid-19 impact on the business sector and labour market in South Africa was explored. As more time has passed since the first emergence of Covid-19 and related restrictions, the authors were able to explore more long-term effects that the pandemic has caused. It has severely impacted the business sector and created disturbances in the labour market. The journal also covers the topic of natural resource management in the Central Asian Region, based on a specific case study. Another case study focused on social aspects of urban agriculture in Latvia, which explored the positive social impact on society that urban agriculture was creating. The paper also explored the performance determinants and measures specific to SMEs in Latvia, as well as the operational aspects of Latvian start-ups by analysing strategic policy documents.

The papers included in the journal cover a wide range of topical research which apply various methodologies, from individual solutions to

problems in specific industries through case study analysis to theoretical and conceptual reviews of theories. The papers give opportunities for new research studies and findings to be made as well as contribute to the European academic and scientific research environment by enabling academics, scientists and researchers from other countries to compare and analyse the findings and conclusions made.

On behalf of the Editorial Board, we would like to thank the authors of the papers – academics, scientists, master and doctoral students, researchers, national and municipal institution employees and enterprise representatives – for their support and participation in developing the journal. We are also grateful to our team of the editorial board and reviewers for all the effort and job that they have done.

Chief editors:
Anda Zvaigzne, Rezekne Academy of Technologies, Latvia
Žanete Garanti, City Unity College Nicosia, Cyprus

THEORETICAL ASPECTS OF GREENING AND DIGITALISATION OF BUSINESS PROCESSES IN ENTERPRISES: THE CASES OF UKRAINE AND LATVIA

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Abstract. *The aim of the study is to analyse the theoretical basis of greening and digital transformation of enterprise business processes. The objectives of the study are to summarize the theoretical and methodological framework for the issues investigated and substantiate the conceptual approach to the environmental and economic development of the enterprise based on the concept of green business and the implementation of the digital transformation approach.*

The scientific novelty of the study consists in further development of the theoretical foundations of greening and digital transformation of enterprise business processes, as well as in the use of the organizational and methodological approach to determine the socio-economic and eco-economic consequences of the choice of priorities for the production and consumption of environmental products. The research used general scientific and special methods: scientific abstraction, analysis and synthesis, induction and deduction, abstraction and concretization, system and comparative analysis; statistical analysis; the matrix method. It has been proved that enterprises in Latvia and Ukraine face the critical task of finding a balance between improving the existing business models of their activities based on the implementation of digital technologies, and minimizing the negative environmental impacts. It has been established that the economic system of Ukraine remains ecologically unfavourable; however, to solve this problem, measures to implement the system of circular economy and create incentives for the development of green business have been developed. The results of expert evaluations have showed that Latvia is the leader in Europe in the consumption of green energy and is the largest exporter in the ICT sector in the Baltic States.

Keywords: *business processes, concept, digital transformation, enterprise green business, greening, matrix method.*
JEL Code: *M10, M15*

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Introduction

In the context of growing global environmental problems and the rapid digitalisation of business, enterprises in Latvia and Ukraine face the crucial task of finding a balance between improving their existing business models through the implementation of digital technologies and minimising the

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negative environmental impacts arising from economic activities. Stakeholders' requirements for qualitative transformation of enterprises' approaches to implementation of information and communication technologies (ICT) and greening of their activities actualize the need to expand the scale of ICT implementation in the management of communication business processes, and the formation of the mechanism of greening by these enterprises is based on the concept of green business.

The works of Daly (2003), Amosha (2003), Sadchenko (2017) are devoted to the studies of economic-ecological systems. The issues of enterprise management based on the environmental approach have been developed in the scientific works by Bardasya (2015), Veklich (2012), Popova (2016), Sadekov (2002).

At the same time, the issues of defining the essence of ecologization of enterprises, establishing the nature of its impact on the external environment and the results of economic activities of economic entities remain underdeveloped in the scientific literature.

Theoretical and methodological aspects of the digitalization of business processes are devoted to the scientific work by such foreign scientists as Gupta (2018), Kroll et al. (2018), Hounshell (2018), Raymond et al. (2009), Schwab (2016).

At the same time, the problems of ICT implementation in the management processes of enterprises, improving approaches to justify and optimize decisions on the digitalization of communication business processes, and the development of an organizational and economic framework for managing communication business processes remain unresolved. At the same time, the problems of ICT implementation in enterprise management processes, improvement of approaches to the justification and optimization of solutions to digitalization of communication business processes, development of organizational and economic foundations of communication business process management remain finally unresolved. Thus, the use of modern ICTs usually requires significant costs from enterprises for their development, implementation and further maintenance and development, so many businesses do not have the financial capacity to implement them. From an economic point of view, ICT can be seen as a means of production which can freely replace enterprise personnel, transforming the organisational structure and decision-making level of enterprise management, leading to negative social changes.

The aim of the study is to analyse the theoretical basis of greening and digital transformation of enterprise business processes.

The objectives of the study are to summarize the theoretical and methodological framework for the issues investigated and substantiate the conceptual approach to the environmental and economic development of the

enterprise based on the concept of green business and the implementation of the digital transformation approach.

The scientific novelty of the research consists in further development of the theoretical foundations of greening and digitalization of business processes of the enterprise, as well as the use of the organizational and methodological approach to determine the socio-economic and environmental and economic consequences of the choice of priorities for the production and consumption of environmental products.

Research methods used: general scientific and special methods: scientific abstraction, analysis and synthesis, induction and deduction, abstraction and concretization, system and comparative analysis; statistical analysis; the matrix method.

The research period is 2021-2022.

Study results and discussion

Until recently, natural resource management was seen as a process of exploitation of natural assets with the purely pragmatic objective of satisfying the material and cultural needs of society. Rational use of natural goods was based on reason and knowledge, so nature management was also understood as a separate science, which investigates the general principles of any human activity associated with the use of natural goods or the transformation of their condition (Galushkina, 1999; Karagodov, 1998).

The interaction and structural relationship of society, production relations, the environment within the existence of the technogenic system "production - consumption" (Lukyanikhin & Petrushenko, 2004), the functioning of which is based on the simple exploitation of natural factors (artificial disturbance of the natural environment), is caused by the complexity and diversity of the process of natural factors use in the process of human productive activity.

Scientific papers (Arbidane, 2022; Vashchenko, 1998; Degtyareva et al., 2014; Korotkov, 1998; Melnyk, 1999; Morozov, 1997; Prigozhin, 1986) point out that the paradigm of socio-economic development based on a technocratic and consumer attitude towards nature is the main reason for the imminent irreversible destruction of the biosphere, destruction of the ozone layer, increased climate instability, impoverishment of flora and fauna. According to Gerasymchuk (2000), it is the growth of anthropogenic load on the biosphere in the process of social development that determines a sharp aggravation of the environmental situation on a global scale, bringing humanity to a critical limit in its interaction with nature.

Stadnitskyi (2003) also believes that anthropogenic pollution of the environment is one of the major global problems in the development of the

world as a whole and of individual countries. Negative effects of anthropogenic pollution, which until the middle of the last century were often considered insignificant "external effects" that can be neglected when choosing optimal technologies or justifying the directions of economic development, have increased to one of the greatest threats to the welfare and security of mankind. The author also insists that the reduction of anthropogenic pollution of society's environment faces almost no technological or technical difficulties. In his opinion, solving this problem is a purely economic task, the difficulty of which is mainly due to the excessive cost of implementing measures to improve the environmental safety of production. Therefore, under present conditions, maximum attention should be paid to the optimal use of limited resources that can be allocated for environmental purposes.

Scherbak (2000) believes that the technological progress of mankind still consists of a number of cycles of resource use and exhaustion, each of which involves the successive passage of certain stages:

1. assimilation (creation) and expansion of the up to now unused ("non-existing") natural resource base;
2. depletion of the used natural resource base and, as a consequence, deterioration of the conditions of society's existence in the environment, search for reserves to restore or replace the resource base;
3. replacement of the outdated resource and environmental base by the newest sources of natural resources (as well as the emergence of new, as a rule, more acute and complex environmental and resource problems).

The intensification of environmental activities not only at the macro level but also at the regional and entrepreneurial levels is of great importance for ensuring socio-economic development today. Thus, according to Maslovskaya (2002), the general orientation of the national strategy of transition to the principles of sustainable development makes the territorial regulation of environmental management especially relevant. The regions become a kind of core of economic, social and environmental arrangement of geo-economic space, as well as the sphere of mobilization for this purpose of material, labour, financial and intellectual resources (Adámek, 2015; Artis, 2011; Bilotserkivets, 2009; Vovk, 2009; Kamarianaki & Gallo, 2011; Kubatko, 2017; Maslov, 2005; National Report…, 1992). It is at the regional level that it becomes advisable and possible to balance the structure and scale of production with the structure and size of the integral natural resource potential, as well as the establishment of high-priority environmental priorities of its use.

The generalization of scientific approaches to the study of economic and environmental activities and the regularities of the process of development and environmental and economic development of the enterprise (Geets, 2000; Chumak & Ivanyenko, 2003; European Commission, 2021) allows us to distinguish socio-psychological, organizational and structural, technical, technological, financial, commercial, communication, information and functional components of their provision.

According to the authors, ensuring the development of an enterprise on the basis of the green business concept is its top environmental priority.

In our view, the implementation of sustainable enterprise development requires new forms of financial cooperation and new ways of financing projects. In doing so, the green industry or green sectors of the economy are designed to materialise new sources of growth associated with the efficient use of natural resources and eco-efficient technologies into environmental products and services, and hence into the value added and income of companies engaged in these activities. Facilitating their development and "greening" traditional "brown technologies" and business models is central to government strategies for transitioning to a greener economy.

The shift globally to technologies and practices that are less environmentally damaging has been recognised as vital for ensuring humanity's continued development, and the adoption and implementation of environmental regulations, the removal of environmentally harmful subsidies for resource use, and increased prices for energy and raw materials have stimulated technological innovation in industries aimed at reducing their negative impacts, dubbed green business, with companies becoming known as green enterprises or environmentally responsible businesses. These businesses appeared in all sectors of the economy and subsequently became known as the "green goods and services sector" or "green business".

The ideology of green business fits well with the need to improve the environment while ensuring economic development at the same time.

"Green" or ecological business is a multi-sectoral area of business activity, which can provide not only environmental but also significant economic benefits on a national scale. As an economic agent, a source of employment and a key factor of economic and social well-being, this sector cannot remain unchanged.

Ukraine's economic system remains environmentally unfriendly. Ukraine is among the world's top consumers of natural resources - energy, water, minerals - per unit of GDP. In January 2022 the Ministry of Environmental Protection and Natural Resources of Ukraine in cooperation with other government agencies developed measures to introduce a circular economy system and create incentives for green business development.

To date, green business offers solutions to some of society's most pressing environmental problems:

- design and construction of energy-efficient buildings;
- recycling and safe waste management;
- renewable energy development;
- wastewater treatment;
- production of organic products (Marushevsky & Hickman, 2017).

Environmental, social and corporate governance (ESG) aspects are being introduced into the activities of Latvian enterprises. These are relatively new parameters of the societal paradigm, and it should be noted that sustainability is becoming an inherent core value that motivates businesses to be more careful about their impact on the environment, employees and society.

According to Swedbank's 2021 survey on changing public attitudes towards sustainability, among so-called early adopters, or trendsetters (mainly young, socially active people who are the first to use a new product, innovation or technology and become an example to others), 78% of those surveyed believed that sustainability should be at the heart of modern business.

According to those surveyed (a sample of 1,009 people aged 18 to 64), the main criteria for a sustainable business include:

- investment in digitalisation of business processes (48% of the respondents);
- environmental safety and reducing environmental pollution (46% of the respondents)
- production and sale of environmentally friendly products (38% of the respondents) (Latvia Business Guide 2021/2022.).

The results of expert studies confirm that Latvia not only leads in Europe in terms of green energy consumption, not only has developed food production and marketing systems but also is the largest ICT exporter in the Baltic States - the turnover in this area amounts to more than 4 billion euros (Latvia Business Guide 2021/2022.).

The issue of digital transformation is quite complex and broad in content, because problems of technological development in one sphere cause problems in other spheres. The first step towards the implementation and diffusion of digital technologies is the awareness of the need for change in the imperative due to the inevitability of a digital breakthrough, which allows the enterprise to strengthen its position in the market and significantly increases the value of innovative products (Global Center…, 2015).

Digitalization of processes is relevant not only at the level of individual enterprises: entire industries choose this development path for themselves

as the only opportunity to meet the rapidly changing conditions of the world around them.

Customers are some of the main drivers of digitalisation, many of whom have already started to transform their operations. By customer experience, we mean not only interaction with external customers but also internal customers. Digital transformation of processes optimises the work of employees in the company, thus increasing the productivity of every team member. Digitalisation technologies enable the most personalised interaction that most customers prefer. Digital channels of communication, omnichannel, artificial intelligence and robotization are giving more time to the really important and complex tasks.

Digitalisation of business encourages innovative ways of enterprise development, in particular:

1. Cloud technologies allow multiple teams to work on a single project simultaneously and use company resources efficiently.
2. Using the Mobile First strategy, enterprises receive and monetize mobile traffic, which has already caught up with that from stationary devices.

Ready-made solutions save time on tasks. Various programs, extensions and connectors optimize enterprise operations and require minimal time for their implementation and adaptation.

Consequently, the demands placed on businesses in Ukraine and Latvia by the digitalisation and globalisation of global markets make it necessary to introduce new and effective digital business solutions (including green solutions) to improve their competitiveness.

It should be noted that the possible socio-economic and ecological-economic consequences of different priorities in the approaches to the production and consumption of ecological products, as well as the need for ecological regulation of production are illustrated by the "benefit-loss" matrix (Fig. 1).

If the cost of improving the environmental quality parameters of products increases in proportion to the increase in the level of environmental friendliness and, accordingly, the price increases, there is no contradiction between the environmental and economic interests of the customer (consumer) and the producer. In this case, the price does not induce the producer to improve quality.

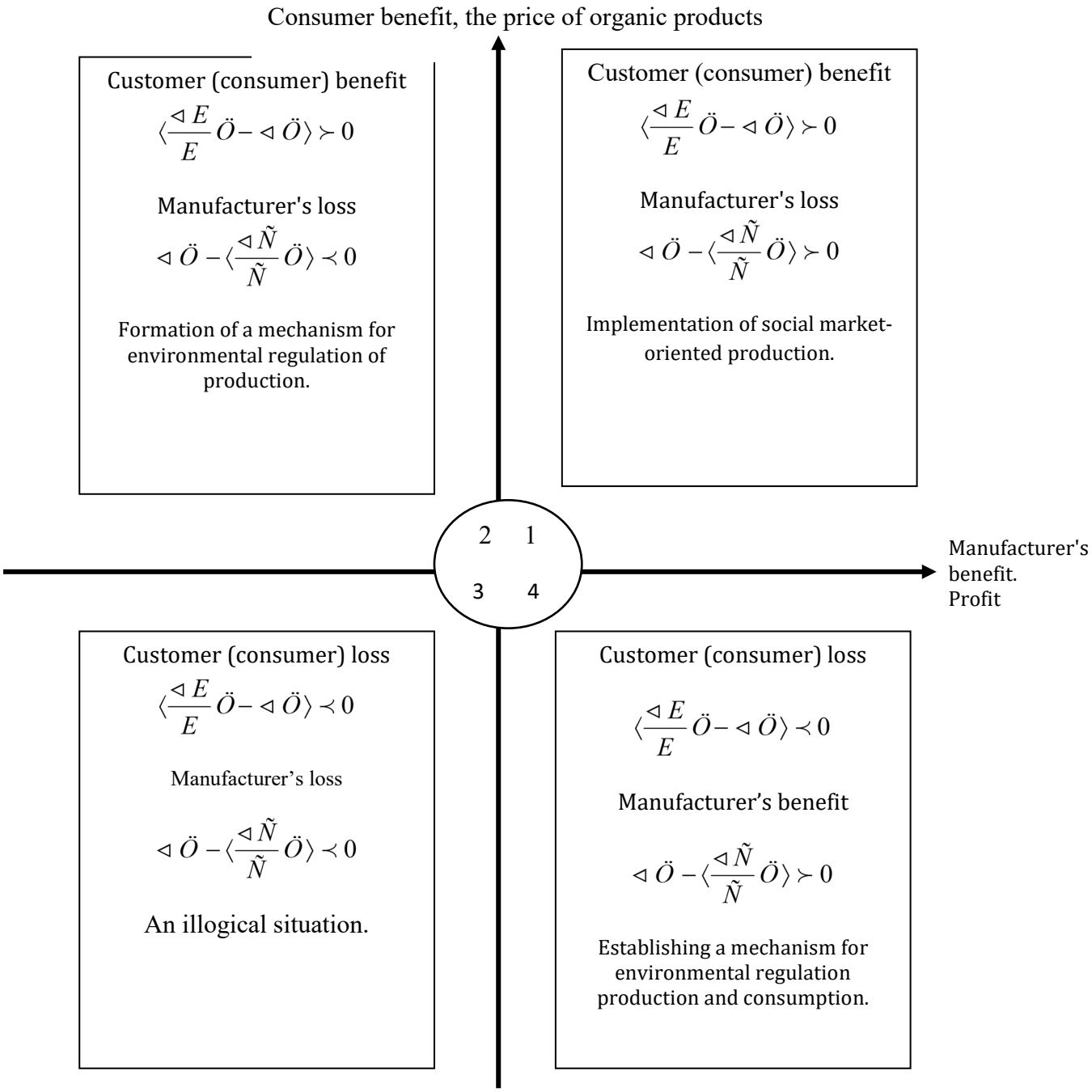

Fig.1. Producer-customer benefit-loss matrix (for a consumer) of environmental products (developed by the authors based on the "buyer-seller" matrix by Ansoff,1993)

The demand for environmentally friendly products is constrained. In this case, it is possible to set a new price (C + Δ C) where the relative increase in price is less than the relative increase in environmental (quality) performance $(\frac{\triangleleft E}{E})$ and higher than the relative increase in cost of production $(\frac{\triangleleft C}{C})$.

This approach can be represented as:

$$\frac{\triangleleft \ddot{I}}{\ddot{I}} \geq \frac{\triangleleft \AA}{\AA} \succ \frac{\triangleleft \ddot{O}}{\ddot{O}} \succ \frac{\triangleleft \tilde{N}}{\tilde{N}} \quad (1)$$

where $\frac{\triangleleft \ddot{I}}{\ddot{I}}$ – relative reduction of external environmental costs.

The given relationship between product quality (eco-friendliness), price and cost is also the best from the point of view of the socio-environmental interests of society as a whole.

The price in this case stimulates an increase in the ecological quality of the product and the demand for it.

In line with the increasing environmental friendliness of new products, external environmental costs (environmental-economic damages) decrease with respect to both the individual consumer and society as a whole.

Let's consider the conditions for reconciling the economic and environmental interests of the producer and the client (consumer). If the price for products of improved environmental quality for an individual consumer were set in proportion to the increase in quality level, i.e.: $\frac{\triangleleft \ddot{O}}{\ddot{O}} = \frac{\triangleleft \AA}{\AA}$, then $\triangleleft \ddot{O}_{\aa} = \frac{\triangleleft \AA}{\AA} * \ddot{O}$,

where ΔC_e – the price increase from an increase in environmental quality by ΔE.

If the price of these products were to be set in proportion to costs, i.e.:

$$\frac{\triangleleft \ddot{O}_{\tilde{n}}}{\triangleleft \ddot{O}} = \frac{\triangleleft \tilde{N}}{\tilde{N}}, \text{ then } \triangleleft \ddot{O}_{\tilde{n}} = \frac{\triangleleft \tilde{N}}{\tilde{N}} \ddot{O},$$

where ΔC_s – price increase from the increase in costs by the amount of ΔC.

The condition for reconciling the interests of the individual consumer and the producer is as follows:

$$\Delta C_e > \Delta C > \Delta C_S \quad (2)$$

It is important to note that the producer will benefit:

$$\triangleleft \ddot{O} - \triangleleft \ddot{O}_{\tilde{n}} = \triangleleft \ddot{O} - \frac{\triangleleft \tilde{N}}{\tilde{N}} * \ddot{O}, \quad (3)$$

but the consumer's benefit will be of this kind:

$$\triangleleft \ddot{O}_{\aa} - \triangleleft \ddot{O} = \frac{\triangleleft \AA}{\AA} * \ddot{O} - \triangleleft \ddot{O}. \quad (4)$$

The total benefit to the producer and the client (consumer) is determined by the value:

$$\triangleleft \ddot{O}_{\aa} - \triangleleft \ddot{O}_{\tilde{n}} = \left(\frac{\triangleleft \AA}{\AA} - \frac{\triangleleft \tilde{N}}{\tilde{N}} \right) * \ddot{O}. \quad (5)$$

The amount of this total benefit can be divided into three parts: the benefit of the individual consumer, the benefit of the producer (enterprise) and the benefit of society (in particular the state) as a whole.

Let us consider the substantive basis of the quadrants of the matrix.

Quadrant 1 "Customer (consumer) convenience, producer benefit" meets the principles of socially oriented market economy and sustainable socio-economic development, and also reflects the system of long-term mutually beneficial buyer-producer relations, as it ensures both return on investment and satisfaction of social and environmental needs of the buyer within acceptable prices.

Quadrant 2 "Customer's (buyer's) benefit, producer's loss" corresponds to the situation where the external environmental costs of production, the lack of assessment of the positive effect of production and consumption of environmental products become the subject of environmental regulation of production from the position of stimulating the greening of the enterprise economy.

Quadrant 3 "Customer (consumer) loss, producer loss" corresponds to the situation which, in Ansoff's (1993) terminology, is called "the land of fools".

Quadrant 4 "Customer (buyer) losses, producer gains" reflects the case where the producer makes a profit from sales, but does not provide the consumer with the goods, the level of environmental quality of which would correspond to the price. This situation often occurs in industries with a low level of technological development.

However, it can occur in the production of new goods in highly developed industries based on innovative technology, where the interests of the buyer are not always taken into account.

Conclusions

Thus, based on the results of the carried out by the theoretical analysis, the conceptual approach to the ecological-economic development of the enterprise on the basis of the green business concept has been substantiated. In accordance with the current realities of the use of natural and economic resources in Ukraine and Latvia, it is determined that increasing the activity of implementation of greening economic activities provides the effectiveness of environmental and economic activities of the enterprise and the implementation of the environmental and economic development of the region.

The implementation of the digital transformation approach allows accelerated adaptation of enterprises' communication business processes to the challenges of the external environment to achieve simplification of users' work, rapid response to customer (consumer) requests, and increased productivity of all business processes of enterprises.

The implementation of the digital transformation approach enables the accelerated adaptation of communication business processes business processes to the challenges of the external environment to achieve simplified user of users, rapid response to customer (customers), higher productivity of all business processes of enterprises.

In our view, for effective greening and digital transformation of enterprise business processes and transformation of enterprise business processes, it is necessary to:

- at the macro level, the following institutional, infrastructural, ecosystem problems need to be solved: strengthening governmental policy on innovative economy development; to bring the profile, it is necessary to solve the following problems: strengthening the state policy on innovation economy development; to bring the profile legislation in Latvia and Ukraine, national, regional and sectoral strategies and programmes for environmental and digital development need to be harmonized with global challenges and programmes for environmental and digital development need to be brought in line with global challenges and eco-economic and digital opportunities; to intensify the development of the investment capital market;
- at the micro level - to implement the systematization of environmental and business processes of the enterprise according to the following criteria: impact on formation of value added of a product or service (main, auxiliary); types of management (administrative, operational, auxiliary); their role in enterprise development (market and consumer research, development of enterprise strategy and management system, formation of digital skills of personnel, its development and training), the level of customer focus.

References.

1. Adámek, E., & Kappel, S. (2015). Empirical Results for Some Monetary Areas According to Optimum Currency Area Criteria. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63 (3), 877-885.
2. Amosha, A. (2003). *Development of industrial production: problems and solutions. Kyiv*. Scientific thought.
3. Ansoff, I. (1993). *Strategic Management*. Saint-Petersburg: Peter Com., 416.
4. Arbidane, I., Purii, H., Dvigun, A., Mamanazarov, & M., Padalka, O., (2022). Simulation of Regional Development of Bioeconomy under Slowbalization. In *Proceedings of the 5th International Scientific Congress Society of Ambient Intelligence - ISC SAI,* ISBN 978-989-758-600-2, 85-92. DOI: 10.5220/0011341900003350
5. Artis, M. J., Chouliarakis, G., & Harischandra, P. K, (2011). *Business Cycle Synchronization Since 1880.* The Manchester School. 173- 207.
6. Bardasya, A. (2015). The mechanism of formation of an innovative ecological and *economic strategy of a coal mining enterprise*. Economic space, 97, 244–252.

7. Bilotserkivets, V.V. (2009). *National Economy*. Kyiv: Centre for Educational Literature, 208.
8. Chumak, A. N., & Ivanyenko, V. V., (2003). Ecological and economic problems of modernity. *Materials of the International Scientific and Practical Conference*, 24, 16-18.
9. Daly, H.E. & Farley J. (2003). *Ecological Economics: Principles and Applications.* Hardcover., 350.
10. Degtyareva, I. B., Melnyk, O. I., & Romanchenko, Y. V. (2014). Economic and financial instruments for sustainable regional development: EU experience. *Mechanism of Economic Regulation*, 3, 18-27.
11. European Commission (2021). *Revision of the Energy Taxation Directive (ETD): Questions and Answers*. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3662
12. Galushkina, T., & Krutyakova, V, (1999). *Ecological policy and mechanisms of its implementation at the regional level.* Odesa: Institute of Market Problems and Economic and Environmental Research.
13. Geets, V.M. (2000). *Instability and economic growth*. Kyiv: Institute of economic forecasting. NAS of Ukraine.
14. Gerasymchuk, Z. (2000). Scientific basis for the study of environmental security as a factor of sustainable development. *Economy of Ukraine*, 11, 62-69.
15. Global Center for Digital Business Transformation (2015). *Digital Vortex How Digital Disruption Is Redefining Industries.* Retrieved from: https://www.cisco.com/c/dam/en/us/solutions/collateral/industry-solutions/digital-vortex-report.pdf.
16. Gupta, Ch. (2018). *What does IIoT mean for MES?* www.automationworld Retrieved from: https://www.automationworld.com/what-does-iiot-mean-mes
17. Hounshell, L. (2018). *The Industrial Internet of Things, digitalisation and the future of business.* Retrieved from: https://www.forbes.com/sites/forbestechcouncil/2018/07/30/the-industrial-internet-of-things-digitalization-and-the-future-of-business/?sh=4e86a141706b
18. Kamarianakis, Y., & Gallo, J. Le. (2011). The Evolution of Regional Productivity Disparities in the European Union 1975-2000. *Regional Studies*, 45(1), 123-139.
19. Karagodov, I. (1,998). Economic management of natural resources. *Business Inform*, 19, 3-7.
20. Korotkov, E. M. (1998). *Management Concept*. Moscow: Deka Company.
21. Kroll H., Horvat D., & Jäger A. (2018). Effects of automatisation and digitalisation on manufacturing companies' production efficiency and innovation performance. Innovation Systems and Policy Analysis. Fraunhofer ISI, Karlsruhe, 58. Retrieved from: https://www.isi.fraunhofer.de/content/dam/isi/dokumente/cci/innovation-systems-policy-analysis/2018/discussionpaper_58_2018.pdf
22. Kubatko, O. (2017). Economic Estimations of Pollution Related Cancer and Nerves Morbidity. *International Journal of Ecology & Development*, 32 (1), 33-43.
23. Latvia Business Guide 2021/2022. Retrieved from https://www.liaa.gov.lv/en/media/1780/download
24. Lukyanikhin, V. A., & Petrushenko, N. N. (2004). *Environmental Management: Principles and Methods. Sumy:* University Book Publishing House.
25. Marushevsky, G., & Hickman, D. (2017). "*Green" business for small and medium-sized enterprises. International technical assistance project "Partnership for Urban Development"*. Kyiv.

26. Maslov, D. G. (2005). Problems of Selecting Sustainable Environmental and Economic System Indicators of the Region. *Vestnik (Herald) of Moscow University*, 6(6), 80-88.
27. Maslovskaya, L. (2002). Regional aspect of transformation of nature management in the context of sustainable development. Economy of *Ukraine*, 2, 64-68.
28. Melnyk, L. (1999). Principles of ecologically safe development. *Economy of Ukraine*, 3, 71-79.
29. Morozov, Y. P. (1997). *Innovation management*. N. Novgorod: NNSU.
30. National Report of Ukraine to the UN Conference "Environment and Development" (1992). Kyiv.
31. Popova, M. (2016). Information provision of environmental management in economic and ecological systems. Proceedings of the International Scientific and Practical Conference, Kyiv. 337-338.
32. Prigozhin, I. (1986). *Order out of chaos: New Dialogue of Man with Nature*. Moscow: Progress.
33. Raymond L., Croteau A. M., & Bergeron F. (2009). The integrative role of IT in product and process innovation: growth and productivity outcomes for manufacturing. Enterprise Information Systems. ICEIS 2009. Berlin, Heidelberg: Springer, 24, 27–39.
34. Sadchenko, E. (2017). *Economic and ecological mechanisms of economic stimulation of nature use.* Sustainable development - XXI century: management, technologies, models. Kyiv. Higher School of Economics and Humanities.
35. Sadekov, A., (2002). Mechanisms of ecological and economic management of the enterprise. Donetsk. *DonGUET named after M. Tugan-Baranovsky, 1.* 65-72.
36. Scherbak, V. (2000). To the concept of solving resource-ecological problems in Ukraine. *Economy of Ukraine*, 1, 51-54.
37. Schwab, K. (2016). The Fourth Industrial Revolution: what it means, how to respond. *World Economic Forum.* Retrieved from: https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/
38. Stadnitskyi, Y. (2003). To the problem of the concept of environmental policy of Ukraine and the mechanism of its implementation. *Economy of Ukraine*, 1, 75-79.
39. Vashchenko, Y. (1998). *Efficiency of the organization as a goal in itself. Kompanion*, 5, 42-44.
40. Veklich, O., (2012). *Increasing the effectiveness of the domestic environmental taxation system as a key component of state environmental policy.* Formation and implementation of national environmental policy. Sumy: University book.
41. Vovk, V. (2009). Ecological economics as a modern integral science: origins and fundamental principles. Responsible economy. *Popular science almanac*, 1, 33-47.

PRINCIPLES OF A CIRCULAR ECONOMY IN THE FOOD SECTOR: A SYSTEMATIC LITERATURE REVIEW

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Abstract. *Since the transition to a circular economy (CE) in various sectors is a priority strategic goal of policy planning in the European Union (EU), the goal of this article is to reveal the principles of the CE in the food sector. To achieve the goal, the study is based on a systematic literature review using the literature synthesis and analysis method and the PRISMA 2020 approach for the selection of appropriate literature. From 25 articles, which were selected from the SCOPUS database, 20 were left for final analysis. Based on the literature review, it was discovered that the main principles of the CE in the food sector are management of resources and waste, emission control, natural and production resource sustainability, increase in energy efficiency, reduction and prevention of food waste, recycling and reuse of food waste and public involvement in the transition to the CE. The determination of CE principles in the food sector is the basis for choosing goals and a right strategy for the implementation of CE principles in practice in this area.*

Keywords: *circular economy principles, food sector, circularity, sustainability.*
JEL code: *O10, Q01.*

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Introduction

The essence of the CE is to maintain the maximum value of products, materials and resources in the economy by minimizing the consumption of raw materials, the amount of waste and the impact on the environment, thereby extending the life cycle of products (European Parliament, 2022). Global adoption of the CE and its principles is now more important than ever in order to maintain the speed of production of goods and services and to meet the ever-increasing consumer demand that burdens the environment and society (Patwa et al., 2021).

Problems with food security and environmental impacts such as resource depletion and greenhouse gas emissions, related to food waste, have increased the attention to this topic of local, national and European policymakers, as well as international organizations and researchers from various sectors (Schanes et al., 2018). Achieving sustainable food consumption requires a deep understanding of aspects of food production and consumption, including food waste as a problem that is increasingly

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perceived as a systemic failure in developed countries (García-Herrero et al., 2021).

It has been researched that food service companies can implement several responsible practices by implementing preventive measures and recycling practices to limit food loss and waste generation, as well as reduce environmental impact (Camilleri, 2021; Lopez et al., 2019). Therefore, the food sector can become one of the main areas where the CE model can be applied, but the current level of implementation of the CE into the food system makes it difficult to combine theory with practice (Fassio & Tecco, 2019).

Aspects of the CE vary between industries because each has its scope, and different stages of the industry life cycle have different characteristics (Ngan et al., 2019).

The authors hypothesize that it is possible to determine the principles of the circular economy for a specific industry based on the analysis of scientific literature.

As the focus and principles of the CE vary from industry to industry, the aim of the research is to determine the principles of the CE in the food sector, based on the literature analysis.

To achieve the goal, the study is based on a systematic literature review using the literature synthesis and analysis method and the Page et al. (2021) approach – a PRISMA 2020 flow diagram for the selection of appropriate literature.

Determination of CE principles in the food sector could be the basis for determining goals and choosing a right strategy for the implementation of CE principles in practice in the food sector.

Research results and discussion

The following qualitative methods were used in the study: systematic literature review, literature synthesis and analysis, as well as the monographic method. Using the PRISMA 2020 approach, 25 articles from the SCOPUS database were selected, of which 20 were left for in-depth analysis.

Systematic literature reviews are a widely used review methodology to synthesize and analyse the existing literature in a specific field (Kraus et al., 2020). To select relevant literature, it is important to choose the right keywords (Marcos-Pablos & García-Peñalvo, 2018).

The process of selection of literature using the PRISMA 2020 flow diagram is shown in Figure 1.

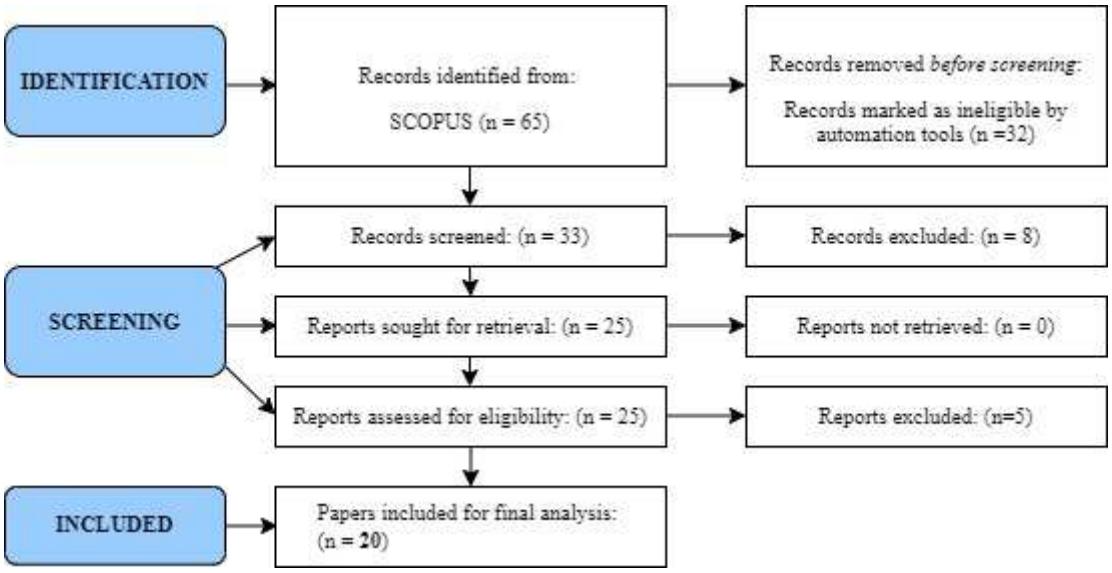

Fig.1 PRISMA 2020 flow diagram for new systematic literature reviews
(authors' construction based on Page et al., (2021))

The SCOPUS database was used to identify the articles for this study. To select appropriate literature, there were used the keywords "Circular economic principles in the food sector". 65 articles were found, of which 33 articles were selected using the advanced analysis tool. Following the titles, another 8 articles were discarded because they related to a different industry. 25 articles were left for reading, 20 of which were selected for final analysis.

To discover the principles of the CE in the food sector, an analysis of the selected literature was carried out. The results are visible in Table 1.

Table 1 CE principles in the food sector based on the literature review
(authors' own compilation)

Source	The CE principles mentioned in the articles
Aznar-Sánchez et al., (2020); Kusumowardani & Tjahjono, (2020); Niero & Rivera, (2018);	• resource (e.g., water, packaging) management; • waste management; • emission control;
Aznar-Sánchez et al., (2020); Kusumowardani & Tjahjono, (2020); Niero & Rivera, (2018); Poponi et al., (2021); Rada et al., (2019); Wysokińska, (2020);	• increasing energy efficiency, minimizing the use of natural resources; • improving the efficiency of water and energy use; • resource recovery; • sustainable energy and soil use; • unconventional pretreatment of food waste for energy recovery; • sustainability of resources; • resource and energy efficiency; • integrated renewable resources

Continuation of the Table 1

Aznar-Sánchez et al., (2020); Borrello et al., (2017); Ezeudu & Ezeudu, (2019); Fiameni et al., (2021); Greer et al., (2020); Hodson de Jaramillo, (2018); Jackowski et al. (2020); Visco et al., (2022); Wysokińska, (2020);	• reduction and prevention of food waste; • prevention of product wastage; • zero waste; • reducing food waste by using it as reusable raw materials; • reuse of products; • processing of food waste and leftovers; • waste reuse; • reuse of residues; • recycling of waste generated at the stages of the supply chain; • reuse of materials at the end of their life cycle; • recycling of by-products of the food industry;
Caporusso et al., (2021); Colley et al., (2020); Madau et al., (2020); Montone et al., (2021); Palermito et al., (2021); Rada et al., (2019); Visco et al., (2022); Wysokińska, (2020); Zhou et al., (2021);	• creation of new product value; • creating a new product from waste; • revaluation of by-products; • creation of new value - materials are nutrients that circulate in closed circulation metabolism; • residues can become raw material for new processes; • waste and by-products as a resource;
Borrello et al., (2017); Hodson de Jaramillo, (2018); Kusumowardani & Tjahjono, (2020); Núñez-Cacho et al., (2020);	• consumer involvement in CE mechanisms; • public involvement in decision-making, participation; • adoption of more sustainable production and consumption patterns; • social welfare of employees and implementation of social responsibility;

Based on the research results, it is concluded that the main principles of the CE in the food sector are:

- **management of resources and food waste** - catering firms must be responsible and must know how to manage food waste and control emissions, so as not to harm society, and be environmentally responsible to the wider community by not contributing to global warming and climate change (Kusumowardani & Tjahjono, 2020);
- **natural and production resource sustainability** - adopting CE principles has the potential to optimize the use of resources, reduce business costs and create a culture of sustainability (Poponi et al., 2021; Wysokińska, 2020), for example, in relation to water resources, the opportunities to increase circularity in this area are based on promoting the use of reused water. In terms of energy use, there is a

great opportunity to increase the energy efficiency of farms using solar energy (Aznar-Sánchez et al., 2020);

- **reduction, recycling and reuse of food waste** - catering and its related production and consumption practices are relevant aspects within the food system (Greer et al., 2020), and practices such as zero waste, reuse of products, materials and waste are noted as some of the most important in the transition to a circular economy;
- **creation of new product value -** food waste is produced in very large quantities every year, causing serious environmental and economic problems, and the waste can be used as secondary raw materials to produce goods with value added (Visco et al., 2022), for example, the revaluation of whey, which is the main by-product of cheese production (Montone et al., 2021);
- **public involvement in the transition to the CE** – it is also important to involve consumers in CE mechanisms (Borrello et al., 2017) and sustainable purchase decisions (Núñez-Cacho et al., 2020), as well as achieve inclusive social participation in adopting sustainable models and promote sustainable consumption (Hodson de Jaramillo, 2018).

For comparison, the European Commission's 11/03/2020 *"A new Circular Economy Action Plan. For a cleaner and more competitive Europe"* was reviewed, where the CE is based on the following principles (European Commission, 2020):

- make sustainable products the norm in the EU;
- empower consumers and public buyers;
- focus on the sectors that use the most resources and where the potential for circularity is high such as: electronics and ICT, batteries and vehicles, packaging, plastics, textiles, construction and buildings, food, water and nutrients;
- ensure less waste;
- make circularity work for people, regions and cities;
- lead global efforts on the CE.

Comparing the general principles of the CE and principles of the CE in the food sector, the authors conclude that although the principles of the CE in the industry relate to the general principles of the CE, they are focused on more specific activities.

It should also be noted that CE strategies are based on the United Nations General Assembly *"Transforming our World: the 2030 Agenda for Sustainable Development"* goals (UNGA, 2015).

There is a consensus that the global food system does not provide good nutrition for all, and leads to environmental degradation and loss of biodiversity; therefore, a deep transformation is needed to solve problems caused by persistent malnutrition and rural poverty, exacerbated by the

increasing effects of climate (Wezel et al., 2020). The food sector has recognized its role and concerns about climate change and the challenges of sustainable food and drink production and consumption (Niero & Rivera, 2018), and since food production is a major contributor to greenhouse gas emissions and a source of environmental degradation, it can increase and accelerate climate change (Gomez-Zavaglia et al., 2020).

Despite the intensive use of valuable natural resources for the production and distribution of food products, no effort is made to recycle the waste generated in the supply chain, so CE strategies play a crucial role to restructure the linear economy model with the active participation of all actors in the supply chain (Borrello et al., 2017). The transition to a CE, in addition to new technologies, infrastructures and innovations, requires changes in society and changes in daily practices (Lehtokunnas et al., 2022).

The authors believe that the negative impact on the environment and other problems on the planet are the consequences of human action or inaction, and only humans can change it. Therefore, the main principle of the CE in the food sector discovered as a result of the systematic literature review could be public involvement in CE mechanisms, participation in decision-making and in adopting more sustainable patterns of production and consumption, creating new value and realizing social welfare and social responsibility. Because with the help of society, it will be possible to successfully manage waste and resources, control emissions, prevent, recycle and reuse food waste and in this way help to achieve the goals of sustainable development.

Conclusions and suggestions

1. Specific CE principles can be highlighted in each sector, whose focus is on the operation of the relevant industry.
2. Determining the principles of the CE in the food sector can be the basis for choosing the right objectives and strategy for the implementation of CE principles in practice in the food sector.
3. The main principles of the CE in the food sector are management of resources and food waste, natural and production resource sustainability, reduction, recycling and reuse of food waste, creation of new product value and public involvement in the transition to the CE.
4. Although the principles of the CE in the food sector relate to the general EU principles of the CE, they are focused on more specific activities.
5. CE strategies are based on the United Nations General Assembly' Sustainable Development Goals.

6. Successful implementation of CE principles and implementation of a CE strategy requires public involvement and participation in CE mechanisms.

References

1. Aznar-Sánchez, J. A., Velasco-Muñoz, J. F., García-Arca, D., & López-Felices, B. (2020). Identification of opportunities for applying the circular economy to intensive agriculture in Almería (South-East Spain). *Agronomy*, *10*(10), 1499. https://doi.org/10.3390/agronomy10101499
2. Borrello, M., Caracciolo, F., Lombardi, A., Pascucci, S., & Cembalo, L. (2017). Consumers' perspective on circular economy strategy for reducing food waste. *Sustainability*, *9*(1), 141. https://doi.org/10.3390/su9010141
3. Camilleri, M. A. (2021). Sustainable production and consumption of food. Mise-en-place circular economy policies and waste management practices in tourism cities. *Sustainability*, *13*(17), 9986. https://doi.org/10.3390/su13179986
4. Caporusso, A., Capece, A., & De Bari, I. (2021). Oleaginous yeasts as cell factories for the sustainable production of microbial lipids by the valorization of agri-food wastes. *Fermentation*, *7*(2), 50. https://doi.org/10.3390/fermentation7020050
5. Colley, T. A., Birkved, M., Olsen, S. I., & Hauschild, M. Z. (2020). Using a gate-to-gate LCA to apply circular economy principles to a food processing SME. *Journal of cleaner production*, *251*, 119566. https://doi.org/10.1016/j.jclepro.2019.119566
6. European Comissinon (2020). *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. A new Circular Economy Action Plan. For a cleaner and more competitive Europe*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
7. European Parliament (2022). *Circular economy: definition, importance and benefits.* Retrieved from https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits
8. Ezeudu, O. B., & Ezeudu, T. S. (2019). Implementation of circular economy principles in industrial solid waste management: Case studies from a developing economy (Nigeria). *Recycling*, *4*(4), 42. https://doi.org/10.3390/recycling4040042
9. Fassio, F., & Tecco, N. (2019). Circular economy for food: A systemic interpretation of 40 case histories in the food system in their relationships with SDGs. *Systems*, *7*(3), 43. https://doi.org/10.3390/systems7030043
10. Fiameni, L., Assi, A., Fahimi, A., Valentim, B., Moreira, K., Predeanu, G., ... & Bontempi, E. (2021). Simultaneous amorphous silica and phosphorus recovery from rice husk poultry litter ash. *RSC advances*, *11*(15), 8927-8939. DOI: 10.1039/D0RA10120F
11. García-Herrero, L., Costello, C., De Menna, F., Schreiber, L., & Vittuari, M. (2021). Eating away at sustainability. Food consumption and waste patterns in a US school canteen. *Journal of Cleaner Production*, *279*, 123571. https://doi.org/10.1016/j.jclepro.2020.123571

12. Gomez-Zavaglia, A., Mejuto, J. C., & Simal-Gandara, J. (2020). Mitigation of emerging implications of climate change on food production systems. *Food Research International*, *134*, 109256. https://doi.org/10.1016/j.foodres.2020.109256
13. Greer, R., von Wirth, T., & Loorbach, D. (2020). The diffusion of circular services: Transforming the Dutch catering sector. *Journal of Cleaner Production*, *267*, 121906. https://doi.org/10.1016/j.jclepro.2020.121906
14. Hodson de Jaramillo, E. (2018). Bioeconomía: el futuro sostenible. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales*, *42*(164), 188-201. https://doi.org/10.18257/raccefyn.650
15. Jackowski, M., Niedźwiecki, Ł., Jagiełło, K., Uchańska, O., & Trusek, A. (2020). Brewer's spent grains—Valuable beer industry by-product. *Biomolecules*, *10*(12), 1669. https://doi.org/10.3390/biom10121669
16. Kraus, S., Breier, M., & Dasí-Rodríguez, S. (2020). The art of crafting a systematic literature review in entrepreneurship research. *International Entrepreneurship and Management Journal*, *16*(3), 1023-1042. https://doi.org/10.1007/s11365-020-00635-4
17. Kusumowardani, N., & Tjahjono, B. (2020). Circular economy adoption in the aquafeed Manufacturing industry. *Procedia CIRP*, *90*, 43-48. https://doi.org/10.1016/j.procir.2020.01.088
18. Lehtokunnas, T., Mattila, M., Närvänen, E., & Mesiranta, N. (2022). Towards a circular economy in food consumption: Food waste reduction practices as ethical work. *Journal of Consumer Culture*, *22*(1), 227-245. https://doi.org/10.1177/1469540520926252
19. Lopez, V., Teufel, J., & Gensch, C. O. (2019). How a Transformation towards Sustainable Community Catering Can Succeed. *Sustainability, 12*(1), 101. https://doi.org/10.3390/su12010101
20. Madau, F. A., Arru, B., Furesi, R., & Pulina, P. (2020). Insect farming for feed and food production from a circular business model perspective. *Sustainability*, *12*(13), 5418. https://doi.org/10.3390/su12135418
21. Marcos-Pablos, S., & García-Peñalvo, F. J. (2018). Decision support tools for SLR search string construction. In *Proceedings of the sixth international conference on technological ecosystems for enhancing multiculturality* (pp. 660-667). https://doi.org/10.1145/3284179.3284292
22. Montone, C. M., Aita, S. E., Cavaliere, C., Cerrato, A., Laganà, A., Piovesana, S., & Capriotti, A. L. (2021). High-Resolution Mass Spectrometry and Chemometrics for the Detailed Characterization of Short Endogenous Peptides in Milk By-Products. *Molecules*, *26*(21), 6472. https://doi.org/10.3390/molecules26216472
23. Ngan, S. L., How, B. S., Teng, S. Y., Promentilla, M. A. B., Yatim, P., Er, A. C., & Lam, H. L. (2019). Prioritization of sustainability indicators for promoting the circular economy: The case of developing countries. *Renewable and Sustainable Energy Reviews*, *111*, 314-331. https://doi.org/10.1016/j.rser.2019.05.001
24. Niero, M., & Rivera, X. C. S. (2018). The role of life cycle sustainability assessment in the implementation of circular economy principles in organizations. *Procedia CIRP*, *69*, 793-798. https://doi.org/10.1016/j.procir.2017.11.022
25. Núñez-Cacho, P., Leyva-Díaz, J. C., Sánchez-Molina, J., & Van der Gun, R. (2020). Plastics and sustainable purchase decisions in a circular economy: The case of Dutch food industry. *PloS one*, *15*(9), e0239949. https://doi.org/10.1371/journal.pone.0239949

26. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. International Journal of Surgery, 88, 105906. https://doi.org/10.1136/bmj.n71
27. Palermito, F., Magaril, E., Conti, F., Kiselev, A., & Rada, E. C. (2021). Circular Economy Concepts Applied to Waste Anaerobic Digestion Plants. *WIT Transactions on Ecology and the Environment*, *254*, 57-68. Doi:10.2495/ESUS210061
28. Patwa, N., Sivarajah, U., Seetharaman, A., Sarkar, S., Maiti, K., & Hingorani, K. (2021). Towards a circular economy: An emerging economies context. *Journal of business research*, *122*, 725-735. https://doi.org/10.1016/j.jbusres.2020.05.015
29. Poponi, S., Arcese, G., Mosconi, E. M., Pacchera, F., Martucci, O., & Elmo, G. C. (2021). Multi-actor governance for a circular economy in the agri-food sector: bio-districts. *Sustainability*, *13*(9), 4718. https://doi.org/10.3390/su13094718
30. Rada, E. C., Costa, L., Pradella, C., & Adami, L. (2019). Unconventional small-scale biogas production with reduced local impact. *International Journal of Energy Production and Management*, *4*(3), 198 – 208. DOI: 10.2495/EQ-V4-N3-198-208
31. Schanes, K., Dobernig, K., & Gözet, B. (2018). Food waste matters-A systematic review of household food waste practices and their policy implications. *Journal of cleaner production*, *182*, 978-991. https://doi.org/10.1016/j.jclepro.2018.02.030
32. United Nations General Assembly (2015). *Transforming our world: the 2030 Agenda for Sustainable Development.* Retrieved from https://www.unfpa.org/resources/transforming-our-world-2030-agenda-sustainable-development
33. Visco, A., Scolaro, C., Facchin, M., Brahimi, S., Belhamdi, H., Gatto, V., & Beghetto, V. (2022). Agri-food wastes for bioplastics: European prospective on possible applications in their second life for a circular economy. *Polymers*, *14*(13), 2752. https://doi.org/10.3390/polym14132752
34. Wezel, A., Herren, B. G., Kerr, R. B., Barrios, E., Gonçalves, A. L. R., & Sinclair, F. (2020). Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. *Agronomy for Sustainable Development*, *40*(6), 1-13. https://doi.org/10.1007/s13593-020-00646-z
35. Wysokińska, Z. (2020). A review of transnational regulations in environmental protection and the circular economy. *Comparative Economic Research. Central and Eastern Europe*, *23*(4), 149-168. http://dx.doi.org/10.18778/1508-2008.23.32
36. Zhou, J., Gullón, B., Wang, M., Gullón, P., Lorenzo, J. M., & Barba, F. J. (2021). The application of supercritical fluids technology to recover healthy valuable compounds from marine and agricultural food processing by-products: A review. *Processes*, *9*(2), 357. https://doi.org/10.3390/pr9020357

ECONOMIC AND SOCIAL ASPECTS OF URBAN AGRICULTURE IN LATVIA – A CASE STUDY

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Abstract. *Urban agriculture is developing rapidly in the world, paying significant, often primary attention not only to the economic but also to the social and environmental functions of the practice. Urban agriculture in Latvia is relatively underdeveloped, most of the practice is carried out in small amounts by households for self-consumption. Besides, an analysis of the volumes produced and results in the context of commercial practice and community and public projects revealed that it was at a developmental stage. Urban agriculture in Latvia has also been little researched so far, and the practice does not have a specific legal status that would enable precise determination of the scope of the practice, as well as financial and trend analysis. However, the practice is developing, especially in the form of community gardens. The aim of this study is to determine and describe economic and social aspects of urban agriculture in Latvia. In order to achieve the aim, a systematic theoretical review was performed to determine the definition and boundaries of the practice of urban agriculture, the analysis and synthesis methods were used to identify and describe the trends, and a case study was used to summarize the economic and social aspects of the practice specific to Latvia. Results of the research confirm that social aspects dominate in urban agriculture in Latvia - in aims, motivation, functions and advantages of the practice. But in terms of risks, the most important are economic aspects, which are also the main hindering factors in the development of urban agriculture in Latvia.*

Keywords: *aspects, case study, Latvia, urban agriculture.*
JEL code: *A10, O13, Q01, Q10, R00.*

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Introduction

A set of several processes, such as urbanization, the negative consequences of climate change, economic stratification, social alienation, globalization risks and resource balance issues, has determined that development in both the economic, social and environmental dimensions is possible only by observing the principles of sustainable development. The dimensions of sustainable development were already identified in the 1987 United Nation's (UN) report "Our Common Future" (Report of the..., 1987), in which the definition of sustainable development emphasizes the ability to meet the needs of the present generation without compromising the needs of future generations. The Agenda 2030, adopted at the 2015 UN summit, defines 17 sustainable development goals; the 11th goal also identifies problems and topicality of urban sustainability (The 17 goals,

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n.d.). Cities are essential in the development of the society - they contribute to the development of technology, innovation, social services and other aspects. But the development process also consumes a lot of resources, often those that are produced outside urban areas. An increasing share of the city's population increases the imbalance of resource consumption and production areas, and this is especially relevant in the context of food resources. Urban agriculture (UA) is the cultivation of food in an urban area and is able to provide at least a part of the food resources for the urban population. But the functionality of UA is not limited to economic functions, such as providing food resources, generating income, reducing expenses on food, etc. Practicing agriculture in cities is also able to perform a wide set of social functions, thus actualizing the role and possibilities of UA in urban sustainability.

In Latvia, UA is little studied, the practice is fragmentary and cannot be unambiguously identified, taking into account that it has no legal regulation and, therefore, no statistical data (Dobele et al., 2022). But taking into account the functionality of UA in sustainable development, it is necessary to determine and analyse its aspects in order to assess specifics and opportunities of the practice in Latvia. Therefore, the aim of this study is to determine and describe economic and social aspects of UA in Latvia. The research hypothesis is that UA in Latvia is positively influenced primarily by social rather than economic aspects. In order to achieve the aim, two tasks have been set by the study and methods have been chosen according to the way the tasks were performed:

- to define UA and determine its conceptual boundaries, using systematic theoretical review and the methods of analysis and synthesis;
- to determine the economic and social aspects of UA in Latvia, using a method of case study.

Methodology

For the analysis of aspects of UA in Latvia, case study analysis was chosen, which is a qualitative research method, the purpose of which is to describe and examine the objects and processes of the study, using both qualitative and quantitative data (Woodside, 2017). Case study is used as a research method for little-studied phenomena (Gagnon, 2010) because it conducts an empirical study of a phenomenon observed at the time of the study and, using several, different types of data collection methods, creates an observation of the phenomenon directly during the study (Wohlin & Rainer, 2022), providing researching the phenomenon in its natural context, in the conditions of real life (Martinsuo & Huemann, 2021), which is a suitable approach to the analysis of UA in Latvia. A case study was

carried out in June - September 2022. Three methods are used in case study: interviews with case representatives, financial reports and information about cases in the mass media. An interview is conducted, as it provides the unmediated opinion of representatives, ensuring the direct expression of the opinion of those involved in the practice (Thelwall & Nevill, 2021). The economic and social aspects of UA are summarized in the SWOT matrix, classifying aspects into strengths and weaknesses of the internal environment and opportunities and threats of the external environment.

Research results and discussion

The concept and specifics of urban agriculture – a theoretical review

In its broadest sense, UA is the practice of agriculture in cities. However, such a broad explanation of the concept does not allow us to identify the specifics of the practice. In a narrower, more precise sense, in research and case studies done in various countries, the concept of UA is mostly varied in two aspects: 1) demarcation of the agricultural process - including only food growing or agricultural processes in a broader sense, including distribution, marketing, etc.; 2) specifying the practice only within city limits or including peri-urban areas as well.

In 1996, the Food and Agriculture Organization (FAO) of the UN published the report "The state of food and agriculture", in which a chapter was devoted not only to the analysis of the possibilities of UA but also to its definition. In it, FAO offers two kinds of definition: 1) in the broadest sense, it is food production within city limits; 2) in a narrower sense, it excludes forestry, fisheries and border or peri-urban agriculture (PUA) (World review. Urban..., 1996). In 2015, the UN's article related to the implementation of sustainable development goals defined UA as the cultivation, processing and distribution of food and other products, cultivating plants, less often raising livestock, in and around cities with the aim of feeding the local population (Game & Primus, 2015). Now the FAO views UA together with PUA, defining it as the production of food and other agricultural products and related processes in cities and their surrounding area, including the specificity that agriculture can be practiced both on land and in another areas (Urban and peri..., n.d.).

The focus of the concept on the practice of food cultivation ensures the specifics of UA - in the urban environment, agriculture is a multifunctional practice and provides not only the primary economic functions, such as providing food resources and generating income, but also promoting and supporting the development of social and environmental sustainability. The functionality of UA is influenced by the scale and approach of the practice -

whether it is practiced within a household, as a commercial practice or in the form of community gardens. In particular, community gardens ensure the performance of the widest functions, becoming not only a place for food production but also promoting socialization and social inclusion, public health, emancipation from the city life, creating connection with nature, developing leisure, recreation and educational opportunities, diversifying the urban landscape, reducing the impact of extreme (negative) sustainability scenarios in preserving and developing biological diversity (Ferreira et al., 2018; Pourias et al., 2016).

The territorial aspect of the concept of UA affects the research results and the principles of practice specificity. Mostly both in studies and in the definitions by organizations, including the UN, UA is analysed together with peri-urban agriculture. Often in studies, UA is defined as both agriculture within the city limits (intra-urban) and near the city borders (peri-urban) (Trendov, 2018), where, depending on the specifics of the city, the peri-urban area can be even 10-20 km from territorial boundaries of the city (Azunre et al., 2019). Peri-urban areas are transitional areas between urban and rural areas with a lower population density than in cities, relatively less developed infrastructure and larger available land resources (Ayambire et al., 2019) – these are the main factors that determine differences between UA and PUA. Although their boundaries in metropolitan cities are blurred and the specificities of peri-urban territories are often more similar to cities than rural areas in terms of various factors, there are several significant differences in intra-urban and peri-urban agricultural practices. Especially they can be identified in the context of the dimensions of sustainable development, where economic sustainability is more able to be promoted by rural and peri-urban agriculture, while UA has wider opportunities in ensuring environmental sustainability, especially biodiversity and regeneration of the urban environment (Dobele et al., 2021a). In addition, the conceptual division of intra-urban and peri-urban agriculture provides an opportunity to conduct comparative studies of UA not only in metropolitan cities but in any city with a relatively high population density.

One of the factors in UA is that it is mostly practiced in small areas of land, which is determined by the limited availability of land resources in cities - often the managed areas are so small that they cannot fully provide the food resources for even one household, not to mention the possibility of growing the in sufficient quantity for selling (Hammelman, 2017). However, despite the limitation of the basic resource – land -, UA in the 21st century is able to develop as a social trend by adapting different practices and territories (Dobele & Zvirbule, 2020).

A case study of urban agriculture in Latvia

In Latvia, UA as a practice for *household* self-consumption is developed - according to the data of a study conducted in 2021, 63.30% of the inhabitants of 9 Latvia's largest cities grow at least one of the food products in the urban area, but mostly (78.00% of them) it is grown only for household self-consumption (Dobele et al., 2021b). However, the grown volumes show that households mostly practice micro-agriculture, as food cultivation is carried out in small volumes.

In Latvia, the *commercial practice* of UA applies two approaches: 1) traditional implementation of the practice – in the case of available land resources, growing produce for sale in the local market; 2) practice oriented towards environmental education and promotion of public awareness - combining the commercial practice of food cultivation with the functions of education, communication and research.

As a complementary *educational practice*, UA is implemented by educational institutions that specialize in food supply systems. In addition to that, since 2002, the Eco-school programme of the international organization Foundation for Environmental Education has been adapted in Latvia, the activities and topics of which also include the development of understanding the value of food and its systems, understanding the value of biological diversity, including the understanding, cultivation and protection of plants natural to the environment (Ekoskola – nāktones skola, n.d.). Although the Eco-school programme does not directly relate to UA, food growing practices of various sizes are often used to achieve the programme's goals, from growing on windowsills to allotment gardens created on school grounds.

In 2019, the first *community garden* was created in Latvia, which implements trends of UA specific to the 21st century. Since then, other community initiatives both in the capital and in other cities of Latvia have been developed. However, the development of practice is still fragmentary, based on individual and association activities, without a systematic approach and support from municipalities or the state.

Cities are the main driving force of the economy, but their resource consumption trends create problems and the need to change daily habits and the way of thinking, and one of the impact aspects can be UA. Therefore, in determining the selection criteria for the case study, the primary aspect was the impact of the case on urban sustainability and the connection of practice with the principles of "green thinking" and "green lifestyle". Two cases were selected according to the criteria set:

- "Hotel Janne" Ltd. - experience in urban horticulture and beekeeping since 2017, located in Riga, the approach of commercial practice and educational promotion;

- association "Kopienas Augnīca" - experience in creating a community garden since 2019, using the practice of urban horticulture, located in Riga, the approach of the open environment-type community garden.

Practices are different both in principles and approaches of the practice, therefore they were chosen for the identification and comparison of the economic and social aspects of UA in Latvia.

The type of activity by "***Hotel Janne***" Ltd. is accommodation in guest houses and other types of short-term accommodation (NACE: 55.20) (Hotel Janne.., n.d.). Although the main activity of the company is accommodation, since 2017 it has been supplemented with vegetable growing and urban beekeeping, selling the products under the brand "Rīgas Jumtu medus" (Urbānā biškopība..., n.d.). As part of the case study, a semi-structured interview was conducted with *Valdis Janovs*, the founder of the company and the manager of beehives.

The association "***Kopienas augnīca***" creates and maintains the community garden "Augnīca". Aims of the association are: to promote environmental education, environmental communication and environmental improvement (Kopienas augnīca, n.d.). Its activity is registered as activities of organizations not elsewhere classified (NACE 94.99) (Kopienas augnīca, n.d.). Initially, a limited liability company was established, but in 2021 the commercial activity was liquidated and the community garden was registered as an association. As part of the case study, a semi-structured interview was conducted with *Elīna Logina*, a member of the association's board, Master of Environmental Sciences.

The economic and social aspects of the analysis of both cases are summarized in a SWOT matrix (Table 1), grouping the economic and social aspects of UA in Latvia into strengths and weaknesses, formed by internal aspects of the industry, and opportunities and threats, formed by external environmental aspects of the practice.

Table 1 SWOT matrix of economic and social aspects of urban agriculture in Latvia (compiled by the author)

Aspect	Cate-gory[1]	Description	Type of aspect[2]
Owners' personal interest in UA	S	practitioners are motivated in creating the interaction between nature and urban environment, in informing the public about the possibilities and importance of a green lifestyle	S
Capacity to provide educational and recreational functions	S	UA has wide opportunities for educating and informing the public about the value and topicality of the environment, food systems, biodiversity, as well as UA practice provides recreation by creating contact with nature in the urban environment	S

Continuation of the Table 1

Location close to educational institutions	S	urban locations ensure that educational institutions incur lower transportation costs by being close to UA practice sites, and are therefore easily accessible	E
Experience in the obtaining of project funding	S	experience in obtaining project funding provides opportunities for existence and development of UA practices	E
Resource-intensive practice, high costs	W	the practice of UA is time-consuming and resource-intensive, which reduces the ability to identify and achieve economic benefits	E
Lack of financial stability	W	difficulties for the community garden to ensure a stable and independent financial flow, mostly financing UA by means term projects and member donations	E
Lack of owned land resources	W	a community garden uses leased land resources that are dependent on the landowners' land use plans	E
Topicality of social cohesion	O	community gardens create and develop community and social interaction, and the issue of social cohesion contributes to the relevance of community gardens	S
Project funding attraction	O	the practice of UA provides an opportunity to attract funding from national and international environmental and educational projects	E
Landowners' interest in UA	O	landowners' support and interest in community garden practices encourages the development of UA by providing support through reduced rents	E
Development of the tourism	O	society's interest in UA provides an opportunity to develop activities of tourism	E
Theft and vandalism	T	a high population density in cities increases risks of theft and vandalism	S
Volatility of society's interest	T	the management of the community garden is based on public interest - if it changes, the existence of the community garden is threatened	S
Absence of support from local governments	T	municipal support for UA is ideological, but not economically practical - there is no financial or other type of support promoting the development of the practice	E

1 – S - strength, W - weakness, O - opportunities, T - threats
2 – S - social, E - economic

In both cases, the motivation for starting UA activity is different; however, it is shaped by social rather than economic aspects. The UA activity started by "Hotel Janne" related to the *owner's interests and hobbies*, as well as the desire to create an *interaction between nature and the urban environment* in the capital. T*he restoration and creation of the connection between humans and nature* was also the main motivation for starting the activity by "Kopienas Augnīcas". The *interest of owners* in both cases is a significant **strength** of UA, ensuring stable development of the practice. The

absence of economic aspects in the motivation for creating the practice cannot be viewed as a deficiency because economic aspects are not primary in the organizations' aims of practising UA either. Regarding their aims in urban beekeeping and horticulture, the organizations highlight the creation of environmental and nature education and human-nature contact, with the representatives of both cases emphasizing the need to renew the interaction and value understanding of the city dwellers about nature and its role in the context of both the environment and food provision. Both the *functionality in the field of education and recreation* and the current *experience in cooperation with educational institutions* is a significant strength of UA in Latvia, while the practice of UA in community gardens is not yet widely developed, it also provides current gardens with higher financial attraction opportunities by engaging in environmental education programmes. Cooperation with schools is also increased by another strength of the practice - *territorial proximity to educational institutions*. The owner of "Hotel Janne" emphasizes that in terms of product delivery, the length of logistics chains is not a significant advantage in the context of Latvia, as rural areas are relatively close to cities. However, in the context of education when fuel prices are rising, it is easier for schools to use the city's public transport and see, get to know the practice without incurring the cost of rented transport and fuel.

Both organizations included in the case study have experience in *obtaining project and state programme funding*, which provides financial support in achieving their aims of practising UA. "Hotel Janne" is currently participating in two programmes: 1) the programme "Bišu draugs", with the aim of educating the society about the importance of bees and other pollinators in nature, (Par projektu, n.d.); 2) the programme "Latvijas skolas soma", with the aim of giving pupils the opportunity to get to know Latvian art and cultural developments, connecting them with teaching and education work, thus reducing social inequality and strengthening the new generation's sense of citizenship and national belonging (Par programmu Latvijas..., 2022), and as part of the programme, "Hotel Janne" provides a narration and a review of various historical stages and regions of Latvia. "Kopienas augnīca" has also been involved in several projects, including at the Riga International Biennale RIBOCA 2 in 2020, implementing the "Seed Bombing" workshop (Seed Bombing darbnīca, n.d.), which provided funding for the purchase of soil. Currently, the association has attracted funding from the European Solidarity Corps' projects, which are intended for young people up to the age of 30 involved in organizations promoting community development (European Solidarity Corps, n.d.).

Despite the experience and possibilities of project funding, the *resource intensity* of practice is one of the main **weaknesses** of UA in Latvia. For the

community garden, soil was purchased, which made up the largest proportion of costs in establishing the UA practice. Also, the representatives of both cases emphasized the time-consuming nature of practice. Moreover, UA is not the primary occupation of any of the case study representatives. As V.Janovs admits: "If there was no hotel, then the beehive or "Bišu draugs" project would not be economically viable. The hotel is the main occupation, and then, in addition, there is this unique thing that you do. This is a hobby that adds value in terms of public image of the hotel, but not in economic terms. It is difficult to calculate the economic effects."

Financial instability and *lack of ownership of land resources* are also a weakness of community gardens. The community garden is maintained based on the principle of donations, without membership fees. Although the experience of other community gardens in Latvia points to the possibility of ensuring financial stability, renting out parts of the community garden, *dependence on fixed-term territory lease agreements* is a characteristic weakness.

The pressures of the information age, the global economic and competition-oriented social policies have led to a crisis of social cohesion (Veen et al., 2016). The *topicality of social cohesion* is an **opportunity** for UA, especially in the development of community gardens. Building community and social interaction is one of the aims and principles of a community garden; therefore, as the relevance of social cohesion increases, community gardens gain development opportunities as one of the solutions to the issue.

Environmental education and awareness and recognition of environmental sustainability is the goal of both national and international sustainable development strategies, which are also provided with development-oriented funding. The experience of the analysed cases confirms that *attracting funding for environmental projects and educational programmes* is an opportunity for UA in Latvia.

The experience of community gardens indicates that currently the opportunities are also created by the *interest of landowners in the development of UA*, offering a fixed-term lease at a zero or relatively low rent. Although fixed-term contracts are the weakness of UA in Latvia, the cooperation experience of existing community gardens allows us to assume that, as the practice develops, other landowners could also be interested in leasing their unmanaged territories for the improvement and diversification of the environment and landscape.

UA in Latvia is still at the development stage, which provides opportunities for the development of this practice not only in the fields of education and social cohesion but also in *tourism*, which is currently being

implemented by "Hotel Janne", providing excursions to urban beehives and honey degustation.

Assessing the **threats** of UA in Latvia, three the most important have been identified by the case study. A higher population density increases the risk of *theft and vandalism*, which was indicated by the representatives of both cases. In the practice of community gardens, the volatility of the society's interest is also a threat – E.Logina pointed out the problem that, at the beginning of the gardening season, the participation of members is always very high, but in the autumn season it decreases rapidly, increasing the amount of work for the association's managers.

The *lack of local government support* for the development of community gardens is also an economic threat. The representative of the association stated that there have been discussions with the Riga municipality, but currently without an exact result - at the idea level, municipalities support the development of UA and community gardens in Latvia, but currently do not offer any supporting models of cooperation.

Evaluating the role of UA in Latvia, V.Janovs said: "Agriculture in cities is necessary to be happy. It is important for a person - not to be separated from nature. The sterile urban environment is not a solution for sustainable development. The second aspect is education. Let the child know that milk does not come from a pack, but a cow, what is the difference between a bee and a wasp, what is pollination and why is it important." E.Logina, evaluating the development possibilities and trends of UA in Latvia, emphasized: "The environmental and social aspects are primarily beneficial for agriculture in the urban environment. Children from kindergartens come to us - they enjoy plants, they study. Contact with nature when living in the city simply disappears. And if the contact in childhood has not been developed, then it will not be. Humans begin to consider nature as something distant from themselves. There are no economic benefits for urban agriculture in Latvia, but growing your own food can change the course of economic thought - I grow, I take more care, I don't throw it out. The benefit is formed in a long-term economic prism - you learn to save and appreciate what is around you."

Conclusions

UA in Latvia is primarily driven by social aspects - they form the strengths of the practice, such as the high motivation of those implementing the practice, the potential and capacity of educational and recreational functions, and opportunities such as the relevance of social cohesion and public interest in urban agriculture. However, public interest as a social aspect is also a threat to the practice, considering that results of the case

study show the volatility of the interest and activity of community participants.

Weaknesses of UA in Latvia mostly relate to economic aspects – the amount of practice costs and the complex calculation and achievement of economic profitability. In the context of resources, UA has both strengths of economic aspects, such as territorial proximity to educational institutions, which are important cooperation partners in the performance of educational and informational functions, and weaknesses, such as the cost of resources, high total costs of the practice.

Funding from projects and state programmes is available for the implementation of UA educational and environmental improvement functions, and the cases analysed have long-term experience in obtaining the funding. However, financial stability and permanence is a challenge for community gardens and a weakness of the practice.

UA in Latvia is threatened by both social and economic aspects. They mostly relate to specifics of the urban environment, such as relatively higher risks of theft and vandalism due to urban population density; and the lack of functional support from the municipality also creates a threat to the practice.

References

1. Ayambire R.A., Amponsah O., Peprah C., & Takyi S.A. (2019). A review of practices for sustaining urban and peri-urban agriculture: Implications for and use planning in rapidly urbanising Ghanaian cities. *Land Use Policy*, 84, 260-277. DOI: 10.1016/j.landusepol.2019.03.004.
2. Azunre G.A., Amponsah O., Peprah C., Takyi S.A. & Braimh I. (2019). A review of the role of urban agriculture in the sustainable city discourse. *Cities*, 93, 104-119. DOI: 10.1016/j.cities.2019.04.006.
3. Dobele M. & Zvirbule A. (2020). The concept of urban agriculture – historical development and tendencies, *Rural Sustainability Research*, 43 (338), 20-26. DOI:10.2478/plua-2020-0003.
4. Dobele M., Zvirbule A., & Dobele A. (2021a). A review of urban, peri-urban and rural agriculture concepts and role in sustainable development. *Proceedings of the international scientific conference "Social Sciences for Regional Development 2020",* part III, Issues of economics, 59-66.
5. Dobele M., Zvirbule A., & Dobele A. (2021b). The motivation of urban agriculture practice – the case of Latvia. *21st International multidisciplinary scientific GeoConference SGEM 2021: conference proceedings of selected papers 2021*, Issue 6.2: Green Design and Sustainable Architecture, 213-222. DOI: 10.5593/sgem2021V/6.2/s27.32.
6. Dobele M., Zvirbule A., & Dobele A. (2022). Legal aspects and institutional framework of urban agriculture in Latvia. *Economic Science for Rural Development 2022*, proceedings of the 23rd International scientific conference, 11-13 May 2002, 143-154, DOI: 10.22616/ESRD.2022.56.015.
7. Ekoskola – nākotnes skola. (n.d.). Retrieved Marc 4, 2022 from https://ekoskolas.lv/

8. *European Solidarity Corps. The power of together.* (n.d.). Retrieved July 4, 2022, from https://youth.europa.eu/solidarity_en
9. Ferreira A.J.D., Gulherme R.I.M.M., Ferreira C.S.S. & Oliveira M.F.M.L. (2018). Urban agriculture, a tool towards more resilient urban communities? *Current Opinion in Environmental Science & Health*, 5, 93-97. DOI: 10.1016/j.coesh.2018.06.004.
10. Gagnon Y.-C. (2010). *The Case Study As Research Method: A Practical Handbook*. Quebec: Les Presses de l'Universitate du Quebec, p. 119.
11. Game I., & Primus R. (2015). *Urban agriculture.* Retrieved April 3, 2022, from https://sustainabledevelopment.un.org/content/documents/5764Urban%20Agriculture.pdf
12. Hammelman C. (2017). Relying on Urban Gardens for Survival within the Building of a Modern City in Colombia. *Global urban agriculture: convergence of theory and practice between North and South*; ed. A.M.G.A. WinklerPrins. UK: CPI Group Ltd., CABI, 159-170.
13. *Hotel Janne, SIA* (n.d.). Retrieved April 4, 2022, from https://company.lursoft.lv/lv/hotel-janne/40203016720
14. *Kopienas augnīca* (n.d.). Retrieved June 7, 2022, from https://company.lursoft.lv/lv/kopienas-augnica/40008304022.
15. Martinsuo M., & Huemann M. (2021). Designing case study research. *International Journal of Project Management,* 39, 417-421. DOI: 10.1016/j.ijproman.2021.06.007.
16. *Par programmu "Latvijas skolas soma".* (2022). Retrieved June 7, 2022, from https://www.lnkc.gov.lv/lv/par-programmu-latvijas-skolas-soma
17. *Par projektu.* (n.d.). Retrieved June 7, 2022, from https://www.bisudraugs.eu/par-mums
18. Pourias J., Aubry C., & Duchemin E. (2016). Is food a motivation for urban gardeners? Multifuncionality and the relative importance of the food function in urban collective gardens of Paris and Montreal. *Agriculture and Human Value,* .33, 257-273.
19. *Report of the World Commission on Environment and Development: Our Common Future*. (1987). Retrieved March 20, 2022, from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf
20. *Seed Bombing darbnīca.* (n.d.). Retrieved July 4, 2022, from https://www.rigabiennial.com/lv/education/riboca-talks/seed-bombing-workshop
21. *The 17 goals*. (n.d.). Retrieved April 21, 2022, from https://sdgs.un.org/goals.
22. Thelwall M.,& Nevill T. (2021). Is research with qualitative data more prevalent and impactful now? Interviews, case studies, focus groups and ethnographies. *Library and Information Science Research,* 43, art. 101094. DOI: 10.1016/j.lisr.2021.101094.
23. Trendov N.M. (2018). Comparative study on the motivations that drive urban community gardens in Central Eastern Europe. *Annals of Agrarian science*, Vol.16, 85-89. DOI: 10.1016/j.aasci.2017.10.003.
24. Urban and peri-urban agriculture (n.d.). Retrieved March 22, 2022, from https://www.fao.org/urban-peri-urban-agriculture/en
25. *Urbānā biškopība – Rīgas Jumtu medus.* (n.d.). Retrieved June 4, 2022, from http://hoteljanne.lv/bites/.
26. Veen E.J., Bock B.B., Van den Berg W., Visser A.J., & Wiskerke J.S.C. (2016). Community gardening and social cohesion: different designs, different motivations. *Local Environment*, 21(10), 1271-1287. DOI: 10.1080/13549839.2015.1101433.

27. Wohlin C., & Rainer A. (2022). Is it a case study? – A critical analysis and guidance. *The Journal of Systems & Software*, 192, art. 111395. DOI: 10.1016/j.jss.2022.111395.
28. Woodside A.G. (2017). *Case Study Research: Core Skills in Using 15 Genres. Second edition.* Bingley, England: Emerald Group Publishing Limited, p. 538.
29. *World review. Urban agriculture: an oxymorone?* (1996). The State of Food and Agriculture. Rome: FAO, 43-94.

MANAGEMENT OF NATURAL RESOURCES IN THE CENTRAL ASIAN REGION

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Abstract. *The term "natural resources" refers to both the natural and socio-economic realms. Natural resources - bodies and forces of nature - are linked to ensure close interaction in the process of nature management. Currently, this specific region has some vulnerable issues such as biodiversity loss and land degradation that are connected with poor resource management. The activities of modern society are followed by enormous changes in nature, which are reflected in the Earth's exterior appearance as well as the states of geosystems. Modern production is distinguished by the inclusion of significant reserves of natural resource potential. However, its participation and application are ineffective. Sustainable development necessitates the management of natural resources in a sustainable and integrated manner. The main purpose of the work is to investigate the main natural resources of the Central Asian region, and to show the cost of poor management. The methods that were used are synthesis, analysis, comparison method, and forecasting method. The novelty of the research is the attention paid to the mismanagement of natural resources in a specific region.*

Keywords*: development, management, natural resources, potential, social economics.*
JEL code: *N5, O1, Q2.*

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Introduction

The concept of "natural resources" belongs to both the natural and socio-economic spheres. By linking these areas, natural resources - bodies and forces of nature, ensure their close interaction in the process of nature management. Natural resources - space-time category; their volume is different in different regions of the world and at different stages of the socioeconomic development of society. Central Asia is a dynamic and diverse region that is experiencing steady economic growth and new development possibilities. Smart management of the region's energy and water resources is critical to the region's continued growth, prosperity, stability, and well-being. Despite the fact that Central Asia is becoming more globalized, national aspirations such as food security and reliable energy services continue to drive development decisions.

The aim of the present paper is to investigate the main natural resources of the Central Asian region, to show the cost of poor management.

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The first part of the paper deals with the concept of natural resources potential. The second part introduces the classification of main resources in this specific region.

Research tasks:

- discuss the theoretical aspects of natural resources;
- analyze the natural resource potential of the Central Asian region

Research period: is modern economy of recent years 2011-2021.

Research methods: analysis, observation and secondary data collection

Research problem: mismanagement of natural resources and the cost of it.

Hypothesis: An important point in the rational use of natural resources is planning and forecasting the use of natural resources. When planning, one should take into account the ever-increasing rate of use of natural resources and make a prospective calculation of their consumption on the basis of mathematical forecasting methods.

The concept of natural resource potential

The natural resource potential of the territory is the totality of the natural resources of the territory that can be used in the economy, taking into account the achievements of scientific and technological progress. The natural resource potential of the territory is the most important economic factor, one of the qualities by which the economic and geographical position is assessed. The most important basis for the economic development of any region and one of the main conditions for the location of productive forces on its territory is the set of natural conditions and resources characteristic of it. The quantity, quality, and spatial combination of resources, the degree of supply is the most important factor in the location of the population and its economic activity (Kerimov et al., 2018).

Any type of resource is beneficial for the economy of the region and rises the potential of natural resources of any specific country in Figure 1.

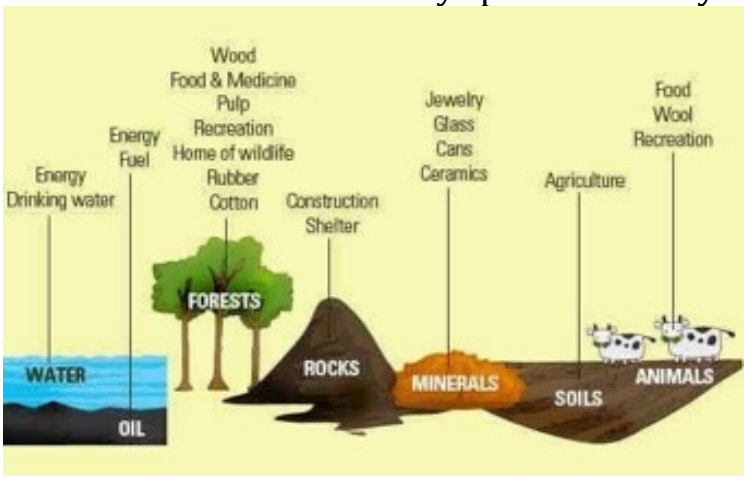

Fig. 1 Types of natural resource potential (Ezoteriker, 2021)

The functioning of national economies and the entire world economy is based on economic resources (factors of production) - natural, labor, capital (in the form of real capital, i.e. in the form of means of production, and financial, i.e. in monetary form), entrepreneurial, as well as scientific (scientific and technical, information knowledge). Taken together, economic resources form the potential of a national economy or a region of the world, or the entire world economy.

Location, operating conditions, and the nature of the use of natural resources affect the directions and rates of regional development. Natural conditions and resources, their territorial distribution, and spatial combinations are the most important factor in the emergence of economic specialization of regions, the formation, and development of territorial systems of different ranks (economic regions, territorial production complexes, industrial districts, nodes, and centers). It is important to take into account the spatial distribution of natural resources to determine the natural prerequisites for the development of the economy and more rational use of natural resources. In this regard, the economic assessment of natural conditions and resources is an important component of the economic and geographic characteristics of a territory, primarily from the point of view of explaining and analyzing the factors that determine the formation of its economic specialization (Simakova, 2013).

Central Asia is a dynamic and diverse region that is experiencing steady economic growth and new development possibilities. Smart management of the region's energy and water resources is critical to the region's continued growth, prosperity, stability, and well-being. Despite the fact that Central Asia is becoming more globalized, national aspirations such as food security and reliable energy services continue to drive development decisions.

The concept of natural resource scarcity has up until this point defined economic analysis generally, and particularly that pertaining to the market for natural resources, with many of the theoretical concepts being closely related to resource allocation issues at the micro- and macroeconomic level. According to the increasing supply-demand ratio on the market, on the one hand, and the way in which these resources are used in the manufacturing process, on the other hand, natural resources (raw materials and energy) are scarce in this sense says (Bulearca et al., 2011).

Socio-economic importance of natural resources

The natural environment serves as the natural basis for human economic activity. All human production activity can be represented as a process of transforming nature into forms that are acceptable for use. From the point of view of the needs of society, all bodies and forces of nature can be conditionally subdivided into two groups: those directly involved in material production and the sphere of non-material services (natural resources) and all the rest (usually referred to as natural conditions). Natural

conditions are elements of nature that are not directly used in the production process but affect the lives of people. The dependence on the natural conditions of agriculture, the mining industry, certain types of transport, recreational activities, etc. is especially strong. Natural conditions can be favorable (optimal temperature regime, sufficient air humidity, etc.) or negatively affect human economic activity. Alpine relief, harsh climate, permafrost, swamps, deserts complicate the economic development of the territory.

Natural resources' economic importance is determined by the amount of two main variables: current income flows and prospective future income flows. The first is mostly determined by production costs and market demand, while the second is determined by abundant resources and management strategy. Present and future income flows must be included to fully comprehend the true value of natural resources. If income is derived from the depletion of natural capital, the former can be a false predictor of how natural resources will influence economic development over the years. Resource-rich countries may provide the groundwork for long-term development and poverty alleviation by managing natural resources responsibly - in the case of renewable resources - and as sources of revenue for future growth - in the case of non-renewable resources (OECD, 2011).

Natural resources of the Central Asian region

Central Asia, once shrouded in secrecy and famed for its trans-Asian trade via the Silk Road, is now an open, dynamic region connecting Eastern Europe and West Asia. It is a region rich in natural resources, such as oil and gas, and home to a diverse range of animals and plants. Central Asia, which includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, is a vast land mass that separates Eastern Europe and the Caucasus from East and South Asia.

Oil and gas production in the region has grown at 2.7 percent and 0.2 percent per year, respectively, over the last five years (Figure 2). Although Kazakhstan produces some gas, the majority of it is reinjected to boost local oil recovery. On the contrary, Turkmenistan and Uzbekistan export the majority of their gas to China, Russia, and Azerbaijan. The produced gas can also be exported to neighboring European countries such as Turkey and Georgia, as well as India and Pakistan in Asia.

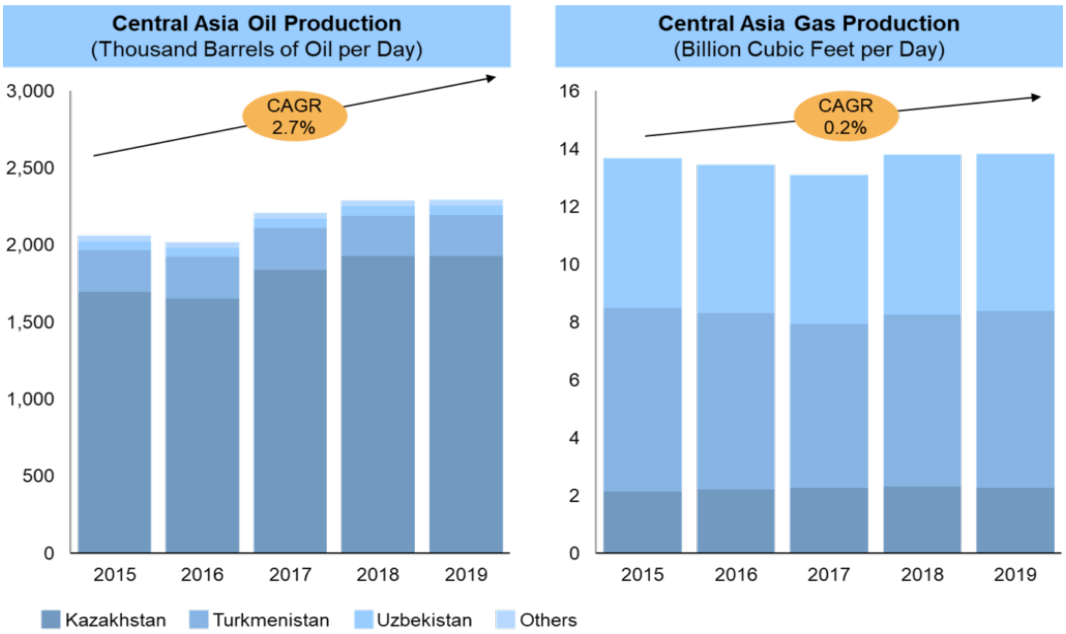

Fig. 2 Oil and gas production in Central Asian region in the period of 2015-2019 (AdiAnalytics, N.D.)

Central Asia is rich in energy resources. Kazakhstan, Uzbekistan and Turkmenistan, located in the lower reaches of the rivers, have significant reserves of oil, gas and coal, as well as significant potential in the field of generating wind and solar energy. The upper reaches of Tajikistan and the Kyrgyz Republic have significant, but not fully utilized, hydropower potential (Batsaikhan & Dabrowski, 2017).

The presence of such diverse energy systems implies the possibility of meeting the seasonal demand of all countries for electricity in the most economical and environmentally friendly way: with the maximum use of inexpensive hydropower in the summer and reliable sources of thermal energy in the winter when the climate is cold, limits the production of hydropower. At the same time, countries can build capacity to develop sources of wind and solar energy in the future.

Cotton played a key role in Central Asia's industrialization and collectivization programs, particularly in Uzbekistan. Uzbekistan has the most share of cotton production among other countries of Central Asia. Moreover, in accordance with international quality parameters, approximately 86% of Uzbek cotton fiber can be attributed to fiber with high tenacity.

The cost of poor resource management

According to (Bulearca et al., 2011), market failures and excessive monopolies - are "the finest friends of conservatism," and this topic has been debated frequently. It should be underlined that monopolies can occur in

both the manufacturing and mining sectors, affecting depletion rates and, consequently, the cost and price of mining and fossil fuel products. In this regard, it is important to comprehend how monopolistic behavior in the mining sector might vary from totally competitive behavior. The goal of every firm is to extract resources in a way that maximizes the present value of earnings over time, and this needs to be emphasized once more.

Mismanagement and inferior technology are the primary causes of Kazakhstan's environmental problems, which include toxic waste (often radioactive), water pollution, and industrial pollution. Previous nuclear tests' radiation levels, as well as vast geological uranium deposits and uranium mining waste, pose significant environmental and health risks. More social issues, such as poverty and security, which both leads to environmental degradation, must be addressed in Kyrgyzstan. Lack of governance, ethnic conflicts, and poverty wreak havoc on already vulnerable ecosystems (often mountainous).

In comparison, it appears that the Kyrgyz government is the only one in Central Asia that explicitly states in its policies the link between environmental stress, poverty, and security risks.

Central Asia's environmental issues are diverse. The collaboration of the Central Asian Republic can be advanced further by addressing environmental concerns. The environmental issues in Central Asia are various. The Aral disaster, as well as biodiversity loss, are two global issues. The degradation of land is severe, and water resources are diminishing and degrading in quality. Climate change is a new threat. Droughts, heat waves, and mudslides are becoming more common. Some issues that should be addressed are as follows: Social adaptation to such changes is becoming increasingly difficult; economically, we must spend significantly more resources to produce the same amount of crop in drought and water-stressed conditions. Conservation and maintenance of nature are financially viable.

According to (Lockwood et al., 2010) the majority of environmental problems are "wicked problems," requiring new institutional and policy solutions. The emergence of this category of policy challenge is characterized by complexity and contestation resulting from diverse problem causes, divergent problem viewpoints, different problem-solving approaches, and disjointed institutional environments. Along with that, there is a transition from government to governance, which is partly a reaction to the need for fresh ideas to deal with these issues. "The interplay among institutions, processes, and traditions that determine how authority and responsibility are exercised, how choices are made, and how citizens or other stakeholders have a voice" is what we mean when we say "governance." A system of government that favors cooperative methods among governmental and non-governmental players from the commercial sector and civil society has come

to be known as "new governance." It is now widely acknowledged that dealing with wicked problems is, in large part, a problem of interaction. This new paradigm of governance. These governing structures are particularly noticeable in policy domains affected by the sustainability discourse, which places unique demands on institutions and policy and has an explicit ethical underpinning in concepts of participation, accountability, stewardship, and duty of care.

Water resources utilization volume forecasts using linear regression method

Recently, the impact of global climate change has been acutely felt in the Central Asian countries, especially this year. Drought and water shortages have led to a reduction in agricultural crops and the loss of livestock not only in the countries of the so-called "lower reaches" - Kazakhstan and Uzbekistan, but also in Kyrgyzstan - the country of the "upper reaches", where several transboundary rivers of Central Asia are formed.

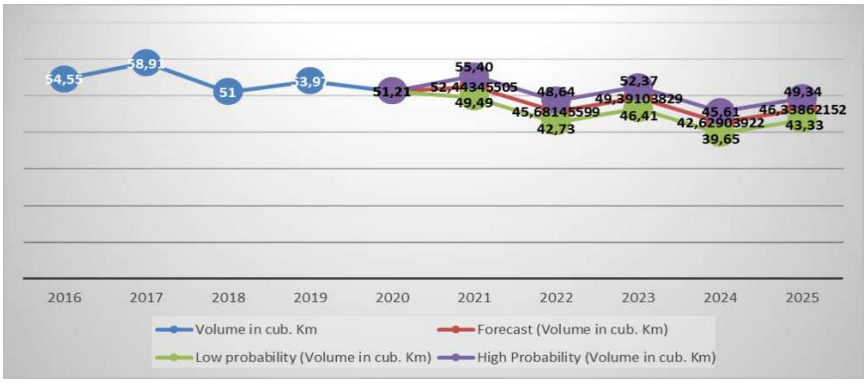

Fig. 3 Water utilization forecast in Uzbekistan in the period of 2016-2025 (compiled by the authors)

The highest volume of water resources used in Uzbekistan was in 2017, almost 59 cubic kilometers (Figure 3). Coming to 2020 the utilization of water dropped to 51,21 cubic kilometers. However, according to linear regression calculation, the result shows that by 2025 the water resources use will come to the point of 46,33 cubic kilometers.

Certainly, the difference in water resource utilization by 2025 is not so big, but according to the forecast after calculation, the result is positive. The authors' guess that such a scenario could happen due to new programs toward sustainable water resource use and new technologies that are being integrated into irrigation systems.

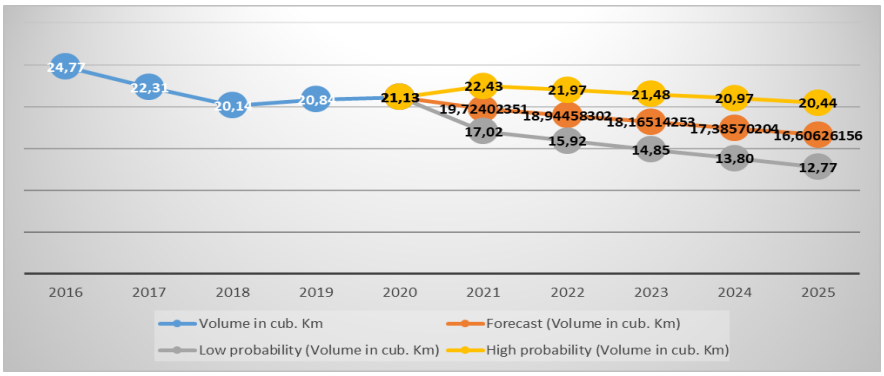

Fig. 4 Water utilization forecast in Kazakhstan in the period of 2016-2025 (compiled by the authors)

Compared to Uzbekistan, Kazakhstan uses twice less amount of water resources. Not so long time ago the use of water was highest in this specific period almost 25 cubic kilometers. It can be seen that coming to 2020 the rate drops noticeably to 21,13 cubic kilometers (Figure 4). According to the calculations done by the authors, the forecast shows that by 2025 the utilization of water resources will drop significantly to almost 17 cubic kilometers.

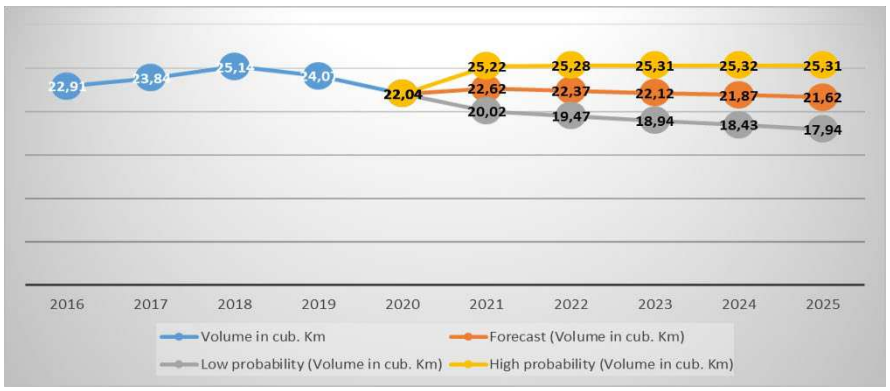

Fig. 5 Water utilization forecast in Turkmenistan in the period of 2016-2025 (compiled by the authors)

Turkmenistan has the most scarce amount of water resources overall in the Central Asian region (Figure 5). Even if this state is abundant with oil and gas resources, water remains the actual issue on a national level in Turkmenistan.

The authors assume the case of Turkmenistan as follows; the state does not have a strong policy for supporting sustainable water use programs. The country pays more attention to the mining of other precious resources while water becomes a scarce resource due to climate change, especially in this region.

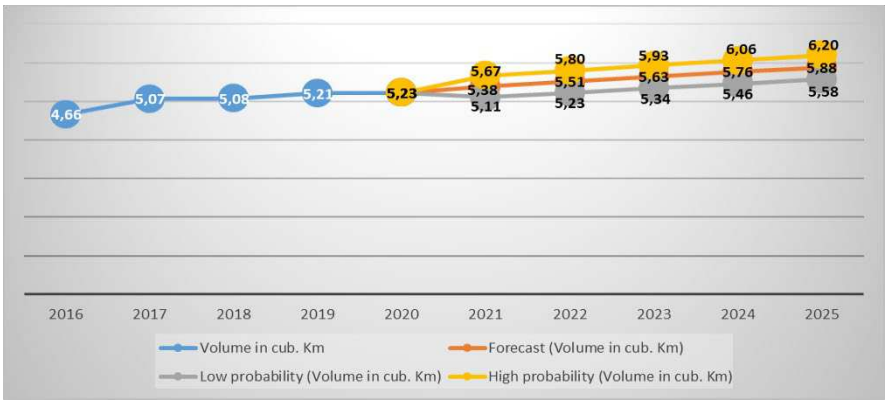

Fig. 6 Water utilization forecast in Kyrgyzstan in the period of 2016-2025 (compiled by the authors)

The Figure 6 shows the water resources use in Kyrgyz Republic in the period of 2016-2025 years. In 2016 at the beginning of this period the rate is 4,66 cubic kilometers of water. Through the next years the water resources use rises due to fact of rising population and heavier load on irrigation of lands for agriculture. Coming to the 2020 it showed 5,23 cubic kilometers. By 2025 the rate has a stable rise but the volume is not significantly more it comes to 5,88 cubic kilometers during a calendar year.

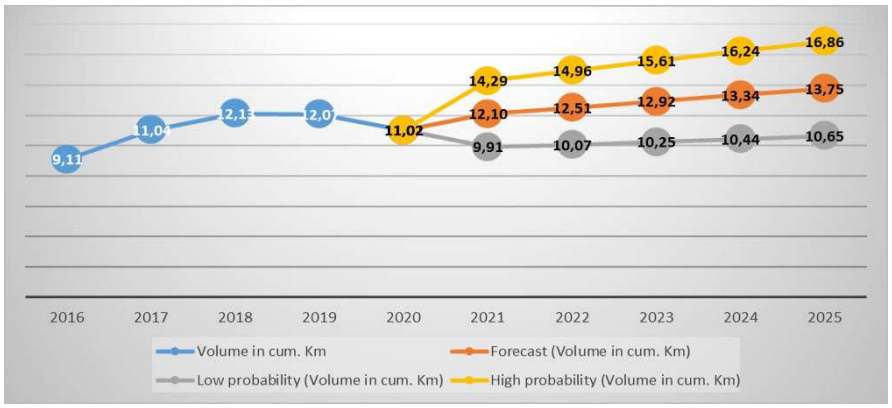

Fig. 7 Water utilization forecast in Tajikistan in the period of 2016-2025 (compiled by the authors)

The Figure 7 shows the least volume of water resources utilization in 2016. Coming to 2020 the rate shows 11,02 cubic kilometers. Starting from 2021 by 2025 according to calculations done by the authors the forecast indicates a stable rise pointing to almost 14 cubic kilometers.

In the conditions of transboundary surface water resources, in the very near future, Central Asian states may face the issue of providing water resources. This is connected both with the problem of low water supply and quality of water consumed, which is objectively facing all the states of the region, and with an increase in water demand in this region. Obviously, the

solution to this problem should be comprehensive and full-scale. It is necessary to solve not separate tasks, but the whole issue, combining actions at the domestic and international levels. In this regard, the authors consider it necessary to carry out a set of measures in the following areas:

1. Promote partnerships between public sector, civil society and private sector stakeholders, ensuring that these partnerships remain equitable and transparent, protect the interests of consumers and investors, and ensure compliance with strict environmental regulations.
2. Ensure the expansion of the information base to support effective planning and decision-making, strengthen management capacity. To this end, in modern conditions, it is expedient to develop a unified Information system (database) of the state and management of water resources.
3. Ensure the use of the potential of the scientific sphere. To do this, it is advisable to develop a network of subordinate scientific organizations that provide scientific support for the current and future activities of state bodies. At the state level, it is necessary to coordinate disparate and partially duplicated scientific research and scientific and technical developments.
4. To develop a draft of a new long-term Agreement on the use of water and energy resources, within which it is necessary to provide for the development of an effective water distribution scheme.
5. The activities of departments that ensure the management of water resources of the state, as a whole, largely depend on the appropriate information support, the correct organization of information flows to provide the necessary support in decision-making.
6. In general, the strategic goal of the national policy on water resources should be the implementation of long-term comprehensive measures aimed at eliminating the negative consequences of limited water resources and creating conditions for economic growth, solving social and environmental problems, and regulating interstate water relations.

Conclusions and suggestions

1. Multiple levels of environmental governance have two consequences for accountability. In order for higher level governing authorities to receive the cooperation of other governing bodies and stakeholder groups, it is first necessary for governmental authorities at all levels to demonstrate that they are fulfilling their assigned responsibilities. Secondly, it is also necessary for acceptance that accountability transcends downward and outward in addition to upward.
2. Justice is a complex and challenging aspect of environmental governance. The following elements call for guidance: (i) the novelty of juggling

competing public and private interests, (ii) the clear and equitable assignment of roles and responsibilities and stakeholder acceptance of those roles and responsibilities, (iii) the conflicts between priority areas and equal and fair resource allocation, and (iv) the needs of those who lack a voice, such as nonhuman animals and coming generations.

3. The capability notion recognizes that tackling difficult problem challenges often necessitates taking into account how well the institutional, organizational, and human resources at hand will serve that purpose. Some of these are leadership, knowledge availability, organizational processes, and an abundance of material and human resources.
4. The natural resource potential of the territory is the most important economic factor, one of the qualities by which the economic and geographical position is assessed. One of the most essential bases of societal economic development is the efficient extraction and utilization of natural resources. Conservation, rational and comprehensive use of this method is part of the tasks of rational nature management.
5. The low level of intraregional trade in Central Asia, which accounts for less than five percent of the total trade, makes the region one of the least economically integrated regions in the world and prevents the stream of investment.
6. Presently, natural resource degradation causes environmental pressures such as qualitative and quantitative impacts on water resources, overexploitation, desertification, soil erosion, deforestation, and environmental degradation.
7. In the future, the governments of the countries of Central Asia need to increase the volume of foreign investment by providing favorable tax rates and maintaining good transport and infrastructure network, in order to increase the volume of gas and oil production, as the region is abundant with these resources.
8. Ecological institutions should establish more widely water reuse practices. For an instance, Greywater systems and rainwater collection systems should be used on a whole national level. It will result on less water consumption and resources will be managed more sustainably.
9. The forest area in the Central Asian region should be expanded. As having present environmental issues climate change is also becoming one of the main global problems, the presence of bigger forest areas would be the perfect solution of many environmental issues of the region. This should be managed seriously by governments of the states.

References

1. AdiAnalytics. (N.D.). Regional spotlight: Oil & Gas in Central Asia. Retrieved from https://adi-analytics.com/2021/05/28/regional-spotlight-oil-gas-in-central-asia/
2. Asian Development Bank. (2010). Central Asia Atlas of Natural Resources. Retrieved from https://www.adb.org/publications/central-asia-atlas-natural-resources
3. Batsaikhan, U., & Dabrowski, M. (2017). Central Asia - twenty-five years after the breakup of the USSR. *Russian Journal of Economics,* 3(3). 296-320. https://doi.org/10.1016/j.ruje.2017.09.005
4. Bulearca, M., Popescu, C., Sima, C., Ghiga, C., & Neagu, C. (2011). Models for natural resource management. *WSEAS Transactions on Business and Economics*, 2(8), 50-65. Retrieved from https://www.researchgate.net/publication/286546193_Models_for_natural_resources_management
5. Ezoteriker (N.D.). Znachenie prirodnyh resursov dlja cheloveka. Znachenie «prirodnye resursy. Prirodnye resursy i kakova ih rol' v zhizni i dejatel'nosti cheloveka. Retrieved from https://ezoteriker.ru/znachenie-prirodnyh-resursov-dlya-cheloveka-znachenie-prirodnye/
6. Kerimov, I. A, Gagaeva, Z. Sh., & Gairabekov, U. T. (2018). Natural Resource Potential - Basis of Sustainable Development of Chechen Republic. *Proceedings of the VIII Science and Technology Conference "Contemporary Issues of Geology, Geophysics and Geo-ecology of the North Caucasus" (CIGGG 2018). Advances in Engineering Research,* Vol.182, 155-159. https://doi.org/10.2991/ciggg-18.2019.29
7. Lockwood, M., Davidson, J., Curtis, A., Stratford, E., & Griffith, R. (2010). Governance Principles for Natural Resource Management. *Society & Natural Resources*, 23(10), 986-1001. https://doi.org/10.1080/08941920802178214
8. OECD (2011). The economic significance of natural resources: Key points for reformers in Eastern Europe, Caucasus and Central Asia. Retrieved from http://surl.li/dmubt
9. Simakova, N. (2013). Prirodno resursnyy potentsial kak factor sotsialno ekonomicheskogo razvitiya regiona. Retrieved from https://cyberleninka.ru/article/n/prirodno-resursnyy-potentsial-kak-faktor-sotsialno-ekonomicheskogo-razvitiya-regiona/viewer
10. Tulyakov, E., (2022). Economic Development as a Priority in the Development Strategy of Uzbekistan for 2022-2026. Retrieved from https://usnd.to/CzkY
11. United Nations (2012). Toolkit and guidance for preventing and managing land and natural resources conflict. Retrieved from http://surl.li/dmucb
12. World Bank (N.D). Central Asia Energy – Water Development Program. Retrieved from http://surl.li/dmucg
13. Zorya, S., & Htenas, A., (2020). How to create more jobs and reduce poverty in Uzbekistan: Focus on the agri-food sector. Retrieved from http://surl.li/dmuce

DETERMINANTS, MEASUREMENT AND MANAGEMENT OF PERFORMANCE IN SMALL AND MEDIUM-SIZED ENTERPRISES

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Abstract. *Small and medium-sized enterprises (SMEs) are considered the backbone of economic growth, as they play a vital role in the economic development of any country, they contribute to the provision of job opportunities and act as suppliers of goods and services to large companies. Despite the role of SMEs in national economies, as well as their importance in promoting competitiveness and employment, the author believes that the SMEs performance determinants and their impact on performance measurement and management have not been sufficiently studied in Latvia. The aim of the research is to explore the SMEs performance determinants and their impact on performance measurement and management. The research is based on the analysis of scientific research papers. General research methods are used in the research: information analysis and synthesis, the logical construction, monographic, data grouping and graphical representation methods. As a result, the impact of the SMEs performance determinants on the measurement and management of SME performance were explored, and the conceptual framework for measuring and managing SME performance was developed.*

Keywords*: small and medium enterprises, performance, growth, performance measurement and management.*
JEL* code:* M10, M20.

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Introduction

At the end of 2020, the economically active SMEs in Latvia accounted for 99.87% of the total number of economically active companies in the market sector. It is important that micro-enterprises are also included in the SME group in Latvia, they made up the largest share or 93.53% of the total number of SMEs in 2020 *(Oficiālās statistikas portals, 2022).*

SMEs can be described as the catalysts of the future economy. It is necessary to accelerate the growth of SMEs and improve their competitiveness *(Forsman, 2008).* SMEs contribute to regional economic development, create new jobs, provide investment opportunities and create economic capital and the potential necessary for sustainable economic growth *(Koudelková &*

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Svobodová, 2014; Belas et al., 2015), as well as support socio-economic policies that promote sustainable development (*Todericiu & Stăniț, 2015; Gonçalves et al., 2019).*

SMEs are the driving force of the European economy, they create jobs, contribute to economic growth and ensure social stability. Nine out of every ten companies are SMEs, and SMEs create two out of every three jobs. SMEs also stimulate the spirit of entrepreneurship and innovation across the EU, so they play a vital role in boosting competitiveness and employment *(Eiropas Komisija, 2020).*

Despite the role of SMEs in national economies, as well as their importance in promoting competitiveness and employment, the author believes that the SMEs performance determinants in Latvia are insufficiently studied and revealed.

The research aim is to assess the SMEs performance determinants and their impact on performance measurement and management.

The research tasks:

1) to study theoretical aspects of the specific characteristics of SMEs;
2) to evaluate the factors determining performance of SMEs;
3) to assess the dimensions of SME performance measurement and management frameworks (PMMF).
4) develop conclusions and proposals

Research hypothesis – the SMEs performance determinants affect the performance measurement and management in SMEs.

General research methods – information analysis and synthesis, the logical construction method, the monographic, data grouping and graphical representation methods – are used in the research. The research is based on the analysis of scientific research papers.

Research results and discussion

Based on their size and capabilities, the key characteristics of SMEs can be identified; they could be both positive, and negative, and could hinder implementation of a performance measurement and management framework (PMMF).

The main characteristics of SMEs can be divided into two main categories: the external environment and the internal environment. The external environment can be described as the environment where the company operates and it cannot be affected. The external environment can be divided into two main subcategories: markets and customers. The internal environment includes

characteristics the company manager can control, such as resources (both labour and financial) and the way the company is managed (management practices) *(Cocca & Alberti, 2010).*

Regarding the *external environment*, SMEs operate in highly competitive, uncertain and rapidly changing market conditions *(Garengo et al, 2005)*, and their main objective is to survive in a competitive market *(Levy et al., 1999).* Creativity and innovation are the main conditions for SMEs to survive in competitive conditions *(Machová et al., 2016).* It must be admitted that there is no unambigous opinion regarding the role of innovation in the operation of SMEs. There is an opinion that innovation can become one of the key success factors of SMEs *(Ehrenberger et al., 2015),* which can help to differentiate the product, beat the competition and attract more customers. B. K. Mabenge et al. *(Mabenge et al., 2020)* consider that newer and larger companies should be advised to use innovation as an instrument to improve their performance. In contrast, older and smaller companies are advised to be cautious when trying to improve their performance through innovation. The economic, environmental and social dimensions of SMEs' sustainable innovation initiatives are mainly reviewed in the manufacturing sector, offering different indicators used by SMEs to measure and monitor the performance of different sustainable innovation initiatives *(Dasgupta, 2021).* Despite the fact that the manufacturing sector SMEs make a significant contribution to economic growth, most researches on innovation management in the manufacturing sector are focused on large organizations *(Terziovski, 2010).*

SMEs usually do not have control or influence in the market, so they need to adapt to market changes *(Hudson, 2001; Garengo et al., 2005).* Owners and managers of SMEs usually have a good knowledge of the local market and customer needs; customer relations and after-sales services are often more intensive than in large organizations. It is possible for SMEs to concentrate on specific market niches, as it is easier to focus on a specific number of customers and satisfy them with customized products and personalized services (*Taticchi et al., 2008b)*. SMEs rely on a limited range of customers, they are usually closer to their clients and able to develop more personal relationships with them (*Machová et al., 2016)*. Delays in payments by SME customers creates fluctuations in cash flow, which reduces the ability to control the future *(Hudson, 2001).*

As one of the key problems of the SMEs' *internal environment* and a typical characteristic of SMEs, the insufficiency of resources is emphasized, reviewing the concept of "resources" not only from personnel, i.e.,

management side but also from the point of view of financial stability and security.

SMEs have limited human resources and capital resources, difficulties in ensuring financial stability, insufficient application of information technology, lack of data and legal restrictions also cause problems *(Watts & Bards, 2005; Levy et al., 1999; Madsen, 2015; Garengo, 2009; Garengo & Sharma, 2014)*. There is a strong relationship between the entrepreneur's knowledge (level of education, work experience, knowledge of functional requirements, self-confidence) and SME performance *(Omerzel & Antoncic, 2008)*. In SMEs, the role of intellectual capital is essential because SMEs have less available material resources compared with larger companies, and thus they rely more on intangible resources *(Demartini & Beretta, 2020)*.

Not just employees *(Singh et al., 2008)*, but owners as well have limited skills – managers often lack management experience or organizational skills, and this determines weak business strategic planning and human resource management *(Pansiri & Temtime, 2008; Garengo, 2009; Garengo & Sharma, 2014)*. New employees are considered an additional cost rather than an investment *(Reijonen & Komppula, 2007)*, thus human resources are not a strategic factor *(Melo & Machado, 2013; Jafari-Sadeghi et al., 2020)*.

The organizational structure with just a few management levels facilitates mutual relations and simplifies communication processes and provides the manager with a clear understanding of the processes, as well as the opportunity to directly influence employees *(Yusof & Aspinwall, 2000; McAdam, 2000a; 2000b; Wiklund & Wiklund, 1999; Singh et al. , 2008; Madsen, 2015; Pekkola et al., 2016)*. Managers are often also the owners of the company, thus the control of SME is primarily in the hands of one or a few individuals with a high degree of autonomy and personal authority *(Storey & Skyes, 1996; Pansiri & Temtime, 2008; Garengo et al., 2005)*. The lack of time and the ubiquity of the entrepreneur are emphasized, since the owner-manager is a part of every business activity *(Reijonn & Komppula, 2007; Garengo et al., 2005; Olsson, 2011)*. SMEs tend to have a lower level of bureaucracy, which allows for faster problem solving and decision making *(Yusof & Aspinwall, 2000; Castka et al. 2004; Murillo & Lozano, 2006; Battaglia et al. 2010)*. SMEs are characterized by flexibility, adaptability and the speed with which it is possible to adapt to a changing environment *(Garengo et al., 2005)*.

The operation of SME can be significantly influenced by the organizational skills of the owner-manager, as decisions are largely based on the manager's personal skills and intuition, rather than information

analysis. The owner-manager usually applies a personalized management style, following a "react and adapt" philosophy, "firefighting" strategies and the learning by doing approach, he/she focuses on short-term goals, but rarely engages in strategic planning *(Kueng, et al., 2000; Hudson et al., 2001b; Garengo et al., 2005; Madsen, 2015)*. SMEs use a reactive approach, characterized by poor strategic planning and informal decision-making processes. Strategic management and long-term priorities may fall on tomorrow's to-do list when pressing day-to-day operational issues and customer needs arise *(Ates et al., 2013)*.

There is a close relationship between the skills of owner-managers and the financial performance of the company. Higher financial performance is observed in companies when the owner-manager possesses entrepreneurial rather than administrative skills *(Wijewardena, et al., 2008)*. SMEs mainly rely on financial and operational rather than intangible aspects such as innovation, research and development *(Bititci et al., 2012; Garengo & Biazzo, 2013)*, mainly using financial measurements *(Madsen, 2015)*.

Based on the above, the author identifies the main advantages of SMEs:

- the owners of the company are usually also its managers;
- the organizational structure promotes mutual relations and simplifies communication processes in the company;
- a lower level of bureaucracy, easier management and control, and the ability to ensure faster problem solving and decision-making;
- knowledge of the local market and customer needs, flexibility and ability to quickly adapt to market changes;
- operates in specific market niches, offering customers customized products and personalized services.

The main disadvantages of SMEs are:

- the manager's decisions are largely based on the manager's personal skills and intuition rather than information analysis;
- companies operate in limited, i.e., local market;
- high competition, uncertainty and rapidly changing market conditions;
- insufficient financial and labour resources;
- delays in customer payments can lead to financial instability;
- insufficient strategic planning.

The concepts of growth, success and performance are often closely related and are sometimes used as synonyms in business research *(Reijonen & Komppula, 2007)*, for example, financial measurement – profit as an indicator of performance and success. Performance, growth and success are affected by the factors related to the characteristics of the entrepreneur, organization or

environment. It should be noted that success is often measured subjectively, while performance and growth are usually measured more objectively. The growth of SMEs is hindered by limited funding opportunities *(Moscalu et al., 2020)*.

There is still a lack of consensus among researchers on how to measure performance *(Watson, 2003)*. It follows that until there is a common understanding of what performance actually means to SME owners, efforts to identify the factors associated with SMEs performance and efforts to separate successful entrepreneurs from less successful entrepreneurs will be imprecise. The idea of the academic conceptual model *(Simpson et al., 2012)* predicts that performance measurements in the form of feedback could change the strategic/ tactical behaviour of SME owner-managers. The model combines, on the one hand, the concept of the company including characteristics of the entrepreneur and the company and the business environment affecting them and, on the other hand, the company's influence on the key success factors and definitions of success, linking them to performance measurements (financial and non-financial). This model defines the theoretical relationships of SME success.

Most of the identified SME performance factors *(Babakus et al., 2006)* are endogenous in nature, referable to the company's internal environment and include factors such as owner-manager's personal virtues and vices or strengths and weaknesses specific to the company's financial and operational management. On the other hand, exogenous factors (i.e., those outside the company) can create significant constraints and contingencies, and can affect competitiveness and survival.

Understanding of the SME performance can provide guidance to both individual business owners and government tasked with promoting economic growth (N.D., 2014). The compilation of SME performance factors (see Table 1) confirms that the key factors influencing performance are directly related and result from the recognition of the above-mentioned advantages of SMEs and the elimination of shortcomings.

Characteristics of an entrepreneur include such individual factors as the owner-manager's *age, education, management skills, experience and motivation*. In a description of a company, the company's *duration, size, location, industry, organisational culture, internal communication and organizational structure* are reviewed as criteria. Strategic planning, as *a mind map or a documented strategic plan*, is an important condition for successful company management, as it provides an opportunity to follow and evaluate the company's progress towards a previously set goal. Human resources include the *owner-manager's attitude, human resource management practices such as selection, appraisal,*

training, motivation and incentives. Funding as a factor affecting performance of SMEs is characterized by *availability of financial capital, i.e., personal and family funds, bank loans, government support, and other financial sources*. Business networks/ partnerships can contribute to the development of a company both locally and internationally and include *various forms of cooperation and internationalization*. The business environment factor includes *economic, technological, legal, and ecological aspects* affecting the company's operation. As previously mentioned, the role of innovation in the operation of SME is not evaluated unambiguously, nevertheless, *innovation, creativity, product diversification and product market development* are considered within the framework of innovation as a factor affecting performance of SMEs.

Table 1 Factors affecting performance in small and medium-sized enterprises (Compiled by the author)

Performance factors	Authors
Entrepreneur	*Dobbs & Hamilton (2007); Ahmad & Seet (2009); Fadahunsi (2012); N.D. (2014); Sarwoko & Frisdiantara (2016); Al-Tit et al. (2019); Rodrigues et al. (2021).*
Company	*Dobbs & Hamilton (2007); Ahmad & Seet (2009); Fadahunsi (2012); N.D. (2014); Sarwoko & Frisdiantara (2016); Al- Tit et al. (2019); Rodrigues et al. (2021).*
Strategic planning	*Dobbs & Hamilton (2007); Fadahunsi (2012); N.D. (2014); Nuel et al. (2020); Rodrigues et al. (2021).*
Human resources	*Dobbs & Hamilton (2007); Ahmad & Seet (2009); Fadahunsi (2012); Sarwoko & Frisdiantara (2016); Chikweche & Bressan (2018); Al-Tit et al. (2019); Rodrigues et al. (2021); Nuel et al. (2020);*
Funding	*Dobbs & Hamilton (2007); Ahmad & Seet (2009); Fadahunsi (2012); Sarwoko & Frisdiantara (2016); Al-Tit et al. (2019); Rodrigues et al. (2021).*
Business networks/ partnerships	*Dobbs & Hamilton (2007); Fadahunsi (2012); N.D. (2014); Al-Tit et al. (2019); Rodrigues et al. (2021).*
Business environment	*Dobbs & Hamilton (2007); Fadahunsi (2012); Sarwoko & Frisdiantara (2016); Al-Tit et al. (2019).*
Innovation	*Ahmad & Seet (2009); N.A. (2014); Alfoqahaa (2018); Nuel et al. (2020); Rodrigues et al. (2021).*

The identified obstacles for implementation of the performance measurement system in SMEs *(Papulová et al., 2021)* relate both to the specific characteristics of SMEs and to the factors influencing performance:

- human resources – limited human resources, employees in companies often perform several duties and do not have time for other activities, such as implementation of a performance measurement system;
- managers and their abilities – horizontal organizational structure where the owner/ manager is occupied with operational or management functions and lacks time for other management functions;
- financial resources – limited financial resources make implementation of the performance measurement system more expensive;
- reactive approach – weak strategic planning and informal decision-making processes;
- insufficient formalization of processes – lack of management systems and formal processes increases difficulty of collecting the necessary information for implementation and use of the performance measurement system;
- misperception and misunderstanding of the performance measurement system – performance measurement systems can be implemented and used effectively if the employees of the company perceive its benefits. However, owner-managers of SMEs often do not understand the potential benefits of implementing a performance measurement system and perceive it as an obstacle to organizational flexibility.

Successful implementation of a performance measurement system is not a simple matter and may take several years *(Papulová et al., 2021)*.

Despite the significant contribution of SMEs to economic growth, the share of employees, or the superiority of SMEs over large companies, a small number of theoretical and empirical studies have been conducted on the implementation of performance measurement systems in SMEs *(Papulová et al., 2021)*. Insufficient attention is paid to the performance measurement in SMEs, the majority of research is focused on the application of the performance measurement system in large companies *(Hudson et al., 2001a, 2001b; Fouad, 2013)*, the adaptation of the performance measurement systems to SMEs *(Laitinen & Chong, 2006)*; however, performance measurement systems used by large companies are not suitable for SMEs because their operating environment is less complicated and they have fewer resources than large companies *(Gonçalves et al., 2019; Cocca & Alberti, 2010; Garengo et al., 2005; Pekkola et al., 2016).* Many researches on performance measurement do not consider the company's size *(Garengo & Bititci, 2007)*, yet implementing PMMS is essential for improving performance regardless of the company's size *(Melnyk et al., 2014; Nudurupati et al., 2016)*. The company's size affects the implementation of the performance measurement system, as the practices enabling implementation of performance measurement systems in large companies are

not necessarily the most appropriate for SMEs, and vice versa *(Taylor & Taylor, 2014)*.

In Table 2, the author provides an overview of the characteristics of individual SME performance measurement systems, based on the key dimensions *(Garengo et al., 2005)* that characterises models of modern performance measurement systems.

Table 2 **Key dimensions of performance measurement and management frameworks for small and medium-sized enterprises**
(Compiled by the author)

Performance measurement and management frameworks	**Authors**	**Strategy allignment**	**Strategy development**	**Focus on stakeholders**	**Balance**	**Dynamic adaptability**	**Process orientation**	**Depth**	**Breadth**	**Causal relationship**	**Clarity and simplicity**
System for organizational performance measurement	*Chennell et al., 2000*	○		●	●		●	●	●		○
Effective performance measurement in SMEs	*Hudson et al., 2001a*	●	●	●	●	●		○	●	○	●
Dynamic integrated performance measurement system	*Laitinen, 2002*	○		○	○	○	●		○	●	○
(Benchmarking of SMEs performance	*St-Pierre & Delisle, 2006*	○			●	●	●			●	○
Performance measurement model based on the grounded theory approach	*Chong, 2008*	○		○	●					○	●
Integrated approach to performance measurement Systems in SMES	*Taticchi et al., 2008a*	○	○		●	●	○		○	○	○
Circular methodology of balanced scorecard for SMES	*Garengo & Biazzo, 2012.*	●	●		○	●			●	●	●
Methodology to develop a performance measurement system in SMES	*Chalmeta et al., 2012*	●	●	○	●	●	●	●	●	●	○
Measurement Framework to Assess SME Performance	*Phihlela et al., 2012*	●	●	●	●	●	●		○	●	●

Continuation of the Table 1

Dynamic Performance Management Approach to Evaluate and Support SMEs Competitiveness	*Bianchi et al., 2015*	●	●	●	●	●	●		●	●	○
Assessment methodology for improving performance in SME's	*Ahmad & Alaskar, 2014*	○		●	●	●	●	●	●	●	●
Continuous performance measurement for small enterprises	*Waśniewski, 2017*	●	●	●	●	●		○	●	○	●
Continuous performance measurement for small enterprises	*Midovska-Petkoska et al., 2019*	●	●	●	●	●	●	●	●	●	●

● – fully describes
○ – partially describes

The most common feature of the SMEs performance measurement systems analysed is the balance-sheet dimension. This aspect has become important since the creation of the concept of the balanced scorecard system. All models, albeit in different dimensions, reflect the strategic focus of performance measurement, and some also consider the impact of performance measurement on strategy development. The next feature included in all concepts is clarity and simplicity, which relates to the need to inform employees about the principles and the need for performance measurement in an understandable and transparent way. It should be noted that almost all performance measurement systems describe causal relationships between performance and its determinants, which allows the used performance indicators to better meet the company's requirements.

In Figure 1, the author presents the PMMF conceptual framework for manufacturing SMEs, which includes identification and assessment of the factors affecting the company: macro environment, stakeholders, and performance determinants. It should be noted that there is a feedback loop for stakeholders.

The measurement of the company's performance, or key performance indicators (KPI), in general, should include both financial and non-financial indicators, and a performance evaluation index (PEI) should be developed and used for performance evaluation. If the actual performance of the company based on the calculation of PEI is, for example, 7.5 and it is higher than the planned or PEI of the previous period, then it can be assumed that the company has been successful. On the other hand, if the company's actual performance,

based on the PEI calculation, is lower than the planned or PEI of the performance has deteriorated and performance improvement measures should

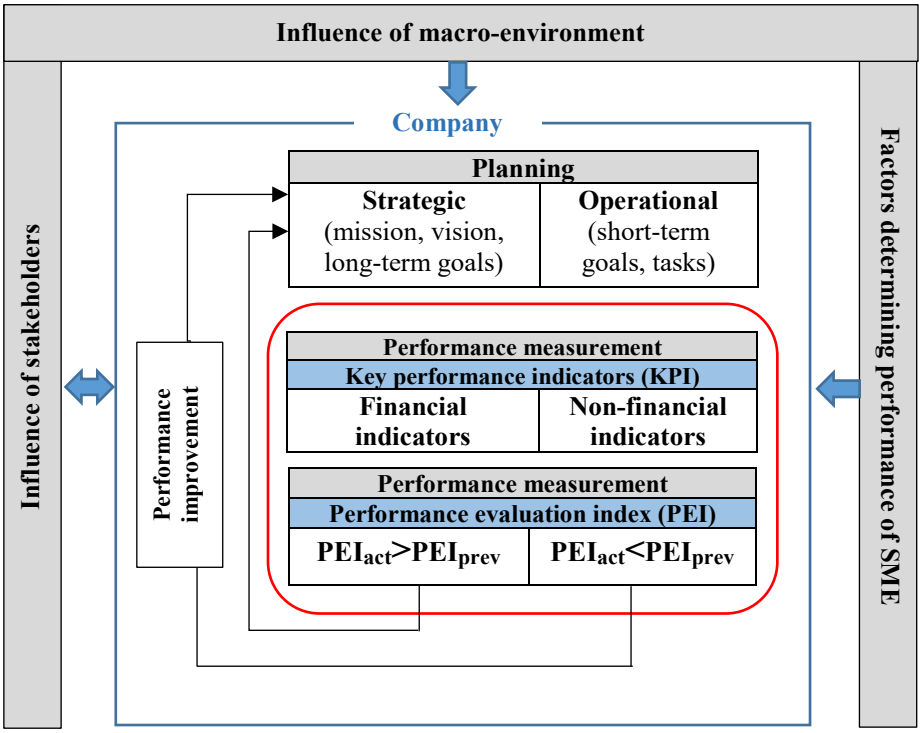

Figure 1 **Conceptual framework for performance measurement and management of small and medium-sized enterprises**
(Created by the author)

be taken, evaluating changes in KPI. Performance evaluation, including KPI and PEI, is the most important component of PMMF or the concept of manufacturing industry SMEs.

Conclusions and suggestions

The SMEs performance is closely related to identifying the main advantages of SMEs: the owners of the company are usually also its managers; the organizational structure simplifies communication processes in the company; there is easier management and control, as well as ability to ensure faster problem solving and decision-making and elimination of deficiencies. Managerial decisions are largely based on the manager's personal skills and intuition rather than information analysis. The company operates in a limited, i.e., local market; there is high competition, uncertainty, insufficient strategic planning and rapidly changing market conditions; there is a possible insufficiency of financial and labour resources, etc.

The implementation of PMMF is determined by the key characteristics of SMEs, the factors determining performance: entrepreneur, company, strategic

planning, human resources, funding, business networks/ partnerships, business environment, and innovation. The identified obstacles to the implementation of the performance measurement system in SMEs: human resources, managers and their abilities, financial resources, reactive approach, insufficient formalization of processes, misperception and misunderstanding of the performance measurement system.

The following dimensions should be considered in the development of SME PMMF: strategy development and its alignment, focus on stakeholders, balance, dynamic adaptability, process orientation, depth and breadth, causality, clarity and simplicity.

Owners and managers of manufacturing SMEs are advised to apply the author's conceptual framework for measuring and managing the performance of SMEs in order to more effectively measure and manage the company's performance.

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References

1. Eiropas Komisija (2020). *Lietotāja rokasgrāmata par MVU definīcijas piemērošanu.* https://ec.europa.eu/docsroom/documents/42921/attachments/1/translations/lv/renditions/pdf
2. Ahmad, M.M., & Alaskar, O. (2014). Development of assessment methodology for improving performance in SME's. *International Journal of Productivity and Performance Management,* 63(4), 477 – 498. http://dx.doi.org/10.1108/IJPPM-06-2013-0108
3. Ahmad, N.H., & Seet, P-S. (2009). Understanding business success through the lens of SME founder-owners in Australia and Malaysia. *International Journal of Entrepreneurial Venturing,* 1(1), 72-87.
4. Alfoqahaa, S. (2018). Critical success factors of small and medium-sized enterprises in Palestine. *Journal of Research in Marketing and Entrepreneurship,* 20(2), 170-188. https://doi.org/10.1108/JRME-05-2016-0014
5. *Al-Tit, A.A., Omri, A., & Euchi, J. (2019). Critical Success Factors of Small and Medium-Sized Enterprises in Saudi Arabia: Insights from Sustainability Perspective. Administrative Sciences.* https://doi.org/10.3390/admsci9020032
6. Ates, A., Garengo, P., Cocca, P., & Bititci, U. (2013). The development of SME managerial practice for effective performance management. *Journal of Small Business*

and Enterprise Development, 20(1), 28-54. https://doi.org/10.1108/14626001311298402

7. Babakus, E., Yavas, U., & Haahti, A. (2006). Perceived uncertainty, networking and export performance: A study of Nordic SMEs. *European Business Review*, 18(1), 4-13. https://doi.org/10.1108/09555340610639815
8. *Battaglia, M., Bianchi, L., Frey, M., & Iraldo, F. (2009). An Innovative Model to Promote CSR among SMEs Operating in Industrial Clusters: Evidence from an EU Project. Corporate Social Responsibility and Environmental Management, 17, 133-141.*
9. Belas, J., Bilan, Y., Demjan, V., & Sipko, J. (2015). Entrepreneurship in SME segment: case study from the Czech Republic and Slovakia. *Amfiteatru Economic Journal*, *17*(38), 308-326.
10. Bianchi, C., Cosenz, F., & Marinkovic, M. (2015). Designing dynamic performance management systems to foster SME competitiveness according to a sustainable development perspective: empirical evidences from a case-study. *International Journal of Business Performance Management*, 16(1), 84-108. DOI: 10.1504/IJBPM.2015.066042
11. Bititci, U. S., Garengo, P., Dörfler, V., & Nudurupati, S. S. (2012). Performance measurement: challenges for tomorrow. *International Journal of Management Reviews*, *14*(3), 305–327. https://doi.org/10.1111/j.1468-2370.2011.00318.x
12. Castka, P., Balzarova, M. A., Bamber, C. J., & Sharp, J.M. (2004). How Can SMEs Effectively Implement the CSR Agenda? A UK Study Perspective. *Corporate Social Responsibility and Environmental Managemen,* 11, 140–149. https://doi.org/10.1002/csr.62
13. Chennell, A.F., Dransfield, S.B., Field, J.B., Fisher, N.I., Saunders, I.W & Shaw, D.E. (2000). OPM®: A system for organisational performance measurement. *In conference proceedings performance measurement,* Cranfield University, 96.-103.
14. Chikweche, T., & Bressan, A. (2018) A systematic review of future research challenges and prospects of organizational learning research in small medium size enterprises, *Journal of Small Business & Entrepreneurship*, 30(2), 175-191, https://doi.org/10.1080/08276331.2017.1362523
15. Chong, H.G. (2008). Measuring performance of small-and-medium sized enterprises: the grounded theory approach. *Journal of Business and Public Affairs,* 2(1), 1.-10. https://ssrn.com/abstract=3542952
16. Cocca, P., & Alberti, M. (2010). A framework to assess performance measurement systems in SMEs. *International Journal of Productivity and Performance management,* 59(2), 186.-200. https://doi.org/10.1108/17410401011014258
17. Dasgupta, M. (2021). Sustainable innovation initiatives by small and medium enterprises: a systematic literature review. *Journal of Small Business & Entrepreneurship,* https://doi.org/10.1080/08276331.2021.1898177
18. Demartini, M.C., & Beretta, V. (2020). Intellectual capital and SMEs' performance: A structured literature review. *Journal of Small Business Management*, 58(2), 288-332, https://doi.org/10.1080/00472778.2019.1659680
19. Dobbs, M., & Hamilton, R.T. (2007). Small business growth: recent evidence and new directions. *International Journal of Entrepreneurial Behavior & Research*, 13(5), 296-322. https://doi.org/10.1108/13552550710780885

20. Ehrenberger, M., Koudelkova, P., & Strielkowski, W. (2015). Factors influencing innovation in small and medium enterprises in the Czech Republic. *Periodica Polytechnica. Social and Management Sciences*, *23*(2), 73-83. doi: 10.3311/PPso.7737
21. Fadahunsi, A. (2012). The Growth of Small Businesses: Towards A Research Agenda. *American Journal of Economics and Business Administration*, 4(1), 105-115. https://doi.org/10.3844/ajebasp.2012.105.115
22. Forsman, H. (2008). Business development success in SMEs: a case study approach. *Journal of Small Business and Enterprise Development*, 15(3), 606 – 622. https://doi.org/10.1108/14626000810892382
23. Fouad, M. A. A. (2013). Factors affecting the performance of small and medium enterprises (SMES) in the manufacturing sector of Cairo, Egypt. *International Journal of Business and Management Studies*, 5(2), 157-166. https://dergipark.org.tr/en/pub/ijbms/issue/26065/274584
24. Garengo, P. (2009). A performance measurement system for SMEs taking part in Quality Award Programmes. *Total Quality Management*, 20(1), 91-105. https://doi.org/10.1080/14783360802614307
25. Garengo, P., & Biazzo, S. (2012). Unveiling Strategy in SMEs Through Balanced Scorecard Implementation: A Circular Methodology. *Total Quality Management & Business Excellence*, 23(1), 79–102. https://doi.org/10.1080/14783363.2011.637800
26. Garengo, P., & Biazzo, S. (2013). From ISO quality standards to an integrated management system: an implementation process in SME. *Total Quality Management and Business Excellence*, 24(3), 310-335. https://doi.org/10.1080/14783363.2012.704282
27. Garengo, P., & Bititci, U. (2007). Towards a contingency approach to performance measurement: an empirical study in Scottish SMEs. *International Journal of Operations & Productive Management,* 27(8), 802-825. https://doi.org/10.1108/01443570710763787
28. Garengo, P., & Sharma, M.K. (2014). Performance measurement system contingency factors: a cross analysis of Italian and Indian SMEs. *Production Planning and Control,* 25(3), 220-240. https://doi.org/10.1080/09537287.2012.663104
29. Garengo, P., Biazzo, S., & Bititci, U.S. (2005). Performance measurement systems in SMEs: A review for a research agenda. *International Journal of Management Reviews*, 7(1), 25–47. https://doi.org/10.1111/j.1468-2370.2005.00105.x
30. Gonçalves, J. M., Ferreira, F. A. F., Ferreira, J. J. M., & Farinha, L. M. C. (2019). A multiple criteria group decision making approach for the assessment of small and medium-sized enterprise competitiveness. *Management Decision*, 57(2), 480–500. https://doi.org/10.1108/MD-02-2018-0203
31. Hudson, M. (2001). *Introducting integrated performance measurement into small and medium sized enterprises*. PhD thesis, University of Plymouth, Plymouth
32. Hudson, M., Lean, J., & Smart, P.A. (2001a). *Improving control through effective performance measurement in SMEs. Production Planning & Control: The Management of Operations,* 12(8), 804-813. https://doi.org/10.1080/09537280110061557
33. Hudson, M., Smart, A., & Bourne, M. (2001b). Theory and practice in SME performance measurement systems*. International Journal of Operations & Production Management*, 21(8), 1096 – 1115. https://doi.org/10.1108/EUM0000000005587

34. Jafari-Sadeghi, V., Dutta, D.K., Ferraris, A., & Del Giudice, M. (2020). Internationalisation business processes in an under-supported policy contexts: evidence from Italian SMEs. *Business Process Management Journal*, 26(5), 1055-1074. https://doi.org/10.1108/BPMJ-03-2019-0141
35. Koudelková, P., & Svobodová, P. (2014). Knowledge creation & sharing as essential determinants of SMEs innovation. *International Economics Letters*, *3*(1), 12-20.
36. Kueng, P., Meier, A., & Wettstein, T. (2000). Computer-based Performance Measurement in SMEs: Is there any option? *Ist International Conference on Systems Thinking in Management*, 318.-323.
37. Laitinen, E.K. (2002). A dynamic performance measurement system: evidence from small Finish technology companies. *Scandinavian Journal of Management*, 18(1), 65–99. https://doi.org/10.1016/S0956-5221(00)00021-X
38. Laitinen, E.K., & Chong, G. (2006). How do Small Companies Measure Their Performance? *Problems and Perspectives in Management*, 4(3), 49-68.
39. Levy, M., Powell, P., & Galliers, R. (1999). Assessing information systems strategy development frameworks in SMEs. *Information & Management*, 35(5), 247–261. https://doi.org/10.1016/S0378-7206(99)00020-8
40. Mabenge, B.K., Ngorora-Madzimure, G.P.K., & Makanyeza, C. (2020). Dimensions of innovation and their effects on the performance of small and medium enterprises: the moderating role of firm's age and size. *Journal of Small Business & Entrepreneurship*, https://doi.org/10.1080/08276331.2020.1725727
41. Machová, R., Huszárik, E.S., & Šimonová, M. (2016). Selected aspects of innovation policy for small and medium sized enterprises, *Journal of International Studies*, *9*(2), 219-232. DOI: 10.14254/2071-8330.2016/9-2/17
42. Madsen, D. Ø. (2015). The Balanced Scorecard in the Context of SMEs: A Literature Review. Review of Business Research, 15(3), 75-86,. https://ssrn.com/abstract=2673096
43. McAdam, R. (2000a). Quality models in an SME context: A critical perspective using a grounded approach. *International Journal of Quality & Reliability Management.* 17(3), 305 - 323. https://doi.org/10.1108/02656710010306166
44. McAdam, R. (2000b). The implementation of re-engineering in SMEs: a grounded study, International Small Business Journal, 18(4), 29-45. https://doi.org/10.1177/0266242600184002
45. Melnyk, S.A., Bititci, U., Platts, K., Tobias,J., & Andersen, B. (2014). Is performance measurement and management fit for the future? *Management Accounting Research*, 25(2), 173-186, https://doi.org/10.1016/j.mar.2013.07.007
46. Melo, P.R.N., & Machado, C.F. (2013). Human resource management in small and medium enterprises in Portugal: rhetoric or reality? *International Journal of Entrepreneurship and Small Business,* 20(1), 117-134. DOI: 10.1504/IJESB.2013.055696
47. Midovska- Petkoska, M., Odzaklieska, D., & Lazaroski, S. (2019). Designing an Integrated Framework for Measuring Organizational Performance in the Companies of the Food Industry in the Republic of North Macedonia. *Proceedings of the 24th International Scientific Conference Strategic Management and Decision Support Systems in Strategic Management.* https://doi.org/10.46541/978-86-7233-380-0_52

48. Moscalu, M., Girardone, C., & Calabrese, R. (2020). SMEs' growth under financing constraints and banking markets integration in the euro area*. Journal of Small Business Management*, 58(4), 707-746, https://doi.org/10.1080/00472778.2019.1668722
49. Murillo, D., & Lozano, J.M. (2006). SMEs and CSR: An Approach to CSR in their Own Words. *Journal of Business Ethics*, 67, 227–240. DOI: 10.1007/s10551-006-9181-7
50. N.D. (2014). Ten top tips for small to medium enterprise (SME) success: 21st century entrepreneurs are profiting from the SME owner-manager model. *Strategic Direction*, 302), 14 - 17. https://doi.org/10.1108/SD-02-2014-0005
51. Nudurupati, S.S., Tebboune, S., & Hardman, J. (2016). Contemporary performance measurement and management (PMM) in digital economies. *Production Planning and Control,* 27(3), 226-235. https://doi.org/10.1080/09537287.2015.109261
52. Nuel, O.I.E., Ezimma K.N., & Pat, A. (2020). Critical success factors for SMEs performance: empirical evidence. *International Journal of Advanced Academic Research,* 6(12), DOI: 10.46654/ij.24889849.s6122
53. Oficiālās statistikas portāls (2022). *Tirgus sektora ekonomiski aktīvi uzņēmumi sadalījumā pa uzņēmumu lieluma grupām pēc nodarbināto skaita un galvenajiem darbības veidiem (NACE 2. red.).* https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START__ENT__UZ__UZS/UZS030
54. Olsson, E. (2011). *Small Firms are Not Little Big Firms: A Study of Corporate Social Responsibility in Swedish Small- and Medium-Sized Enterprises*. Lund University Center for Sustainability Studies, Lund, Sweden.
55. Omerzel, D.G., Antoncic, B. (2008). Critical entrepreneur knowledge dimensions for the SME performance. *Industrial Management & Data Systems*, 108(9), 1182 – 1199. https://doi.org/10.1108/02635570810914883
56. Pansiri, J., & Temtime, Z.T. (2008). Assessing managerial skills in SMEs for capacity building. *Journal of Management Development*, 27(2), 251 – 260. https://doi.org/10.1108/02621710810849362
57. Papulová, Z., Gažová, A., Šlenker, M., & Papula, J.,(2021). Performance Measurement System: Implementation Process in SMEs. *Sustainability,* 13(9), 1-19. https://doi.org/10.3390/su13094794
58. Pekkola, S., Saunila, M., & Rantanen, H. (2016). Performance measurement system implementation in a turbulent operating environment. *International Journal of Productivity and Performance management*, 65(7), 947-958. https://doi.org/10.1108/IJPPM-01-2015-0018
59. Phihlela, T.R., Odunaike, S.A., & Olugbara Durban, O.O. (2012). A Measurement Framework to Assess SME Performance. *Proceedings of the Information Systems Educators Conference*, New Orleans Louisiana, USA, 29, 1.-9.
60. Reijonen, H., & Komppula, R. (2007). Perception of success and its effect on small firm performance. *Journal of Small Business and Enterprise Development*, 14(4), 689-701. https://doi.org/10.1108/14626000710832776
61. Rodrigues, M., Franco, M., Silva, R., & Oliveira, C. (2021). Success Factors of SMEs: Empirical Study Guided by Dynamic Capabilities and Resources-Based View. *Sustainability*. 13(21):12301. https://doi.org/10.3390/su132112301
62. Sarwoko, E., & Frisdiantara, C. (2016). Growth Determinants of Small Medium Enterprises (SMEs). *Universal Journal of Management, 4(1), 36-41.* DOI:10.13189/UJM.2016.040105

63. Simpson, M., Padmore, J., & Newman, N. (2012). Towards a new model of success and performance in SMEs. *International Journal of Entrepreneurial Behavior & Research*, 18(3), 264-285. https://doi.org/10.1108/13552551211227675
64. Singh, R.K., Garg, S.K., & Deshmukh, S.G. (2008). Strategy development by SMEs for competitiveness: a review. *Benchmarking: An International Journal,* 15(5), 525 – 547. https://doi.org/10.1108/14635770810903132
65. Storey, D., & Skyes, N. (1996). Uncertainty, innovation and management. in Burns, P. and Dewhurst, J. (Eds), *Small Business and Enterpreneurship*, Macmillan Press, NY, 73-93. https://doi.org/10.1007/978-1-349-24911-4_4
66. St-Pierre, & J., Delisle, S. (2006). An expert diagnosis system for the benchmarking of SMEs performance. *Benchmarking: An International Journal,* 13(1/2), 106-119. https://doi.org/10.1108/14635770610644619
67. Taticchi P., Balachandran K.R., Botarelli M., & Cagnazzo L. (2008a). Performance measurement management for small and medium enterprises: an integrated approach. *Journal of Applied Management Accounting Research*, 6 (2), 57–71.
68. Taticchi, P., Cagnazzo, L., Botarelli, M. (2008b). Performance Measurement and Management (PMM) for SMEs: a literature review and a reference framework for PMM design. *Annual Conference La Jolla.*
69. Taylor, A., Taylor, M. (2014). Factors influencing effective implementation of performance measurement systems in small and medium-sized enterprises and large firms: a perspective from contingency theory. *International Journal of Production Research*, 52(3), 847-866. https://doi.org/10.1080/00207543.2013.842023
70. Terziovski, M. (2010). Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view. *Strategic Management Journal,* 31(8), 892-902. https://doi.org/10.1002/smj.841
71. Todericiu, R., & Stăniţ, A. (2015). Intellectual Capital – The Key for Sustainable Competitive Advantage for the SME's Sector. *Procedia Economics and Finance*, 27, 676–681. https://doi.org/10.1016/S2212-5671(15)01048-5
72. Waśniewski, P. (2017). A performance measurement system for small enterprises – a case study. *Zeszyty Teoretyczne Rachunkowości*, 93(149), 211- 233. *DOI: 10.5604/01.3001.0010.3197*
73. Watson, J. (2003). Failure rates for female-controlled businesses: are they any different? *Journal of Small Business Management*, 41(3), 262–277.
74. Watts, T., & McNair-Connolly, C.J. (2012). New Performance Measurement and Management Control Systems*. Journal of Applied Acounting Research*, 13(3), 226.-241. https://doi.org/10.1108/09675421211281308
75. Wijewardena, H., Nanayakkara, G., & Zoysa, A.D. (2008). The owner/manager's mentality and the financial performance of SMEs. *Journal of Small Business and Enterprise Development,* 15(1), 150 – 161. https://doi.org/10.1108/14626000810850892
76. Wiklund, H., & Wiklund, P.S. (1999). A collaboration concept for TQM implementations in small and medium sized enterprises. *International Journal of Applied Quality Management*, 2(1), 101-115. DOI: 10.1016/s1096-4738(99)80006-2
77. Yusof, S.M., & Aspinwall, E. (2000). A conceptual framework for TQM implementation for SMEs.The TQM Magazine, 12(1), 31–37. https://doi.org/10.1108/09544780010287131

THE IMPACT OF COVID-19 ON THE BUSINESS SECTOR AND LABOUR MARKET IN SOUTH AFRICA: A FOCUS ON THE HOSPITALITY INDUSTRY

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Abstract. *The purpose of this paper is to explore the impact which was by the Covid-19 pandemic in the hospitality industry of South Africa. South Africa has one of the largest and highest developed hospitality industries in the region. The hospitality sector in South Africa employs 5% of the active age group and contributes around 10.3% revenue income to the government of South Africa. Unfortunately, South Africa emerged as one of the hot spots of the Covid-19 virus infections. As a way of controlling the pandemic, hard lockdowns were introduced starting on the 27th of March 2020. The sealing of the country's port of entries brought the hospitality sector to its knees. This study evaluates impact of Covid-19 on the business sector and the labour market in South Africa, focussing on the hospitality industry. The study used secondary data from survey reports from South Africa's National Department of Tourism, (Statssa), Google mobility and other authoritative relevant sources. The study concluded that the pandemic had a devastating effect on areas such as labour, the overall business, the labour market, and the hospitality sector. The most affected areas from the hospitality sector were aviation, maritime, special events, accommodation, hotels, restaurants, lodges, recreational parks, and national parks. When COVID-19 came, some businesses in the hospitality sector were servicing loans borrowed from financial institutions. The findings of the study indicated the need for a strong financial backup to cushion business during pandemics for the hospitality sector, tax holidays and adoption of stringent health protocols to assist the industry recovery and make business more profitable. The theoretical implication of the study is that it will expose the impact of COVID-19 on the business sector and the labour market in South Africa with a focus on the hospitality industry, and to map a future mitigatory way to overcome such natural calamities towards the business sector.*

Keywords: business sector, Covid-19, hospitality industry, income-revenue, labour market.
JEL code: M30.

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Introduction

The research goal of this paper is to explore the extend at which the pandemic Covid-19 affected the business sector together with fall in demand in the labour market from employers in the hospitality sector in South Africa. The major aim of this paper is to make contingency plans in future in the event the

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same calamity faces the hospitality sector of South Africa and the global world at large. The research period was between the beginning of the pandemic Covid-19 in March 2020 to the end of year 2021 when the lockdowns were eased and normal business activities started in the South Africa tourism industry. Term tourism includes people that travel to various places either locally, nationally or worldwide for leisure and vacation or economic activities. The tourism industry is one of the progressive sectors to a great extent. It is important to note that various post crises troubled global tourism, but COVID-19 confronted this sensitive industry with unprecedented circumstances (Singh et al., 2021). The years 2020-2021 worldwide will be known and associated with COVID-19. COVID-19 is a human crisis that attacked the core principle of human existence (Verma and Gustafsson, 2020). COVID-19 is the biggest growth pole in the field of international hospitality and tourism scholarship (Rogerson and Baum, 2020). According to Olsen and Timothy (2020), observation in the spike of academic publications focussing much on the impact of the pandemic on global travel and how the COVID-19 marks the opportunities to start again from scratch and rejuvenate the tourism and hospitality industry more sustainably. The situation is unremarkable for the hospitality sector, the pandemic is one of the most impactful events of the 21st century. The COVID-19 pandemic led to an unforeseen crisis with the shutdown of tourist flows (Kock et al., 2020, Zenker and Kock, 2020), as it led an unforeseen – the South African government came out with a policy response to the COVID-19 crisis in different sectors which are infrastructure reconstruction, monetary assistance and human resources for tourism and hospitality companies and promotion activities (Li et al., 2021).

After ravaging the public health facilities, the pandemic has restructured the business environment with some businesses retrenching or completely closing (Bartik, 2020). The pandemic spread was associated with movement, and tourists' perceptions of risk resulted in changes of patterns in terms of mobility and radical shifts resulting in changes to consumer demands where the business has to adapt (Korinth, 2020; Kowalska and Niezgoda, 2020; Neuburgee and Egger, 2020; Sanchez – Canizares et al., 2020; Godovyykh et al., 2021; Rogerson and Rogerson; 2021). The tourism and hospitality business sectors are differently responding to the debilitating effects of the COVID-19 pandemic as indicated by the eight-country study which was carried out by Alonso et al. (2021). The objective of this paper is to evaluate the impact of COVID-19 on the business sector and the labour market in South Africa with a major focus on the hospitality industry. South Africa was the worst affected on the African continent economical wise by the COVID -19 crisis (Rogerson and

Rogerson, 2020). More precisely, the study evaluates the impact of the pandemic on the business, labour market and hospitality industry. COVID-19 brought about a flurry of worldwide challenges. The pandemic's ramifications have been devastating and are yet to be quantified. The pandemic brought unprecedented economic disruption never seen since the Second World War (Gossling et al.,2020). The tourism and hospitality industry which is the mainstay in developed and developing countries was shaken, as it relies on mobility and interaction which was left disturbed leading to a collapse in some sectors (Nicola et al., 2020).

Literature review and conceptual framework

The COVID-19 pandemic has transformed the trajectory of all types of business worldwide (Kvirkvelia and Tsitsagi, 2021). Due to the challenges caused by the pandemic, it is now extremely difficult for businesses in all sectors to keep their financial wheels running, as revenues dwindled and the uncertainty costs skyrockets (Verma and Gustafsson, 2020). Looking into the tourism business, the observations which were made were that COVID-19 has been one of the most impactful and problematic pandemics of the modern era (Assaf and Scuderi, 2020). According to records, no pandemic has been so disastrous on the hospitality and tourism sector than the COVID-19 virus (Hall et al., 2020). As it stands, there will be no more going back to the conditions the industry used to operate on (Brouder, et al., 2020). The pandemic is different from other disasters which had befall humankind and affected tourism and its value chain business (Hall et al., 2020).

The impact of COVID-19 in the future of the hospitality industry

Calls have been raised on the impact of the pandemic to have reimagined the future of tourism and hospitality. According to Zenker and Kock (2020), there is a need for in-depth research on how the tourism industry will affect the hospitality industry, tourism behaviour, destination image and how the government can chop on to support the sector as a way of avoiding it to collapse totally. According to a report which was released by the World Economic Forum, South Africa is ranked number 61 on the Travel and Tourism Competitive Report (World Economic Forum, 20019). Before the pandemic, South Africa's robust air system was excellent as per the diagram on the next page, and the middle combined with its upper class had an impact on the regional and domestic tourism front. Estimation is also made that 30% of

tourists who came to South Africa visit other destinations in the region (Mhlanga et al., 2018).

With the children and young people being challenged on their mental well-being, the COVID-19 brought an opportunity to learn more about mental health among people (Fore, 2021). COVID-19 created a fertile breeding ground for novel solutions and approaches to problems affecting the world (Ramalingham and Prabhu, 2020). COVID-19 created some opportunities, for example, school and university closing are leading to increased methods for online learning and distance education (Seshaiyer and McNeely, 2020). Organisations suffer from procedures and rigid hierarchies making organisational life less pleasant. COVID-19 has forced organisations to break their old models and act instantly. Currently, procedures can be skipped and decisions can be made autonomously without approvals. Employees can now work from home with minimum supervision (Kraaijenbring, 2020).

Tourists from the whole world fall to 86% on a year-to-year basis with a devastating impact on hotel bookings, air reservations being the most affected. The intention to travel by tourists was negatively affected as observed in the diagram above (Luo and Lam, 2020). The second quarter of 2020 was the worst in the tourism industry and business was very low. In July there were some improvements under the developed and safety protocols. By the end of 2020, the hotel industry was hit hard, as it was operating at a negative 78% with air tender travel subdued at a negative of 72% (Dube, 2021). UNWTO (2021) reports indicated that the travel and hospitality sector could not offset the losses made during 2020. Sun International which owns Hilton Hotel in South Africa closed its hotels and casino resorts in the country which included luxury hotels at Sandton, Joburg, Victoria and Alfred and Cape Town.

The impact of Covid-19 on the labour market in the tourism sector

The travel and tourism industry are labour intensive identified by the government as one of the pillars for the country's development. Records show that there are 700 000 employees in the sector (Department of Tourism, 2020). Due to COVID-19, the sector's contribution to the country's gross domestic product was low, and there were severe job losses in the industry. According to the World Travel and Tourism Council (WTTC), the African continent lost about 8 million jobs due to the pandemic (City Press, 2020). According to surveys carried out in April and June 2020, 99% of the business were negatively affected, 75% closed their business after revenue falling and 67% were

optimistic that the business was going to survive (Department of Tourism, 2020).

The travel and tourism sector is a labour intensive sector that was identified by the state as an important driver of the economy. In 2018 the industry contributed R425 billion to the economy and generated spending of R82.5 billion (Department of Tourism, 2020). More than 700 000 are employed in the sector (Department of Tourism, 2020). Due to COVID-19, the tourism sector's contribution to the nation's gross domestic product was very small and job losses have been witnessed in the sector. The World Travel and Tourism Council in Africa estimated that 8 million jobs were lost due to the pandemic (City Press, 2020). The Department of Tourism carried out two surveys in April and June 2020 concerning the hospitality performance during the COVID-19. The research showed that 99% of the business were negatively affected, 75% closed their entity after revenue fall and 67% were optimistic about the survival of the business (Department of Tourism, 2020). The pandemic led to the complete collapse of markets and different products and their models will leave the market coupled with changes in consumer behaviours (Rogerson and Rogerson, 2021). Sub-Saharan governments have high levels of informal workers, and this constitutes a large proportion of the workforce and furloughing is also a challenge (Addinson et al., 2020). As of May 2020, according to the United States Bureau of Labour Statistics (BLS), 5.5 million people were employed in the leisure and hospitality sector (BLS, 2020). Due to COVID-19, the highest unemployment levels were recorded with revealing rates of about 39% and 36% between 2010-2020 at approximately 14%(US Bureau of Labour Statistics, 2020).

COVID-19 effects on the financial inflows of South Africa

The biggest challenge faced by business owners during the peak periods of COVID-19 was to keep business open and survive financially by being liquid. The government tried to give minimal support, but it was the honour of the business to devise ways to survive. During December 2020 and January 2021 when alcohol and beaches were banned, this strained the business which was struggling (Rogerson and Rogerson, 2020). Urban accommodation facilities were banned after being forced to stop their business activity of accommodations for several months (Anderson, 2020). The pandemic poses challenges not only for the health of the citizens but the economy of a country as well.

The Capital group approached the Department of Health to only accommodate travellers from countries who will be in quarantine for 14 days. Some hotels partnered with South Africa's private sector health provider to offer sanitised isolation hotels (Discovery Health, 2020). The Capital group came up with a survival group of having clients using their hotel rooms as working from home whilst under isolation. In May 2020 the repositioning strategy had attained 80 per cent occupancy levels in Johannesburg and Pretoria albeit only at one-third of the budgeted revenue because of discounted rates (Anderson, 2020). The selection of quarantine centres was affected by political patronage and to mention, Emalahleni local municipality as one lodge owned by a politically connected daughter was too expensive at a public expense footing with big benefits for the lodge owners (Jacob, 2020).

In Mpumalanga the Zithabiseni Resort and Conference Centre was used to accommodate Mozambicans, but the resort was rundown due to negligence of basic maintenance. In May 2020 the quarantined people threatened to take the government to court due to poor conditions which were detailed as unbearable and unhygienic (Yende, 2020). Informal business tourism is an important aspect of the informal economy across the South African region (Benjamin and Mbaye, 2014). The badly thumped sector was tourism. Restrictions on public gatherings and flight suspensions negatively affected the industry. Tourism and allied industries received the same level of stress, and many companies located in tourism hot spots were forced to shut down to try to contain the virus which was spreading like fire.

Table 1 How the financial inflows depleted during lockdowns in South Africa (South Africa Department of Tourism, 2020)

Revenue	83% report decline in revenues in March 2020 by more than 50% as compared to March 2019.
Debt service	58 % of firms unable to service debts in March 2020
Occupancy/Customer use	For 85% of firms down by 50% or more and for 47 % firms down by 100 %.
Fixed costs	54% unable to cover fixed costs in March 2020
Forward bookings	As compared to March 2019, 81% of firms report bookings down by at least 50% and for 36% respondents by 100 %
Size of firm	All sizes of firms are in decline but the worst affected are micro and small firms
Sub-sector of firm	All are impacted but worst are those in conservancies/nature tourism

Methodology

The research adopted a secondary method approach which is also known as the desktop approach. According to Clark et al. (1998), the desktop research approach involves activities where there is no need for primary or original data to be gathered. As a result, the paper is going to use secondary sources of data. The researcher will analyse, evaluate and review the literature on the topic under investigation to illuminate the specific themes. Primarily the researcher has used google scholar as the source of information for the research to get more insights on the impact of COVID-19 on labour and business with a specific focus on the tourism and hospitality sector in South Africa.

The literature consisted of journal articles, book chapters, conference papers, the government published reports and published records from the tourism and hospitality industry such as the World Tourism Organisation. The researcher also employed snowballing where the researcher would review the reference of relevant research items to identify further sources applicable to the study. This paper sought to analyse and evaluate the impact of COVID-19 on the business sector and the labour market in South Africa with a focus on the hospitality industry. The data generated during desktop analysis was evaluated through a thematic analysis where the categorising and conceptualisation of the variables explored about the subject under investigation was done.

The four determinants that formed the basis of the discussion in this paper were,

- H1: How Covid-19 impacted the operations of the tourism and hospitality business in South Africa
- H2: The effects of COVID-19 and the labour market in the hospitality sector of South Africa
- H3: The impact of the tourism and hospitality sector in the development of the South African economy
- H4: The effects of lockdowns and movement restrictions of hospitality workers due to COVID-19 in the hospitality industry of South Africa.

H1: How Covid-19 impacted the operations of the tourism and hospitality business in South Africa

The COVID-19 pandemic decimated the international tourism economy, as mobility and restrictions in the tourism industry left the sector in a precarious situation (Makoni and Tichaawa, 2021). The announcement of prolonged international travel bans and local movements have been regarded as the

widely pandemic mitigation measures (Das and Tiwari, 2020). COVID-19 is a game-changer in global tourism and offers a chance to turn away from the hegemony asserted by forces operating in the market for the return of tourism as a force to reckon in the economy (Desboilles, 2020).

The South African tourism sector experienced debilitating impacts of the pandemic. The pandemic represented a crisis event that transformed the tourism and hospitality sector as well as the parameters in which it functions (Rogerson and Rogerson, 2020). Besides its public health effects, COVID-19 has restructured the business environment with many companies closing either on a permanent or short-term basis (Bartik, 2020).

The impact of COVID-19 made the government chart new initiatives to pave the way for a recovery plan. The pandemic accompanied devastating effects not only from the financial perspective but alos in the conservation of the tourism and hospitality sector. The COVID-19 resulted in global challenges, economic and health care crises and posed spill over to tourism. The tourism and hospitality industry faced COVID-19 tourism effects and was one of the hardest-hit globally (Abbas et al., 2021).

H2: The effects of COVID-19 and the labour market in the hospitality sector of South Africa

According to the International Labour Organisation (2020), the dream of the right to decent work for every employee (Baum and Nguyen, 2019) has been challenged by the effects of Covid-19 induced economic turmoil which resulted in the widespread retrenchment of tourism workers with minimal or no compensation. The International Labour Organisation (2020) explained the negative consequences of the pandemic on work and employment with a major focus on the informal sector of the global south. Employees were denied the right to work due to the collapse of the tourism and hospitality sector.

H3: The impact of the tourism and hospitality sector in the development of the South African economy

The tourism sector has shown its ability to adapt to the needs and modifications of the international markets, contributing to the creation of jobs and a vital economic factor at the global level. The tourism industry and hospitality ‘s gross product is more than 3% of the worldwide gross domestic product, and in 2014 the share was 2.4 trillion dollars and bigger than the automotive manufacturing sectors (Machiarelli, 2021)

In South Africa, Spain, Malaysia, South Africa, Jamaica and Peru half of all service export comes from the tourism and hospitality industry (World Travel

and Tourism Council, 2015). The hospitality sector plays a pivotal role in the food and beverage industry, accommodation, which forms the national strategy (StasSA, 2004). The hospitality industry is a service industry which is labour intensive, and employee management is an important function (Grobler and Diedericks, 2009). Due to these factors, relevant education and training is important for the success of the industry (Kay and Russette, 2000).

H4: The effects of lockdowns and movement restrictions of hospitality workers due to COVID-19 in the hospitality industry of South Africa.

The economic risks associated with COVID-19 are regarded highest in the poorest parts of the third world countries with the greatest region to feel the heat being sub-Saharan Africa. COVID-19 long term effects will be to reverse the gains made in the tourism sector in the last number of years, and this will deepen the continent's poverty problems (Buheji et al., 2020). South Africa, the problems of COVID-19 in tourism and hospitality were scrutinised with extant literature. Contributions have been evaluated on the hotel sector according to (Sucheron, 2021), the hosting of economic events (Bartis et al., 2021), surf tourism (Martin et al., 2021).

Discussions and Conclusion

The pandemic stifled economic activities, and the social distancing measures led to shut down of financial markets, corporate offices and events. The rate at which the virus was spreading and the uncertainty of how bad the situation could get resulted in flight safety in consumption. COVID-19 led to social distancing, people movement restrictions, forced wearing of masks. The pandemic has the potential of being the largest macro-economic shock of the last 100 years (Hevia and Neumeyer, 2020). The pandemic has decimated the international tourism economy, as people feared contracting the virus through mobility (Rogerson et al., 2020). The pandemic that spreads to 35 states in Nigeria as a health crisis resulted in an economic dilemma affecting the whole sector of the Nigerian economy and brought the whole country to its knees.

The global lockdown and restrictions in movement during the COVID-19 impacted the tourism and hospitality industry being negatively affected and ultimately affecting the trading of travel and tourism shares worldwide. According to Baker et al. (2000), the increase in the number of lockdowns, travel restrictions and monetary policies during the pandemic affected the opening, lowest and highest prices of the stock market in the United States (Ozili and Arun, 2020). The pandemic also resulted in a contraction in the gross domestic

product from the fall in tourism, hospitality and recreation sectors. A reduction in travelling and business meetings resulted in a loss of tax related to these activities with the government losing (Chowdhury et al., 2021). The pandemic affected many businesses worldwide. This was worsened by lockdowns and movement restrictions imposed by governments. The measures were meant to put all economic activities on hold until the outbreak is contained. The decisions by governments varied according to the financial stability of the country (Menhat et al., 2021). Maritime tourism refers to activities comprising of sea transportation, cruising, beach activities, scuba diving, snorkelling and other recreational activities that take place in the marine environment (Kizielewic, 2012). In Malaysia, islands are the most popular tourist spots (Mapjabil et al., 2015). About 40% of tourists that visit Redang Island marine park are foreigners with the rest being locals (Marine Park of Malaysia, 2017).

The study focused on the COVID-19 pandemic effects towards the tourism and hospitality sector (Hall et al., 2020; Sigala, 2020) both on the business model to the country of South Africa and the impact it caused to the hospitality industry. Like any other country, the tourism industry in South Africa suffered the negative consequences of COVID-19. The pandemic is set to change the operations of the tourism and hospitality sector and how it functions in the country. COVID-19 will reshape tourism patterns, accommodation services and commercial aviation flows in the country. The events of 2020 took place at an accelerating pace with the small and micro enterprises affected severely. Several conflicts occur between stakeholders in the hotel and tourism sector, which negatively affected business due to policy regulations and failure by the government to bail out the industry. The government of South Africa showed an uncaring attitude towards the crippling consequences of its intervention in the tourism and hospitality industry. Business lost a lot to COVID-19. The lockdown and restrictions meant that no one was allowed to travel, and revenue was lost. The debts being serviced could not be paid. The taxes being paid to the government could not be paid. All growth strategies were put on hold, as the business was fighting for its survival. Retrenchments became the order of the day in the tourism and hospitality industry. Labour disputes became the order of the day, as the business could not pay their employees due to poor business.

References

1. Abbas, J., Mubeen, R., Iorember, P. T., Raza, S., & Mamirkulova, G. (2021). Exploring the impact of COVID-19 on tourism: transformational potential and implications for a sustainable recovery of the travel and leisure industry. *Current Research in Behavioral Sciences*, *2*, 100033.

2. Anyanwu, J. C., & Salami, A. O. (2021). The impact of COVID-19 on African economies: An introduction. *African Development Review*, *33*(Suppl 1), S1.
3. Baum, T., & Hai, N. T. T. (2020). Hospitality, tourism, human rights and the impact of COVID-19. *International Journal of Contemporary Hospitality Management*.
4. Chowdhury, E. K., Khan, I. I., & Dhar, B. K. (2021). Catastrophic impact of Covid-19 on the global stock markets and economic activities. *Business and Society Review*.
5. Dube, K. (2021). Implications of COVID-19 induced lockdown on the South African tourism industry and prospects for recovery. *African Journal of Hospitality, Tourism and Leisure*, *10*(1), 270-287.
6. Danquah, M., Schotte, S., & Sen, K. (2020). COVID-19 and employment: Insights from the Sub-Saharan African experience. *The Indian Journal of Labour Economics*, *63*(1), 23-30.
7. Fore, H. (2021). Five opportunities for children we must seize now: an open letter on why I believe we can reimagine a better post-COVID world for every child.
8. Huang, A., Makridis, C. A., Baker, M., Medeiros, M., & Guo, Z. (2020). Understanding the impact of COVID-19 intervention policies on the labor market of the hospitality and retail industries. *SSRN: http://dx. doi. org/10*, *2139*.
9. Khanna, A. (2020). Impact of migration of labour force due to global COVID-19 pandemic with reference to India. *Journal of Health Management*, *22*(2), 181-191.
10. Kraaijenbring, J. (2020). The Bright Side of Covid-19: Seven Opportunities of the Current Pandemic. Forbes.
11. Leonard, L., & Dlamini, T. (2014). Greening within the Johannesburg tourism and hospitality sectors. *African Journal of Hospitality, Tourism and Leisure*, *4*(2), 1-8.
12. Menhat, M., Zaideen, I. M. M., Yusuf, Y., Salleh, N. H. M., Zamri, M. A., & Jeevan, J. (2021). The impact of Covid-19 pandemic: A review on maritime sectors in Malaysia. *Ocean & Coastal Management*, *209*, 105638.
13. Makoni, L., & Tichaawa, T. M. (2021). Impact analysis of the COVID-19 pandemic on the informal sector business tourism economy in Zimbabwe. *African Journal of Hospitality, Tourism and Leisure*, *10*(1), 165-178.
14. Macchiarelli, C. (2021). How is Covid-19 affecting international travel and tourism?. *The Economics Observatory*, *22*.
15. Nzonzo, J. C., & Chipfuva, T. (2013). Managing talent in the tourism and hospitality sector: A conceptual view point. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *3*(2), 92-97.
16. Nomnga, V. J. (2017). Unlocking the potential of women entrepreneurs in the tourism and hospitality industry in the eastern Cape Province, South Africa. *Journal of Economics and Behavioral Studies*, *9*(4 (J)), 6-13.
17. Nyawo, J. C. (2020). Evaluation of government responses and measures on COVID-19 in the tourism sector: A case of tour guides in South Africa. *African Journal of Hospitality, Tourism and Leisure*, *9*(5), 1144-1160.
18. Ozili, P. K., & Arun, T. (2020). Spillover of COVID-19: impact on the Global Economy. *Available at SSRN 3562570*.
19. Obi, S. E., Yunusa, T., Ezeogueri-Oyewole, A. N., Sekpe, S. S., Egwemi, E., & Isiaka, A. S. (2020). The socio-economic impact of covid-19 on the economic activities of selected states in Nigeria. *Indonesian Journal of Social and Environmental Issues (IJSEI)*, *1*(2), 39-47.

20. Sikiru, A. A., & Salisu, A. A. (2021). Hedging against risks associated with travel and tourism stocks during COVID-19 pandemic: the role of gold. *International Journal of Finance & Economics*.
21. Seshaiyer, P., & McNeely, C. L. (2020). Challenges and Opportunities From COVID-19 for Global Sustainable Development. *World Medical & Health Policy*, *12*(4), 443-453.
22. Singh, A. L., Jamal, S., & Ahmad, W. S. (2021). Impact assessment of lockdown amid COVID-19 pandemic on tourism industry of Kashmir Valley, India. *Research in Globalization*, *3*, 100053.
23. Sibanyoni, J. J., Kleynhans, I. C., & Vibetti, S. P. (2015). South African hospitality graduates‟ perceptions of employment in the hospitality industry. *African Journal of Hospitality, Tourism and Leisure*, *4*(1), 1-16.
24. Thams, A., Zech, N., Rempel, D., & Ayia-Koi, A. (2020). *An initial assessment of economic impacts and operational challenges for the tourism & hospitality industry due to COVID-19* (No. 2/2020). IUBH Discussion Papers-Tourismus & Hospitality.
25. Xiang, S., Rasool, S., Hang, Y., Javid, K., Javed, T., & Artene, A. E. (2021). The Effect of COVID-19 Pandemic on Service Sector Sustainability and Growth. *Frontiers in Psychology*, *12*.

ENERGY AUDIT INFORMATION SYSTEM

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Abstract. *The opportunities provided by energy audits to improve the competitiveness of companies by reducing energy consumption and introducing energy-efficient solutions also allow for achieving the environmental goals set by the European Union and Latvia in relation to climate neutrality. It is important to consider the results of energy audits in the development of both local and regional and national policies, thus setting more precise results to be achieved. At present, there is no unified energy audit development information system in Latvia, in which all audit stages and calculations could be performed; this would reduce clerical and calculation errors and allow data to be predicted and used in policy development, research. As part of the paper, the authors researched the concept of energy audit, its process and the results to be achieved by companies by implementing energy efficient measures, as well as the policy goals of the European Union and Latvia in environmental improvement programmes. The paper summarizes and analyses the programs and methods available in Latvia, which are used to develop energy audits of companies, as well as the practices of other countries and their results.*

The research aim is to develop the specification of the energy audit information system, based on the analysis of the used energy audit information systems. Based on the findings, the authors developed a specification of the program's energy audit information system requirements, which is suitable for the Latvian market.

Keywords: *energy audit, energy audit information system, energy efficiency.*
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Introduction

Every inhabitant of Latvia has encountered topical environmental problems – environmental pollution and waste management problems, air quality problems, extraction and regeneration of natural resources, etc. In 2019, a total of 127.21 million euros were spent on environmental protection in Latvia, which included wastewater management, purchase and use of waste collection and processing equipment, maintenance, protection of the surrounding air and climate, biodiversity, landscape protection and other environmental protection activities ("Vides aizsardzības izdevuma konti…", 2022). Realizing that the economic and environmental sector is facing many

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and varied challenges due to the consequences of the war in Ukraine. Therefore, at the company level and in the development of national policy, it is important to be aware of the opportunities provided by energy audits, which are very relevant now, so that companies can reduce their energy consumption and introduce energy-efficient solutions, thus improving both the competitiveness of companies in the market and achieving the environmental goals set by Europe and the country in relation to climate neutrality.

The availability of a professional energy audit, its development and the investments provided are currently underappreciated in Latvia. Energy audits must be a fast and effective tool to implement national policies and provide companies with support for improving energy efficiency.

The research aim: to develop the specification of the energy audit information system, based on the analysis of the energy audit information systems used.

Research hypothesis: the need and creation of a new energy-efficiency information system is economically beneficial.

The following **tasks** have been set to reach the aim:

1) identify, study, analyse and evaluate sources of information (scientific literature and various types of documents, standards) on the topic;
2) get acquainted with the methodology of energy audits and evaluate the tools used for its performance;
3) develop the energy audit information specification of the system, i.e., see screen sketches;
4) analyse and evaluate the obtained results, formulate conclusions, as well as develop recommendations based on the obtained results.

The following **research methods** were used to achieve the aim and tasks set in the paper: analysis of literature and documents, examining and describing the energy audit system, and its history; the graphical method for displaying statistics and quantitative data; the descriptive method, examining the energy audit systems used in Latvia and the world; the system modelling method in the empirical part, developing the energy audit system specification; the logical construction method in formulating results and conclusions, developing proposals.

As part of the study, the energy audit cycle and its structure in the scientific literature were also examined ("Standard Environmental Management Energy...", 2022; "The energy audit of buildings in 4 steps", 2020), as well as the contributions and results provided by the energy audit in various sectors and countries, for example: Investigating the Thermal Performance of Canadian Houses Using Smart Thermostat Data (Doma et al., 2021), Benchmarking of Industrial Energy Efficiency: Outcomes of an Energy Audit Policy Program (Locmelis et al., 2020), Promoting Sustainable Energy:

Does Institutional Entrepreneurship Help? (Heiskanen et al., 2019), A study of the comparability of energy audit program evaluations (Andersson et al., 2017), Multilevel Governance Energy Planning and Policy: a View on Local Energy Initiatives (Dobravec et al., 2021), Reduction of Energy Consumption and Delay of Control Packets in Software-Defined Networking (Naseri et al., 2021), including practical studies: "Analysis of Energy Use and Energy Savings: a Case Study of a Condiment Industry in India" (Ullah et al., 2021) and "Energy Efficiency – Ecological and Economic Profitability" (Hawrylak, 2020).

Energy efficiency is one of the most important and cost-effective tools available to any facility or organization. Energy efficiency aims to reduce the amount of energy needed to provide products and services or a healthy indoor climate. In the world, an industrial energy audit is already a common practice, while in Latvia it is still something new and applicable to most companies and objects (Grinbergs & Gusta, 2013, 355).

The 2011 study conducted by Ian Shapiro in the United States (USA) analysed more than 300 energy audits, identifying the ten most common errors and problems. As a result, 30% of audits found errors in data, their rewriting and calculations; in 57% of audits, there was an insufficient/erroneous analysis of the calculations of consumed energy bills; 53% of the audits overestimated the savings provided by the improvements to be made (Shapiro, 2011, 26-29). The mentioned mistakes served as the basis – one of the most important reasons for the development of the first computer programs for energy auditors. Their purpose was to reduce errors in data transcription and calculations. Since this study was carried out 11 years ago, there has been a significant leap in development in the energy audit industry, and new and high-quality studies on the compliance and uniformity of energy audits both regionally and internationally would be needed now.

Concept and history of energy audit

In any industry, the three main types of expenses are energy (electricity, thermal energy), labour and materials. If the amount of work and materials is more difficult to influence, because it determines the quality of the final service or product, then the energy consumption can be gradually improved, reaching the best reading in relation to the performance indicators of the company, for example, the reduction of the consumption of electricity consumed in relation to the amount of production produced, etc.

Energy audit and the need for it arose in connection with energy crises in the world in the second half of the 20th century. Each subsequent crisis in the energy sector forces us to rethink energy consumption and the use of renewable resources in energy production. Eurobarometer 2021-2022, a

monitoring tool for EU institutions, revealed that in the winter opinion survey of 2018, environmental changes, and climate change worried 12% of the European Union population, 3% of the population in Latvia ("Standard Eurobarometer 96, Winter", 2022, 2). On June 17, 2011, the standard ISO 50001:2011 "Energy management systems. Requirements with instructions for use" was introduced ("What is the history of the ISO 50001", 2022). This standard is currently used all over the world, and its implementation is equated to an energy audit.

Energy auditing was not popular in the construction industry until 2002 when it was included in the European Directive 2002/91 EC on the energy performance of buildings. Supplementing the document in accordance with climate changes and changes in energy policy, in 2010 it was determined that large companies (and energy consumers) should conduct an energy audit every four years (Egwunatum & Akpokodje, 2019).

The history of an energy audit is not old, its development and demand has increased significantly in recent years and continue to increase. Also in 2022, due to the war in Ukraine, drastic changes affect the economy, which is directly affected by the increase in electricity, natural gas and fuel prices, inflation, the imposed sanctions on certain countries, etc. factors that result in companies looking for ways to save resources. These changes force companies to choose to conduct an energy audit and implement data-based energy efficiency improvement measures outside of the mandatory energy audits stipulated by national legislation.

Looking at the available literature, the concept of energy audit is widely used, and its explanations are various (the concepts of energy audit can be viewed: "Energoefektivitātes likums", 2020; "Енергоаудит", 2010; Mondal, N. d.; "Energy audit", 2022; "Energy Auditing", 2020).

Summarizing the explanations of the energy audit concepts, the authors of the paper formulated a summarizing variant – an energy audit is a comprehensive evaluation of the company's energy, which summarizes various types of energy – electricity, thermal energy, fuel, water, etc. (information for a two-year period) – changes in consumption structures in buildings, processes or equipment, energy flow and provides recommendations for the implementation of economically sound energy efficiency improvement measures. Energy consumption in companies should be viewed more broadly – it is an essential part of company costs, which can be analysed and improved. Energy efficiency means using less energy to do the same amount of work, thereby reducing energy bills and environmental pollution ("What is Energy Efficiency?", 2020). In energy audits, an important part of the analysis is the ratio of energy quantities to the products produced, or the services provided. This indicator makes it possible to assess in the long term whether the introduced energy efficiency measures have been effective

because over time the energy consumption in relation to the products produced or the services provided should decrease.

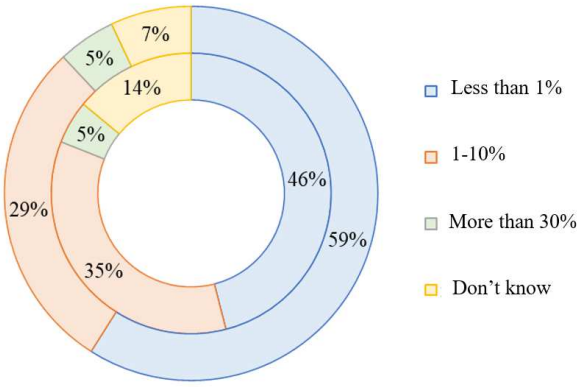

Fig.1 Eurobarometer survey question "How much money, on average, per year has your company invested in improving the efficiency of resource use during the last two years?" collection of answers about Latvia (SMEs, resource efficiency and green markets, 2018)

According to *Eurobarometer 2021* data, among small and medium-sized enterprises (SMEs) in Latvia, 59% of the enterprises invested less than 1% during the year to improve the efficiency of resource use; only 5% of companies invested more than 5% (see Figure 1).

Energy audit information systems in the world

The first energy audit programs were created after 2010 and were initially created by private companies to optimize their operations and improve the work process in order to be able to perform energy audits faster and more conveniently. Convinced of the effectiveness of the programs, they were developed, and the licenses of the programs were offered to other companies as well. Various energy audit programs are more developed and available in the United States (US) and Canada. In 2020, a compilation of the ten most popular energy audit software programs was published (based on data on the most frequently used energy audit programs in 2019; the names are given in the original language): EMAT ("Audit services", 2022; "About EMAT", 2022); TREAT ("TREAT Energy Audit Software", 2022); Energy Analysis Software ("Rebecca Energy Management", 2021); OptimiMiser ("OptiMiser is a collaborative…", 2022); Weatherization Assistant ("Software description", N d.); Green Training ("Energy Audit Software", N. d.); HomeSelfe ("HomeSelfe RE's innovative technology", 2016); FirstFuel ("Behavioral Energy Efficiency", N. d.); Buildee ("Uncover Energy Efficiency", N. d.); SnapCount (The lighting retrofit software that changed everything, 2022).The Simuwatt Energy Auditor program is also widely used, with the help of which the costs of auditing and modelling existing commercial

buildings can be reduced by 25%. The program was developed with the technical assistance of the National Renewable Energy Laboratory. Simuwatt uses DOE's open-source modelling tools EnergyPlus and OpenStudio (Roth, 2017). It should be mentioned that this company also owns the energy audit platform Buildee.

Current energy audit methods are generally expensive, time-consuming and require a high level of expertise, especially when maintaining a large and diverse portfolio of equipment/tools, as stated by the authors of the 2020 study "Changing how energy audits are done" M. Goss and T. King (2020). The authors also offer their own solution – an alternative approach to the usual energy audit, a software application and calculation tool called REM (*Rapid Energy Modelling Tool*).

Energy audit information system – specification of requirements

In the part of the research, the authors developed the offer of the energy audit information system program, which is suitable for the Latvian market and the peculiarities of nature and resources. The name of the energy audit program is EAS, which is an abbreviation of the Energy Audit System. The specification of energy audit information system requirements is made from the point of view of an energy auditor, assuming that the software is created and maintained by the private sector, the main client is auditor companies. Mutual energy auditors and large companies/large electricity consumers work in a B2B (Business to Business) model.

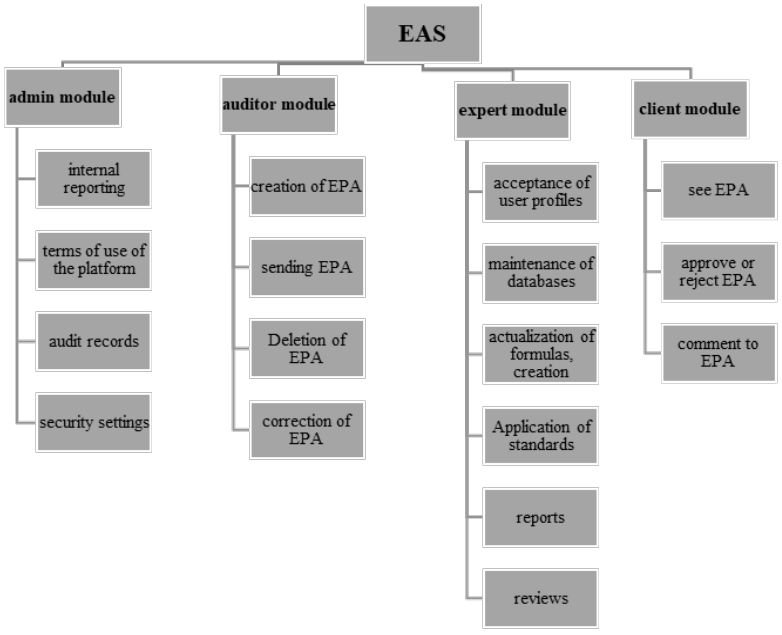

Figure 2. Functional decomposition of the EAS program (created by the authors)

The basic functional requirements for the EAS program are to perform energy audit calculations in accordance with the requirements of the regulatory standards for energy efficiency calculations, their national annexes and the regulatory acts and recommendations binding on Latvia:

- ensure correct calculations and adapt the form of the energy audit to the specifics of the company; provide the user with the opportunity to enter input data necessary for the calculation,
- provide control of parameters and input data values (control of measurement units, mutual dependencies of input data values, maximum and minimum values, comparison with similar data, etc.),
- ensure energy efficiency standards, their national annexes and the calculation of the results specified in the current regulatory acts,
- provide the user with the opportunity to see with which formulas and with which value the specific calculation value was obtained,
- provide structured calculation data export from the system,
- ensure the storage of information on energy efficiency calculations, for example, so that the competent authority can verify the professional activity of independent experts or independent experts use the performed calculations or their data for future calculations (for example, for re-evaluation of the energy efficiency of the building),
- maintain centralized (can be corrected by an expert) and decentralized (can be corrected and used by users in their calculations) databases, such as building material catalogues, the essential consumer database, in which to enter various characteristics that can be automatically used for calculations,
- create calculation templates for faster start of calculations in the case of similar objects – both templates maintained by the administrator and individual templates created by users,
- maintain a centralized standard catalogue of energy efficiency improvement measures, to be used when preparing an overview of economically justified energy efficiency improvement measures, the implementation costs of which are profitable in the expected (planned) lifetime and allowing the user to manually enter forecasted energy prices, time periods, planned costs and benefits in percentage, kilowatts, and kilowatt hours.

Future development opportunities of the program. When creating an energy audit program in accordance with the specification requirements described above, there are possible additions and improvements that should be foreseen and planned as future system improvement tasks:

- the program is combined/linked with the Construction Information System, thus both energy auditors and clients, as well as employees of

control and inspection institutions work on the same platform where all related information is circulated,

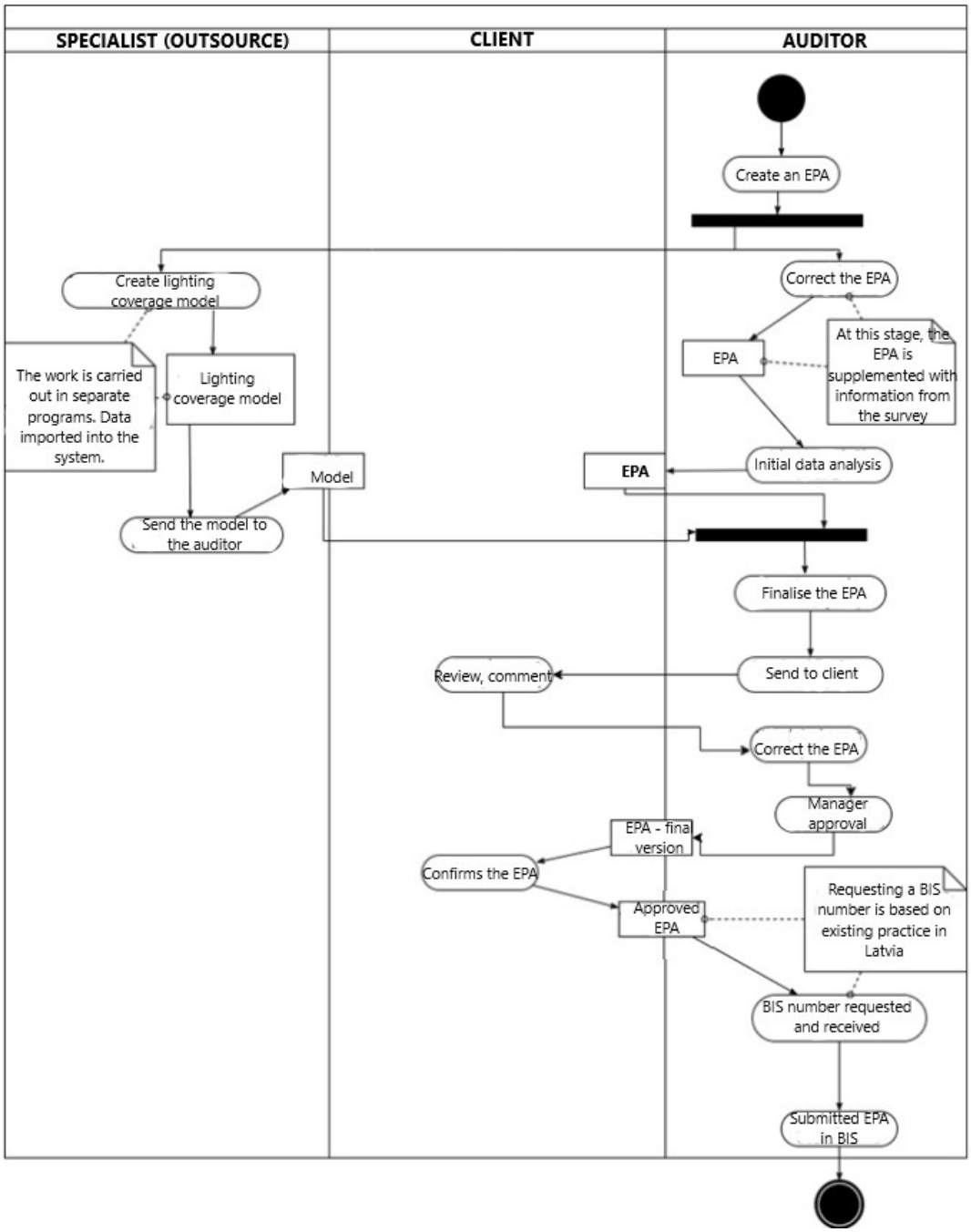

Fig.3 Diagram of status transitions (created by the authors)

- an added building energy certificate program (Heatmod or a similar program) suitable for development and approval of building energy certificates,
- a portal/section of innovative solutions has been created, which gathers offers of energy-efficient and innovative products and solutions, providing an opportunity for companies and organizations to familiarize themselves with them and implement them in their practice,

- include additional steps for auditors – audit planning, receiving data immediately on the portal, etc.,
- import data from both building modelling systems and monitoring equipment, thus enabling energy audits to be performed on a larger scale and faster.

While developing and formulating the specification of the energy audit information system, the authors of the paper concluded that the initial program development provides for simple program content and functions, which are improved with each subsequent version and practical feedback from program users, so that the program meets the needs of energy auditors and clients of the time, promoting availability and efficiency of energy audits.

Analysis of system creation and maintenance costs

The costs of the creation and maintenance of the energy audit information system EAS have been considered assuming that the program is developed by a private sector company, which uses the program for the provision of its services and offers its licenses to other companies after the program's verification period.

Potential system users or clients are seven accredited ("Akreditētās institūcijas", N. d.) companies for energy audits and not yet accredited companies. In 2022, these companies in Latvia are: "LBRA" Ltd.; "Efekta" Ltd.; AS "Inspecta Latvia"; "Bureau Veritas Latvia" Ltd.; "Ekodoma" Ltd.; "TUV Nord Baltik" Ltd.; "CMB" Ltd.; "Solution Expert" Ltd.; "Energoaudits" Ltd.; "Building consulting and energy audit" Ltd.

On average, program development from planning to program delivery takes 4-12 months, although 85% of such projects do not meet the expected time frame (Wardynski, 2017). According to the specification of the program developed by the authors, it is assumed that 18 months are needed for the development of the program. Likewise, certain levels of security are also important for this information system, so that it is safe for all users, the necessity of which is also confirmed by Eurobarometer statistical data – respondents are worried about problems related to digital tools and the growing role of the Internet in society, moreover, more than half of the survey participants cybercrime and cyberattacks are a concern ("Digital Rights and Principles", 2021); in addition, 28% of SMEs (the same in Latvia and Europe) have encountered cybercrime, however, in Latvia, these situations are not reported in 57% of cases ("Expectations and Concerns from a Connected…", 2021).

The development process of the EAS program is expected to last for 18 months (i.e., 78 weeks), so the initial software development, excluding

database preparation and development, program user training, testing and program maintenance costs for two years, would cost ~727,818 euros.

It should be noted that until the actual development of the program, several factors affecting the price and the development of the program may change, for example, on May 18, 2022, the procurement information "Development of the building energy efficiency calculation information system and implementation of change requests" was published in the Electronic Procurement System ("Elektronisko iepirkumu sistēma", 2022) in order to develop a system in which independent experts in various building energy efficiency assessment processes would perform the necessary calculations in accordance with the requirements of the standards, their national annexes and regulatory acts binding on Latvia and prepare building energy efficiency assessments. The program mentioned in the example can serve as a basis or a part of the basis for an energy audit program to be further improved.

Payback period of the information system. Assuming the scenario that the EAS program is implemented by a private sector company that deals with energy audits. Since the companies in this industry are not large, it is assumed that the company has five employees. The salary of one employee consists of the number of hours worked and the hourly rate:

- the average hourly rate of one employee in the 1st quarter of 2022 was 13.20 euros (profession 214207 "Energy Auditor"),
- average number of hours worked per month – 96 hours,
- monthly salary – 1,267.20 euros.

The amount of work performed by the energy auditors has been adopted based on the author's work experience, and the calculations assume that with the help of the program, one auditor can perform ten energy audits per month, instead of the previous two energy audits.

Using the EAS program, the expected savings would be the monthly salaries of three employees, which amounts to 3,801.60 euros. In the calculations of the payback period for the development and maintenance of the program, the minimum cost threshold, which the authors mentioned above, is assumed to be 727,818 euros, so the payback period would be 15.95 years. It should be noted that licenses for the use of the EAS program could also be offered to other energy audit companies, thus shortening the payback period. The authors of the paper considered three possible scenarios in which the program licenses are sold to energy auditors of other companies to reduce the payback period and make a profit (see Table 1).

The most advantageous scenario is B, which would pay off after two years and would provide the company with a profit of 219,579.760 euros in the third year. According to the authors, however, the most optimal and realistic scenario is scenario C, assuming that every month at least

50 licenses are sold and maintained to energy auditors of other companies (including the companies mentioned at the begging of this chapter). They can also be licenses used by municipalities and state enterprises. By setting the price of one license at 300 euros, the EAS program would have fully recouped its development costs after three full years.

Table 1. Program payback period scenarios (EUR; created by the authors)

Criteria		Month	Year	Total
Program development costs		-	-	727 818.0
Program savings for the company		3 801.6	45 619.2	-
Scenario A				
License costs	1 license cost	800.0	9 600.0	-
	20 license cost	16 000.0	192 000.0	-
Payback period	1. year	-	-	-490 198.8
	2. year	-	-	-252 579.6
	3. year	-	-	-14 960.4
	4. year	-	-	222 659.0
Scenario B				
License costs	1 license cost	150.0	1 800.0	-
	150 license cost	22 500.0	270 000.0	-
Payback period	1. year	-	-	-412 198.8
	2. year	-	-	-96 579.6
	3. year	-	-	219 040.0
Scenario C				
License costs	1 license cost	300.0	3 600.0	-
	50 license cost	15 000.0	180 000.0	-
Payback period	1. year	-	-	-502 198.8
	2. year	-	-	-276 579.6
	3. year	-	-	-50 960.4
	4. year	-	-	174 659.0

Based on the analysis of financial data on the development, maintenance and payback period of the program, the authors concluded that the development and maintenance of such a program do not pay off for a private sector company in the real market situation. It would be necessary to analyse the possibility of developing and maintaining this program at the national level, which would allow the program to operate at the same level and in connection with BIS, thus allowing for easier implementation of environmental and political issues. Under the best-case scenario, this program could be merged/added to BIS, which would allow the easier collection of national compliance and enforcement statistics, and no data import/export, resulting in one efficient and complete program for all parties involved.

Conclusions and proposals

Conclusions

1. Based on the fact that the concept of an energy audit is widely used in the literature and its explanations are different, the authors of the paper formulated a definition of energy audit appropriate for the study: energy audit – a comprehensive assessment of the company's energy, which collects various types of energy – electricity, thermal energy, fuel, water, etc. (information for a two-year period) – changes in consumption structures in buildings, processes or equipment, energy flow and provides recommendations for the implementation of economically sound energy efficiency improvement measures.
2. The energy audit process consists of four stages: a collection of energy consumption data, a survey, data analysis, preparation, and approval of the audit report. Each stage consists of its own unique information and data, the analysis of which is the basis for improving the company's energy performance.
3. After reviewing foreign energy audit programs, the authors concluded that several energy audit programs have been developed and established since 2012. The most popular of them are EMAT, TREAT, and Energy Analysis Software.
4. Summarizing the direction of energy policies and their relationship with energy audits, the authors of the work concluded that energy policy should be more widely applicable, including not only to large companies and large energy consumers; in addition, the wider availability of energy audit data (within certain criteria) would help to set more precise regional and national strategies and achieve the defined goals related to energy and climate neutrality in the environmental fields.
5. Latvian and foreign studies show specific calculation data that prove that energy efficiency measures carried out based on an energy audit or an energy efficiency system are financially beneficial for companies.
6. There have been several attempts to develop and use energy audit tools in Latvia, such as EFA2 and Heatmod; however, these programs and tools are focused on energy audits of buildings and the development of energy certificates.
7. The proposed hypothesis – the need and creation of a new energy efficiency information system is economically beneficial – was partially confirmed. Based on the theoretical analysis of the energy audit, its process, and the provided results, including the evaluation of energy audit tools at the world and national level, the need for a new and unified energy efficiency information system will be confirmed. However, the creation of such a system is not economically beneficial because the payback period,

calculated from the minimum cost threshold of the program – 727,818 euros, is 15.95 years.

Proposals

1. An order to perform efficient and accurate calculations of energy audit data and automatically transfer them to BIS, thus reducing errors in manual calculations, it is necessary to develop a unified energy audit program in which data can be entered on an online platform and calculations based on current regulatory enactments can be performed.
2. The development and maintenance of energy audit tools should be done at the national level because the development of such a tool does not pay off financially for energy audit firms.
3. When creating an energy audit program, future improvements and additions to the system should also be envisaged and planned:
   3.1. the program is combined with BIS, thus both energy auditors, clients, and employees of control and inspection institutions work on the same platform where all information is available,
   3.2. an added building energy certificate program Heatmod or a similar program suitable for developing and validating building energy certificates,
   3.3. a portal/section of innovative solutions has been created, where offers of energy-efficient and innovative products and solutions are collected so that companies have the opportunity to familiarize themselves with them and implement them in their practice,
   3.4. improved functionality – a built-in opportunity for auditors to plan energy audits and receive data immediately on the unified portal,
   3.5. perform data import – both from building modelling systems and from monitoring equipment; this would allow a wider and faster audit.

References

1. About EMAT. (2022). *EMAT Program*. https://www.ematprogram.com/about-emat/
2. Akreditētās institūcijas: meklēšanas rezultāti. (N. d.). *Valsts aģentūra "Latvijas Nacionālais akreditācijas birojs"*. https://www.latak.gov.lv/index.php?option=com_institucijas&view=institucijas&task=myForm&Itemid=151&lang=lv
3. Andersson, E., Arfwidsson, O., Bergstrand, V. [et al.]. (2017). A study of the comparability of energy audit program evaluations. *Journal of Cleaner Production, 142*, 2133-2139.
4. Audit services: EMAT Program. (2022). *EMAT*. https://www.ematprogram.com/audit-services/
5. Behavioral Energy Efficiency. (N. d.). *Uplight*. https://uplight.com/solutions/behavioral-energy-efficiency/#solution-stat

6. Digital Rights and Principles: Special Eurobarometer 518. (2021). *European Commission, Directorate-General for Communication*. https://www.eccireland.ie/eurobarometer-ireland-digital-rights-and-principles-2021/
7. Dobravec, V., Matak, N., Sakulin, C. [et al.]. (2021). Multilevel governance energy planning and policy: a view on local energy initiatives. *Energy, Sustainability and Society, 11*(2).
8. Doma, A., Ouf, M., & Newsham, G. (2021, January). Investigating the Thermal Performance of Canadian Houses Using Smart Thermostat Data. *ASHRAE Transactions, 127*(1), 64+.
9. Egwunatum, S.I., & Akpokodje, O.I. (2019). Economic Aspects of Building Energy Audit. Zero and Net Zero Energy. *IntechOpen*. https://www.intechopen.com/chapters/67283
10. Elektronisko iepirkumu sistēma. Iepirkumu meklētājs. (2022). *Valsts reģionālās attīstības aģentūra*. https://www.eis.gov.lv/EKEIS/Supplier
11. Energoefektivitātes likums. (2020, May 26). *Latvijas Vēstnesis*. https://likumi.lv/ta/id/280932-energoefektivitates-likums
12. Energy Audit Software. (N. d.). *Green Training USA: Training For Your Green Career*. https://www.greentrainingusa.com/tools/energy-audit-software.html
13. Energy audit. (2022). *Petroleum Conservation Research Association*. https://pcra.org/index.php/en/departments/industrial-sector/energy-audit
14. Energy Auditing. (2020). *Energypedia*. https://energypedia.info/wiki/Energy_Auditing
15. The energy audit of buildings in 4 steps. (2020). *Oze-Energies*. https://www.oze-energies.com/en/energy-audit/the-energy-audit-of-buildings-in-4-steps/
16. Expectations and Concerns from a Connected and Automated Mobility: Special Eurobarometer 496. (2021). *European Commission, Directorate-General for Communication*. https://data.europa.eu/data/datasets/s2231_92_1_496_eng?locale=en
17. Goss, M., & King, T. (2020, April 9). Changing how energy audits are done: the Rapid Energy Modelling tool quickly and comprehensively analyses campus energy efficiency, targets inefficient buildings, benchmarks energy use and provides insights. *Consulting Specifying Engineer, 57(3)*. https://www.csemag.com/articles/changing-how-energy-audits-are-done/
18. Grinbergs, K., & Gusta, S. (2013). Energy Audit Method for Industrial Plants. *Civil Engineering'13: 4th International conference proceedings, 4*. https://llufb.llu.lv/conference/Civil_engineering/2013/partI/Latvia_CivilEngineering2013Vol4PartI_350-355.pdf
19. Hawrylak, B. (2020). Energy Efficiency – Ecological and Economic Profitability. *Architecture, Civil Engineering, Environment, 13*(4), 85-92.
20. Heiskanen, E., Kivimaa, P., & Lovio, R. (2019). Promoting sustainable energy: Does institutional entrepreneurship help?. *Energy Research and Social Science, 50*, 179-190.
21. HomeSelfe RE's innovative technology: about us. (2016). *HomeSelfe*. https://www.homeselfe.com/realestate/about-us/
22. The lighting retrofit software that changed everything. (2022). *StreamLinx*. https://www.streamlinx.com/
23. Locmelis, K., Blumberga, D, Blumberga, A., & Kubule, A. (2020). Benchmarking of Industrial Energy Efficiency: outcomes of an energy audit policy program. *Energies (Basel), 13*(9), 2210.

24. Mondal, P. (N. d.). Energy Audit: Definition, Objectives and Approach. https://www.yourarticlelibrary.com/energy/energy-audit-definition-objectives-and-approach/29343
25. Naseri, A., Ahmadi, M., & PourKarimi, L. (2021). Reduction of energy consumption and delay of control packets in Software-Defined Networking. *Sustainable Computing: Informatics and Systems, 31*, 100574.
26. OptiMiser is a collaborative effort of many people, all passionate about moving our built environment to sustainability today!: about us. (2022). *OptiMiser*. https://optimiserenergy.com/about-us/
27. Rebecca Energy Management. (2021). *MIPU Predictive hub*. https://mipu.eu/en/rebecca-energy-management/
28. Roth, A. (2017). Simuwatt Relaunches Energy Auditor. *Office of Energy Efficiency and Renewable Energy*. https://www.energy.gov/eere/buildings/articles/simuwatt-relaunches-energy-auditor
29. Shapiro, I. (2011). 10 Common problems in energy audits. *ASHRAE Journal, 53*(2), 26-32.
30. SMEs, resource efficiency and green markets: Flash Eurobarometer 456. (2018). *European Commission, Directorate-General for Communication*. https://data.europa.eu/data/datasets/s2151_456_eng?locale=en
31. Software description. (N. d.). *Oak Ridge National Laboratory*. https://weatherization.ornl.gov/softwaredescription/
32. Standard Environmental Management Energy Audit Service, For Industrial, New Construction. (2022). *IndiaMart*. https://www.indiamart.com/proddetail/energy-audit-service-20943870891.html
33. Standard Eurobarometer 96, Winter. (2022, April). *European Commission*. https://europa.eu/eurobarometer/surveys/detail/2553
34. TREAT Energy Audit Software. (2022). *Performance Systems Development*. https://psdconsulting.com/software/treat/
35. Ullah, K.R., Thirugnanasambandam, M., Saidur, R. [et al.]. (2021). *Analysis of Energy Use and Energy Savings: a case study of a Condiment Industry in India. Energies (Basel), 14*(16), 4798.
36. Uncover Energy Efficiency: Buildee platform: built for everyone. (N. d.). *Buildee*. https://buildee.com/
37. Vides aizsardzības izdevuma konti – vispārējās valdības izdevumi vides aizsardzībai pa vides jomām, (milj. eiro) 2013-2019. (2022). *Centrālā statistikas pārvalde*. https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START_ENV_VI_VIA/VIA030/table/tableViewLayout1/
38. Wardynski, D.J. (2017). How Long Does it Take to Build Custom Software for a Business? *Brainspire*. https://www.brainspire.com/blog/how-long-does-it-take-to-build-custom-software-for-a-business
39. What is Energy Efficiency? (2020). *Energystar*. https://www.energystar.gov/about/about_energy_efficiency
40. What is the history of the ISO 50001. (2022). *The Standards Stores*. https://50001store.com/articles/what-is-the-history-of-the-iso-50001/
41. Энергоаудит. (2010). *Академик: словари и энциклопедии*. https://dic.academic.ru/dic.nsf/ruwiki/1347303

OPERATIONAL ASPECTS OF LATVIAN START-UPS REFERRED TO IN STRATEGIC POLICY DOCUMENTS

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Abstract. *The paper is entitled Operational Aspects of Latvian Start-Ups Referred to in Strategic Policy Documents. The present research aims to analyse the operational aspects of start-ups based on the information available in various policy documents. The research examined national, regional and global-scale policy documents. Long-term strategic policy documents, which help to identify obstacles to start-up development, play an important role in the development of start-ups in Latvia. An examination of obstacles to the development of start-ups would help to contribute to the achievement of the goals set by the policy documents analysed. The research examined various kinds of policy documents. The policy documents analysed reveal trends in start-ups and public support mechanisms as well as give recommendations; therefore, the main conclusion is that the documents play an important role in the growth of start-ups because, based on empirical research findings, relevant problems could be easily identified and solved in the long term. The literature review revealed that there were relatively few policy documents specifically for start-ups; therefore, prospects for the development of policy documents in future are wide. The following specific research tasks were set: to analyse long-term policy documents in relation to start-ups; to identify the main operational aspects of start-ups; and to put forward conclusions and proposals. The research employed the monographic and descriptive methods. The author concluded that the research studies conducted in Latvia indicated a high administrative burden, whereas international research studies identified a low administrative burden in Latvia. Because of the different opinions, a repeat research study should be conducted. The further research could examine administrative procedures and their impact on the establishment of companies.*

Keywords: ecosystem, innovative companies, policy, start-ups, strategy, support.
JEL code: M13

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Introduction

Strategic planning is the backbone of strategic management (Steiner, 1979). On the one hand, it suggests systematic techniques and contributes to organizational performance in cohesion and, on the other hand, it shapes the future of the organization (Poister, 2010). In order for companies to develop successfully in the future, strategic planning is necessary at various levels. Strategic planning is defined as disciplined efforts to make critical decisions and take actions that guide the organization: what it is, what it does and why it does it (Osborne and Gaebler, 1992). It is a social process through which

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local communities cope with external and internal challenges (Healey and Khakee, 1997). Strategic planning is important to deal with challenges and problems in every business activity, especially it relates to start-ups.

Support for innovative companies is one of the government's priorities, which is also defined in the following national policy documents: The Guidelines for the National Industrial Policy for 2014-2020 (Cabinet of Ministers, 2013) and the Smart Specialization Strategy (Ministry of Education and Science, 2020). Setting such a priority is an essential factor in developing proposals for the Business Environment Improvement Action Plan. A special support mechanism in the form of tax relief has been created to promote the emergence of start-ups. Support as well as access to financing through publicly co-funded acceleration funds and venture capital funds are available for start-ups at a one-stop agency – the Investment and Development Agency of Latvia. At the beginning of 2019, the Ministry of Economics in cooperation with the Latvian Startup Association and Gateway&Partners conducted a study of the start-up ecosystem in Latvia entitled Assessment of the Start-up Ecosystem in Latvia, the Identification of the Current Situation and the Development of Proposals Therefor (Ministry of Economics, 2019). Support for start-ups at the level of national strategic planning is an important factor in the development of the start-up ecosystem.

An increase in innovations and the variety of technological solutions gradually contribute to business productivity. For this reason, the talents of various industries are increasingly concentrated in the business and research environment in the regions of Latvia and especially in the Riga agglomeration, which plays a decisive role in the rapid economic development of the areas and in increasing prosperity (Cross-Sectoral Coordination Centre, 2020).

The present research aims to analyse the operational aspects of start-ups based on the information available in various policy documents. The following specific research tasks were set: to analyse long-term policy documents in relation to start-ups; to identify the main operational aspects of start-ups; and to put forward conclusions and proposals. The research employed the monographic and descriptive methods.

Development of start-ups

Start-ups play an important role in the entire innovation ecosystem, which provide an influx of innovative business ideas and promote a faster shift of the economic paradigm towards the knowledge economy (Ministry of Economics, 2022a). In order to develop the economy in the long term, knowledge of ongoing processes and implementation of business ideas is necessary.

In Latvia, start-ups began emerging intensively since 2016 when the Law on Aid for the Activities of Start-up Companies came into force. The purpose of the law is to promote the emergence of start-ups in Latvia, thereby promoting research as well as the introduction of innovative ideas, products or processes in economic activity (commercialization of research products) (Saeima, 2016). After 2016, the emergence and activity of start-ups increased not only in Latvia but also throughout Europe. Trends in start-ups were analysed by the European Commission's annual report on European SMEs (European Commission, 2021).

According to a study Assessment of the Start-up Ecosystem in Latvia and the Identification of the Current Situation conducted by Oxford Research Baltics Ltd in 2022, 512 companies that were defined as start-ups and were up to 7 years old, i.e. founded in the period 2015-2021, were identified in Latvia in national and international databases. The fastest increase in the emergence of start-ups was reported in 2019 (104 companies). Totally, the share of start-ups (up to 3 years old) reached 46%, which could be viewed positively (Ministry of Economics, 2022b).

In surveys, start-ups (76%) said they planned to increase their employment in the coming years and then increase their outputs (62%). The start-ups were more likely to set higher growth targets than other SMEs did, with 38% start-ups planning to increase their turnover over the next few years. Almost all the environmental and social sustainability activities the surveys asked about were more frequently performed by start-ups, the only exception was recycling or reuse of materials – there was no difference between start-ups, scale-ups and other SMEs regarding the activities (European Commission, 2021). Besides, support for innovative start-ups and businesses, including the self-employed, was actually suspended, as governments implemented emergency measures and the support beneficiaries were affected by lockdown measures. Initial Covid-19 measures focused on protecting and maintaining the current economic capacity. However, little attention has been paid to cooperation, as well as to starting up a business or innovation at existing businesses. However, the number of start-ups would be expected to decrease during the crisis due to increased market uncertainty (OECD, 2021b). Environmental and social sustainability is important for start-ups; therefore, the start-ups are motivated to operate in the long term.

Analysis, problems

An assessment of public support based on the opinions obtained by the start-up surveys has been performed by the Ministry of Economics in its report Assessment of the Start-up Ecosystem in Latvia, the Identification of

the Current Situation and the Development of Proposals Therefor (Ministry of Economics, 2019). Besides, a SWOT analysis done in the Strategy for Start-up Ecosystem Development for 2022-2025 mentions a high administrative burden for professional investors in start-ups – private and venture capital funds – as a weakness (Ministry of Economics, 2022).

The innovation ecosystem is underdeveloped. In Latvia, businesses are mostly represented by micro-enterprises and SMEs with limited capacity to invest in research and development. The businesses lack knowledge and skills about the role of innovation in business development and competitiveness. In Latvia, the share of innovative small and medium enterprises is one of the lowest in the EU at 30.3% (Cross-Sectoral Coordination Centre, 2020). A lack of knowledge and skills is an obstacle to the development of any enterprise, especially start-ups.

Start-up managers rated themselves as equal to other entrepreneurs, although their businesses had an opportunity to grow faster and expand in a shorter period, thereby reaching the peaks of their professional development. At the same time, the public sector indicated that it wanted to provide additional support to potentially the fastest-growing companies, which provided proportionally the highest return to the government over a short period. Besides, the start-ups indicated that obtaining support from the public sector is not an end in itself for their development. After the Law on Aid for the Activities of Start-up Companies was adopted in 2016, the government has also been actively involved in developing the start-up ecosystem, and the law has also helped to design other support mechanisms for the development of start-ups. At the same time, the goal of public support is for "Latvia to become choice No. 1 for start-ups in the Baltic States" is outdated and unattainable now and also does not allow focusing on the strengths of the ecosystem. The opinions of start-ups about the public support system indicated that it was based on the process, not on the result, as only four companies had already received support. This was also confirmed by the results of a survey of start-ups, as only 14% of them could theoretically be classified as start-ups according to the restrictive criteria of the law, which were contrary to the culture and values of start-ups. In addition, the start-ups indicated that public support involved several problems: a high administrative burden, a too-small amount of financial support, the need to make prepayments, as well as a long application processing period. The intensity of additional support was viewed from the grant perspective, not from the perspectives of the client and total cost, as start-ups needed to make value added tax payments and also pay expenses related to the administrative burden, which required hiring an additional administrative employee. For these seasons, the start-ups called for optimizing the application procedures, specifying the expected number of

hours of administrative work, avoiding prepayments, shortening the deadline for processing applications and optimizing the application and reporting process. Although there were improvements in the public sector, they still did not meet the level expected by the start-ups (Ministry of Economics, 2019). The results of research studies conducted in Latvia contradicted the data published by an OECD study, see Fig.1.

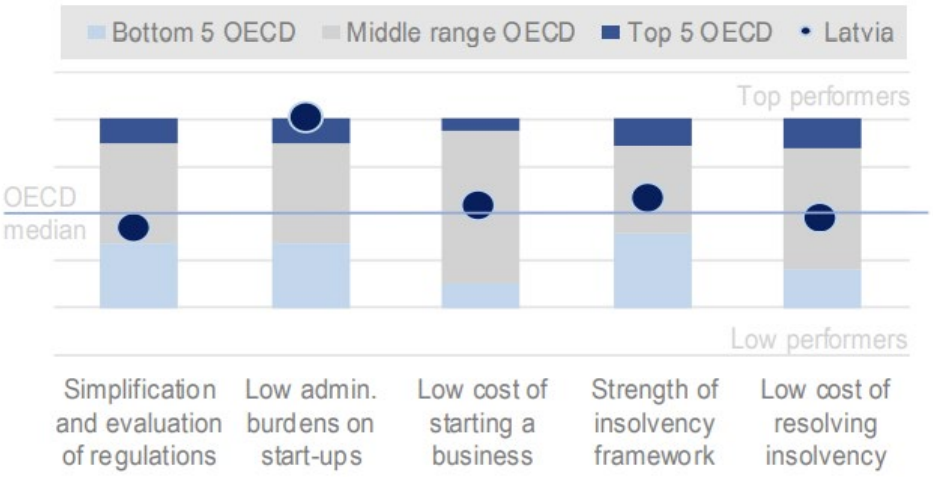

Fig.1. Legal framework for business (OECD, 2021a)

As shown in Fig.1, the indicators examined: simplification and evaluation of regulations, administrative procedures, cost of starting a business, strength of the insolvency framework and cost of resolving insolvency were close to the median, and the only indicator that stood out was the low administrative burden for start-ups. According to the results of the OECD study, there were low administrative procedures for start-ups in Latvia, yet the start-ups surveyed in Latvia claimed that there was a high administrative burden.

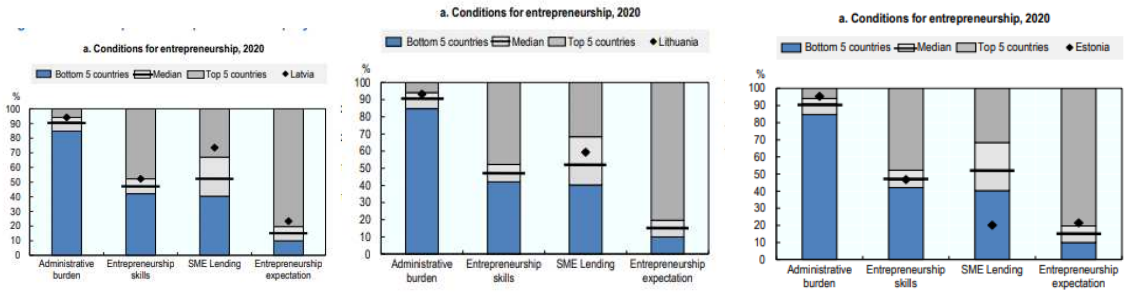

Fig. 2, 3, 4. Conditions for doing business in Latvia, Lithuania and Estonia (OECD, 2021a)

Another OECD study on conditions for doing business revealed that the administrative burden was high in all the Baltic States. Because of the different opinions, a repeat research study should be conducted. The further research could examine administrative procedures and their impact on the establishment of companies.

The effectiveness of public administration is low and responses to the needs of the business environment are insufficiently quick. In view of fast changes in the external environment, the ability of public administration to respond promptly, thereby providing appropriate conditions for the business environment, is insufficient. In recent years, the negative impact of the legal framework and administrative obstacles on businesses increased, as evidenced by the deteriorating indicators of international competitiveness of Latvia and the other economic rankings as well as the results of surveys of businesses in Latvia. The effectiveness of internal and external administrative burden reduction activities was hindered by their fragmentation, as well as a lack of practical applicability and capacity of the methods developed. The institutional environment has long been mentioned as a weakness in national competitiveness, that is why economic growth based on increases in productivity, as stated in the National Development Plan of Latvia for 2021-2027, requires reforms, as well as investments are needed in this field. In Latvia, businesses pointed to inefficient government bureaucracy, unstable (short-sighted) policy-making practices and an inefficient judicial system as the most significant shortcomings of the institutional environment that limited their competitiveness (Cross-Sectoral Coordination Centre, 2020).

Support mechanisms for start-ups

In 2021, according to the global start-up ecosystem index created by the international start-up ecosystem map and research centre StartupBlink, Latvia was ranked 42nd among 150 countries, losing 6 positions compared with 2020. The index indicated that the start-up ecosystem of Latvia had the potential to become a technological centre with access to the European market and relatively low living costs. Public support systems available to start-ups, such as innovation vouchers, start-up-friendly regulations and start-up visas, were rated positively. At the same time, compared with Estonia and Lithuania, Latvia needed to continue rapidly expanding the available support and investment attraction activities, as the growth of Latvia in these fields should be particularly strong in order to not only reach but also exceed the indicators (Ministry of Economics, 2022). A comparison of the start-up ecosystem of Latvia with those of the neighbouring countries reveals that it is necessary to work on improving support mechanisms in Latvia, as start-ups need help to start their economic activity.

Start-ups are nominated as the main target group in a programme of the European Union Cohesion Policy 2021-2027 (Esfondi.lv, 2021). Programme goal No. 1 – a more competitive and smarter Europe – places a focus of support directly on start-ups, thereby promoting innovative and smart

economic changes and regional ICT connectivity with specific support objectives. The main target groups of specific support objective 1.2.2 Using the advantages of digitalization for business development are as follows: society and economic operators: small and medium enterprises, universities, the public sector, planning regions and municipalities, persons who are going to start economic activity, start-ups, associations and foundations, as well as small- and mid-capitalization companies in the case of financial instruments. The activities supported by specific support objective 1.2.3 Promoting sustainable growth, competitiveness and job creation for SMEs, including through productive investments include support for innovation and entrepreneurial motivation. The purpose of the support activities is to motivate individuals to start up a business and to focus on the development and use of innovative solutions, thereby increasing the share of innovative companies in the economy. The support is provided in a non-financial form, thus supporting events, marketing activities and creativity in the innovation and business start-up segment, including awarding prizes. The support is focused on business beginners, start-ups, SMEs, especially in RIS3 specializations. The support is provided for companies to enter new markets and increase their exports – a support mechanism has been created so that they can promote their goods/services in the global market –, while also focusing the support on increasing the export capacity of knowledge-intensive, including technology intensive, start-ups and SMEs as well as on tourism. The support is provided in the form of grants, thereby contributing to the participation of companies and start-ups in international exhibitions and industry events, product adaptation to foreign markets, certification, building all-level cooperation and capacity build-up, as well as participation in digital platforms (Esfondi.lv, 2021). It is important that start-ups are the main target group in the EU Cohesion Policy programme, as it helps to carry out various support activities and develop the environment for start-ups.

The following financial instruments are used: venture capital, seed and growth stage venture capital and mezzanine investments, multi-level venture capital funds, including investments for SME participation in the capital market, loans for increasing productivity and start-up loans, which include co-financing investments in start-ups in cooperation with qualified venture capital investors, as well as portfolio and individual guarantees. An acceleration fund is envisaged for the development of innovative ideas and companies. Seed capital, start-up capital and growth capital investment, as well as a mezzanine fund will be available for the development of existing companies with growth potential. Loans will be provided for the establishment of new companies and the development of existing economic operators for the purposes of investment and working capital. Loans will be provided for investment projects and industries with a higher degree of risk,

as well as for financing start-ups between venture capital investment cycles. Loan guarantees are planned to be granted for loans for investment, including for starting a business and increasing productivity, as well as for current assets, financial leasing and bank guarantees. It is envisaged to provide support to economic operators in the form of export credit guarantees. The need for financial instrument services is substantiated by an analysis of market imperfections in the field of financial access (Esfondi.lv, 2021). The process of formation of companies is supported and promoted by granting loans to start-ups.

The EU Cohesion Policy supports the engagement of women in doing business, their (re)integration into the labour market and gender equality in specific sectors traditionally dominated by men. The European Innovation Council will develop targeted measures promoting women's engagement in innovation under the Horizon Europe programme, including a pilot project implemented in 2020 and aimed at promoting women-managed start-ups and innovative small and medium enterprises. The Commission will also promote women in decision-making positions in private equity and venture capital funds and support funds that invest in gender-diverse portfolios through the InvestEU programme to attract private and public investment in Europe for more sustainable, inclusive and innovative growth. In the field of research and innovation, the Commission will introduce new measures to strengthen gender equality under Horizon Europe, such as the possibility to request a gender plan from applicants, as well as an initiative to increase the number of women-managed technology start-ups. Funding for gender and intersectional research will also be available (European Commission, 2020). For example, women in both EU and OECD countries are 75% more likely than men to report that they have skills to start a business. These barriers to starting up a business also affect business ambitions; for example, women expect to be 60-70% more than men in business over the next five years and create 20 or more jobs, as well as improve business survival rates and performance. Increasing financing for start-ups, particularly microfinance for individuals who face barriers in mainstream financial markets, including women, youth and immigrants. It is estimated that the unsatisfied demand for microfinance in the EU is currently EUR 14 billion per year. Governments need to invest more capital in this market, as most of the lenders target customers from underrepresented and disadvantaged groups (OECD, 2021a). Support mechanisms are vital for fostering the growth of the start-up ecosystem in the long term; therefore, it is important that support objectives are defined in the European Union's cohesion policy programmes.

Recommendations for the development of start-ups from state institutions

Constructive recommendations for the development of start-ups have been developed by the Ministry of Economics and included in its report Assessment of the Start-up Ecosystem in Latvia, the Identification of the Current Situation and the Development of Proposals Therefor (Ministry of Economics, 2019). The recommendations are as follows: it is required to validate the concepts developed by national programmes in cooperation with clients; expand the criteria set by the Law on Aid for the Activities of Start-up Companies; reduce the administrative burden on public support by granting a one-time start-up status; specify the period necessary for performing administrative procedures, which needs to be stated in informational materials; specify the activities and funds expected from start-ups for granting them funding; design and certify a procedure for recognition of qualified investors by national institutions; specify a period for processing applications and adhere to it; regularly inform the audience and emphasize the improvements and changes made by support programmes; informational materials should be focused and easy to read (Ministry of Economics, 2019). The recommendations developed reveal in detail the need for improvements in various fields: legislation, the administrative burden and communication exchange in order to improve the start-up ecosystem in general and help the start-ups to develop and operate in the long term.

Conclusions and Proposals

Start-ups play an important role both in increasing competition and in fostering the growth of the national economy. The operation and development of start-ups provides high-paid jobs, which also contributes to the influx of innovative business ideas, the development of high value-added goods and services, investment attraction as well as the transition of the national economy to a modern and innovative economy (Ministry of Economics, 2022). Long-term strategic policy documents, which help to identify obstacles to development, play an important role in the development of start-ups in Latvia. In future research studies, an examination of the obstacles to the development of start-ups would help to contribute to the achievement of the goals set by the policy documents analysed.

Public support involves several problems: a high administrative burden, a too-small amount of financial support, the need to make prepayments, as well as a long application processing period. The results of research studies conducted in Latvia contradicted the data published by an OECD study. An analysis of the studies included in long-term policy documents on business

conditions revealed that the studies conducted in Latvia indicated a high administrative burden, whereas international studies identified a low administrative burden in Latvia. Because of the different opinions, a repeat research study should be conducted. The further research could examine administrative procedures and their impact on the establishment of companies.

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References

1. Cabinet of Ministers (2013). *On the Guidelines for the National Industrial Policy for 2014-2020 (in Latvian).* Retrieved: https://likumi.lv/doc.php?id=257875
2. Cross-Sectoral Coordination Centre (2020) *The National Development Plan of Latvia for 2021-2027* (in Latvian). Retrieved: https://pkc.gov.lv/sites/default/files/inline-files/20200204_NAP_2021_2027_gala_redakcija_projekts_.pdf
3. Esfondi.lv (2021) *European Union Cohesion Policy Programme for 2021-2027.* Retrieved: https://www.esfondi.lv/planosana-1
4. European Commission (2020) *A Union of Equality: Gender Equality Strategy 2020-2025.* Retrieved: https://ec.europa.eu/info/policies/justice-and-fundamental-rights/gender-equality/gender-equality-strategy_en
5. European Commission (2021*) Annual Report on European SMEs 2020/2021.* Retrieved: https://op.europa.eu/en/publication-detail/-/publication/849659ce-dadf-11eb-895a-01aa75ed71a1
6. Ministry of Economics (2019) *Assessment of the Start-up Ecosystem in Latvia, the Identification of the Current Situation and the Development of Proposals Therefor (in Latvian). Id.No. EM 2018/58.* Retrieved: https://www.em.gov.lv/sites/em/files/2019-03 27_11_46_18_jaunuznemumu_petijums1.pdf
7. Ministry of Education and Science (2020) *Smart Specialization Strategy (in Latvian).* Retrieved: https://www.izm.gov.lv/lv/viedas-specializacijas-strategija
8. Ministry of Economics (2022) *Strategy for Start-up Ecosystem Development for 2022-2025. Retrieved:* https://www.em.gov.lv/lv/jaunuznemumu-ekosistemas-attistibas-strategija
9. Ministry of Economics (2022a) *Guidelines for the National Industrial Policy for* 2021 - 2027. Retrieved: https://www.em.gov.lv/lv/industriala-politika
10. Ministry of Economics (2022b) *Assessment of the Start-up Ecosystem in Latvia and the Identification of the Current Situation (in Latvian). Retrieved:* http://petijumi.mk.gov.lv/node/4042
11. Healey, P., & Khakee, P., et al. (1997) *Making Strategic Spatial Plans*. London: UCL Press Limited.

12. OECD (2021a*) OECD SME and Entrepreneurship Outlook 2021*. Retrieved: https://www.oecd.org/publications/oecd-sme-and-entrepreneurship-outlook-2021-97a5bbfe-en.htm
13. OECD (2021b) *The Missing Entrepreneurs 2021. Policies for Inclusive Entrepreneurship and Self-Employment.* Retrieved: https://www.oecd-ilibrary.org/employment/the-missing-entrepreneurs_43c2f41c-en
14. Osborne, D., & Gaebler, T. (1992) *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector*. Addison-Wesley Publishing.
15. Poister, T. H. (2010) *The Future of Strategic Planning in the Public Sector*. Public Administration Review, 70, 246-255.
16. Saeima (2016) *Law on Aid for the Activities of Start-up Companies.* Retrieved: https://likumi.lv/ta/id/287272-jaunuznemumu-darbibas-atbalsta-likums
17. Steiner, G. A. (1979) *Strategic Planning: What Every Manager Must Know.* London: The Free Press.

A HISTORICAL OVERVIEW OF EVOLUTION OF THE IRRIGATED AGRICULTURE SECTOR IN MOROCCO

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Abstract. *Purpose and aim of the study: The paper aim is to analyse scientific and other relevant literature on the sustainable development of the irrigated agricultural sector in Morocco.*

Design / Methodology / Approach: The method of data collection is literature review. Literature review was chosen, as it is the basis for further research. The obtained data are presented in accordance with the identified historical periods. A summary of results is delivered.

Main Findings: In light of scarce water resources, the technical, legal and institutional levels in the agricultural sector are permanently updated by the public authorities in order to mitigate the impact of climate change and adapt the management of water resources.

Originality: Sustainability is regarded as gradual and sequential growth and development. Sustainability means the consideration of all the stakeholders' interests in the decision-making process.

Implications: Concerted efforts of the public authorities, companies and other stakeholders in the improvement in the efficiency of water use in agriculture through the development of localized irrigation technology and modernization of collective or private water supply networks in large irrigated areas would be beneficial for all. Innovative irrigation systems that allow the exploitation of unconventional, largely unused water resources must be developed. Low cost solutions with natural and locally available materials (Low Technology, Low Energy, Low cost, Easy to Use) should be used.

Keywords: *agricultural sector, damn, efficiency, irrigation, water demand, water resources, water supply.*
JEL code: *Q25.*

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Introduction

In the contemporary conditions of the negative impact of climate change on water availability, agriculture and food security, scarce water

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resources are to be used in an efficient and ecologically correct way in order to guarantee the sustainable supply of water and food. Water resources in the agricultural sector for food security are of great importance.

Agriculture in Morocco, as in many other developing countries, plays a key role in the national economy. The agricultural sector generates between 13 to 20% of the national Gross Domestic Product (GDP) (Adghough, 2018). This sector employs about 40% of the active population. The agricultural sector is undoubtedly the leading employer in Morocco. The total area of Morocco is 71 million hectares; the areas used in agriculture occupy 13% or 8.7 million hectares (FAO, 2001). 55% of the 1.2 million hectares under irrigation belong to the public authorities, 30% to owners and communities, 15% are irrigated by underground water from private pumping (FAO, 2001). Water is a scarce natural resource in agricultural production. Water resources depend on climate change. Among other factors, water is decisive for the productivity and yield of crops. A dose and frequency of irrigation are of paramount importance for the plant and its productive optimum. In Morocco, water resources are on increasingly high demand. Several factors influence this. Among those factors, the three key factors are (Boukhari, Nami, Chikhaoui, Raclot, Sabir, 2019): climate change that results in recurrent droughts and lower levels of precipitation; demographics, since the population is significantly growing; and economies due to the development of the agricultural, tourist and industrial sectors. Population growth, changing consumer behaviour and climate change have serious effects on the availability of fresh water. This scarcity of water resources requires to improve the efficiency of water use in agriculture, and to develop localized irrigation technology.

The aim of the paper is to analyse scientific and other relevant literature on the sustainable development of the irrigated agricultural sector in Morocco. The present research is based on the approach of sustainable development. Our research originality is revealed by our understanding of sustainability as gradual and sequential growth and development. Sustainability means the consideration of all the stakeholders' interests in the decision-making process (Ahrens, Zascerinska, & Aleksejeva, 2021). The method of data collection is literature review. Literature review was chosen because literature review is the basis for the development of further research work (Snyder, 2019). Particularly, a historical overview of the process allows identifying tendencies and trends for further development. The obtained data will be presented in accordance with the determined historical periods. A summary of results will be shown. The novelty of the research is revealed in the directions of future research.

Research results and discussion

The Green Morocco Plan (GMP) (Ministry of Agriculture, 2008) and Morocco Generation Green 2020-2030 (Naji, 2020) served as the basis for the analysis of the development of the irrigated agricultural sector in Morocco in different historical periods.

Four key stages in the development of the irrigated agricultural sector in Morocco are identified as shown in Figure 1.

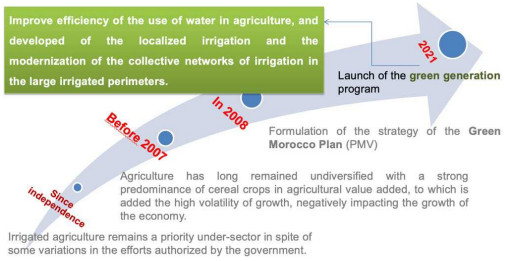

Fig.1 Four key stages in the development of the irrigated agricultural sector in Morocco (Wahid, 2022)

Figure 2 illustrated the key methods for the development of the irrigated agricultural sector in Morocco in different historical periods.

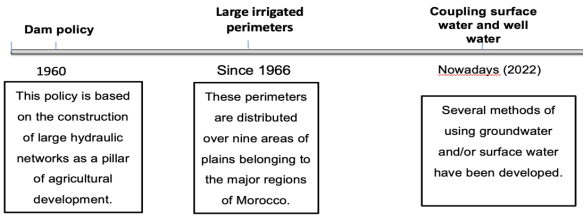

Fig.2 Key methods for the development of the irrigated agricultural sector in Morocco in different historical periods
(Wahid, 2022)

Since 1956 when Morocco officially gained independence, irrigated agriculture remains a priority sector for the government efforts. The irrigated land occupies only 15% of the cultivated area of the national acreages (Maazouz, 2016). It contributes to a total value of 45% on average of the agricultural added value and intervenes for 75% of agricultural exports (Global Yield Cap Atlas, 2022). However, before 2007, despite of the important contribution of the agricultural sector to the national GDP, its share in the budget of public investment remained limited (Ministry of Agriculture, 2008). This deficit of the public investment, associated with a deficit of the private investment, partly due to limited participation of the banking structure to the finance of the agricultural sector, had placed

agriculture in a spiral of low productivity, low incomes and poverty. In addition, for a long time the sector was not properly diversified. Cereal crops in the agricultural added value prevailed. Also, the agricultural sector obtained a strong volatility of growth that negatively impacted the growth of the whole economy, too. The sector was also weakened by the lack of human resources (Naji, 2020). Agricultural professional organizations were poorly organized and structured. Another identified problem was that these structures could not meet the new requirements set to modern agricultural problems (Ministry of Agriculture, 2008). In addition to these structural deficiencies, the sector environment can be characterized by the climatic change that threatens the durability of the systems of production, in particular the modes of sustainable use of water; the instability and volatility of the world markets of the basic commodities that resulted in the rise of the inducing price, for example, food crises in 2007-2008; changes in the world competing landscape (specialization, modes of marketing, the modern distribution implying the in-depth transformations in the chains of value, etc); increasing requirements to the product quality traceability by the customers.

In 2008, Moroccan agriculture had to choose a direction between stagnation and potential to mobilize and rehabilitate in order to solve the faced challenges. In this context, the Department of Agriculture gave an impetus by formulating the strategy of the Green Morocco Plan (PMV) in 2008. This strategy focused on the objective to make agriculture an engine of economic and social development by the transformation of the agricultural sector into a modern, competitive and inclusive sector. The programmes of subsidy and reorganization through the specialized structures of the Regional Offices of Agricultural Development (ORMVA) were initiated by the State. They supported the reorientation of agriculture towards new techniques and farming methods, the promotion of the improved and adapted crop varieties, and the development of irrigation techniques to save water. 10 years after its launch, the Green Morocco Plan (PMV) repositioned the agriculture sector to become an engine of the economic growth as disclosed in Figure 3.

Fig.3 Evolution of the GDP in billions of Moroccan dirhams (MMDH) (chained prices) (HCP, 2020)

The value of 65 billion dirhams (measured in terms of GDP), created before the PMV, doubled to 125 billion dirhams in 2018. During this period, the average annual growth rate was + 5.25%, as illustrated in Figure 3. This evolution was two times faster if compared with the decade former to the PMV (1997-2007) during which the annual growth rate average of the GDP was only 2.5% (Ministry of Agriculture, 2008). This change testifies to the new productive dynamics generated by the Green Morocco Plan within which the conditions of production were systematically transformed so as to significantly impel the profits of 10% of productivity as shown in Figure 4.

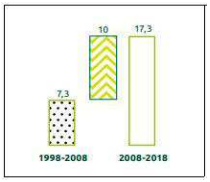

Fig.4 Contribution of agriculture to the points of national economic growth (%) (Ministry of Agriculture, 2008)

This value creation was ensured by improved effectiveness of the organization of the production process. In comparison with other countries, the growth rate of the production in the agricultural sector in Morocco had the highest growth rate during the period 2008-2014 as shown in Table 1. Hence, agriculture appears to be the most productive sector of the national economy in Morocco exceeding industry and the services.

Table 1 Growth rate based on the improved organization and production processes in some countries
(Direction de la Stratégie et des Statistiques, 2020)

Pays	Agriculture			Industrie			Services		
	1990-2014	1990-2007	2008-2014	1990-2014	1990-2007	2008-2014	1990-2014	1990-2007	2008-2014
Espagne	2,9	4,0	0,0	-0,2	0,1	-1,1	-1,1	-0,6	-2,4
France	2,5	2,6	2,2	0,7	1,2	-0,6	0,0	0,2	-0,7
Italie	1,8	2,4	0,2	-0,2	0,4	-1,9	-0,5	0,0	-1,7
Portugal	1,9	1,4	3,0	0,4	0,5	0,0	-0,3	0,0	-1,3
Égypte	1,5	1,0	2,9	-1,5	-1,2	-2,3	-0,5	-0,4	-0,8
Maroc	3,0	2,7	3,3	-0,1	0,3	-1,0	0,2	0,3	-0,6
Tunisie	3,3	3,9	1,8	0,3	0,6	-0,6	1,4	1,8	0,6
Turquie	1,1	1,0	1,4	-0,8	-0,6	-1,4	-0,4	-0,3	-0,6

To balance the supply of hydrous resources and demand of irrigated agriculture, the Green Morocco Plan adopted the policy of control and management of the water articulated around four structuring programmes as depicted in Figure 5:

- National Programme of Saving Irrigation Water (PNEEI): to mitigate the effects of the rarefaction of the water resources and to improve efficiency of their use in agriculture through the development of localized irrigation and modernization of collective networks of irrigation in the large irrigated perimeters (Direction de la Stratégie et des Statistiques, 2020);
- Programme of Extension of Irrigation (PEI): the downstream of dams for the creation of new perimeters and the reinforcement of the irrigation of the existing perimeters dominated by the dams;
- Programme of the Rehabilitation and Safeguard of the Perimeters of Small and Average Hydraulics (PMH): to improve the efficiency and the availability of water and to ensure the small agriculture irrigated in the fragile zones perennially;
- Programme of Promotion of the Public-Private Partnership (PPP): to improve technical, economic and financial management of water for irrigation and development of nonconventional water resources.

Fig.5 Summary of achievements of irrigation programmes at the end of 2018 (Direction de la Stratégie et des Statistiques, 2020)

Water is managed on the basis of agreements and rules which allow the distribution of water between the various users and sites in an organized way, adequate to the farming systems of irrigation and climate conditions. In Morocco, hydraulics covers nearly 683.000 ha (Kweld, 2006; Saad, 2014). Hydraulics is the pillar in the agriculture development to support the irrigation of million hectares (Benjelloun, 2001; Saâd, 2012).

At the end of the 1960s, the Moroccan government decided to enhance water management through “the policy of dams”. This policy was based on the construction of large hydraulic networks (Benjelloun, 2001). In these hydraulic zones, all the crop, fodder and cereal plots, and fruit plantations were served from the dam lakes via a dense network of irrigation canals. It was generally composed of main canals and secondary canals to ensure the distribution of water to the entire irrigated territory. The strategic choice of the dam policy was defined by the climate context of the country but also by a proactive policy of control and enhancement of water resources including development of efficient and sustainable irrigated agriculture.

Since 1966, nine large irrigated areas have been created in Morocco under the direction of the Regional Offices for Agricultural Development (ORMVA) as depicted in Figure 6.

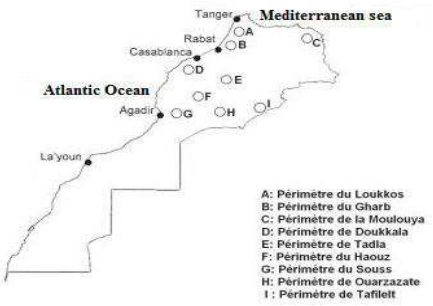

Fig.6 Geographical location of 9 major irrigated perimeters of Morocco (Saâd, 2012)

These perimeters are distributed over nine plain areas belonging to the major regions of Morocco as described in Figure 6 and Table 2.

Table 2 Importance of crops (in ha) in nine major irrigated perimeters of Morocco (Saâd, 2012)

	Cereals	Plantantions Fruit trees	Forages	Cultures Industrial	Vegetables	Total
Doukkala	52343	500	16849	19700	3683	93075
Gharb	52425	19844	25307	23138	6955	127668
Haouz	51109	70443	11593	1639	3856	138640
Loukkos	4240	1705	5960	11317	9701	32928
Moulouya	9060	26106	4878	6201	7613	53858
Ouarzazate	14070	-	3560	-	565	18195
Souss-Massa	4084	3795	1832	-	6742	16453
Tadla	36800	28095	29192	8389	-	102476
Tafilelt	26340	-	8117	-	652	35109

The perimeters are distributed over a large area of the national territory, in the North, known as the perimeter of Loukkos (30,300 ha) (A, Figure 6), in the South - the perimeters of Souss-Massa (39,900 ha) (G, Figure 6); Ouarzazate (37,650 ha) (H, Figure 6) and Tafilelt (27,900 ha) (I, Figure 6), to the West - the perimeters of Gharb (113,350 ha) (B, Figure 6) and Doukkala (104,600 ha) (D, Figure 6), in the East - the perimeter of Moulouya (77,280 ha) (C, Figure 6), in the centre - the perimeters of Haouz (142,620 ha) (F, Figure 6) and Tadla (109,000 ha) (E, Figure 6). This coverage also affects three bioclimatic levels: the arid (Souss-Massa, Ouarzazate and Tafilelt and Haouz), the semi-arid (Tadla, Doukkala and Moulouya) and the sub-humid (Gharb and Loukkos). This geoclimatic combination is a real advantage for crop diversity and agricultural production, and biodiversity (Saad, 2014). Irrigation was recognized by public authorities as an inescapable recourse. The government, through the ORMVATs, has set up an irrigation water distribution network supplied to the plot. The years of abundant surface water marked by the development

of irrigation were followed by a period of drought characterized by restrictions in the use of surface water for irrigation as shown in Figure 7.

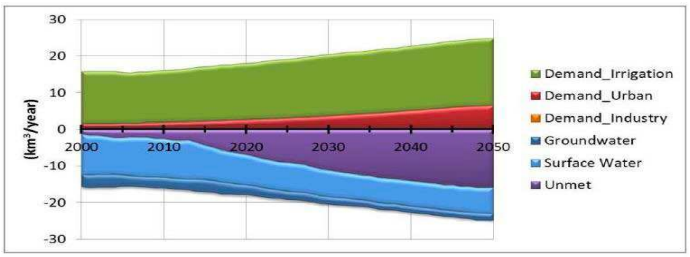

Fig.7 Climate scenario for water demand and supply in the MENA region (Immerzeel, et al, 2011)

The same climate scenario for water demand and supply are in the MENA (Middle East and North Africa) region (Middle-East and Northern Africa) (Immerzeel, Droogers, Terink, Hoogeveen, Hellegers, Bierkens, Van Beek, 2011). The continuity and regularity of surface water supplied to the plot is not always obvious, and the exploration of other alternative water resources has become essential. Restrictions on the use of mains water were becoming more and more frequent. Alongside major hydro-agricultural investment efforts by the public authorities, at farm level, farmers have developed their own initiatives to deal with water scarcity: digging wells, boreholes and/or or their deepening. This is the reason of the increase in the number of private pumping over time. In this perspective, groundwater abstraction and its use for irrigation require more technical means and methods (Benjelloun, 2001; Kweld, 2006). The difficulty of using groundwater justifies the multiple strategies developed by farmers to irrigate their plots. The variability of cultivated areas, the specificity of crop needs and the location of the farm in relation to the irrigation network are all parameters that justify the development of "private pumping" (Kweld, 2006; Dugu, Lejars, Ameur, Amichi, Braiki, Burte, Kuper, 2014; Kuper, Faysse, Hammani, Hartani, Marlet, Hamamouche, Ameur, 2016). Other socio-economic factors are not least in this justification: the diversification of crops, the improvement of incomes, the availability of financing from immigration. "Private pumping" aims in particular to make up for the lack of water supplied by the network and to manage periods of low water marked by the scarcity of water resources and low flows. The distribution of individual pumping over the entire perimeter does not obey any rule (Kweld, 2006). The depths of wells in Morocco vary from one locality to another; and in the same locality, this variability in depth can be observed from one exploitation to another. As "private pumping" develops, access to groundwater has become an alternative and an imperative. As the main idea is to compensate for the mediocrity of precipitation and the lack of

water in the network, several methods of using groundwater and/or surface water have been developed.

Conclusions and suggestions

The literature analysis allowed for identifying a fact that the agricultural sector in Morocco and, consequently, irrigation, remain the key areas for the country's sustainable development. In light of scarce water resources, technical, legal and institutional levels in the agricultural sector are permanently updated in order to mitigate the impact of climate change and management of water resources. The present research is limited by the theoretical analysis of scientific and other relevant literature. Concerted efforts of the public authorities, companies and other stakeholders in the improvement in the efficiency of water use in agriculture through the development of localized irrigation technology and modernization of collective or private water supply networks in large irrigated areas would be beneficial for all. Active engagement of small-holder farmers into the implementation of the Green Generation programme could help strengthen water supply networks. Innovative irrigation systems that allow the exploitation of unconventional, largely unused water resources must be developed. Low cost solutions with natural and locally available materials (Low Technology, Low Energy, Low cost, Easy to Use) are proposed. Further research tends to focus on the comparative analysis of irrigation in the agricultural sector in terms of type of crops, water management regulations, labour force availability, financial sustainability, and economic perspective in the same climate conditions in other Mediterranean countries. This will help to search for efficient key irrigation technologies for agriculture in Morocco in order to support sustainable economic growth and social development in the country.

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References

1. Adghough, Jamal. (2018). *Economic Overview of Agriculture and Food in Morocco*. Cuvillier Verlag. https://cuvillier.de/de/shop/publications/7879
2. Ahrens, A., Zascerinska, J., & Aleksejeva, A. (2021). Fostering External and Internal Sustainability within the English for Academic Purposes Course in the Covid-19

Pandemic. *Education. Innovation. Diversity, 2*(2), 6-15. https://doi.org/10.17770/eid2021.1.5412

3. Benjelloun, T. (2001). *Valorisation de l'eau d'irrigation dans les grands prim tres irrigus au Maroc: cas des productions v g tale situation actuelle et l ments de strat gie*. Ministere de l'agriculture du developement rural et des eaux et forets, Maroc, p.21.
4. Boukhari, T., Nami, R., Chikhaoui, M., Raclot, M., & Sabir, D. M. (2019). Evaluation des performances du modele agro-hydrologique swat reproduire le fonctionnement hydrologique du bassin versant nakhla. *European Scientific Journal, 15* (5).
5. Direction de la Stratégie et des Statistiques. (2020). *Le Plan Maroc Vert bilan et impacts*. Ministere d'agriculture, de peche maritime et de developpement rural, d'eau et de foret, Maroc.
6. Dugu, P., Lejars, C., Ameur, F., Amichi, F., Braiki, H., Burte, J., & Kuper, M. (2014). Recompositions des agricultures familiales au maghreb: une analyse comparative dans trois situations d'irrigation avec les eaux souterraines. *Revue Tiers Monde, 4,* 99–118.
7. Global Yield Cap Atlas. (2022). *Morocco*. https://www.yieldgap.org/Morocco.
8. Haut-Commissariat AU Plan (HCP). (2020). *Evolution of the GDP in Moroccan dirham million* (MMDH) (chained prices). https://www.hcp.ma
9. Immerzeel, W.W., Droogers, P., Terink, W., Hoogeveen, J., Hellegers, P.J.G.J., Bierkens, M.F.P. & Van Beek, L.P.H. (2011). Middle-East and Northern Africa water outlook. *Future Water Report*, 136 pp.
10. Kuper, M., Faysse, N., Hammani, A., Hartani, T., Marlet, S., Hamamouche, F., & Ameur, F. (2016). Liberation or anarchy the janus nature of groundwater on north-africa's new irrigation frontier. In jakeman et al. (eds.), *Integrated groundwater management: concepts, approach and challenges*, pp: 583–615. dordrecht: springer.
11. Kweld, E. (2006). *Suivi des exploitations agricoles du Tadla en vue de d terminer leurs performances dans l'utilisation des eaux souterraines. M moire du troisi me cycle pour l'obtention du dipl me d'ing nieur d'etat en g nie rural*. Institut agronomique et veterinaire Hassan II, Maroc, p 173.
12. Maazouz, S. (2016). *Le Developpement de L'irrigation Durable au Maroc*. AgriMaroc.
13. Ministry of Agriculture. (2008). 'Plan Maroc vert: Premires perspectives sur la stratgie agricole', April 2008: http://agrimaroc.net/Plan_Maroc_Vert.pdf
14. Naji, A. (2020). *Morocco Generation Green 2020-2030.* To Boosts the Agriculture Sector. https://www.meer.com/en/61716-morocco-generation-green-2020-2030
15. Plan Maroc Vert. (2018). *Le Plan Maroc Vert bilan et impacts*. Minist re d'agriculture, de peche maritime et de developpement rural, d'eau et de foret, Maroc.
16. Saâd, H. (2012). Les périmètres irrigués du Maroc : une aubaine pour deux espèces d'oiseaux migrateurs, la Tourterelle des bois (Streptopelia turtur) Et la Caille des blés *(Coturnix coturnix)*. *Rev. Écol. (Terre Vie)*, vol. 67: 3- 11.
17. Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines, Journal of *Business Research*, Volume 104, 2019, Pages 333-339.
18. The Food and Agriculture Organization of the United Nations (FAO) (2001). *Food insecurity: when people live with hunger and fear starvation. The State of Food Insecurity in the World 2001*. The Food and Agriculture Organization of the United Nations.
19. Wahid, N. (2022). *Participatory situation analysis and mapping of best practices in Morocco.* Communication in MED-WET Project Meeting 3.

THEORETICAL ASPECTS OF THE ROLE OF THE SHADOW ECONOMY

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Abstract. *The shadow economy is definitely a significant problem throughout the world. Research studies on the shadow economy still lack a single approach to the term shadow economy. Several definitions of the shadow economy are used to assess the role of the shadow economy.*
The present research aims to examine the theoretical role of the shadow economy and the definitions thereof given in various economic theories.
Analysing the definitions of the shadow economy, researchers identify ambiguous interpretations of the term given in various theories. The term shadow economy has a considerable number of synonyms used for researching the shadow economy. Some definitions focus on hidden outcomes, whereas others focus on hidden employment. A definition of the shadow economy is of great importance in assessing the size of the shadow economy.
The research employed the following methods: monographic, descriptive, as well as analysis, synthesis and document analysis.

Keywords: *definitions of the shadow economy; economic theories.*
JEL code: *O17, H26.*

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Introduction

Research studies on the shadow economy still lack a single approach to the term shadow economy. It is important to pay attention to the shadow economy because of the negative effects thereof (Sauka et al., 2016). The problem of the shadow economy exists in many countries and, depending on its size, affects the economic development of the country, the social wellbeing of companies and households and national policies. The shadow economy distorts competition, negatively affects the national tax system and its structure, and leads to unfair distribution of the tax revenues. Such economic activity distorts official statistics, which could make policies based on the statistics simply irrational

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and ineffective. All this leads to significant changes in the amount of tax revenues collected by the government and slows down the economic growth of the country (Kazimieraityte & Skvarciany, 2019). The shadow economy makes a negative impact on both the lives of individuals and the development of the country. The individuals who do not pay taxes through receiving undeclared or "envelope wages" lose their right to unemployment insurance, parental leave allowances and pension or sickness allowances (Kazimieraityte & Skvarciany, 2019). This situation is particularly problematic because it is often the recipients of "envelope wages" who earn low incomes and therefore need public support (Bank of Latvia, Notiks…, 2021). The authors of the research believe that most of the employees who decide to work informally often do not consider at the first moment that they are vulnerable to sudden misfortunes and will not receive public support in the event of misfortune because they were attracted by the possibility of earning more.

Tax evasion also makes a negative impact on society as a whole, as less tax revenue is collected for public infrastructure, education and health care. It is also often observed that individuals are not at all aware of the negative externalities of tax evasion (Bank of Latvia, Ēnu…, s.a.). If a large part of a national economy represents the shadow economy and individuals default on their tax obligations but still use public services, it forces the government to raise tax rates on those who do pay taxes, thereby making their lives even more difficult (Tanzi, 2002). The authors of the research believe that the shadow economy is even more encouraged in this way. The explanation and definition of the shadow economy is of great importance in identifying the size of it. To assess the role of the shadow economy, several definitions of the shadow economy are available in the literature.

The research aims to examine the theoretical role of the shadow economy and the definitions thereof given in various economic theories.

The research employed the following methods: monographic, descriptive, as well as analysis, synthesis and document analysis.

The present research is based on the research findings made by various authors and other literature sources.

Research results

The shadow economy is definitely a significant problem throughout the world. It is also known as the "grey economy", "informal economy", "undeclared economy" etc. The names, although describing similar economic activities, could be interpreted differently. Some definitions focus on hidden outcomes

(Gerxhani, 2004), whereas others focus on hidden employment (Hussmanns, 2004; Perry, 2007). For example, unregistered companies hide all their output, registered companies might choose to hide part of their output to reduce tax obligations (Kelmanson et al., 2019).

In economics, there is no single definition of undeclared economic activity, yet historically shadow economy activities are defined based on the following basic theories:

- the classical/Marxian approach states that the informal economy focuses on surplus labour as a product of the process whereby the capitalist economy provides its resources; an exception is the people who keep a traditional lifestyle (Sanyal & Bhattacharya, 2009); it is a process called "exclusion" by Sanyal (2007). In other words, the formal economy is dependent upon the informal economy through an unequal exchange of labour (VanderBerg, 2014);
- the dualism/modernization approach assumes that the shadow economy consists of marginal activities distinct from and unrelated to the formal sector. This approach views the shadow economy as providing income for the poor and as a safety net in times of crisis. This theory is based on the dual labour market function (Doeringer & Piore, 1971; Saint–Paul, 1996) that divides the labour market into four categories: primary, secondary, informal and illegal. The primary sector is represented by regular paid jobs that are taxed and regulated legally. The secondary sector consists of jobs that have less security than main jobs and is less regulated legally, e.g. low-wage jobs in the service sector. Informal jobs are taken by individuals who do cash-only economic activities, including those having no employment contracts and submitting no employment record books to their employers. The fourth category is illegal economic activity and includes all criminal activities that generate revenue;
- structuralism/globalization theory study the shadow economy, considering micro-enterprises and their employees, as well as labour costs. Globalization theory assumes that the mentioned factors increase the competitiveness of large companies. Unlike other theories, the theory of structuralism postulates that the shadow economy is a feature of capitalistic development of a country. This theory is based on Wallerstein's (2004) world system model and represents the duality that exists between the formal core of the economy or the country with high wages and high productivity in business and the informal periphery with low wages and low productivity (Godfrey, 2011);
- advocates of this theory state that informal sector employees work in small businesses or are self-employed with no social guarantees. The formal sector

generates value from the informal sector in ways that block the existence of an unjust world system. This exploitative relationship between labour and capital metaphorically explains the persistence of the shadow economy (Godfrey, 2011);

- neoliberal/legalist theory (Maiti & Sen, 2010), Khadiullina et al., 2013) states that the informal sector consists of micro-enterprises that prefer to operate illegally to reduce costs. This theory postulates that a significant element is a hindrance to growth due to lower productivity, limited investments, an inadequate and ineffective tax system, a low level of introduction of technological progress and complications caused by macroeconomic policies. According to De Soto (2000), micro-enterprises will continue to operate informally as long as the tax system of the country is burdensome and expensive for the businesspersons (Alderslade et al., 2006). According to Godfrey (2011), structuralism/globalization theory differs from neoliberal economic/legalist theory in the fact that dualists view informality in the deep structure of economic roots (i.e. in the marginal value of labour supply), whereas structuralism/globalization theory views it as stemming primarily from institutional preference and agreement. Neoliberal economic/legalist theory assumes that informality is a restriction on participation imposed by the previous public policy model and therefore the shadow economy represents a free choice of individuals. A potential way out of the shadow economy would be the elimination of political and economic barriers at national level and the reduction of formalities;
- post-structuralist/illegalist/voluntarist/utilitarian theory strongly relates to neoliberalism. According to it, the shadow economy is the choice of businesspersons to avoid taxes and labour market regulation. According to the advocates of this theory, the shadow economy might seem desirable only to a part of the population that has lower skills, lower incomes and no social guarantees from formal employment (Maloney, 2004; Chen, 2012). Moreover, most of the small enterprises fall victim to low productivity and have high failure rates because of such employees, thereby contributing to the cycle of poverty. This theory postulates that the inefficiency of public administration also plays an important role, especially in the field of public services: medicine, taxes and social guarantees. This creates a situation in which employees make their own decision to join or not to join specific social protection programmes (Maloney, 2004; Chen, 2012).

Different definitions of the shadow economy are available in the literature (Table 1).

Table 1 Definitions of the shadow economy (Koufopoulou et al., 2019; Brekis, 2007; Hassan & Schneider, 2016; Perry, 2007)

Term	Definition
Hidden economy	The hidden economy generally represents three kinds of economy: 1. The parallel economy is considered to be illegal hidden economic activities performed by formally employed individuals at their workplaces; consequently, the gross national product generated previously is secretly redistributed. It is also called the "white-collar" shadow economy, as mostly managerial or administrative personnel are involved in it. No new goods or services are produced by the parallel economy. The individuals engaged in it increase their incomes at the expense of other individuals. 2. The grey economy is considered to be unregistered legal trade in goods or services. The individuals engaged in this sector deliberately try to avoid official records, resulting in lower costs and higher profits. 3. The black economy is considered to be criminal and legally prohibited activities, which relates to the production and sale of prohibited goods or services. It involves theft and robbery as well as the production and provision of services such as prostitution, drug production and sale.
Informal economy	It usually refers to economic activities and transactions that are sufficiently hidden to be measured or taxed, and it is assumed that the economic actors are at least passively aware that bringing the activities to the attention of authorities would lead to negative tax or other legal consequences.
Shadow economy	The shadow economy is a part of the economy that is not declared for tax purposes and usually involves the exchange of goods and services that are paid for in cash. It represents mostly legal economic and productive activities that are deliberately hidden from authorities and, if recorded, would affect GDP (excluding illegal or criminal activities, charitable or household activities)
Undeclared economy	The undeclared economy represents transactions that are not declared to tax, social security and/or labour law authorities for purposes where they should be declared, yet are legal in all other respects.
Underground economy	The underground economy includes the output that is not recorded and therefore "hidden" or "hidden" from taxation, mostly income taxes and VAT. Part of the output relates to legal activities, e.g. transactions between firms and retailers.

It should be concluded that the definitions of the shadow economy vary according to its linkages with the formal economy. Some of the definitions focus on economic activities parallel to the formal economy, while some of the activities are more or less independent. The definition of the shadow economy plays an important role in assessing its size (Schneider, 2014). The most

common definitions are as follows: "the shadow economy is the gross domestic product that is not recorded in official statistics because of non-declaration and/or incomplete declaration" and "the production of legal or illegal goods and services that are not included in the official GDP" (Ministry of Finance, Ēnu…, 2021). It is obviously difficult to obtain accurate information on the activities of the underground or shadow economy, as the individuals involved in the activities wish to remain anonymous (Schneider & Enste, 2000).

Encouraging electronic payments and limiting the use of cash would likely help to decrease the spread of the shadow economy, as one party to the transaction (usually the consumer) does not benefit from not reporting the transaction and might not even be aware of being engaged in the shadow economy (Kelmanson et al., 2019). Governments and businesses around the world have been debating how to reduce the use of cash for a long time. The main non-cash benefits it brings are, for example, easier and faster shopping, reducing the possibility of corruption and limiting the spread of the shadow economy. The main flow of cash occurs in retail trade, catering and service provision ("Swedbank" AS, Mūsdienīgi…, 2020).

Conclusions

The shadow economy is definitely a significant problem throughout the world. An analysis of definitions of the shadow economy revealed ambiguous interpretations of the term by various theories. It is also called the "grey economy", "informal economy", "undeclared economy" etc. The names, although describing similar economic activities, could be interpreted differently. Some definitions focus on hidden outcomes, whereas others focus on hidden employment. The term shadow economy has a considerable number of synonyms used for researching the shadow economy. The definition of the shadow economy plays an important role in assessing its size. The shadow economy is a part of the economy that is not declared for tax purposes and usually involves the exchange of goods and services that are paid for in cash.

The authors of the research advise every individual to avoid making cash transactions for goods and services consumed daily, especially in cases where there is doubt that taxes are not paid from the transactions, for example, for goods bought in the marketplace and services purchased from private individuals and others, thereby contributing to a decrease in the shadow economy.

References

1. Alderslade, J., Talmadge, J., & Freeman, Y. (2006). *Measuring the informal economy: One neighborhood at a time*. Washington, DC: Brookings Institution, Metropolitan Policy Program
2. Bank of Latvia (29 November 2021). *Notiks diskusija par ēnu ekonomikas un aplokšņu algu ierobežošanas iespējām (Discussion to be held about the shadow economy and the possibilities of limiting envelope wages).* Available at: https://www.bank.lv/lb-publikacijas/zinas-un-raksti/latvijas-bankas-informacija-presei/12668-notiks-diskusija-par-enu-ekonomikas-un-aploksnu-algu-ierobezosanas-iespejam (accessed: 15/01/2022)
3. Bank of Latvia (s.a.). *Ēnu ekonomika (Shadow Economy).* Available at: https://www.naudasskola.lv/lv/mana-ekonomika/limeni/10-12/labklajiba/enu-ekonomika (accessed: 19/12/2021)
4. Brekis, E. (2007). *Latvijas ēnu ekonomikas modelēšana: nodokļu politikas aspektā (Modelling the Shadow Economy of Latvia: the Aspect of Tax Policy).* Available at: https://dspace.lu.lv/dspace/bitstream/handle/7/5152/25616-Brekis_Edgars_Dokt020104.pdf?sequence=1 (accessed: 09/01/2022)
5. Chen, M. A. (2012). *The Informal Economy: Definitions, Theories and Policies*. WIEGO working Paper No.1, p.26
6. De Soto H. (2000): The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else, Basic Books, p.275
7. Doeringer, P.B., & Piore, M.J. (1971). Internal Labor Markets and Manpower Analysis (1st ed.). Routledge, https://doi.org/10.4324/9781003069720
8. Gerxhani, K. (2004). The informal sector in developed and less developed countries: A literature survey. *Public choice*, *120*(3), pp.267-300
9. Godfrey, P. C. (2011). Toward a theory of the informal economy. *Academy of Management Annals*, *5*(1), pp.231-277
10. Hassan, M., & Schneider, F. (2016). Size and development of the shadow economies of 157 worldwide countries: Updated and new measures from 1999 to 2013. *Journal of Global Economics*, *4*(3), pp.1-15
11. Hussmanns, R. (2004). *Measuring the informal economy: From employment in the informal sector to informal employment* (Vol.53, p.32). Policy Integration Department, Bureau of Statistics, International Labour Office
12. Kazimieraityte, M., & Skvarciany, V. (2019). *Šešėlinę ekonomiką lemiančių veiksnių tyrimas. Mokslas-Lietuvos ateitis*, *11*(1). Available at: https://journals.vilniustech.lt/index.php/MLA/article/view/9388/8936 (accessed: 23/04/2022)
13. Kelmanson, M. B., Kirabaeva, K., Medina, L., Mircheva, M., & Weiss, J. (2019). *Explaining the Shadow Economy in Europe: Size, Causes and Policy Options*. International Monetary Fund, WP/19/278. Available at: https://www.imf.org/~/media/Files/Publications/WP/2019/wpiea2019278-print-pdf (accessed: 21/04/2022)
14. Khadiullina, G., Shurkina, E., & Svirina, A. (2013). Informal Economy Dynamics as an Important Factor Defining Level of Social Unease. *Journal of Economics Studies and Research*, *2013*, pp.1-13, https://doi.org/10.5171/2013.720741

15. Koufopoulou, P., Williams, C. C., Vozikis, A., & Souliotis, K. (2019). Shadow Economy: Definitions, terms & theoretical considerations. *Advances in Management and Applied Economics*, *9*(5), pp.35-57. Available at: https://www.researchgate.net/profile/Paraskevi-Koufopoulou/publication/333080662_Shadow_Economy_Definitions_terms_theoretical_considerations/links/5cdf91f192851c4eabaa5528/Shadow-Economy-Definitions-terms-theoretical-considerations.pdf (accessed: 09/01/2022)
16. Maiti, D., & Sen, K. (2010). The informal sector in India: a means of exploitation or accumulation?. *Journal of South Asian Development*, *5*(1), pp.1-13
17. Maloney, W. F. (2004). Informality revisited. *World development*, *32*(7), pp.1159-1178
18. Ministry of Finance (9 February 2021). *Ēnu ekonomika (Shadow Economy).* Available at: https://www.fm.gov.lv/lv/enu-ekonomika (accessed: 01/01/2022)
19. Perry, G. (Ed.). (2007). *Informality: Exit and exclusion*. World Bank Publications
20. Saint-Paul, G. (1996). *Dual labor markets: a macroeconomic perspective*. MIT press
21. Sanyal, K. (2007). *Rethinking capitalist development: Primitive accumulation, governmentality and post-colonial capitalism*. Routledge, New Delhi, India
22. Sanyal, K., & Bhattacharyya, R. (2009). Beyond the factory: globalisation, informalisation of production and the new locations of labour. *Economic and Political Weekly*, pp.35-44
23. Sauka, A., Schneider, F., & Williams C. C. (2016). *Entrepreneurship and the Shadow Economy.* Edward Elgar Publishing. Available at: https://www.elgaronline.com/view/edcoll/9781784719876/9781784719876.xml (accessed: 12/04/2022)
24. Schneider, F. (2014). *Outside the State – the Shadow Economy and Shadow Economy Labor Force.* CESifo Working Paper No. 4829, Category 1: Public Finance. Available at: https://www.econstor.eu/bitstream/10419/102178/1/cesifo_wp4829.pdf (accessed: 12/04/2022)
25. Schneider, F., & Enste, D. (2000). Shadow Economies Around the World: Size, Causes and Consequences. *Causes and Consequences*. Available at: https://www.elibrary.imf.org/view/journals/001/2000/026/article-A001-en.xml (accessed: 01/01/2022)
26. "Swedbank" AS (16 March 2020). *Mūsdienīgi norēķini – klientu paradumi un tirgotāju risinājumi (Modern Payments – Customer Habits and Merchant Solutions).* Available at: https://biznesam.swedbank.lv/ievads/finanses/beskaidras-naudas-norekini-52973, (accessed: 08/05/2022)
27. Tanzi, V. (2002). The shadow economy, its causes and its consequences. *Edited Lecture. Brazilian Institute of Ethics*. Available at: http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=083EAE89C39A8A837C5033F17A30EBDA?doi=10.1.1.581.4386&rep=rep1&type=pdf (accessed: 12/04/2022)
28. VanderBerg, N. (2014). The informal economy: A literature review. *Unpublished paper. Retrieved from http://www. westnh. org/wpcontent/uploads/2014/06/PHASE-1-_-Appendix-B_Informal_Economy_Literature-Review. pdf*
29. Wallerstein, I. (2004). World-systems analysis. In *World-Systems Analysis*. Duke University Press, p.128