

ISSN 2029-2805 (print)
ISSN 2029-2813 (online)



STUDIJOS KINTANČIOJE VERSLO APLINKOJE

Straipsnių rinkinys

Vilnius
2025

STUDIJOS KINTANČIOJE VERSLO APLINKOJE

STUDIES IN A CHANGING BUSINESS ENVIRONMENT

Straipsnių rinkinys

Vilnius
2025

Mokslinis komitetas:

Pirmininkas:

Prof. dr. Rimantas Dapkus, Lietuvos regioninių tyrimų institutas, Vytauto Didžiojo universitetas, Kaunas, Lietuva

Nariai:

Dr. Paweł Dziekański, Jano Kochanowskio universitetas, Kelcai, Lenkija

Dr. Aksana Yarashynskaya, Bydgoščiaus mokslo ir technologijų universitetas, Bydgoščius, Lenkija

Prof. dr. Artūras Jukna, Vilniaus Gedimino technikos universitetas (VILNIUS TECH), Vilnius, Lietuva

Prof. dr. Inna Khovrak, Oxford Research, Oslo, Norvegija

Dr. Viktor Kozlovskij, Vilniaus kolegija, Vilnius, Lietuva

Dr. Tomasz Marcysiak, WSB Merito Universitetas, Torunė, Lenkija

Doc. dr. Olena Pimenova, Ekonomikos ir žmogiškųjų išteklių mokslų universitetas, Varšuva, Lenkija

Doc. dr. Piotr Prus, Bydgoščiaus mokslo ir technologijų universitetas, Bydgoščius, Lenkija

Prof. dr. Ilona Skačkauskienė, Vilniaus Gedimino technikos universitetas (VILNIUS TECH), Vilnius, Lietuva

Prof. dr. Aidas Vasilis Vasiliauskas, Generolo Jono Žemaičio Lietuvos karo akademija, Vilnius, Lietuva

Doc. dr. Gintautė Žibėnienė, Mykolo Romerio universitetas, Vilnius, Lietuva

Scientific Committee:

Chair:

Prof. Dr. Rimantas Dapkus, Lithuanian Regional Research Institute, Vytautas Magnus University, Kaunas, Lithuania

Members:

PhD. Dr. Paweł Dziekański, Jan Kochanowski University in Kielce, Kielce, Poland

Dr. Aksana Yarashynskaya, University of Science and Technology in Bydgoszcz, Poland

Prof. Dr. Artūras Jukna, Vilnius Gediminas Technical University (VILNIUS TECH), Vilnius, Lithuania

Prof. Dr. Inna Khovrak, Oxford Research, Oslo, Norway

Dr. Viktor Kozlovskij, Vilniaus kolegija/ Higher Education Institution, Vilnius, Lithuania

Dr. Tomasz Marcysiak, WSB Merito University, Toruń, Poland

Assoc. Prof. Dr. Olena Pimenova, The University of Economics and Human Sciences in Warsaw, Poland

Assoc. Prof. Dr. Piotr Prus, University of Science and Technology in Bydgoszcz, Poland

Prof. Dr. Ilona Skačkauskienė, Vilnius Gediminas Technical University (VILNIUS TECH), Vilnius, Lithuania

Prof. Dr. Aidas Vasilis Vasiliauskas, General Jonas Žemaitis Military Academy of Lithuania, Vilnius, Lithuania

Assoc. Prof. Dr. Gintautė Žibėnienė, Mykolas Romeris University, Vilnius, Lithuania

STUDIJOS KINTANČIOJE VERSLO APLINKOJE

STUDIES IN A CHANGING BUSINESS ENVIRONMENT

Lietuvos ekonomikos dėstytojų asociacija, 2025 –184psl.

ISSN 2029-2805 (print)

ISSN 2029-2813 (online)

© Lietuvos ekonomikos dėstytojų asociacija, 2025

TURINYS

Pratarmė	5
The Synergy of Artificial Intelligence and Human Capital Driving Forces of Sustainable Economic Growth in the Digital Era	7
<i>Prof. Dr. Adam Baszyński (Adam Mickiewicz University in Poznań, Poland)</i>	
Climate Change Reporting According to the U.S. Securities and Exchange Commission	14
<i>Prof. Dr. Ryszard Kamiński (Adam Mickiewicz University in Poznań, Poland)</i>	
Information and Communication Technologies in Ensuring Digital Security in Higher Education Institutions Policies, Strategies, and International	20
<i>Ivan Khovrak (Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine)</i>	
Baltijos šalių fiskalinė drausmė ir ekonominės tendencijos ES kontekste.....	31
<i>Dr. Viktor Kozlovskij, Semen Burmistrov (Vilniaus kolegija)</i>	
Digitalization of Logistic Processes in Manufacturing Companies	39
<i>Dr. Laima Skauronė, dr. Deimena Montvydaitė (Panevėžio kolegija / State Higher Education Institution, Lithuania)</i>	
Management of Resource and Information Processes in Enterprises for the Development of an Inclusive Space	49
<i>Prof. Dr. Oksana Polinkevych (Lutsk National Technical University, Ukraine)</i>	
Baltijos šalių išmaniojo augimo dinamika ES kontekste	57
<i>Dr. Viktor Kozlovskij (Vilniaus kolegija)</i>	
Pressure Cooker as Model for Sustainability Education	64
<i>Saulius Buivys (Rotterdam Business School, The Netherlands), Assoc. Prof. Dr. Gintautė Žibėnienė (Vilniaus kolegija / Higher Education Institution, Lithuania)</i>	
Factors of Competitiveness of Regions in Ensuring the Post-War Development of Ukraine	71
<i>Dr. Olesya Hryhoryeva, Dr. Svitlana Kulakova (National University «Yuri Kondratyuk Poltava Polytechnic», Poltava, Ukraine)</i>	
Žalioji tiekimo grandinė tvarumas ir inovacijos logistikoje	79
<i>Jūratė Leonavičienė, Eglė Gotautienė (Klaipėdos valstybinė kolegija)</i>	
Balancing Sustainability and Consumer Expectations in Packaging	87
<i>Dr. Rūta Petrauskienė (Kauno kolegija / Higher Education Institution, Lithuania)</i>	
Sustainable Cities in the Context of Climate Change: An Analysis of Innovation, Policy and Practice	94
<i>Vaiva Mickevičienė, Inga Piščikienė, Indrė Sprogytė-Bredelienė (Vilniaus kolegija / Higher Education Institution, Lithuania)</i>	

Utenos rajono turizmo išteklių vertinimas lankytojų požiūriu patrauklumo aspektu	103
<i>Doc. dr. Ramutė Narkūnienė, doc. dr. Jurgita Daubarienė, Jūratė Aksomitienė (Utenos kolegija)</i>	
Darbo rinkos pokyčiai ir studentų baigiamųjų darbų tematika Lietuvos universitetuose: dirbtinio intelekto poveikis.....	112
<i>Dr. Lina Kankevičienė (Kauno kolegija)</i>	
Organizational Mechanisms for the Implementation of the Concept of the Creation in Ukraine of Marine Robotics for Environmental Purposes	120
<i>Prof. Dr. Iryna Nadtochii, Assoc. Prof. Anatolii Nadtochyi (Admiral Makarov National University of Shipbuilding, Kherson Educational-Scientific Institute, Ukraine)</i>	
Automobilių gamintojų prekės ženklo lojalumo determinantai: empirinis tyrimas	129
<i>Dr. Rytis Zautra, dr. Lina Kankevičienė, Tadas Mažliakas, Modestas Juškauskas, Gantas Brazaitis, Laurynas Žemčiūgas, Mantas Rastapkevičius (Kauno kolegija)</i>	
A Journey Toward the 21st-Century Business School: The Case of Rotterdam Business School ...	137
<i>Ron Ainsbury (Finance and Banking University, Hanoi, Vietnam), Saulius Buivys (Rotterdam Business School, The Netherlands), Assoc. Prof. Dr. Gintautė Žibėnienė (Mykolas Romeris University, Lithuania)</i>	
Studentų nuomonės apie kontaktinį ir nuotolinį mokymąsi tyrimas	144
<i>Rasa Bražulienė, Daiva Aktas, Roma Aleknienė (Vilniaus kolegija)</i>	
Personal Income Control as a Strategy Against the Shadow Economy: The Latvian Case	154
<i>Angelina Tjurina (Riga College of Accountancy and Finance, Latvia)</i>	
Application of the Principle of Proportionality in the Context of Tax Law.....	159
<i>Assoc. Prof. Dr. Sigita Šimbelytė (Kazimieras Simonavičius University, Panevėžio kolegija / State Higher Education Institution, Lithuania)</i>	
Darbo užmokesčio apskaitos metodika.....	169
<i>Lina Kušleikienė, dr. Renata Šivickienė (Šiaulių valstybinė kolegija)</i>	
Marketing Research in Global Markets.....	178
<i>Maryna Chyzhevska, Viktorija Dobrianska, Kseniia Chichulina (National University «Yuri Kondratyuk Poltava Polytechnic», Poltava, Ukraine)</i>	

PRATARMĖ

Socialinės, edukologinės, vadybos ir ekonominės jaunimo ugdymo problemos domina ne tik akademinę bendruomenę, bet ir verslininkus, įvairių viešojo sektoriaus institucijų atstovus. Tai stiprina mokslo ir verslo bendradarbiavimą kokybiškai rengiant specialistus darbo rinkai.

Lietuvos ekonomikos dėstytojų asociacijos straipsnių rinkinys yra skirtas supažindinti akademinę bendruomenę bei plačiąją visuomenę su aktualiomis kintančioje verslo aplinkoje kylančiomis mokslo ir studijų problemomis, mokslo taikomaisiais tyrimais, plėtoti mokslinę tarpdalykinę diskusiją.

Straipsnių rinkinio tikslas – apžvelgti makroekonominės šalių verslo aplinkos pokyčius ir įvairių ūkio sektorių esamą padėtį bei plėtros tendencijas, proporcingumo principo taikymo mokesčių teiseje aspektus, pokyčius darbo rinkoje pasitelkiant dirbtinio intelekto sprendimus bei logistinių procesų optimizavimo ir skaitmenizacijos galimybes, pateikti Baltijos šalių fiskalinės drausmės, ekonomikos augimo tendencijas ir kitų užsienio šalių verslo rizikas bei padėtį pasibaigusios COVID-19 pandemijos bei tebesitęsiančio karo Ukrainoje sąlygomis, paskatinti socialinę partnerystę bei atsakomybę, išanalizuoti verslo ir aukštojo mokslo institucijų bendradarbiavimo galimybes, išnagrinėti aukštojo mokslo studijų kokybės tobulinimo, ekonomikos, finansų, verslo, vadybos ir apskaitos, rinkodaros žinių gilinimo, studentų mokymosi rezultatų ir motyvacijos bei praktinių gebėjimų, pasitenkinimo studijomis kontaktiniu bei nuotoliniu būdu problemas. Šiame jau tęstiniu tapusiame leidinyje publikuojami dvidešimt du Ukrainos, Lenkijos, Latvijos, Nyderlandų ir Lietuvos aukštųjų mokyklų dėstytojų straipsniai, kuriuose nagrinėjami teoriniai įvairių Lietuvos ir užsienio aukštojo mokslo institucijų bei verslo subjektų problemų aspektai ir pristatomi aukštosiose mokyklose vykdomų tyrimų rezultatai, dalijamasi patirtimi, aptariamos problemos ir numatomos tolesnės veiklos gairės. Tikėtina, kad visi šie straipsniai prisidės prie socialinių bei humanitarinių mokslų tyrimų gausinimo, paskatins diskusijas apie mokslo taikomosios veiklos svarbą, dėstytojų kvalifikacijos kėlimo tobulinimo galimybes, mokslo ir verslo bendradarbiavimo perspektyvas.

Straipsnių rinkinys yra leidžiamas Lietuvos ekonomikos dėstytojų asociacijos lėšomis, taip pat penki straipsnių rinkinio leidiniai anksčiau išleisti, gavus dalinę paramą iš valstybės biudžeto, laimėjus Lietuvos mokslo tarybos dalinės finansinės paramos asociacijų veikloms konkursus. Leidinys yra įtrauktas į IndexCopernicus duomenų bazę (prieiga per internetą: <http://journals.indexcopernicus.com>). Elektroninė versija publikuojama Lietuvos ekonomikos dėstytojų asociacijos interneto svetainėje: <http://www.leda.lt/studijos-kintancioje-verslo-aplinkoje>. Šiuo metu jau yra išleisti devyni straipsnių rinkinio leidiniai, kuriuose publikuota daugiau kaip du šimtai dvidešimt šalies ir užsienio aukštojo mokslo institucijų dėstytojų moksliniai straipsniai.

Dėkojame visiems autoriams už parengtus straipsnius, atliktų mokslo taikomųjų tyrimų medžiagą ir viliamės, kad leidinys bus naudingas ir sudomins ne tik akademinę bendruomenę, socialinius partnerius, bet ir plačiąją visuomenę.

THE SYNERGY OF ARTIFICIAL INTELLIGENCE AND HUMAN CAPITAL: DRIVING FORCES OF SUSTAINABLE ECONOMIC GROWTH IN THE DIGITAL ERA

Prof. Dr. Adam Baszyński

Adam Mickiewicz University in Poznań, Poland

Annotation

The article explores the dynamic interactions between artificial intelligence (AI) and human capital as critical drivers of economic growth. It examines how AI acts as a catalyst for changes in labor markets, increasing the demand for new skills, reskilling, and upskilling, while also transforming educational models. Simultaneously, the paper highlights the pivotal role of human capital in the effective implementation, management, and ethical governance of AI technologies across industries. By reviewing classical and modern economic growth theories, the study situates AI and human capital within broader macroeconomic frameworks. Key hypotheses address the impact of AI-human capital integration on productivity, innovation, and sustainable economic development. The article emphasizes that AI complements rather than replaces human capital, with synergy between technological advancements and human creativity being essential for future economic resilience. Finally, it offers policy recommendations focused on education, workforce development, and strategies to mitigate potential risks such as labor market polarization and skill mismatches. This literature-based analysis provides a foundation for understanding the transformative potential of AI-human capital interactions in shaping the digital economy.

Key words: economic growth, AI, factors of growth, mechanisms of impact.

INTRODUCTION

Research Problem: What are the interactions between artificial intelligence and human capital in the context of economic growth? How do these two factors influence each other and contribute to economic progress?

The aim of the article is to review the literature on the impact of artificial intelligence on economic growth and analyze the mechanisms of its influence, particularly: (1) To understand the role of artificial intelligence in accelerating production and service processes, as well as transforming business models. (2) To analyze the role of human capital in the effective implementation and adaptation of AI technologies across industries. (3) To explore the synergy between artificial intelligence and human capital in the context of sustainable economic growth. (4) To provide recommendations for educational and economic policies supporting the integration of AI and human capital.

Aligned with the research problem and objectives, the following hypotheses were formulated: (H1) The integration of artificial intelligence with human capital contributes to increased productivity and innovation within businesses. (H2) A lack of adequate AI-related skills among workers can limit the full economic growth potential in the digital age. (H3) Sustainable economic growth in the future will rely on the synergy between human creativity and machine intelligence.

1. THEORETICAL FOUNDATIONS OF ECONOMIC GROWTH

Economic growth is a complex, multidimensional process involving an increase in the real value of production within a given economy over time. Classical theories of economic growth include the concepts of Adam Smith, Thomas Malthus, David Ricardo, as well as Roy Harrod and Evsey Domar.

Adam Smith, in his work *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), introduced the idea that economic growth is driven by the division of labor, capital accumulation, and free-market trade. Smith believed that the „invisible hand“ leads to an efficient allocation

of resources, ultimately fueling economic growth (Smith, 1954). A free market, competition, and limited government intervention are essential for economic expansion.

Thomas Malthus argued that population growth leads to a decline in per capita income because natural resources are limited. He believed that population growth is constrained by the availability of resources and food (Malthus, 1925). He emphasized that without controlling population growth, economies may encounter growth barriers.

David Ricardo's theory emphasizes the complex interactions between resources, population, wages, and international trade as key factors influencing economic growth (Ricardo, 1957). Population growth, and consequently the increasing demand for food, leads to higher land rents and food prices, which may restrict economic growth. Constraints related to natural resources, such as land, affect production costs and can limit growth. The acceptance of the iron law of wages suggests that, in the long run, wages will tend toward subsistence levels, impacting demographics and labor supply. Savings and capital investment are crucial for economic growth. Comparative advantage and specialization in international trade enhance efficiency and overall economic prosperity.

The Harrod-Domar model, developed in the 1930s and 1940s (Harrod, 1939; Domar, 1946), focuses on the role of investment and savings in driving economic growth. Economic growth is a function of the savings rate and investment efficiency. This model emphasizes the need to increase the savings rate and improve investment efficiency.

Among modern theories of economic growth, the most significant are the models of Robert Solow, Joseph Schumpeter, and endogenous growth theories, including the AK model. A comprehensive discussion of economic growth theories can be found in works such as: Aghion & Howitt, (1998); Aghion, & Howitt, (2009). In the Polish literature, relevant works include work of Piątek (2016).

Robert Solow's model, developed in the 1950s, introduces the concept of long-term sustainable growth, where economic growth depends on capital accumulation, population growth, and technological progress. The Solow (1956, 1957) model accounts for the diminishing marginal productivity of capital, meaning that investments alone cannot drive infinite growth. Technological progress is the key factor in long-term economic growth.

Joseph Schumpeter (1934) introduced the concept of „creative destruction“, where innovation and entrepreneurship are the primary drivers of economic growth. New technologies and innovations replace outdated production methods, leading to economic expansion. Innovation and entrepreneurship are essential for economic dynamism and long-term growth.

Endogenous growth theories, developed in the 1980s and 1990s by Paul Romer (1986, 1990) and Robert Lucas (1988), assume that economic growth results from internal factors such as investments in human capital, innovation, and government policies. Growth is driven by endogenous factors like investments in education, research and development, and policies that encourage innovation, requiring collaboration between the public and private sectors. Policies that support investments in human capital and innovation can lead to sustained economic growth.

The AK model, a form of endogenous growth theory, assumes a linear relationship between capital and output, meaning there are no diminishing returns to capital (Rebelo, 1991). Constant returns to capital enable continuous economic growth without the need for technological progress. The AK model emphasizes the importance of continuous capital investment for long-term growth.

Classical theories of economic growth, derived from the works of Smith, Ricardo, and Malthus, focus on the role of trade, capital accumulation, and population. Modern theories, such as the Solow model, endogenous growth theories, and Schumpeter's theory, place greater emphasis on technological progress, innovation, and government policies. Both perspectives provide valuable insights into the factors influencing economic growth, but modern theories offer a more complex and dynamic approach to understanding long-term economic growth, including the role of human capital in this process.

This raises the question of the role that human capital plays in these theories. Smith—naturally—did not use the term „human capital“¹, but he emphasized the importance of the division of labor and workers' skills. He argued that specialization and the enhancement of workers' skills lead to increased productivity. Ricardo also did not focus on human capital, but his theory of comparative advantage implies that the development of workers' skills and abilities can influence specialization and international trade. Malthus did not consider human capital in his analyses. He primarily focused on the relationship between population and natural resources, suggesting that population growth leads to resource shortages. The Harrod-Domar model mainly concentrates on the role of physical capital and investment. Human capital is not directly included, although one could argue that investments in education and training may increase the efficiency of physical capital.

In the original Solow model, human capital was not explicitly included. However, later extensions of the model introduced human capital as a key factor influencing productivity and economic growth². A higher level of education and workers' skills leads to greater productivity and the acceleration of technological progress.

Schumpeter emphasized the role of entrepreneurs and innovation in the process of „creative destruction.“ Human capital, in the form of skilled workers and innovative entrepreneurs, is crucial for introducing new technologies and production methods that drive economic growth.

In endogenous growth theories, human capital plays a central role. The theories of Romer and Lucas highlight that investments in education, research, and technological development drive long-term economic growth. Human capital enhances the ability to innovate and adopt new technologies, leading to sustained economic growth.

The AK model, as part of endogenous growth theories, assumes that human capital can influence constant returns to capital. Investments in human capital can lead to continuous economic growth by increasing the efficiency of physical capital and promoting innovation.

Human capital plays diverse roles in different theories of economic growth³. In classical theories, it is often marginalized or considered only indirectly through workers' skills and specialization. In modern growth theories, human capital is a central element, crucial for innovation, adaptation, technology transfer, and long-term economic growth. Investments in education, training, and skill development are considered essential for boosting productivity and promoting sustainable economic growth.

2. HUMAN CAPITAL AND ITS COMPONENTS

Gary Becker (1964), a Nobel Prize laureate in economics, defined human capital as a resource encompassing knowledge, skills, competencies, and character traits that contribute to individuals' ability to create economic value. Theodore Schultz (1961), also a Nobel Prize laureate, viewed human capital as an effective factor of production, whose development through education and training leads to economic growth and social development.

The Organisation for Economic Co-operation and Development (OECD, 2019) defines human capital as the knowledge, skills, competencies, and other attributes of individuals that are relevant to their economic productivity. The World Bank (2018) defines human capital as a resource comprising human health, skills, knowledge, and motivation, which are crucial for individuals to realize their potential and contribute to economic growth.

Based on these definitions, the following definition of human capital is proposed for this study: it is a resource encompassing individuals' knowledge, skills, competencies, health, and character

¹ This term became widely used only in the 1960s due to the works of T. Schultz (1961) and G. Becker (1964), although the significance of the human factor as a determinant of economic growth had been recognized much earlier.

² A significant contribution to the study of human capital as a factor of economic growth in the first half of the 1990s was made by N.G. Mankiw, D. Romer, and D.N. Weil, (1992), who incorporated the process of human capital accumulation into the neoclassical Solow growth model.

³ More on this topic can be found in the comprehensive work by J. Growiec, (2022).

traits, which are developed through education, vocational training, and continuous skill development (experience), enabling them to create economic value, contribute to economic growth, adapt to dynamic labor market changes, and advance their careers.

Knowledge refers to the information and theories that individuals acquire through formal education and self-learning. Skills are practical abilities developed through training and professional experience. Competencies include a broader set of abilities, such as interpersonal, communication, and managerial skills, which are essential in various professional contexts. Health refers to individuals' physical and mental state, which affects their ability to work and productivity. Character traits include attributes such as motivation, determination, and work ethic, which influence individuals' engagement and ability to achieve professional goals. Education, training, and professional experience are key factors that develop and strengthen human capital, leading to higher productivity and the ability to generate economic value.

The adopted definition highlights the comprehensive nature of human capital and its importance in economic processes, economic development, and economic growth. The key components of this concept of human capital are formal education, vocational training, and skill development.

Formal education refers to the systematic process of teaching and learning conducted in educational institutions such as schools, colleges, and universities. It is an organized way of acquiring knowledge, skills, and competencies at various levels, from basic to higher education. Formal education provides individuals with essential literacy and numeracy skills necessary for functioning in society. At higher levels, individuals gain specialized knowledge and skills critical for specific professions and roles. Formal education promotes critical thinking, problem analysis, and intellectual development. Completing formal education is usually certified by diplomas and degrees recognized by employers and institutions. Examples of formal education include primary and secondary schools, universities and other higher education institutions, and undergraduate, master's, and doctoral programs.

Vocational training includes educational programs and practical training focused on acquiring specific skills and competencies necessary for particular occupations. These programs are generally shorter than formal education and more focused on the practical aspects of work. Vocational training allows individuals to acquire specialized skills required in specific professions, such as craftsmanship, technical fields, or healthcare. Participants gain skills that are currently in demand in the labor market, increasing their employability. Vocational training can also be used to upgrade the qualifications of already employed individuals, enabling career advancement or career changes. These programs often include practical exercises, internships, and workshops that provide participants with real-world professional experience. Examples of vocational training include: (1) craft courses (e.g., carpentry, electrical work), (2) technical training (e.g., machine operation, programming), (3) professional certification programs (e.g., nursing courses, accounting courses, language courses).

Skill development refers to the continuous process of enhancing, improving, and updating professional and interpersonal skills. It includes both formal and informal learning methods that contribute to increased productivity and efficiency in the workplace. Rapid technological advancements and labor market changes require continuous skill development to keep up with new demands. Enhancing professional and interpersonal skills leads to higher efficiency and work quality, which, in turn, boosts company productivity. Investing in skill development increases career advancement opportunities and career growth. Employees with a broad range of skills are more attractive to employers. Skill development also contributes to overall personal growth, increasing self-confidence and job satisfaction. Examples of skill development include: (1) on-the-job training, (2) online courses and e-learning platforms, (3) workshops and seminars, (4) mentoring and coaching programs.

3. INTERACTIONS BETWEEN HUMAN CAPITAL AND AI IMPLEMENTATION IN THE CONTEXT OF ECONOMIC GROWTH

The interactions between human capital and the implementation of artificial intelligence (AI) in the context of economic growth can be analyzed at multiple levels (Daco 2024). The mutual influence of these factors is crucial for maximizing the benefits of automation, innovation, and digital transformation. The feedback loop between human capital and artificial intelligence manifests in two ways: on one hand, AI acts as a catalyst for changes in human capital, while on the other hand, human capital is a prerequisite for the effective implementation of AI.

AI as a catalyst for changes in human capital in a few ways: (1) increases demand for new skills, (2) causes reskilling and upskilling and (3) enables new education models (World Economic Forum 2025). AI automates routine tasks, reshaping the structure of labor demand. Workers must develop digital, analytical, and creative skills, as well as adaptability. AI necessitates continuous skill development, posing a key challenge for education policy and the labor market. Companies and governments invest in training programs to help workers adapt to the new technological landscape. AI enables personalized learning and the automation of educational processes, accelerating skill development in a knowledge-based economy.

Human capital is a prerequisite for the effective implementation of AI because it provides: (1) ability to implement and manage AI, (2) innovation and entrepreneurship and (3) ethics and regulation (Brey & Marel 2023; Aon 2023). The mere presence of advanced technologies does not guarantee economic growth. Highly skilled professionals are essential for developing, implementing, and overseeing AI systems. Human capital, particularly in the form of creative leaders and entrepreneurs, is crucial for developing new AI-driven business models. Economic growth associated with AI also requires appropriate regulations and ethical guidelines. Human capital plays a key role in designing responsible AI systems and monitoring their societal impact.

The impact of AI on productivity and economic growth is expressed in: (1) increased productivity, (2) development of new economic sectors and (3) global disparities in AI adoption. AI automates repetitive tasks, allowing workers to focus on more complex, creative, and strategic activities, thereby enhancing their productivity. AI enables the growth of advanced industries such as biotechnology, algorithmic finance, and autonomous transportation systems, creating new job opportunities. Regions with well-developed human capital and AI infrastructure experience faster economic growth, while countries with a shortage of skilled workers may struggle with AI implementation.

Against this backdrop, potential risks and challenges arise, such as: (1) labor market polarization, (2) displacement of traditional jobs and (3) mismatch between education systems and technological change (Cazzaniga et al., 2025). AI may widen the gap between highly skilled workers and those in jobs susceptible to automation, increasing economic inequality. AI-driven changes reshape labor markets, eliminating certain professions and requiring adaptation from both workers and employers. If education systems fail to keep pace with technological advancements, the skills gap between market demands and workforce capabilities may continue to grow.

The interactions between human capital and AI implementation are crucial for future economic growth. AI does not replace human capital but rather complements it, enhancing efficiency and economic development opportunities. However, to fully harness AI's potential, investments in education, training, and skill development are essential to help workers adapt to evolving market conditions.

CONCLUSIONS

1. Synergy between AI and human capital drives economic growth: The integration of AI with human capital significantly enhances productivity, innovation, and economic resilience. AI acts as

a catalyst for efficiency in production and services, while human capital—through skills, creativity, and adaptability—is essential for leveraging AI's full potential. Sustainable economic growth relies on the complementary relationship between technological advancements and human capabilities.

2. Human capital is crucial for effective AI implementation: The successful adoption and management of AI technologies depend heavily on the quality of human capital. Skilled professionals are required not only for developing and operating AI systems but also for ensuring ethical governance and strategic decision-making. Investments in education, reskilling, and continuous skill development are key to maximizing the economic benefits of AI.

3. AI-induced transformations pose both opportunities and challenges: While AI fosters economic growth, it also brings potential risks such as labor market polarization, displacement of traditional jobs, and skills mismatches. To mitigate these challenges, proactive educational and labor market policies are needed, focusing on closing the digital skills gap, supporting lifelong learning, and ensuring that economic growth remains inclusive and equitable.

List of references

1. Aghion, P., & Howitt, P. (1998). *Endogenous Growth Theory*. Cambridge, MA: MIT Press.
2. Aghion, P., & Howitt, P. (2009). *The Economics of Growth*, MIT Press.
3. Galor, O. (2011). *Unified Growth Theory*, Princeton University Press.
4. Aon. (2023, August 17). *How AI will impact human capital in the technology, media and telecoms sectors*. (Retrieved from <https://www.aon.com/insights/articles/2023/how-ai-will-impact-human-capital-in-technology-media-telecoms>).
5. Becker, G.S. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, First Edition, NBER Books, National Bureau of Economic Research.
6. Brey, B., & Marel, E. van der (2023, December 5). *Artificial intelligence and the clustering of human capital*. European Centre for International Political Economy. (Retrieved from <https://ecipe.org/publications/artificial-intelligence-and-the-clustering-of-human-capital/>).
7. Cazzaniga, M., Jaumotte, F., Li, L., Melina, G., Panton, A.J., Pizzinelli, C., Rockall, E.J., and Mendes Tavares, M. (2025). *Gen-AI: Artificial Intelligence and the Future of Work*, Staff Discussion Notes 2024, 001 (2024), accessed February 6, 2025, <https://doi.org/10.5089/9798400262548.006>.
8. Daco, G. (2024, March 22). *Economic growth through capital investment in GenAI*. EY-Parthenon. (Retrieved from https://www.ey.com/en_gl/insights/ai/economic-growth-through-capital-investment-in-gen-ai).
9. Domar, E.D. (1946). Capital expansion, rate of growth, and employment. *Econometrica*, 14(2), 137–147.
10. Growiec, J. (2022). *Accelerating Economic Growth: Lessons From 200,000 Years of Technological Progress and Human Development*, Springer, <https://doi.org/10.1007/978-3-031-07195-9>.
11. Harrod, R.F. (1939). An essay in dynamic theory. *Economic Journal*, 49(193), 14–33.
12. Lucas, R.E. Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
13. Malthus, T. R. (1925). Prawo ludności.
14. Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth, *The Quarterly Journal of Economics*, 107(2), 407–437.
15. OECD. (2019). *Education at a glance 2019: OECD indicators*. OECD Publishing.
16. Piątek, D. (2016). *Instytucje państwa a wzrost gospodarczy w krajach postsocjalistycznych*, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.
17. Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of Political Economy*, 99(3), 500–521.
18. Ricardo, D. (1957). *Zasady ekonomii politycznej i opodatkowania*. PWN.
19. Romer, P.M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037. <https://doi.org/10.1086/261420>.
20. Romer, P.M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part II), S71–S102. <https://doi.org/10.1086/261725>.
21. Schultz, T.W. (1961). Investment in Human Capital, *American Economic Review*, Vol. 51, No. 1 (Mar., 1961), pp. 1–17.
22. Schumpeter, J.A. (1934). *The theory of economic development*. Harvard University Press.

23. Smith, A. (1954). *Badania nad naturą i przyczynami bogactwa narodów*. PWN.
24. Solow, R.M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65–94.
25. Solow, R.M. (1957). Technical change and the aggregate production function. *Review of Economics and Statistics*, 39(3), 312–320.
26. World Bank. (2018). *World development report 2018: Learning to realize education's promise*. World Bank.

DIRBTINIO INTELEKTO IR ŽMOGIŠKOJO KAPITALO SINERGIJA: TVARAUS EKONOMIKOS AUGIMO VAROMOSIOS JĖGOS SKAITMENINĖJE EROJE

Santrauka

Straipsnyje nagrinėjama dinaminė dirbtinio intelekto (DI) ir žmogiškojo kapitalo sąveika kaip esminiai ekonomikos augimo veiksniai. Aptariama, kaip DI veikia darbo rinkos pokyčius, didindamas naujų įgūdžių paklausą, skatindamas perkvalifikavimą ir kompetencijų tobulinimą bei transformuodamas švietimo modelius. Tuo pat metu pabrėžiama svarbi žmogiškojo kapitalo reikšmė efektyviam DI technologijų diegimui, valdymui ir etiniam reguliavimui įvairiose pramonės šakose. Remiantis klasikinių ir šiuolaikinių ekonomikos augimo teorijų apžvalga, straipsnyje analizuojamas DI ir žmogiškojo kapitalo vaidmuo platesniame makroekonominiam kontekste. Pagrindinės hipotezės nagrinėja DI ir žmogiškojo kapitalo integracijos poveikį produktyvumui, inovacijoms ir tvariam ekonomikos vystymuisi. Pabrėžiama, kad DI papildo, o ne pakeičia žmogiškąjį kapitalą, o technologinių naujovių ir žmogaus kūrybiškumo sinergija yra būtina ateities ekonomikos atsparumui užtikrinti. Galiausiai pateikiamos politikos rekomendacijos, susijusios su švietimu, darbo jėgos vystymu ir strategijomis, skirtomis sumažinti riziką, tokią kaip darbo rinkos poliarizacija ir įgūdžių neatitikimai.

Pagrindiniai žodžiai: ekonomikos augimas, dirbtinis intelektas (DI), augimo veiksniai, poveikio mechanizmai.

CLIMATE CHANGE REPORTING ACCORDING TO THE U.S. SECURITIES AND EXCHANGE COMMISSION

Prof. Dr. Ryszard Kamiński
Adam Mickiewicz University in Poznań, Poland

Annotation

The article focuses on the presentation and evaluation of the standards for reporting on companies' climate change achievements developed by the Securities and Exchange Commission in the USA. These standards were adopted in 2024 and will be implemented gradually over several years. Nevertheless, they are already controversial in terms of their practical application by companies. This fact inspired the author to prepare this text. The methodology of the article - a critical analysis of literature sources and legal acts and a comparative method. The article was prepared based on the literature on the subject and the regulations.

Key words: sustainability, corporate reporting, ESG reporting, reporting standards.

INTRODUCTION

In recent years, there has been an effort in various countries to standardise the reporting of climate change achievements by companies. The main rationale behind these efforts was the need for much broader and better disclosure of progress in this area than before. Such measures have been taken in the USA, among others. The organisation that has developed and promoted sustainability standards, including on climate change in this country is the Securities and Exchange Commission (SEC). The first standards for reporting on climate change achievements were adopted in April 2024. The purpose of this article is to present these standards and evaluate them. The article was prepared on the basis of the literature on the subject and the regulations. The method used was a critical analysis of literature sources and legal acts and a comparative method. The legal status as at 31 December 2024 has been taken into account.

1. CONTENT OF REPORTS ACCORDING TO SEC STANDARDS

In 2022, the USA Securities and Exchange Commission (SEC) proposed a new performance reporting rule for companies (The Securities and Exchange Commission, 2022). This is the requirement to report certain climate-related information annually, including how climate risks are identified, assessed, managed and disclosed, and relating to climate change risk management. It was assumed that this requirement would apply to all SEC-listed companies, including those outside the US. It was proposed that companies classified as smaller would have limited climate-related reporting obligations; also, the timing of their introduction is later compared to larger companies. It was optimistically assumed that the first reports would be submitted by large entities as early as 2024 for 2023. This project was widely debated, causing work on it to be prolonged by almost two years. Finally, in March 2024, the Securities and Exchange Commission (SEC) adopted a final resolution on 'Improving and Standardising Climate-related Disclosures' (The Securities and Exchange Commission, 2024). It required US-listed entities to disclose certain climate-related information in their registration statements and annual reports. With this resolution, the SEC introduced a set of mandatory and voluntary sustainability and ESG reporting requirements applicable to US listed companies. Public disclosure documents should include specific climate-related financial data and analyses of greenhouse gas emissions.

The new SEC resolution came into effect as a result of amendments to the Securities Act of 1933 (Securities Act of 1933) and the Securities Exchange Act of 1934 (Securities Exchange Act of 1934), which introduced provisions requiring public companies to include information relating to climate

issues in their. In particular, this concerns:

- climate-related risks that have had or are likely to have a material¹ impact on the company's business strategy, results of operations or financial position;
- the actual and potential material impact of any identified climate-related risks on the company's strategy, business model and prospects.

In addition, if the company has taken measures to mitigate or adapt to significant climate risks as part of its strategy then it should include in its report:

- a quantitative and qualitative description of significant expenditure incurred and the material impact on financial estimates and assumptions made in the strategy;
- information on transition plans, scenario analysis or internal carbon pricing;
- information on management's oversight of climate-related risks and management's role in assessing and managing significant climate-related risks;
- information on any processes used by the company to identify, assess and manage significant climate-related risks and, if the company manages these risks, whether and how such processes are integrated into the company's overall risk management system or processes.
- information about the company's climate-related objectives, if any, which have materially affected or are likely to materially affect the company's operations, performance or financial position; this information includes significant expenditures and material impacts on financial estimates and assumptions as a direct result of achieving the objective or activities directed towards achieving it;
- information on Scope 1 emissions and/or Scope 2 greenhouse gas (GHG) emissions²; this obligation applies to large accelerated entities (LAF³) and accelerated entities (AF⁴) that are not otherwise exempt from the reporting obligation;
- attestation report information at the level of limited assurance ; this obligation applies to entities required to disclose Scope 1 and/or Scope 2 emissions, (for LAF entities - the attestation report is to be at the level of reasonable assurance after a transition period);
- information on capitalised costs, expenses, charges and losses incurred as a result of severe weather events and other natural conditions such as hurricanes, tornadoes, floods, drought, fires, extreme temperatures and sea level rise;
- information on capitalised costs, expenses and losses related to carbon offsets and renewable energy credits or certificates (RECs), if these are a material element of the company's plans to achieve its climate-related objectives;
- a qualitative description of how estimates and assumptions have been developed if the estimates and assumptions the company uses in preparing its financial statements have been materially affected by risks and uncertainties associated with severe weather events and other natural conditions or disclosed climate-related transition targets or plans.

It should be added that the SEC's standards for climate disclosure are based on the TCFD (Task Force on Climate-related Financial Disclosures) standards and therefore, it can be inferred, the correct preparation of reports by U.S. companies will require knowledge of the TCFD guidelines. Companies will be required to disclose climate-related information in their registration statements and annual reports filed with the Commission under the Securities Exchange Act. The rule has been adopted that the required climate-related disclosures should be provided in a separate, appropriately described section of the registration statement or annual report, or in another relevant section of the filing, such as 'risk factors', 'business description' or 'management's discussion and analysis', or

¹ A matter is defined as 'material' if there is a substantial likelihood that a reasonable investor would regard it as important in deciding whether to buy or sell securities or how to vote, or such a reasonable investor would regard the omission of a disclosure as significantly altering the total set of information made available.

² 'Scope 1' (direct) emissions result directly from the burning of fossil fuels to make products, power vehicles or heat buildings, while 'Scope 2' indirect emissions come from energy purchased from utilities.

³ LAF - an issuer that has publicly traded shares worth at least \$700 million as at the last business day of the issuer's most recently completed second fiscal quarter.

⁴ AF - is an issuer that has publicly traded shares of at least \$75 million but less than \$700 million as at the last business day of the issuer's most recently completed second fiscal quarter.

alternatively, by including such disclosure in another filing submitted to the Commission.

2. ENTITIES COVERED BY SEC STANDARDS

The standardisation of climate-related disclosures applies to all listed SEC reporting companies, including foreign private issuers. The first companies to comply are those that the SEC defines as large accelerated reporting entities (LAFs), i.e. listed companies with a market capitalisation in excess of USD 700 million. However, the SEC regulations also apply to smaller entities.

For large companies, the SEC's climate disclosure requirements will take effect from 2025. However, large fast-track filers have been required to start preparing for such reporting from 2024 onwards, in particular assessing their approach to monitoring and estimating climate-related risks and Scope 1 and 2 greenhouse gas emissions and recording related other information. In 2026, companies qualified as LAFs will have to disclose SEC reports (Reg S-K and S-X) under the first set of climate disclosure standards for the 2025 financial year. Climate change and GHG emissions reporting obligations will also be phased in for other companies. The specific date will depend on the status of the company, i.e. registered:

- a) as an LAF,
- b) as an Accelerated Filer (AF),
- c) as a Non-Accelerated Filer (NAF⁵),
- d) as a Smaller Reporting Company (SRC⁶) or
- e) as an Emerging Growth Company (EGC⁷).

It is worth mentioning that - in accordance with the Commission's requirements - companies that fail to comply with the disclosure obligations may have to pay a substantial fine and may also be subject to penalties for causing damage by damaging the company's reputation and increasing risks for investors.

By adopting SEC standards, the USA has joined other countries, including China, European Union member states, India, Chile, Egypt, and the UK, which also require climate reporting by public companies (D. Noor, 2024). The process of diffusion of these standards in the USA has been extended through a law taken up in the state of California requiring large companies to account in detail for their greenhouse gas emissions - starting in 2026 (Sidley, 2023). The California climate disclosure rules include Senate 253 (SB 253): The Climate Corporate Data Accountability Act (California Government, 2023,a) and Senate 261 (SB 261): The Climate-Related Financial Risk Act (California Government, 2023,b)⁸.

The laws will require companies to disclose carbon emissions and climate-related financial risks. The laws are focused on corporate disclosures and do not regulate actions that companies should take to reduce their carbon emissions. SB 253 is the Climate Corporate Data Accountability Act, which requires large businesses in California to publicly report their greenhouse gas emissions annually, in accordance with the Greenhouse Gas Protocol. From 2026, companies will have to report on their direct and indirect emissions (Scope 1 and Scope 2). In the following year, Scope 3 emissions — i.e. companies' indirect supply chain emissions — must also be included in the reporting scope. Businesses must obtain third party assurance by a verifying company with expertise in carbon accounting, which will be overseen by the California Air Resources Board (CARB). SB 261 is the Climate-Related Financial Risk Act, which requires companies to bi-annually disclose threats they will face as a result of climate change. Reporting must include physical and transition risks faced by the business, as well as an outline of mitigation measures and strategies. Submissions are reviewed by

⁵ NAFs - are entities that are not large accelerated reporting entities, accelerated reporting entities or smaller reporting companies.

⁶ SRC - is the smaller company making the report.

⁷ EGC - is a company qualified as an 'emerging growth company'.

⁸ On September 27, 2024, California Governor Gavin Newsom signed Senate Bill (SB) 219 "Greenhouse gases: climate corporate accountability: climate-related financial risk", which updates certain provisions outlined in the two 2023 bills. There have been changes to specific details, such as some of the deadlines and disclosure dates for Scope 3 greenhouse gas emissions (California Government, 2024).

California's Climate-Related Risk Disclosure Group. Companies should align with the Task Force on Climate-related Financial Disclosure (TCFD) framework, or another format that meets TCFD recommendations (Carbon Chain, 2023). As you can see, these laws will impact both public and private companies doing business in California who meet certain annual revenue thresholds. The rules could potentially impact businesses required to report under the US SEC's climate disclosure rules, who may need to report under the California laws as well as under a more extensive scope. It is expected that this provision will affect some 5300 companies located in California, including the likes of Chevron, Wells Fargo and Amazon (D. Noor, 2024).

3. COMMENTS ON SEC STANDARDS

The main objective of the new mandatory climate disclosure rules adopted by the SEC is to standardise and enhance the usefulness of sustainability reporting for companies themselves, as well as ESG-related information for investors. Many US companies currently apply different sustainability reporting standards and frameworks, which does not serve comparability. The SEC's resolution unifies the reporting regime by imposing common ESG and climate reporting principles that appear to meet most of the needs of regulators, investors and other stakeholders. The SEC is unequivocal on this - in the Explanatory Memorandum to the resolution, which reads "We are proposing to require disclosures about climate-related risks and metrics reflecting those risks because this information can have an impact on public companies' financial performance or position and may be material to investors in making investment or voting decisions" (The SEC's Mandatory Climate Risk Disclosure Plan). One has to agree with this argumentation. Indeed, the new reporting will allow investors to gain a greater understanding of the risks that the climate crisis poses to corporations and how they contribute to global warming.

It should be noted that the SEC's resolution is also generating discontent among some corporate interest groups and Republican government officials. They argue that its requirements are a manifestation of undue interference in the work of corporate boards of directors - not only of listed companies, but also of other companies, such as small businesses that buy products from larger corporations, which will have to report on their climate impacts. In their view, this imposes disclosure obligations on other unlisted private companies and multinationals that are not formally under the purview of the SEC (D. Noor, 2024).

Commentators also highlight that the SEC's proposed climate-related disclosure rules will be one of many rules for US companies to report on ESG issues. This is especially so given that other standards and frameworks focus more strongly on social issues, including disclosure of board diversity, hiring practices, workplace culture, employee wellbeing efforts or equality and inclusion (The SEC's Mandatory Climate Risk Disclosure Plan). Thus, the resolution's goal of harmonising reporting rules across the US will not be fully achieved.

CONCLUSIONS

1. In the last decade or so, there has been clear pressure throughout the world for companies to take measures aimed at reducing their negative impact on the natural environment and causing adverse climate change. This pressure is exerted, among other things, through the introduction of new reporting obligations. Regulations for reporting on this topic have been introduced in the USA. Their aim is not only to make corporate managements aware of the risks of their adverse environmental impact (including those resulting in financial problems), but - more importantly, one can assume, for the creators of these regulations - to induce these bodies to take action to protect the environment and combat climate change.

2. The SEC standards are domestic standards, but will also cover foreign companies operating

in the USA. Thus, their familiarity will be important for many companies operating internationally. The standards focus primarily on climate issues; social and governance issues are not given sufficient prominence. This is due to the SEC's motivation to introduce standards that primarily emphasise the information needs of investors - treating the expectations of other company stakeholders (e.g. communities, employees) as secondary. The introduction of nationwide business regulation in the USA is a complex process, due to the country's legal system consisting of federal regulations and state regulations. It is conceivable that further specific non-financial reporting standards relating to other areas of companies' activities (social, employee) will be developed by the SEC in the future. This will probably take place after the currently introduced regulations have become firmly established in the practice of companies.

List of references

1. *California climate disclosure rules: What companies need to know about SB253 and SB261*, Carbon Chain 2023, https://www.carbonchain.com/carbon-reporting/california-disclosure-sb253-sb261?utm_term=&utm_campaign=Leads-DSA&utm_source=adwords&utm_medium=ppc&hsa_acc=8717044976&hsa_cam=19073635133&hsa_grp=147785089870&hsa_ad=712968880533&hsa_src=-g&hsa_tgt=dsa-19959388920&hsa_kw=&hsa_mt=&hsa_net=adwords&hsa_ver=3&gad_source=1&gclid=Cj0KCQIAvP-6BhDyARIsAJ3uv7YidZblGH5SzeSwGFKE9ULnPfzKpbU6pYOKe9QxnfnkSdocY-80r1W0aAqzPEALw_wcB, access: 21.11.2024.
2. *California Enacts Novel Disclosure Requirements for the Voluntary Carbon Market and Green Claims*, Environmental Update, (Oct. 17, 2023), <https://www.sidley.com/en/insights/newsupdates/2023/10/california-enacts-novel-disclosure-requirements-for-the-voluntary-carbon-market-and-green-claims>, access: 19.03.2024.
3. Noor D., *US regulators approve significantly scaled back climate disclosure rule*, The Guardian, Wed 6 Mar 2024, <https://www.theguardian.com/business/2024/mar/06/us-sec-climate-change-emissions-disclosure>, access: 8.04.2024.
4. *Senate Bill No. 253, CHAPTER 382, An act to add Section 38532 to the Health and Safety Code, relating to greenhouse gases, and making an appropriation therefor*, Approved by Governor October 07, 2023, Filed with Secretary of State October 07, 2023, California Government 2023 a, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB253, access: 21.11.2024.
5. *Senate Bill No. 261, CHAPTER 383, An act to add Section 38533 to the Health and Safety Code, relating to greenhouse gases, and making an appropriation therefor*, Approved by Governor October 07, 2023. Filed with Secretary of State October 07, 2023, California Government 2023,b, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB261, access: 21.11.2024.
6. *Senate Bill No. 219, CHAPTER 766, An act to amend Sections 38532 and 38533 of the Health and Safety Code, relating to greenhouse gases*, Approved by Governor September 27, 2024. Filed with Secretary of State September 27, 2024, California Government 2024, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB219, access: 21.11.2024.
7. *The SEC's Mandatory Climate Risk Disclosure Plan*, <https://www.brightest.io/sec-climate-disclosure-rules>, access: 13.06. 2024.
8. *The Securities Act of 1933*, <https://www.govinfo.gov/content/pkg/COMPS-1884/pdf/COMPS-1884.pdf>.
9. *The Securities Exchange Act of 1934*, <https://www.govinfo.gov/content/pkg/COMPS-1885/pdf/COMPS-1885.pdf>.
10. The Securities and Exchange Commission, *The Enhancement and Standardization of Climate-Related Disclosures for Investors* (2022), Release Nos. 33-11042; 34-94478; File No. S7-10-22, <https://www.sec.gov/rules/proposed/2022/33-11042.pdf>.
11. The Securities and Exchange Commission, *The Enhancement and Standardization of Climate-Related Disclosures for Investors* (2024), Release Nos. 33-11275; 34-99678; File No. S7-10-22, <https://www.sec.gov/files/rules/final/2024/33-11275.pdf>.

JAV VERTYBINIŲ POPIERIŲ IR BIRŽŲ KOMISIJOS KLIMATO POKYČIŲ ATASKAITOS

Santrauka

Straipsnyje aptariami JAV Vertybinių popierių ir biržų komisijos parengti ataskaitų apie įmonių pasiekimus klimato kaitos srityje pateikimo ir vertinimo standartai. Šie standartai buvo priimti 2024 m. ir bus įgyvendinami palaipsniui per kelerius metus. Nepaisant to, jie jau dabar kelia daug diskusijų dėl praktinio jų taikymo bendrovėse. Šis faktas paskatino autorių pasidomėti šiuo klausimu ir parengti šį straipsnį. Straipsnio metodika – kritinė literatūros šaltinių ir teisės aktų analizė bei lyginamasis metodas. Straipsnis parengtas remiantis šia tema pateikta literatūra ir reglamentais.

Pagrindiniai žodžiai: tvarumas, įmonių atskaitomybė, ESG atskaitomybė, atskaitomybės standartai.

INFORMATION AND COMMUNICATION TECHNOLOGIES IN ENSURING DIGITAL SECURITY IN HIGHER EDUCATION INSTITUTIONS: POLICIES, STRATEGIES, AND INTERNATIONAL EXPERIENCE

Khovrak Ivan

Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine

Annotation

This article analyses the role of information and communication technologies (ICT) in ensuring the digital security of higher education institutions (HEIs). The study examines key threats affecting the digital infrastructure of HEIs and explores cybersecurity policies and strategies adopted by leading HEIs worldwide, as well as their adaptation to international digital security standards. The paper proposes an adaptive digital security management model for Ukrainian HEIs and formulates practical recommendations for its implementation.

Key words: digital security, cyber threats, higher education institutions, international standards, information and communication technologies, management, model, integrated approach, security culture.

INTRODUCTION

In the modern era of digital transformation, higher education institutions (HEIs) are actively integrating information and communication technologies (ICT) into all aspects of their activities, including educational processes, scientific research, and administrative management. While this integration enhances educational efficiency, expands access to knowledge, and fosters global academic collaboration, it also introduces new challenges in digital security. The use of cloud services, e-learning systems, and big data analytics increases the risk of cyber threats, data leaks, and unauthorised access to management systems.

According to EDUCAUSE (2023), nearly two-thirds of HEI leaders consider digital security one of the primary concerns, with data protection ranking second among key challenges after student enrolment. This underscores the critical necessity of strengthening digital security policies and implementing effective cybersecurity mechanisms in higher education. In recent years, many researchers and experts have identified the primary cyber threats posed by ICT applications, which affect not only private enterprises and government organisations (Kaur, 2022) but also HEIs (Hart, 2020).

Digital security in HEIs has become a strategic priority, requiring an integrated approach that includes the development and implementation of unified management policies, the use of advanced technological solutions (such as multi-factor authentication, data encryption, and real-time threat monitoring), and systematic training of staff and students in cybersecurity hygiene. Global educational and research communities are already adapting international standards to the educational environment, forming comprehensive digital security policies that reduce risks and enhance the resilience of digital systems. Despite the implementation of individual security measures, Ukrainian HEIs remain vulnerable to attacks due to the absence of a comprehensive digital security approach, posing risks to the long-term security of the higher education digital ecosystem.

1. METHODS

The objective of this study is to analyse the role of ICT in ensuring digital security in HEIs, assess international experiences, and develop an adaptive digital security management model for Ukrainian HEIs. To achieve this goal, the study aims to address the following research tasks: 1) Analyse the primary cyber threats to HEIs and their impact on digital security management; 2) Explore digital security strategies and policies of leading HEIs worldwide; 3) Assess the application of

international digital security standards in higher education; 4) Develop an adaptive digital security management model for Ukrainian HEIs.

To accomplish these objectives, the study employs the following research methods: content analysis, comparative analysis, case study methodology, classification and categorisation methods, empirical generalisation, and a systematic approach. The scientific novelty of this research lies in the development of a universal risk management model applicable to both Ukrainian and international HEIs. The practical significance of the study is determined by its potential implementation by HEI management to enhance the cyber resilience of digital infrastructures.

Thus, this research aims to solve an urgent scientific and practical problem of improving the level of digital security in higher education institutions through the integration of modern ICT, risk management strategies, and international cybersecurity practices.

2. RESULTS

Over the past decade, the digital transformation of educational processes has led to the widespread integration of ICT in the higher education sector. While enhancing the efficiency of learning and administrative processes, this shift has also resulted in an increase in the number and complexity of cyber threats. Table 1 presents an analysis of cyber threats specifically adapted to the unique characteristics of HEIs, which include:

- 1) Open academic environment – Frequent information exchange, open access to research findings, and international collaboration.
- 2) Diverse user base – A large number of students, faculty, researchers, and administrative staff, increasing the likelihood of security misconfigurations or user errors;
- 3) Legacy systems – Due to budget constraints or research-specific needs, some institutions operate outdated or insufficiently integrated security measures;
- 4) High-value scientific information – Unique research data, intellectual property, and academic findings are attractive targets for malicious actors.

These factors necessitate a tailored cybersecurity approach by distinguishing two key threat classification criteria: 1) Attack source (external or internal); 2) Attack vector (penetration channel or vulnerability exploitation method, e.g., social engineering, malware, large-scale attacks, technological vulnerabilities, etc.).

Table 1. *Major cyber threats and their impact on HEIs*

Classification Criteria	Threat Type	HEI-Specific Characteristics	Impact on the CIA Triad
Source: External Vector: Social Engineering (Phishing via Emails and Messengers)	Phishing & Social Engineering	Fraudulent messages imitating official HEI communications or partner organisations, targeting students, faculty, and administrative accounts.	Confidentiality: Compromise of user credentials. Availability: Disruption of access to educational resources
Source: External Vector: Malware (Ransomware Encrypting Data)	Ransomware	Attacks on servers storing research data and academic databases, particularly those with grant-related or intellectual property information, leading to potential paralysis of research and learning activities.	Availability: Loss of access to critical data Confidentiality: Risk of data leaks during recovery

Source: External Vector: Large-Scale Attack (Network Overload, DDoS)	DDos Attacks	Attacks targeting university web portals, online learning platforms, and research infrastructures, particularly during exams or academic conferences, causing temporary service outages.	Availability: Disruption of critical educational and administrative functions
Source: External Vector: Supply Chain Exploitation (Compromising External Services)	Supply Chain Attacks	Exploiting vulnerabilities in external cloud services, e-learning platforms, or partner institutions to gain unauthorised access to HEI internal systems.	Confidentiality / Integrity: Risk of academic data tampering or theft, reputational damage
Source: Internal Vector: Human Factor (Negligence or Malicious Actions)	Insider Threats	The open academic environment fosters negligence or intentional security breaches by staff and students (e.g., storing sensitive data on personal devices, using unsecured networks).	Confidentiality / Integrity: Leakage of research and personal data Availability: Disruption of internal processes
Source: Internal / Environmental Exploitation Vector: Technological Vulnerability (Legacy Systems)	Legacy Systems & Outdated Software	Budgetary constraints result in outdated hardware and software lacking timely security updates, increasing system vulnerabilities.	Integrity / Availability: Risk of system failures and unauthorised modifications
Source: Internal / Environmental Exploitation Vector: Misconfiguration (Incorrect Setup of IoT/Cloud Services)	Misconfiguration of IoT / Cloud Services	Improper configuration of remote learning systems, conference halls, security cameras, and other IoT devices, creating unauthorised access risks.	Confidentiality / Availability: Potential data leaks, service disruptions
Source: External Vector: Multi-Stage Attack (Gradual Penetration)	Advanced Persistent Threats (APT)	Targeted attacks on research institutions to obtain exclusive research data, patented technologies, and confidential academic materials, leveraging HEIs' high innovation levels and international collaborations.	Confidentiality / Integrity / Availability: Strategic data theft, academic process disruption, reputational risks
Source: External Vector: AI-Based Attacks (Evasion of Security Mechanisms Using AI)	AI-based Attacks	Exploiting artificial intelligence to bypass traditional security measures on university platforms (e-learning systems, digital libraries, research management systems), making threat detection more challenging.	Confidentiality / Integrity / Availability: High risk of systemic breaches and data leaks due to sophisticated evasion tactics

This classification approach ensures clear differentiation of threats and provides a structured foundation for developing targeted countermeasures within HEIs. Cyber threats significantly impact digital security management in HEIs, leading to potential losses of sensitive data, financial losses, reputational damage, and disruptions to academic processes. To effectively manage digital security, comprehensive strategies must be implemented. These include regular system updates, cybersecurity training for staff and students, and the development of incident response plans (Savchenko, V. Makliuk, O., 2024). The management aspects of the impact of cyber threats on HEIs are presented in Table 2.

Table 2. *Management Aspects of Cyber Threats in HEIs*

Aspect	Description	Management Measures
Strategic Planning	Defining long-term digital security goals and integrating strategy into the HEI mission.	- Development of a strategic plan - Establishment of KPIs - Approval of the strategy by HEI leadership
Organisational Structure	Establishing specialised cybersecurity departments and distributing responsibilities across HEI units.	- Appointment of a Chief Information Security Officer (CISO) - Formation of a cybersecurity committee - Development of internal incident response procedures
Human Resource Policy	Improving staff qualifications and fostering a security culture in the academic environment.	- Regular training and certification programs - Encouragement of participation in internal awareness programs - Conducting simulated cyber incidents
Budgeting	Optimisation of cybersecurity expenditures and justification of investments through cost-benefit analysis.	- Allocation of dedicated budget lines - Conducting cost-benefit analysis - Securing additional funding through grants or government programs
Regulatory Compliance Audits	Ensuring compliance with legal requirements (e.g., GDPR, national legislation, ISO standards) and integrating them into internal policies.	- Regular compliance audits - Development of internal policies aligned with international standards - Legal support and expert consultations
Collaboration with Partners	Cooperating with external cybersecurity service providers and experts for proactive threat mitigation.	- Establishing partnership agreements - Organising joint seminars and research initiatives - Utilising external security audits and expert consultations to enhance cybersecurity levels

To minimise risks and enhance the resilience of the HEI information infrastructure, digital security must be integrated into the institution's overall strategic development plan. This requires the development of adaptive security management models, considering the unique characteristics of open academic environments. At the same time, it is crucial to establish regular communication between HEI departments and integrate external cybersecurity experts for rapid incident response. Additionally, modern risk assessment methods and cost analysis should be employed to justify cybersecurity investments (Table 3). A comprehensive management approach will not only protect critical data and processes but also enhance trust in ICT and HEI digital systems, which is a vital factor in ensuring long-term sustainability in the dynamic digital landscape.

Table 3. *Recommended cyber threat mitigation measures for HEIs*

Threat Type	Recommended Countermeasures	Risk Level
Phishing & Social Engineering	Cyber hygiene training, multi-factor authentication (MFA), email filtering systems, simulated attacks.	High
Ransomware	Regular data backups, network segmentation, advanced antivirus solutions, Disaster Recovery Plan (DRP) development, continuous system monitoring.	Very High
DDoS Attacks	Content Delivery Networks (CDN), specialised anti-DDoS solutions, distributed network monitoring, load balancing policies.	High
Supply Chain Attacks	Security audits of third-party providers, inclusion of cybersecurity requirements in contracts, access control restrictions, integration of security monitoring systems.	Very High
Insider Threats	Strengthening access control policies, regular cybersecurity training, activity monitoring, User Behavior Analytics (UBA/UEBA) implementation.	High
Legacy Systems & Outdated Software	Regular updates, patch management, IT infrastructure audits, deployment of modern firewalls and antivirus solutions.	High
Misconfiguration of IoT / Cloud Services	Configuration in accordance with international standards, regular audits, automated testing, development of IoT security policies.	High
Advanced Persistent Threats (APT)	Security Information and Event Management (SIEM) integration, behavioural analytics, network segmentation (separating research laboratories), regular penetration testing, Incident Response Plan (IRP) development.	Very High
AI-Based Attacks	Development of adaptive AI-driven defence algorithms, anomaly detection solutions, continuous system updates, integration with SIEM, collaboration with cybersecurity research centres.	Very High

Leading HEIs worldwide have developed and implemented comprehensive digital security strategies aimed at protecting their information resources. Table 4 presents a comparative analysis of cybersecurity strategies and policies adopted by the top five global universities based on the QS World University Rankings 2025. This analysis is based on content evaluation of publicly available information from official HEI websites.

Table 4. *Overview of digital security strategies in the top 5 HEIs (QS World University Rankings 2025)*

Rank	University	Cybersecurity Strategy and Policy	Organisational Structure
1	Massachusetts Institute of Technology (MIT) (Cambridge, USA)	A comprehensive and dynamically updated security policy covering risk management, data protection, and regulatory compliance. This policy is integrated into the overall IT infrastructure, regularly enhanced through audits, training programs, and the adoption of advanced technologies (e.g., automated threat monitoring and analytics systems).	Information Systems & Technology (IS&T) manages IT resources, while research groups (notably CSAIL) focus on cybersecurity innovation and research.
2	Imperial College London (London, United Kingdom)	A detailed data protection policy that governs access management, IT system monitoring, multi-factor authentication (MFA), and rapid response to cyber threats. The strategy includes systematic security checks, vulnerability analysis, and continuous standard updates based on emerging threats.	ICT Services – a specialised department responsible for cybersecurity implementation within the university's IT infrastructure, technical support, threat monitoring, and risk management.
3	University of Oxford (Oxford, United Kingdom)	A formalised security policy defining data access, storage, and processing in compliance with international standards (e.g., GDPR) and risk management practices. The strategy includes data encryption, multi-layered authentication, and event-driven security management systems.	Oxford University IT (OUIT) – a centralised entity responsible for the implementation, support, and monitoring of cybersecurity measures across all university operations.
4	Harvard University (Cambridge, USA)	A comprehensive policy focused on protecting sensitive information, research data, and personal records. The strategy includes risk management, encryption, regular audits, and training initiatives to enhance cybersecurity awareness among staff and students.	Harvard ISDP team oversees policy enforcement, monitors IT systems, and manages incident response, ensuring seamless integration of security measures into all university functions.
5	University of Cambridge (Cambridge, United Kingdom)	An officially established security policy that sets standards for data access, risk management, and IT system reliability. The strategy emphasises regulatory compliance, data encryption, authentication technologies, and continuous threat monitoring.	University Information Services (UIS) – a specialised unit responsible for cybersecurity enforcement, threat monitoring, and IT system support.

An analysis of university websites reveals that each of the top-ranked HEIs has a well-documented digital security strategy, covering all key aspects: risk management, data protection, compliance with international standards, and rapid incident response. These comprehensive strategies integrate technical, organisational, and educational measures to ensure a high level of digital security. All leading HEIs have dedicated cybersecurity divisions that centrally coordinate information security initiatives. These divisions are responsible for policy implementation, system monitoring, and rapid security response. Their structured approach facilitates efficient IT resource management and ensures swift action in the event of cyber incidents, which is crucial for maintaining the uninterrupted functioning of academic and research activities. It is worth noting that education and research play a central role in these strategies. Leading HEIs integrate specialised cybersecurity courses into their curricula, covering both theoretical foundations (e.g., risk management, cryptography, digital

hygiene) and practical applications (e.g., laboratory simulations, cyber incident response training, and case studies). Regular hands-on training further equips students and staff with practical skills for responding to cyber threats. The establishment of dedicated research centres and cybersecurity laboratories (such as MIT CSAIL or Oxford Internet Institute) fosters innovation in digital security solutions. These institutions conduct cutting-edge scientific research, frequently publishing in leading academic journals, which contributes to the continuous advancement of cyber threat detection methodologies and risk management frameworks.

Collaboration, partnerships, and effective incident management play a vital role in HEI cybersecurity. Top universities actively engage with government agencies, the private sector, and international organisations, facilitating the exchange of technological innovations, the standardisation of security procedures, and the joint development of advanced cybersecurity solutions. All analysed HEIs have clearly defined incident response procedures, including proactive planning, regular cyberattack simulations, continuous threat monitoring, and real-time response mechanisms. These standardised security frameworks minimise the impact of cyber incidents and ensure the seamless continuity of educational and research operations.

International digital security standards play a crucial role in shaping effective information protection systems within HEIs (Table 5). The analysed international standards not only establish general requirements and recommendations for the protection of information systems and data but also promote the unification of security approaches, ensure compatibility across different systems, and enhance the overall security level of HEIs.

Table 5. *Comparison of international digital security standards*

Standard	Purpose	Key Components	Relevance for HEIs
ISO/IEC 27001:2022	Development, implementation, and maintenance of Information Security Management Systems (ISMS).	Risk-based approach: security policies, risk assessment, monitoring, auditing, incident response, and continuous improvement.	Provides a structured and systematic framework for managing cybersecurity risks, ensuring regulatory compliance, and enhancing trust in university IT systems.
ISO/IEC 27701:2019	Extension of ISO/IEC 27001 to incorporate privacy information management, ensuring GDPR compliance.	Integration with ISMS, personal data management, adherence to international privacy regulations.	A critical standard for protecting student and faculty personal data, allowing HEIs to effectively manage information privacy while ensuring compliance with global legal requirements.
NIST Cybersecurity Framework 2.0 (2024)	A flexible risk-management framework for cybersecurity governance, based on industry best practices.	Five core functions: Identify, Protect, Detect, Respond, Recover.	Enables HEIs to tailor security measures to their unique needs, improving cyber resilience and rapid response capabilities.
ISO/IEC 15408-1:2022 (Common Criteria)	Establishes evaluation criteria for the security certification of IT products and systems.	Certification methodology, assessment of security functionality and assurance levels, validation of security mechanisms.	Ensures high trust levels for IT products used in education and research, helping universities select secure and certified technological solutions.

International standards and EU cybersecurity policies enable the development of structured approaches to ensuring digital security in HEIs, which is particularly relevant in the context of globalisation and the increasing complexity of cyber threats. The EU Cybersecurity Strategy defines key directions for enhancing Europe's digital resilience by strengthening the protection of critical infrastructures, advancing cutting-edge cybersecurity technologies, and fostering international cooperation. This strategy aims to establish a unified and integrated approach to cyber

risk management, which helps reduce vulnerabilities and enhance trust in digital services. The EU Directive 2022/2555 (NIS2) introduces mandatory cybersecurity measures for risk management, strengthening information systems, and implementing standardised incident reporting procedures, ensuring a high level of cybersecurity for critical EU infrastructures. Modern HEIs can leverage the provisions of these strategies and directives as a foundation for building their own digital security frameworks, particularly in the following ways:

1) Adapting Risk Management Standards – HEIs can integrate the principles of the EU cybersecurity strategy and NIS2 Directive into their internal risk management processes, conducting regular audits, vulnerability assessments, and developing comprehensive incident response plans.

2) Developing and Implementing Incident Reporting Procedures – HEIs can establish internal standardised procedures for rapid response to cyber incidents, thereby minimising the negative impact on educational and research activities.

3) Enhancing IT Supply Chain Security – EU cybersecurity policies can encourage HEIs to expand their security policies to include supplier security assessments, which is critical for ensuring the stability of university information systems.

4) International Cooperation and Knowledge Exchange – The NIS2 Directive can facilitate greater integration at the European level, allowing HEIs to participate in joint cybersecurity programs, forums, and research initiatives, thereby advancing best practices in digital security.

5) Serving as a Benchmark for Internal Policies – Even if an HEI is not directly subject to NIS2 requirements, its principles can serve as a reliable benchmark for developing high cybersecurity standards in line with leading European practices.

The analysis indicates that integrating international cybersecurity standards (ISO/IEC 27001, ISO/IEC 27701, NIST Cybersecurity Framework, ISO/IEC 15408) enables the creation of a comprehensive cybersecurity management system, aligned with the modern requirements of digital transformation in higher education. The combination of these standards with leading European cybersecurity strategies (such as the EU Cybersecurity Strategy and NIS2 Directive) not only helps reduce cybersecurity risks but also creates opportunities for innovation-driven growth and cross-border collaboration in the field of cybersecurity.

3. DISCUSSION

The conducted study confirms the necessity of developing an adaptive digital security management model for Ukrainian higher education institutions (HEIs). This model is based on three fundamental components – managerial, technical, and organisational – each aimed at enhancing the overall level of security for HEI information resources through the implementation of effective strategies, ICT solutions, and performance evaluation mechanisms (Table 6). A comprehensive approach is crucial, as cyber threats are multifaceted and require both strategic and operational responses.

The managerial component encompasses regulatory compliance, security policy development, auditing, and the establishment of cybersecurity governance structures. Its effectiveness is assessed based on the regularity of security audits, incident response speed, and the reduction in unauthorised access attempts. The use of Security Information and Event Management (SIEM) systems and risk management platforms ensures centralised threat monitoring and proactive security planning.

The technical component involves the deployment of modern cybersecurity technologies, including firewalls, Intrusion Detection/Prevention Systems (IDS/IPS), VPN solutions, and encryption mechanisms. The effectiveness of this component is measured by the reduction in vulnerabilities, the speed of threat detection, and the number of successfully prevented cyberattacks. The integration of solutions from leading cybersecurity firms ensures a high level of protection and compliance with international cybersecurity standards.

Organisational Component: The human factor remains one of the most critical cybersecurity risks, making the organisational component essential. It includes staff and student training, cyber

incident simulations, and the establishment of a cybersecurity culture within HEIs. Effectiveness assessment involves measuring staff cybersecurity awareness, the number of training sessions conducted, and response times during simulated cyberattacks. The use of educational platforms allows HEIs to integrate cybersecurity training modules into academic curricula, thereby fostering a sustainable cybersecurity culture.

Table 6. *Adaptive digital security management model for Ukrainian HEIs*

Component	Key Measures	ICT Tools	Performance Evaluation (KPIs)
Managerial	- Development and implementation of security policies - Establishment of cybersecurity units - Conducting audits and risk assessments - Centralised monitoring of IT systems and ICT infrastructure	SIEM systems (e.g., Splunk, QRadar), risk management platforms, data analytics systems	- Reduction in unauthorised access incidents - Frequency of audits - Incident response time
Technical	- Implementation of IDS/IPS systems - Adoption of modern encryption technologies - Network segmentation and VPN implementation - Regular software updates and patch management	Firewalls, IDS/IPS systems (e.g., Snort, Suricata), VPN solutions, antivirus software, patch management tools	- Reduction in detected vulnerabilities - Improvement in threat detection rates - Number of blocked incidents per period
Organisational	- Regular cybersecurity training and workshops - Development and testing of incident response plans - Establishing a cybersecurity culture through internal communication	E-learning platforms (e.g., Moodle, Coursera for Campus), cyber incident simulation systems, communication platforms (e.g., Microsoft Teams)	- Number of training sessions conducted - Staff cybersecurity awareness levels (survey-based) - Response time during cybersecurity simulations

The proposed adaptive digital security management model ensures a comprehensive approach to cybersecurity in HEIs, combining managerial measures (policies, procedures, audits), technical safeguards (hardware and software solutions), and organisational initiatives (education, awareness campaigns, and cybersecurity culture). The model is based on leading international standards and best practices, as demonstrated by successful case studies from world-class universities. Implementing this model in Ukrainian HEIs will strengthen cybersecurity, protect digital assets, and enhance trust in online educational services. To systematically integrate cybersecurity standards into HEI security frameworks, the following algorithmic approach is proposed:

- 1) Assessment of Current Security Posture – Conduct an audit of existing security measures, identifying key vulnerabilities and risks.
- 2) Selection of Relevant Security Standards – Determine which international standards apply, ensuring alignment with HEI needs.
- 3) Development of an Implementation Plan – Create a step-by-step roadmap, defining the financial, human, and technological resources required.
- 4) Integration of Policies and Procedures – Develop internal security policies aligned with selected standards; establish incident response, auditing, and monitoring protocols.
- 5) Cybersecurity Training for Personnel – Conduct staff and student cybersecurity training, ensuring continuous knowledge updates.

- 6) Implementation and Testing – Deploy security controls, conduct penetration testing, and identify potential weaknesses.
- 7) Ongoing Monitoring and Audits – Perform regular internal and external security audits, continuously updating security policies based on emerging threats.
- 8) Reporting and Continuous Improvement – Generate security reports for HEI leadership and adjust strategies based on audit findings and evolving cyber risks.

CONCLUSIONS

1. The analysis of cyber threats in the higher education sector led to the development of a classification system identifying key cybersecurity challenges faced by HEIs, including DDoS attacks, phishing, credential compromise, cloud service vulnerabilities, and insufficient digital literacy among staff and students. These threats can result in significant academic and financial losses, necessitating robust risk management strategies, expanded security measures, and enhanced cybersecurity awareness within the academic community.

2. The analysis of digital security strategies and policies adopted by leading universities such as MIT, Harvard, and Oxford has demonstrated the critical importance of comprehensive cybersecurity strategies. These strategies are founded on risk management policies, multi-factor authentication, regular system audits, and structured cybersecurity training programs. A key aspect of these strategies is the establishment of centralised cybersecurity departments and continuous threat monitoring. A holistic approach, which integrates high-quality educational programs, active research initiatives, effective partnerships, and structured incident management, serves as the foundation for sustainable cybersecurity governance. Adapting these proven best practices to Ukrainian HEIs would not only enhance the protection of information resources but also develop a skilled workforce capable of effectively countering modern cyber threats. Therefore, it is crucial for Ukrainian HEIs to design modular programs that will train specialists in the implementation of advanced information security technologies. It is also recommended to support research projects through the creation of joint cybersecurity laboratories and the acquisition of grant funding. Furthermore, Ukrainian HEIs should establish collaborations with both local and international partners to effectively integrate global cybersecurity standards into national educational frameworks.

3. Additionally, Ukrainian HEIs are advised to develop a robust security monitoring and response system, incorporating internal training programs and real-world scenario-based testing to enhance cybersecurity preparedness. The evaluation of international cybersecurity standards confirmed their critical role in securing HEI digital environments. Adopting globally recognised security frameworks (e.g., ISO/IEC 27001, ISO/IEC 27701, NIST Cybersecurity Framework, ISO/IEC 15408) ensures structured risk management, regulatory compliance, and cyber resilience. Leading HEIs successfully integrate these standards into their policies and procedures, leveraging automated threat monitoring systems and adaptive data protection models to strengthen security.

4. The study demonstrated that cyber threats are constantly evolving, requiring algorithmic security approaches and regular security audits to keep policies up to date. HEIs must not only protect their critical infrastructure but also foster a culture of cybersecurity awareness among students and faculty. Given the specific challenges faced by Ukrainian HEIs, the proposed adaptive security management model integrates managerial, technical, and organisational cybersecurity measures. Ensuring digital security in HEIs requires a systematic approach based on international standards, continuous improvement of digital literacy, and the implementation of advanced risk management strategies. These efforts will contribute to the creation of a secure digital learning environment capable of withstanding modern cybersecurity threats.

List of references

1. Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1772, and repealing Directive (EU) 2016/1148 (NIS 2 Directive). Access via the Internet <http://data.europa.eu/eli/dir/2022/2555/2022-12-27>
2. Hart, S. , Margheri, A., Paci, F., & Sassone, V. (2020). Riskio: A Serious Game for Cyber Security Awareness and Education. *Computers & Security*, 95, 101827. Access via the Internet <https://doi.org/10.1016/j.cose.2020.101827>.
3. Harvard Information Security and Data Privacy (ISDP) team. Access via the Internet <https://privsec.harvard.edu/about>
4. Imperial College London ICT Security. Access via the Internet <https://www.imperial.ac.uk/admin-services/ict/>
5. ISO/IEC 15408-1:2022 Information security, cybersecurity and privacy protection – Evaluation criteria for IT security. (2022). Access via the Internet <https://www.iso.org/standard/72891.html>
6. ISO/IEC 27001 Information security, cybersecurity and privacy protection – Information security management systems – Requirements. Access via the Internet <https://www.iso.org/standard/27001>
7. ISO/IEC 27701:2019 Security techniques – Extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management – Requirements and guidelines. (2019). Access via the Internet <https://www.iso.org/standard/71670.html>
8. Kaur, J., & Ramkumar, K .R. (2022). The recent trends in cyber security: A review. *Journal of King Saud University - Computer and Information Sciences*, 34: 8, Part B, 5766-5781. Access via the Internet <https://doi.org/10.1016/j.jksuci.2021.01.018>.
9. MIT Information Systems and Technology. Access via the Internet <https://ist.mit.edu/>
10. NIST Cybersecurity Framework 2.0. (2024). Access via the Internet <https://nvlpubs.nist.gov/nistpubs/CSWP/NIST.CSWP.29.pdf>
11. Oxford University IT. Access via the Internet <https://www.it.ox.ac.uk/home>
12. QS World University Rankings: Top global universities. (2025). Access via the Internet <https://www.topuniversities.com/world-university-rankings>
13. Savchenko V., & Makliuk, O. (2024). Cyber security as a factor of the efficiency of the functioning of higher education's institutions. *Economy and society*, 60. Access via the Internet <https://doi.org/10.32782/2524-0072/2024-60-24>
14. The EU Cybersecurity Strategy. Access via the Internet <https://digital-strategy.ec.europa.eu/en/policies/cybersecurity>
15. Twilley, R. (2023). Three Cybersecurity Facts Campus Leaders Should Know. EDUCAUSE. Access via the Internet <https://surl.li/mmtaqf>
16. University of Cambridge Information Services. Access via the Internet <https://www.uis.cam.ac.uk/>

INFORMACINIŲ IR KOMUNIKACINIŲ TECHNOLOGIJŲ TAIKYMAS UNIVERSITETŲ SKAITMENINIAM SAUGUMUI UŽTIKRINTI: POLITIKOS, STRATEGIJOS IR TARPTAUTINĖ PATIRTIS

Santrauka

Straipsnyje analizuojamos informacinės ir komunikacinės technologijos aukštojo mokslo institucijų skaitmeniniam saugumui užtikrinti. Išnagrinėtos pagrindinės grėsmės, darančios įtaką aukštųjų mokyklų skaitmeninei infrastruktūrai. Tirtos pirmaujančių pasaulio aukštųjų mokyklų kibernetinio saugumo politikos ir strategijos bei jų pritaikymas tarptautiniams skaitmeninio saugumo standartams. Pasiūlytas adaptyvus skaitmeninio saugumo valdymo modelis Ukrainos aukštosios mokykloms ir suformuluotos praktinės rekomendacijos jo įgyvendinimui.

Pagrindiniai žodžiai: skaitmeninis saugumas, kibernetinės grėsmės, aukštojo mokslo institucijos, tarptautiniai standartai, informacinės ir komunikacinės technologijos, valdymas, modelis, integruotas požiūris, saugumo kultūra.

BALTIJOS ŠALIŲ FISKALINĖ DRAUSMĖ IR EKONOMINĖS TENDENCIJOS ES KONTEKSTE

Dr. Viktor Kozlovskij, Semen Burmistrov

Vilniaus kolegija

Anotacija

Fiskalinės drausmės rodikliai yra esminis ekonominio stabilumo ir viešųjų finansų tvarumo garantas Europos Sąjungoje (ES). Per 2003–2023 m. laikotarpį ES viešosios skolos ir biudžeto deficito pokyčiai atskleidė didelį svyravimų mastą, ypač ekonominių krizių metu. 2008–2009 m. finansų krizė ir COVID-19 pandemija sukėlė spartų viešosios skolos augimą, tačiau tarpkriziniu laikotarpiu buvo stebimas skolos mažėjimas ir biudžeto balanso gerėjimas. Straipsnio tikslas – atsižvelgus į fiskalinės drausmės kriterijų raidą ES bei panaudojus autorių siūlomą tyrimo metodiką, išanalizuoti Baltijos šalių fiskalinės drausmės rodiklių pokyčius ES kontekste. Tyrimo naudoti aprašomoji ir lyginamoji mokslinių šaltinių ir statistinių duomenų analizės. ES rezultatai rodo, kad viešoji skola per 2003–2023 m. laikotarpį nuolat augo, vidutiniškai siekdama 79,3 proc. BVP, o biudžeto deficitas, nors ir sumažintas nuo 6,3 proc. 2009 m. iki 3,4 proc. 2022 m., vis dar neatitiko fiskalinių kriterijų. Baltijos šalys, palyginus, demonstruoja įvairią situaciją: Lietuva pasižymi viena mažiausių viešųjų skolų ir stabilia fiskaline drausme, Latvija susiduria su didesniais fiskaliniais svyravimais, o Estija, išlaikiusi itin žemą skolos lygį, augo lėčiau ekonominiu požiūriu. Šie rezultatai pabrėžia fiskalinės drausmės ir ekonominio lankstumo būtinybę ilgalaikiam stabilumui užtikrinti.

Pagrindiniai žodžiai: fiskalinė drausmė, viešoji skola, biudžeto deficitas, Baltijos šalys, Europos Sąjunga.

ĮVADAS

Mastrichto kriterijų įvedimas buvo svarbus žingsnis Europos Sąjungos (ES) ekonominės ir pinigų sąjungos plėtroje. Šie kriterijai siekė užtikrinti fiskalinę drausmę, kontroliuoti viešosios skolos augimą ir valdyti biudžeto deficitą, siekiant užtikrinti stabilumą Euro zonoje. Tačiau pastarųjų dešimtmečių krizės – 2007 m. finansų krizė ir Didžioji Recesija, valstybių skolų krizė ES, COVID-19 pandemija ir energetikos krizė – atskleidė šių standartų ribotumą.

2007 m. finansų krizė, peraugusi į Didžiąją Recesiją, privertė ES šalis imtis plataus masto ekonomikos palaikymo priemonių, dėl kurių viešoji skola ir biudžeto deficitas smarkiai padidėjo. Graikija, Ispanija ir Portugalija susidūrė su nemokumo rizika, sukeldamos valstybių skolų krizę ES (Pjanić et al., 2020). Mastrichto kriterijų griežtumas tuo metu apsunkino veiksmingą atsaką į nuosmukį.

COVID-19 pandemija dar labiau išryškino fiskalinės politikos lankstumo svarbą. ES laikinai sustabdžius griežtą fiskalinių taisyklių laikymąsi, daugelis valstybių žymiai padidino viešąsias išlaidas. Tai sukėlė precedento neturintį viešosios skolos augimą (Popescu et al., 2023). Šis laikotarpis parodė, kad nors Europos Centrinio Banko (ECB) bendra pinigų politika užtikrina kainų stabilumą, ji nesumažino pandemijos poveikio atskiroms šalims skirtumų (Ferreiro & Serrano, 2021).

Energetikos krizė, prasidėjusi dėl staigaus naftos ir dujų kainų augimo 2021 m. pabaigoje, taip pat padidino fiskalines problemas. Daugeliui ES šalių įvedus papildomas priemones gyventojų apsaugai nuo kainų augimo, viešieji finansai dar labiau susilpnėjo (Dubbart, 2024). Šią situaciją komplikuoja demografiniai pokyčiai, kurie ateityje gali padidinti viešąsias išlaidas pensijoms ir sveikatos priežiūrai.

Mokslininkai dažnai kritikuoja Mastrichto kriterijus už jų universalumą, kuris neleidžia lanksčiai reaguoti į specifines ekonomines sąlygas. Kai kurie tyrimai pabrėžia poreikį pereiti prie lanktesnių labiau specifinių viešosios skolos valdymo instrumentų, atitinkančių skirtingas šalių situacijas ir stiprinančių atsparumą ekonominiams sukrėtimams (Kinnunen et al., 2021).

Apibendrinant, pastarųjų krizių patirtis rodo, kad ES fiskalinė politika turi būti pertvarkyta, siekiant užtikrinti didesnę lankstumą ir efektyvesnę prisitaikymą prie ateities iššūkių. Naujausi moks-

liniai tyrimai atskleidžia viešosios skolos ir biudžeto deficito problemų sudėtingumą, nagrinėdami priežastis, pasekmes ir skirtumus tarp ES valstybių narių.

Atsižvelgiant į aukščiau pateiktus argumentus, šio straipsnio tikslas – atsižvelgus į fiskalinės drausmės kriterijų raidą ES bei panaudojus autorių siūlomą tyrimo metodiką, išanalizuoti Baltijos šalių fiskalinės drausmės rodiklių pokyčius ES kontekste. Nurodytam tikslui pasiekti, keliami tokie uždaviniai:

- apžvelgti fiskalinės drausmės rodiklių (Mastrichto kriterijų) raidą ES;
- pateikti metodinį tyrimo pagrindimą;
- išnagrinėti ES viešojo sektoriaus skolos ir biudžeto deficito kitimo tendencijas;
- išanalizuoti fiskalinės drausmės rodiklių (Mastrichto kriterijų) pokyčius ES kontekste.

Tyrimo metodai. Darbe naudojami: aprašomoji ir lyginamoji mokslinių šaltinių ir antrinių statistinių duomenų analizės.

1. FISKALINĖS DRAUSMĖS KRITERIJŲ RAIDA ES

Fiskalinė drausmė Europos Sąjungoje yra esminis veiksnys siekiant užtikrinti ilgalaikį ekonominį stabilumą ir viešųjų finansų tvarumą. Šių kriterijų ištakos siejamos su 1992 m. Maastrichto sutartimi, kuri numatė griežtas finansines taisykles šalims, siekiančioms prisijungti prie euro zonos. Šios taisyklės buvo grindžiamos fiskalinio apdairumo principais, reikalaujant, kad biudžeto deficitas neviršytų 3 proc. BVP, o viešoji skola – 60 proc. BVP (Afonso & Coelho, 2024; Popescu et al., 2023; Ioannou, 2023). Nors šie kriterijai buvo skirti užtikrinti finansų tvarumą, jų griežtumas kai kurioms šalims tapo iššūkiu.

1997 m. Stabilumo ir augimo paktas (SAP) įtvirtino papildomas priemones fiskalinei drausmei užtikrinti po euro įvedimo. SAP numatė sankcijas šalims, neatitinkančioms biudžeto ir skolos normų, taip siekiant užkirsti kelią dideliems ekonominiais disbalansams (Popescu et al., 2023). Tačiau 2005 m. paktas buvo reformuotas, suteikiant daugiau lankstumo, leidžiant atsižvelgti į ekonominius veiksnius, pvz., investicijas į švietimą ar inovacijas.

2008 m. pasaulinė finansų krizė atskleidė šių mechanizmų trūkumus. Daugelyje ES šalių padidėjo biudžeto deficitai ir skola, todėl 2011 m. buvo priimtas „Šešių dokumentų paketas“, kuris sustiprino fiskalinę drausmę. Taisyklėse buvo numatyta, kad šalys, kurių skola viršija 60 proc. BVP, turėtų ją mažinti bent 1/20 per metus (Bušs et al., 2024).

2012 m. priimtas Fiskalinis paktas dar labiau griežtino taisykles, ribodamas struktūrinį biudžeto deficitą iki 0,5 proc. BVP šalims, kurių skola viršija 60 proc., ir iki 1 proc. šalims, turinčioms mažesnę skolą (Bušs et al., 2024; Ferreira & Serrano, 2021).

COVID-19 pandemija sukėlė didelį ekonominį šoką, dėl kurio laikinai buvo sustabdytos fiskalinės taisyklės, leidžiant valstybėms narėms didinti deficitą, siekiant įveikti krizę (Fedajev et al., 2022; Martinho, 2021; Pinilla et al., 2021). Šis laikotarpis parodė, kad ES fiskalinės drausmės sistema turi būti lankstesnė, kad galėtų prisitaikyti prie netikėtų ekonominių iššūkių (Bušs et al., 2024; Claeys et al., 2021).

2. TYRIMO METODINIS PAGRINDIMAS

Straipsnyje pateikiamo tyrimo metodinį pagrindą sudaro tokie elementai: nagrinėjami subjektai, analizuojamas laikotarpis, lyginami rodikliai.

Nagrinėjami subjektai yra dviejų grupių: ES bendrai ir Baltijos šalys (Estija, Latvija, Lietuva) atskirai.

Analizuojamas 2003–2023 m. laikotarpis, ypatingą dėmesį kreipiant į mažesnių jo gabalų ribinius metus: 2004, 2009 ir 2020.

Analizuojami rodikliai skirstomi į dvi grupes: ES mastu nagrinėjami viešojo sektoriaus skola (proc. nuo BVP) ir nacionalinio biudžeto deficitas (proc. nuo BVP); Baltijos valstybių mastu apžvel-

giami viešojo sektoriaus skola (proc. nuo BVP), nacionalinio biudžeto deficitas (proc. nuo BVP), infliacija (per vartotojų kainų indeksą, apskaičiuojamą proc., lyginant su praeitu laikotarpiu), o taip pat BVP vienam gyventojui (PPP) pokytis procentais bei jo lyginimas su ES vidurkiu.

Visi straipsnyje naudojami statistiniai duomenys paimti iš ES statistikos tarnybos (Eurostat) duomenų bazės.

3. ES VIEŠOSIOS SKOLOS AUGIMO ANALIZĖ 2003–2023 M.

Per pastaruosius 20 metų Europos Sąjungos (ES) viešoji skola nuolat didėjo. Ši tendencija būdinga tiek senosioms valstybėms narėms, tiek naujoms narėms, kurios prie Sąjungos prisijungė po 2004 m. Išsamesnė analizė leidžia pastebėti tam tikrų skirtumų, ypač įvertinus tris pagrindinius laikotarpius: 2004, 2009 ir 2020 m.

Analizuojant 27 ES valstybių duomenis (1 lentelė), išryškėja kelios pagrindinės tendencijos, kurių pirmoji yra fiskalinio taupymo (angl. austerity) politika. Nepaisant pagrindinio tikslo – mažinti skolą ir subalansuoti biudžetą, pastebima, kad nuo 2004 iki 2014 m. viešoji skola daugumoje valstybių toliau augo. Tik kelios šalys – Vokietija, Vengrija, Latvija ir Malta – sugebėjo pasipriešinti šiai tendencijai ir sustabdyti arba sumažinti skolos didėjimą. Likusios 23 valstybės narės susidūrė su nuolatiniu skolos augimu.

1 lentelė. Viešosios skolos ir BVP santykis ES 2003–2023 m., proc. nuo BVP

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
ES	66.8	67.1	67.2	65.1	62.4	65.2	75.9	80.6	82.0	85.2	87.0
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
ES	87.2	85.4	84.3	82.0	79.9	77.8	90.0	87.4	83.4	89.9	

2007 m. vidutinė ES skola sudarė 62,4 proc. nuo BVP, o 2014 m. šis rodiklis išaugo iki 87,2 proc., tai yra 1,4 karto daugiau nei 2007 m. Šis spartus augimas buvo tiesiogiai susijęs su 2008–2009 m. finansų krize, kuri paskatino didesnes viešąsias išlaidas ir valstybės skolą.

2014–2019 m. laikotarpiu pastebimas skolos lygio mažėjimas. Vidutinė ES skola per šiuos penkerius metus sumažėjo nuo 87,2 proc. iki 77,8 proc. Tai reiškia 10,8 proc. punkto kritimą – reikšmingą rezultatą per gana trumpą laikotarpį. Jei ši tendencija būtų išsilaikiusi, ES vidutinė viešoji skola galėjo pasiekti Maastrichto kriterijų ribą (60 proc. nuo BVP) iki 2027 m. Deja, COVID-19 pandemija 2020 m. nutraukė šį progresą.

2019–2023 m. laikotarpis buvo ypač dinamiškas. 2020 m. skolos lygis smarkiai išaugo iki 90 proc. nuo BVP – tai viršijo net 2008–2009 m. finansų krizės laikotarpiu stebėtus rodiklius. Nors 2021 ir 2022 m. skola pradėjo mažėti ir siekė atitinkamai 87,4 proc. ir 83,4 proc., 2023 m. skolos lygis vėl išaugo iki 89,9 proc. Šis svyravimas rodo, kad ES fiskalinė politika vis dar nėra pakankamai lanksti, kad galėtų prisitaikyti prie greitai kintančių ekonominių sąlygų.

4. BIUDŽETO BALANSO SITUACIJOS RAIDA ES 2003–2023 M.

Nagrinėjant ES biudžeto balanso situaciją per pastaruosius du dešimtmečius, galima pastebėti keturis pagrindinius laikotarpius. Analizė atskleidžia reikšmingus pokyčius nuo 2003 m., kai biudžeto balansas pamažu atsistatinėjo po deficito laikotarpio, iki 2023 m., kai valstybės narės ir toliau siekė sumažinti biudžeto deficitą. (2 lentelė)

2003–2008 m. laikotarpį galima apibūdinti kaip lėtą, bet nuoseklaus biudžeto deficito mažėjimo metą. Nors tuo metu dauguma ES šalių dar nepasiekė biudžeto pertekliaus, pastebėta aiški stabilizacijos tendencija. Šiaurės Europos šalys, tokios kaip Švedija ir Danija, parodė teigiamą biudžeto valdymo pavyzdį, tuo tarpu Balkanų ir Vidurio Europos šalys susidūrė su nuolatiniu biudžeto disbalansu.

Lenkija buvo išskirtinis atvejis, kuriai pavyko pagerinti savo biudžeto balansą net ir sudėtingomis sąlygomis.

2 lentelė. Biudžeto balansas ES 2003–2023 m., proc. nuo BVP

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
ES	-3.1	-2.9	-2.5	-1.3	-6.0	-2.1	-6.3	-6.2	-4.1	-3.7	-3.0
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
ES	-2.5	-1.9	-1.4	-0.9	-0.4	-0.4	-6.7	-4.7	-3.4	-3.5	

2007–2009 m. laikotarpis buvo itin sunkus visoms ES narėms, nes finansų krizė lėmė drastišką biudžeto deficito padidėjimą. Per dvejus metus biudžeto deficitas padidėjo daugiau nei šešis kartus – nuo 0,6 proc. 2007 m. iki 6,3 proc. 2009 m. Šis nuosmukis buvo didžiausias per visą analizuojamą laikotarpį ir paveikė visų ES šalių biudžetus. Tik 2018 m. (praėjus 11 metų) ES biudžeto balansas grįžo į prieškrizinį lygį.

2010 ir 2011 m. laikotarpis pasižymėjo gana greitu biudžeto balanso atsigavimu, nors jis vis dar neatitiko ES rekomenduojamos 3 proc. deficito normos. Stabilus atsigavimas buvo pastebimas nuo 2011 iki 2018 m., kai dauguma ES šalių ne tik pasiekė, bet ir viršijo ES rekomenduojamą biudžeto deficito ribą. Per šį laikotarpį ES bendrai sumažino savo biudžeto deficitą 49,3 proc., o tai buvo vienas sėkmingiausių fiskalinės politikos laikotarpių. 2014 m. dauguma valstybių narių pasiekė ES nustatytą biudžeto deficito normą, o papildomos pajamos biudžetui leido investuoti į strateginius projektus. Tai taip pat parodė, kad griežta fiskalinė drausmė, derinama su ekonomikos augimu, gali duoti teigiamų rezultatų.

2020 m. pandemija vėl padidino ES biudžeto deficitą iki 6,7 proc., viršijant net finansų krizės metu pasiektą lygį. Tačiau jau 2021–2022 m. deficitai pradėjo mažėti ir pasiekė 3,4 proc. 2022 m. Nepaisant šių pastangų, 2023 m. biudžeto balansas liko silpnai teigiamas, rodantis politinių ir ekonominių iššūkių įtaką. 2023 m. pavasarį vykusios diskusijos apie naujus ES fiskalinės politikos sprendimus pabrėžė, kad valstybės narės turi tęsti biudžeto deficito mažinimą, kartu užtikrinant ekonomikos augimą ir socialinį stabilumą. Šios diskusijos atspindi poreikį toliau ieškoti naujoviškų būdų, kaip spręsti viešųjų finansų iššūkius ilgalaikėje perspektyvoje.

5. BALTIJOS VALSTYBIŲ FISKALINĖS DRAUSMĖS RODIKLIŲ ANALIZĖ

Lietuva. 2004–2023 m. laikotarpiu Lietuvos nacionalinio biudžeto balanso situacija gali būti vertinama geriau nei vidutiniškai ES. Vidutiniškai biudžeto deficitas siekė 2,2 proc. nuo BVP, o tai yra geresnis rodiklis nei ES vidurkis (3,2 proc.). Pagal šį rodiklį Lietuva lenkia Lenkiją bei beveik visas Balkanų ES nares (išskyrus Bulgariją), artėja prie Kipro ir Čekijos.

Lietuvos viešoji skola yra palyginti maža, vidutiniškai sudaranti apie 33,1 proc. BVP. Iki 2009 metų šalis sugebėjo išvengti reikšmingo skolos augimo, tačiau vėliau sekė bendrą ES tendenciją – skolos ir BVP santykis pakilo nuo 18,7 proc. 2004 metais iki 38,3 proc. 2023 metais. Šis rodiklis yra panašus į Rumunijos ir Čekijos rodiklius, tačiau geresnis nei Lenkijoje, nors ne toks sėkmingas kaip Bulgarijoje.

Infliacija Lietuvoje per tą laikotarpį buvo mažesnė nei Vengrijoje ar Rumunijoje, tačiau didesnė nei Lenkijoje, Slovakijoje ar Slovėnijoje – vidutiniškai siekė 4,1 proc.. Nors šis rodiklis viršijo ES vidurkį (2,3 proc.), infliacijos augimo dinamika bei defliacijos laikotarpis 2015 metais beveik visiškai atitiko bendras tendencijas ES.

Lietuvos BVP vienam gyventojui (PPP) augimas buvo pastebimas, pasiekęs 104 proc., ir pagal šį rodiklį leido šaliai priartėti prie kaimyninės Lenkijos, o taip pat prie ES lyderių: Rumunijos ir Bulgarijos. Dėl spartaus augimo tempo šalis sugebėjo pasiekti 73 proc. ES vidurkio, kai tuo tarpu Lenkija tuo pačiu laikotarpiu pasiekė tik 65,1 proc. ES vidurkio.

Tačiau šių šalių augimo dinamika po 2016 metų skiriasi. Per pastaruosius 8 metus Lenkija lenkė Lietuvą pagal palyginamuosius ES augimo rodiklius.

Latvija. 2004–2023 m. laikotarpiu Latvijos nacionalinis biudžetas ilgą laiką buvo deficitinis su vos vieneriais metais, kai buvo pasiektas balansas, ir be jokio pertekliaus laikotarpio. Vidutinis 2,8 proc. deficitas yra geresnis nei ES vidurkis (3,2 proc.), tačiau akivaizdžiai prastesnis lyginant su Lietuvos 2,2 proc. deficitu. Reikšmingas aspektas – deficito augimas, kuris Latvijoje įvyko 8 kartus – mažiau nei Lietuvoje ar Bulgarijoje.

Latvijos nacionalinės skolos rodikliai ir dinamika yra panašūs į Lietuvos, tačiau jos rezultatai buvo silpnesni. Vidutinė Latvijos skola sudarė 34 proc. BVP (Lietuvos – 33,1 proc.), tačiau ji buvo didinama 9 kartus (Lietuvoje – 8 kartus). Pradinis skolos lygis buvo žemesnis – 14,6 proc. (Lietuvoje – 18,7 proc.), tačiau 2023 metais Latvijos skolos ir BVP santykis pasiekė 43,6 proc. (Lietuvoje – 38,3 proc.). Tuo pat metu, lyginant su ES vidurkiu (79,3 proc.), Latvijos skolos lygis atrodo palyginti nedidelis, tačiau šalies mastas ir pradinė pozicija daro šiuos rodiklius reikšmingais.

Latvijos infliacija buvo didesnė nei Lietuvoje, siekdama vidutiniškai 4,6 proc. Nors šis rodiklis taip pat viršija ES vidurkį (2,3 proc.) ir infliacijos dinamika buvo panaši, tačiau Latvijai būdingi žymiai didesni infliacijos svyravimai ir visiškas defliacijos nebuvimas.

Latvijos BVP vienam gyventojui (PPP) augimas nebuvo toks sėkmingas kaip kaimynės Lietuvos, tačiau per 20 metų siekė 80 proc., kas viršija ES vidurkį. Kita vertus, Latvija 6 kartus per šį laikotarpį negalėjo išlaikyti ES vidurkio augimo tempo (Lietuvoje – tik 4 kartus). Esminis skirtumas pastebimas 2008–2010 metų laikotarpiu, po kurio Latvija sunkiai atsigauna. Šie iššūkiai atsispindi didesnėse augimo rodiklių svyravimo reikšmėse.

Estijos nacionalinio biudžeto situacija yra išskirtinė visoje ES, nes vidutinis deficitas siekė tik 0,4 proc., pralenkiant net ir Bulgarijos rezultatus. Per 20 metų laikotarpį Estija viešojo sektoriaus deficitą turėjo tik 10 metų. Reikia pastebėti, kad nuo 2015 metų biudžeto situacija ėmė blogėti ir tapo nuolatinio deficito būklės. Tuo tarpu kaimyninėse valstybėse padėtis buvo kitokia: Lietuva nuo 2016 iki 2020 metų perėjo iš deficito į perteklių, o Latvijoje deficito ir pertekliaus laikotarpiai keitėsi chaotiškai.

Estijos nacionalinė skola taip pat išsiskiria ES. Pradėjusi nuo vos 5,6 proc., 2023 metais ji pasiekė 19,6 proc., vidutiniškai sudarydama tik 9,6 proc., kai ES vidurkis siekia 79,3 proc. Tai reiškia, kad per tą patį laikotarpį, kai Lietuva beveik padvigubino savo skolą, o Latvija ją patrigubino, Estija savo skolą padidino 3,5 karto. Tokio staigaus valstybės skolos augimo nebuvo nei vienoje kitoje ES šalyje. Minėtas šuolis įvyko 2020 m., kai skola šoktelėjo nuo 8,5 proc. iki 18,6 proc. BVP. Iki tol (iki 2019 m.) viešojo sektoriaus skola augo ypač lėtai, o po 2020 m. augo nuosaikiai.

Infliacija Estijoje, iš pirmo žvilgsnio, atrodo vidutinė, siekianti 4,2 proc., t. y. tarp Latvijos (4,6 proc.) ir Lietuvos (4,1 proc.) rodiklių. Tačiau atidžiau išanalizavus matomos didelės infliacijos svyravimo amplitudės. Pavyzdžiui, 2019–2022 metais Estija iš pradžių patyrė 2,3 proc. infliaciją, vėliau 0,4 proc. defliaciją, po kurios sekė staigus šuolis iki 4,7 proc. ir beveik 19,4 proc. infliacijos. Tuo pačiu metu nei Lietuva, nei Latvija defliacijos nepatyrė. Be to, per 20 metų Estija defliaciją visumoje patyrė 4 metus, kai Latvija jos iš viso nepatyrė, o Lietuva – tik kartą.

Estijos BVP vienam gyventojui (PPP) augimas yra netikėtas tarp Baltijos šalių. Per 20 metų jis sudarė tik 52 proc., nors pradinė pozicija buvo nedaug geresnė nei kaimynių. Estija tik 5 kartus per šį laikotarpį augo lėčiau nei ES vidurkis (Latvija – 6 kartus, Lietuva – 4 kartus). Vis dėlto, nors kitos Baltijos šalys per 20 metų pasiekė daugiau nei 80 proc. bendrą augimą, Estijos rodikliai buvo silpnesni. Kita vertus, jos galutinė pozicija ES kontekste buvo aukštesnė – 75,4 proc. ES BVP vidurkio.

IŠVADOS

1. Europos Sąjungos fiskalinės drausmės sistema, nors ir išlieka esminiu finansinio stabilumo garantu, evoliucionavo siekiant suderinti tvarumo reikalavimus su ekonominės realybės iššūkiais. Nuo griežtų Maastrichto kriterijų iki lankstesnių mechanizmų, tokių kaip SAP reformos ir Fiskalinis paktas, fiskalinės taisyklės buvo koreguojamos atsižvelgiant į krizines situacijas, tokias kaip 2008 m. finansų krizė ar COVID-19 pandemija. Tai rodo, kad ilgalaikiam ekonominiam stabilumui užtikrinti būtina išlaikyti balansą tarp drausmės ir lankstumo.

2. Straipsnyje naudojama tyrimo metodika leidžia nuosekliai analizuoti Europos Sąjungos ir Baltijos šalių viešųjų finansų dinamiką bei makroekonominis rodiklius per 2003–2023 m. laikotarpį. Įtraukiant lyginamąją analizę tarp ES vidurkio ir Baltijos šalių, tyrimas remiasi įvairialypiais rodikliais, tokiais kaip skolos lygis, biudžeto deficitas, infliacija bei BVP pokyčiai, taip atskleidžiant regioninius skirtumus ir ES fiskalinės politikos poveikį. Duomenų patikimumą užtikrina Eurostat bazės naudojimas, suteikiantis tyrimui objektyvumo ir pagrįstumo.

3. ES viešosios skolos ir biudžeto balanso analizė per 2003–2023 m. atskleidžia cikliškus finansinius pokyčius, kuriuos daugiausia lėmė pasaulinės ekonominės krizės ir pandemijos poveikis. Nors laikotarpiu tarp krizių buvo pasiekta reikšmingų rezultatų, tokių kaip skolos mažėjimas ir biudžeto balanso gerėjimas, 2008–2009 m. finansų krizė ir 2020 m. COVID-19 pandemija aiškiai parodė fiskalinės sistemos trūkumus. Ši patirtis pabrėžia būtinybę didinti ES fiskalinės politikos lankstumą, siekiant veiksmingiau reaguoti į nenumatytas ekonomines krizes, išlaikant skolos tvarumą ir biudžeto drausmę kaip ilgalaikius prioritetus.

4. Per 2004–2023 m. laikotarpį Baltijos šalys – Lietuva, Latvija ir Estija – demonstruoja skirtingus fiskalinės drausmės, viešosios skolos valdymo ir ekonominio augimo rezultatus, atspindinčius jų nacionalinės politikos ypatumus ir gebėjimą prisitaikyti prie išorinių ekonominių iššūkių. Lietuva išsiskiria subalansuota fiskaline politika, mažesniu biudžeto deficitu ir viena mažiausių viešųjų skolų ES kontekste, o tai sudarė prielaidas sparčiam BVP vienam gyventojui augimui ir artėjimui prie ES vidurkio. Latvija susidūrė su didesniais fiskaliniais svyravimais ir augančiu viešosios skolos lygiu, tačiau išlaikė vidutiniškai geresnę situaciją nei daugelis ES šalių. Tuo tarpu Estija, nors ir patyrė mažiausią biudžeto deficitą bei išlaikė ypatingai žemą viešosios skolos lygį, o taip pat turėjo lėčiausią ekonomikos augimą, tačiau galutinė jos ekonominė pozicija buvo artimesnė ES vidurkiui, lyginant su kitomis Baltijos šalimis. Šių šalių patirtis rodo, kad fiskalinė drausmė, skolos valdymas ir investicijos į ekonomiką yra būtinos sąlygos ilgalaikiam tvariam augimui.

Literatūra

1. Afonso, A., & Coelho, J. C. (2024). Fiscal sustainability, fiscal reactions, pitfalls and determinants. *Applied Economics*. <https://doi.org/10.1080/00036846.2024.2337808>
2. Bušs, G., Grüning, P., & Tkačevs, O. (2024). Choosing the European fiscal rule. *Baltic Journal of Economics*, 24(1), 116–144. <https://doi.org/10.1080/1406099X.2024.2340402>
3. Claeys, G., Darvas, Z., Leandro, Á., & Mathieu, C. (2021). The great COVID-19 divergence: managing a sustainable economic recovery in the EU. *Bruegel Policy Contribution*, 6. <https://doi.org/10.2139/ssrn.3862845>
4. Dubbert, T. (2024). Stochastic debt sustainability analysis using time-varying fiscal reaction functions: An agnostic approach to fiscal forecasting. *Journal of Economic Studies*, 56(8), 901–917. <https://doi.org/10.1080/00036846.2023.2174500>
5. Fedajev, A., Stanujkic, D., Zivkovic, Z., & Popovic, G. (2022). The impact of the COVID-19 pandemic on economic convergence in the European Union. *Journal of Economic Studies*, 49(1), 175–189. <https://doi.org/10.1108/JES-04-2021-0184>
6. Ferreira, J., & Serrano, F. (2021). The COVID Health Crisis and the Fiscal and Monetary Policies in the Euro Area. *International Journal of Political Economy*, 50(3), 212–225. <https://doi.org/10.1080/08911916.2021.1984730>
7. Ioannou, S. (2023). Regional and municipal debt in the Eurozone: A cross-country analysis. *Regional*

- Studies*, 57(1), 97-111. <https://doi.org/10.1080/00343404.2022.2109087>
8. Kinnunen, J., Georgescu, I., & Iordache, A. (2021). Fiscal and monetary responses to the COVID-19 pandemic: Evidence from EU countries. *Eastern Journal of European Studies*, 12(2), 21-38. Available at: <https://www.ejes.uaic.ro>
 9. Martinho, R. (2021). Economic impacts of COVID-19 pandemic: A focus on Portugal and its EU partners. *Journal of Risk and Financial Management*, 14(11), 551. <https://doi.org/10.3390/jrfm14110551>
 10. Pinilla, J., Barber, P., & Vallejo-Torres, L. (2021). The economic impact of COVID-19 on European countries: A comparative analysis. *Health Policy*, 125(10), 1317-1327. <https://doi.org/10.1016/j.healthpol.2021.07.007>
 11. Pjanić, M., Milenković, N., Andrašić, J., Kalaš, B., & Mirović, V. (2020). Public debt's predictors in EU: Evidence from members and non-members of European Monetary Union. *Economic Research-Ekonomska Istraživanja*, 33(1), 3562-3579. <https://doi.org/10.1080/1331677X.2020.1776137>
 12. Popescu, M. E., Cristescu, A., & Paun, R. M. (2023). The COVID-19 pandemic and main economic convergence indicators in the EU. *Economic Research-Ekonomska Istraživanja*, 36(2), 2142807. <https://doi.org/10.1080/1331677X.2022.2142807>

THE FISCAL DISCIPLINE AND ECONOMIC TRENDS OF THE BALTIC STATES IN THE CONTEXT OF THE EUROPEAN UNION

Summary

The introduction of the Maastricht criteria was an important step in the development of the European Union (EU) economic and monetary union. These criteria aimed to ensure fiscal discipline, control the growth of public debt, and manage budget deficits to ensure stability in the Eurozone. However, crises over the past decades—such as the 2007 financial crisis and the Great Recession, the sovereign debt crisis in the EU, the COVID-19 pandemic, and the energy crisis—have revealed the limitations of these standards.

The 2007 financial crisis, which led to the Great Recession, forced EU countries to adopt large-scale economic support measures, resulting in a sharp increase in public debt and budget deficits. Greece, Spain, and Portugal faced insolvency risks, triggering the sovereign debt crisis in the EU (Pjanić et al., 2020). The rigidity of the Maastricht criteria at that time hindered an effective response to the recession.

The COVID-19 pandemic further highlighted the importance of fiscal policy flexibility. With the temporary suspension of strict fiscal rules in the EU, many countries significantly increased public spending. This resulted in an unprecedented rise in public debt (Popescu et al., 2023). This period demonstrated that, while the European Central Bank's (ECB) common monetary policy ensured price stability, it did not reduce the impact of the pandemic's effects across different countries (Ferreiro & Serrano, 2021).

The energy crisis, which began due to the sharp rise in oil and gas prices at the end of 2021, also exacerbated fiscal problems. The introduction of additional measures by many EU countries to protect citizens from rising prices further weakened public finances (Dubbert, 2024). This situation is complicated by demographic changes, which could increase public spending on pensions and healthcare in the future.

Scholars often criticize the Maastricht criteria for their universality, which prevents flexible responses to specific economic conditions. Some studies emphasize the need to shift to more flexible, country-specific public debt management tools that address different national situations and strengthen resilience to economic shocks (Kinnunen et al., 2021).

In light of the above arguments, the aim of this article is to analyze the changes in fiscal discipline indicators in the Baltic States in the EU context, considering the evolution of fiscal discipline criteria in the EU and using the research methodology proposed by the authors. The objectives of this study are:

- to review the evolution of fiscal discipline indicators (Maastricht criteria) in the EU;
- to provide a methodological foundation for the study;
- to analyze trends in public sector debt and budget deficit changes in the EU;
- to examine changes in fiscal discipline indicators (Maastricht criteria) in the EU context.

Research methods. The study employs descriptive and comparative analysis of scientific sources, as well as statistical analysis of secondary data. All statistical data used in this article are derived from the EU statistical office (Eurostat) database.

EU results show that public debt continuously increased between 2003 and 2023, averaging 79.3 percent of GDP, while the budget deficit, although reduced from 6.3 percent in 2009 to 3.4 percent in 2022, still did not meet fiscal criteria. The Baltic States, in comparison, demonstrate a diverse situation: Lithuania boasts one of the lowest public debt levels and stable fiscal discipline, Latvia faces greater fiscal fluctuations, and Estonia, maintaining an exceptionally low debt level, has grown more slowly in economic terms. These results highlight the necessity of fiscal discipline and economic flexibility for ensuring long-term stability.

Key words: fiscal discipline, public debt, budget deficit, Baltic countries, European Union.

DIGITALIZATION OF LOGISTIC PROCESSES IN MANUFACTURING COMPANIES

Dr. Laima Skauronė, dr. Deimena Montvydaitė
Panevėžio kolegija / State Higher Education Institution, Lithuania

Annotation

Industry 4.0 led to digital technologies such as big data, cloud computing, IoT, robotics, and automation, that are transforming traditional logistics operations. The Industry 5.0 concept, including smart logistics technologies as IoT, AI, big data analytics, simulation, and digital twin, is suggested to broaden the existing Industry 4.0. However, Industry 4.0 technologies are still the most important technological enablers for smart logistics in Industry 5.0. Research examines the digitalization of logistic processes in manufacturing and explores the potential benefits of these advancements, including increased efficiency, error reduction, cost optimization, and improved customer satisfaction. It highlights the critical role of digital technologies in streamlining workflows, enhancing real-time decision-making, and enabling predictive modeling for supply chain management. The analysis also emphasizes the challenges associated with implementing digitalization, including the need for substantial investments, skilled workforce development, and robust IT infrastructure. The comprehensive literature analysis-based article reveals how digitalization can optimize supply chains, reduce manual processes, and create innovative opportunities for organizations to respond to market demands. Research analysis contributes to understanding the transformative potential of logistics digitalization and offers insights for businesses considering adopting Industry 4.0 technologies.

Key words: logistics processes, manufacturing companies, digitalization, Industry 4.0, Industry 5.0.

INTRODUCTION

Logistics processes are an integral part of manufacturing companies. For a company to remain competitive, it is essential to continuously assess the processes occurring within it. Transportation, warehousing, production, and sales are crucial processes that need to run smoothly and meet consumer demands. The digitalization of these processes helps companies operate efficiently by saving time and reducing labor costs.

Currently, there is significant global focus on the fourth industrial revolution (Industry 4.0), which is characterized by the creation of new technologies and their implementation within companies, enabling the digitalization of many processes. Industry 5.0 represents a paradigm shift from the technology-driven focus of Industry 4.0 to a more human-centric, sustainable, and resilient approach to industrial processes. This transformation aligns with the European Commission's recommendations (2024) for creating a sustainable and human-centered European industry.

To successfully compete in the market, it is vital to stay informed about changing trends and adopt them, which is why most companies should evaluate the importance of process digitalization. With the help of technology, companies' operations become more efficient, meet consumer needs, and require fewer human resources. Therefore, for today's manufacturing companies, it is especially important to keep up with global trends, continuously invest in technology, and digitalize logistics processes.

The digitalization of logistics processes has been studied by Kayikci (2018), Mousheimish, Taher, and Finance (2015), Nagulevičius and Jakubavičius (2019), Pighin (2017), Tofan and Jakubavičius (2018), Žaludienė, Petrauskienė, Ratautaitė, and Vienažindienė (2021), Grubmuller, Duerkop, and Huth (2021), Nila, & Roy (2024), Winkelhaus & Grosse, (2020), Glistau & Machado, (2019), Radivojević & Milosavljević (2019), Barreto, Amaral, & Pereira (2017), Wang (2016), Timm & Lorig (2015), and other authors of scientific literature. These authors examine the impact of the Industry 4.0 on logistics processes. Researchers (Ghobakhloo, Iranmanesh, Fathi, Rejeb, Foroughi, &

Nikbin, 2024; Hsu, Cai, Zhan & Ji, 2024; Jefroy, Azarian, & Yu, 2022) have recently been focusing on the impact of the 5th Industrial Revolution (Industry 5.0) on the digitalisation of logistics processes in manufacturing companies, focusing on systemic transformations to create a sustainable, human-centred and resilient European industry. Authors research shows that the digitalization of logistics processes in companies reduces the need for labor, increases operational efficiency, and creates added value. However, the digitalization of processes requires investment.

Problem of the research: In recent years, there has been an increasing amount of discussion surrounding the digitalization of logistics processes. However, employees of manufacturing companies lack knowledge about managing digitized logistics processes. According to Bardakçi (2020), the goal of process digitalization, using technological capabilities, is to increase profitability, efficiency, and to compete in the global market. Therefore, it can be argued that most companies should consider the opportunities of digitalizing logistics processes. For some companies, keeping up with the Industry 4.0 and innovations can be challenging, so it is important to explore the aspects of logistics process digitalization in manufacturing companies opening the possibility to gradually integrate technologies into companies' daily operations.

Aim of the research: To evaluate the digitalization of logistic processes in manufacturing companies.

Objectives of the research: 1. To analyze logistics processes in the operations of manufacturing companies. 2. To examine the concept of digitalization of logistic processes. 3. To investigate the impact of digitalization of logistics processes on the operations of manufacturing companies.

Object of the research: Digitalization of logistics processes.

Methods of the research: Comprehensive analysis of scientific literature, analytical generalization. Comprehensive analysis of scientific literature is applied for analyzing logistics processes in the operations of manufacturing companies, examining the concept of digitalization of logistic processes and investigating the impact of digitalization of logistics processes on the operations of manufacturing companies while summarizing, comparing and examining scientific literature aiming to give a comprehensive view of the research object. Analytical generalization method is applied to broaden the practical application of this research by investigating the problem that is relevant for a wide range of manufacturing companies that are applying digitalization of logistics process.

1. LOGISTICS PROCESSES IN THE OPERATIONS OF MANUFACTURING COMPANIES

Increasing demand typically signifies one thing – growing supply. This means that companies must remain competitive, and thus, it is crucial to focus on the quality of goods and services. With the onset of the Industry 4.0, most manufacturing companies are rapidly upgrading their equipment, digitizing it, and striving to deliver the highest quality products and services. Therefore, to compete successfully, every company must stay informed about innovations and its implementation.

Logistics processes are a significant part of the operations of manufacturing companies. They are interconnected, meaning that the logistics process chain is continuous. Topolšek, Čižiūnienė, and Ojsteršek, (2018) state that logistics was associated only with two functions – transportation and warehousing. According to authors, as logistics was further examined, procurement, production, and sales were also included in logistics processes (Figure 1). The authors emphasize that logistics definitions are not always precise, making it difficult to define exactly what logistics and its processes encompass. However, based on the author's definition of logistics processes, it can be concluded that logistics is not limited to storing goods in warehouses or transporting cargo from loading points to destinations. Logistics also includes providing companies with the necessary materials for production or operational needs. If a company is a manufacturer, numerous production processes take place within it, which the authors also associate with logistics, especially when linked to the supply chain, where goods are produced and distributed from the company to customers. Additionally, one of the important logistics processes is sales, which is directly connected to the marketing

department. Sales not only involve order management but also finding new customers and advertising channels.

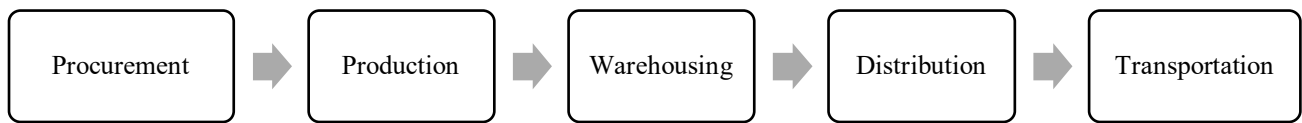


Figure 1. *Logistic Processes*

Source: compiled by the authors based on Topolšek, Čižiūnienė, and Ojsteršek, 2018

As Zinkevičiūtė and Vasiliauskas (2013) state, the activities of companies were once focused solely on marketing and production. However, authors note that the activities between purchasing and production and between production and sales were not well defined. It can be argued that the operations of manufacturing companies should not be solely associated with the production process and the product's entry into the market. To meet consumer demands, companies must focus on processes before and after production, such as inventory and finished goods storage, order management, and transportation. Inventory management maintains the necessary level of raw materials required for efficient customer service while also considering other logistics costs. Finished goods storage ensures that a company always has the required assortment to manage orders efficiently, which can shorten order times and reduce the resources needed for fulfillment. Riazanova and Žilinskienė (2019) identify the following logistics processes: transportation, order receiving, customer service policies, product manufacturing and handling, inventory management, optimal warehouse usage, cargo handling, and managing exceptional cases such as accidents. Authors provide a more specific definition of logistics processes. Even the most crucial process in manufacturing companies is product manufacturing and handling, as this is the core activity of the company, to succeed, a company must effectively manage its inventory. According to Bagshaw (2017), logistics reflect a collection of activities that ensure the availability of the required products, in the necessary quantity, for the right customers, at the right time. Therefore, to meet customer needs, a company must manage its warehouse, check stock levels, deliver goods on time, and continuously improve its customer service policies, as the service quality directly affects the order process. According to Zinkevičiūtė and Vasiliauskas (2013), logistics includes supply, materials management, and distribution. Supply, or procurement, ensures that the company has the resources needed for production and operational purposes. Materials management involves the movement of materials required for production and the movement of finished goods within the company. Distribution is the final part of logistics, where the finished products are released to the market. Demirova (2019) states that logistics process consists of these parts: material supply, production, and distribution. These authors' definitions are quite similar and complement each other. However, logistics processes form an uninterrupted chain of actions that are integral to a company's operations. They begin with supply, meaning that the manufacturing company ensures the availability of raw materials and orders the necessary quantities for production and operational needs. Then, production begins, followed by the distribution of the finished product. Distribution starts with customer search and advertising outreach and ends with transporting the product to customers.

The main goal of a manufacturing company is to produce a product whose value exceeds the sum of the raw materials, components, and all other costs incurred during production. Consumers value not only the product's value but also its timely delivery to the right location for use. Therefore, every company must focus on each logistics process, analyze the costs associated with each process, and calculate the final product's value. Minalga (2008) distinguishes three primary functional areas of logistics systems: procurement (purchasing), production, distribution (marketing). In manufacturing companies, logistics activity starts with the procurement (purchasing) functional area.

Logistics helps companies determine the necessary number of materials – the current inventory. Inventory planning is essential for the economical use of a company's working capital, which is used for purchasing materials. As Sližienė and Zaukas (2013) state, procurement logistics solves the tasks of optimal delivery of raw materials and supplies from the supply market to the company's warehouses until they are used for production. Thus, procurement is a vital area because it ensures the extraction of materials needed for the final product and their movement to production sites. The essence of the procurement process is maintaining relationships with multiple suppliers to effectively acquire necessary raw materials. Without procurement, the manufacturing process could not occur due to the lack of raw materials. Therefore, for manufacturing companies, this is a crucial process. In manufacturing companies, inventory is essential, as transporting large quantities of raw materials reduces transportation costs. Sometimes, raw materials may be of poor quality, causing production to halt. Therefore, companies involved in continuous production of raw material and supply chain management must have stock.

The production process includes all the actions necessary to convert raw materials and purchased components into the final product while ensuring quality control and meeting customer requirements. Sližienė and Zaukas (2013) describe the task of production logistics as ensuring the uninterrupted movement of material flows at the lowest cost while adhering to the production schedule. Thus, the production process essentially transforms raw materials into a finished product, which is sold to consumers. This process is the core of manufacturing companies' operations and is inseparable from procurement, as well as distribution, since the created product must reach the market.

The distribution process involves the delivery of finished products from the manufacturer to the final consumer. Becker, Gorke, Felix, and Schmidt (2016) define distribution logistics as the direct connecting link between production units and the sales market. Authors state that distribution logistics can be divided into three elements – order processing, warehousing, and transportation (Figure 2).

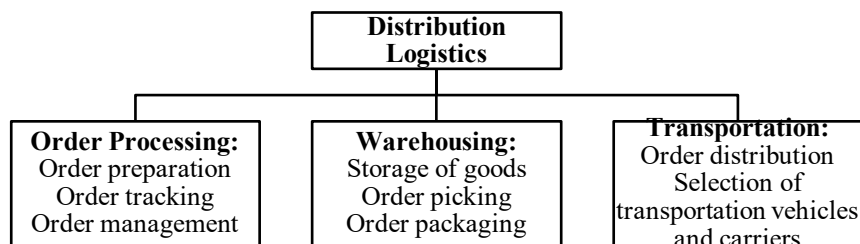


Figure 2. *Elements of Distribution Logistics*

Source: compiled by the authors based on Becker, Gorke, Felix, and Schmidt, 2016

Based on the scientific literature analysis, it has been determined that distribution logistics encompasses a significant part of logistical processes. Every manufacturing company encounters these processes in its daily operations. Order processing is particularly crucial to ensure that customer expectations are met. Warehousing is important to prevent stock shortages and enable faster and more efficient order fulfillment. Transportation fulfills the main logistics goal of delivering goods to consumers at the right time and place. Without these processes, the operation of manufacturing companies would be ineffective, as customer expectations would not be satisfied.

Therefore, manufacturing companies undergo many processes, most of which are logistics related. According to the literature analysis, it can be stated that logistical processes in manufacturing companies begin with the ordering of materials from suppliers and end with the delivery of the final product to the consumer. During this cycle, manufacturing companies carry out procurement, production, warehousing, distribution, and transportation processes. These processes are crucial for the functioning of manufacturing companies, as they form an uninterrupted chain that must continue to meet customer expectations.

2. THE CONCEPT OF DIGITALIZATION OF LOGISTIC PROCESSES

In recent years, the digitalization of logistic processes has become a frequently heard term. Generally, digitalization is understood as the transfer of information or processes into the digital realm using technology. According to Murauskas (2021), business process digitalization is the automation of processes, transferring them into the digital space, abandoning any paper or electronic documents, which allows achieving higher efficiency in planning and managing tasks. Based on this definition, by digitalizing business processes, companies can improve their performance, as this helps in planning and managing business activities. This means that innovative technologies allow companies to process vast amounts of information without human intervention, making most processes automated. As a result, companies reduce service costs, perform tasks more quickly, and consequently, reduce time expenses.

Qin, Liu, and Grosvenor (2016) define digitalization of the process more specifically, stating that it can be understood as converting physical information formats into digital form. Authors compare it to how traditional mail is replaced by email, spreadsheets are moved to programs like Excel, and typewriters are replaced by Google Docs. In logistics, these programs are often used to speed up operations; modern capabilities allow for faster receipt of emails, sending and receiving commercial offers, invoices, and thus, quicker order fulfillment.

When discussing the digitalization of logistics processes, it is crucial to also analyze the terms 'Industry 4.0' and 'Logistics 4.0'. These concepts are closely related to the digitalization of logistics processes. According to Nekrasov and Sinicyna (2020), earlier technologies were mainly used for information exchange between people, but now and in the future, they will be used in technological processes, with programs capable of making decisions on their own without human involvement. This means that the Industry 4.0 gradually introduced process digitalization, automation, and robotics into companies.

As stated by Oesterreich and Teuteberg (2016), the term 'Industry 4.0' could be described as the increasing automation and digitalization of the manufacturing environment. Gubán and Kovács (2017) argue that the essence of Industry 4.0 lies in the implementation of smart systems, enabling self-regulating production, where people, machines, equipment, and products communicate with each other.

Delfmann, Ten Hompel, Kersten, Schmidt, T., and Stölzle (2018) stated that the implementation of the envisaged Industry 4.0 vision without Logistics 4.0 is just unthinkable as the globalization of the economy without logistics networks that span the world. Logistics 4.0 is very important to the current business world (Amr, Ezzat, and Kassem, 2019). Particularly, the term 'Logistics 4.0' receives growing attention. It states that logistics as a central function plays an important role within the digital transformation of the manufacturing sector and thus, the underlying Industry 4.0 vision. Logistics 4.0 is defined in scientific literature similarly to Industry 4.0, as it represents the application of the tools of the Industry 4.0 in the logistics field. Authors define this term quite similarly (Table 1).

Table 1. *Definitions of Logistics 4.0*

Athors, Year	Definition
Nila, & Roy, 2024	Logistics 4.0 is a concept related to Industry 4.0, encompassing skills and notions of supply chain organization, integrating logistics with advanced technology in order to satisfy consumer demand for customized goods and services.
Winkelhaus & Grosse, 2020	Logistics 4.0 is a logistics system that enables the sustainable fulfilment of individualized customer needs without increasing costs and supports the development of industry and trade using digital technologies.
Glistau & Machado, 2019	The term 'Logistics 4.0' marks the specific application of Industry 4.0 in the logistics sphere.

Radivojević & Milosavljević, 2019	The term 'Logistics 4.0' should support Industry 4.0 processes from handling market demands and production planning to the delivery of smart products to end users. The solution is the digitization of logistics actions and processes – the adaptation of digital logistics.
Barreto, Amaral, & Pereira, 2017	The Logistics 4.0 paradigm can be summarized as the optimization of inbound and outbound logistics which must be supported by intelligent systems, embedded in software and databases from which relevant information is provided and shared through data enabled technology systems (e.g., blockchain, IoT) in order to achieve a major automation degree.
Wang, 2016	Logistics 4.0 is the use of barcode, radio frequency, identification technologies, sensors, global positioning systems, and other advanced network technologies for information processing and network communication technology platforms.
Timm & Lorig, 2015	Similar to the Industry 4.0 concept known from production engineering, Logistics 4.0 describes the transformation from technology-oriented logistics to software-oriented logistics, i.e., the world of smart services.

Source: compiled by the authors

The authors state that Logistics 4.0 is the application of the ideas of the Industry 4.0 in the logistics sphere, using smart technologies and leveraging process digitization. It can be concluded that Logistics 4.0 is smart logistics, employing specific digital technologies, as identified by Wang (2016). Other authors highlight similar technologies used in logistics.

Winkelhaus and Grosse (2020) identify the key technologies applied in logistics – the Internet of Things, cyber-physical systems, big data, cloud systems, and other technologies. According to Radivojević and Milosavljević (2019), the main tools used in logistics, based on Industry 4.0 ideas, would include wireless sensor networks, the Internet of Things, autonomous vehicles, drones, 3D printing, cloud computing, blockchain, big data, robotics and automation, and augmented reality (Figure 3)

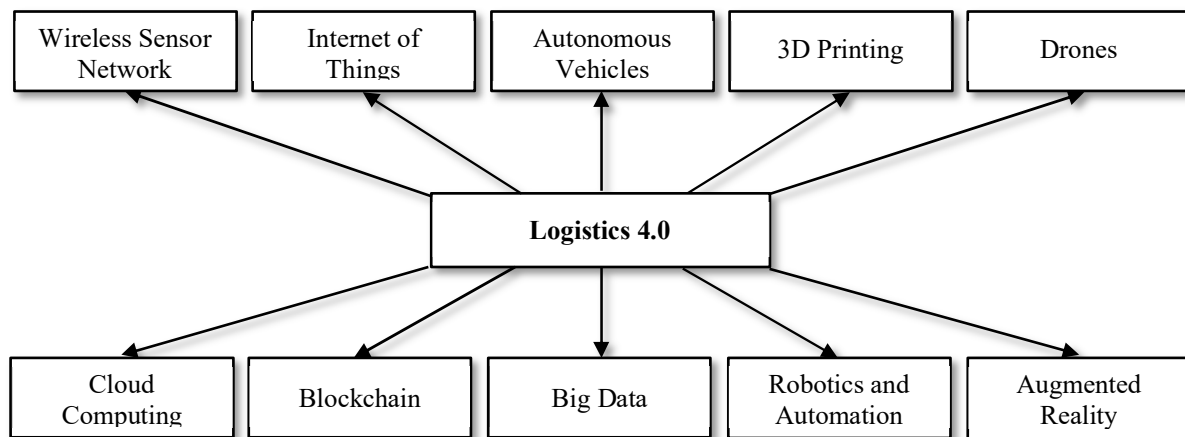


Figure 3. *Logistics 4.0 technologies*

Source: compiled by the authors based on Radivojević and Milosavljević, 2019

Glistau and Machado (2019) summarize that the tools applied in logistics under the Industry 4.0 are identification, mobile communication, location tracking tools, electronic data interchange, data analysis methods, and data processing techniques.

The recognised absence of human-centricity, resiliency, and sustainability in Industry 4.0 thinking has led the European Commission to introduce the Industry 5.0 vision, with the explicit goal of ensuring that new production and logistics systems provide a win-win for both – companies and so-

ciety (Grosse, Sgarbossa, Berlin & Neumann, 2023). From the conceptual development perspective, Industry 5.0 is not considered a radical technological revolution from Industry 4.0 but essentially shifts the focus from technology to the development of human and society driven by new technologies (Jefroy, Azarian & Yu, 2022). The Industry 5.0 concept is suggested to complement the existing Industry 4.0 (Madsen & Berg, 2021). Despite Industry 5.0 promise, the practical evidence supporting the effectiveness of it remains limited (Ghobakhloo et al., 2024). The technological achievements of Industry 4.0 are deeply rooted in the application of smart logistics industry 5.0 – Industry 4.0 technologies are still the most important technological enablers for smart logistics in Industry 5.0. For example, IoT, AI, big data analytics, simulation, and digital twin are still the focus of smart logistics transformation (Jefroy, Azarian & Yu, 2022). The automation and digitalization of processes is continuing, as advanced technologies offer unprecedented opportunities for logistics. For example, artificial intelligence can optimize routes and forecast demand, blockchain technologies can increase transparency in supply chains, and the Internet of Things and sensors can track freight movements in real time. Smart logistics leverages IoT, big data, autonomous systems for maximum efficiency and flexibility (Hsu, Cai, Zhang, & Ji, 2024). Logistics 5.0 is taking shape, which is the transformation of logistics, combining business technology and the needs of society.

Concluding, it can be stated that the digitalization of logistics processes can be defined using the terms 'Industry 4.0' and 'Logistics 4.0'. European Commission introduced the new concept of the Industry 5.0, however the technological achievements of Industry 4.0 are deeply rooted in the application of smart logistics industry 5.0. Digitalization itself refers to the transfer of information and processes into the digital space. It can be concluded that the digitalization of logistics processes is the core idea of Logistics 4.0, meaning that by utilizing technologies such as big data, cloud computing, the Internet of Things, robotics, and automation, along with other tools, companies can reduce human resource involvement, increase operational efficiency, and thus enhance their competitiveness.

3. THE IMPACT OF DIGITALIZATION OF LOGISTICS PROCESSES ON THE OPERATIONS OF MANUFACTURING COMPANIES

As the Industry 4.0 accelerates and technologies evolve, many companies must make decisions regarding the digitalization of their logistics processes. This revolution has provided companies with the opportunity to improve their operations, increase efficiency, and gain a competitive edge. Digitalization of logistics processes is closely related to the supply chain, as it can help avoid human errors and information transfer disruptions. However, before investing in any innovations, it is essential to understand their potential impact.

According to Kayikci (2018), the digitalization of all processes, from planning to distribution, will optimize workflows and reduce delivery times, because smart technologies from the Industry 4.0 revolution allow companies to respond to supply chain disruptions in a timely manner, adapt to changes in logistics processes, and even predict potential risks by modeling systems with various scenarios. El Hamdi and Abouabdellah (2022) also state that the digitalization of logistics processes will positively affect logistics processes by improving flows, optimizing work, and shortening delivery times. Authors add that technologies enable new functions, which facilitate the optimization of resources and energy. According to Şerban (2017), digitalization requires a deep understanding and investments in the development of IT architecture, which is necessary to take advantage of the tools and services provided by digitalization. Parviainen, Tihinen, Kääriäinen, and Teppola (2017) state that potential benefits of digitalization are enormous; even now, by digitalizing information-intensive processes, companies can reduce costs by up to 90 percent and improve work performance multiple times. The authors emphasize that by changing traditional processes with digital tools, data is automatically collected, which allows for a better understanding of process performance, cost-driving factors, and risks. Olanrewaju and Willmot (2013) state that technologies increase

company value in four ways: better connectivity, automation of manual tasks, better decision-making, and product or service innovations. The authors add that digitalization can reshape all aspects of modern business.

Analyzing the impact of digital technologies, it was found that smart technologies and process digitization provide companies with better connections with customers, colleagues, and suppliers. Big data and advanced data analysis allow systems to make decisions, while process automation helps optimize risks. Additionally, business digitization aids companies in creating innovative products and services, which provide customers with the opportunity to engage in the production process and create customized products.

CONCLUSIONS

1. Scientific literature analysis revealed that manufacturing companies' logistics processes begin with the ordering of raw materials and end with the delivery of the final product to the customer. During this cycle, the manufacturing company undergoes procurement, production, warehousing, distribution, and transportation processes.

2. After examining the digital tools applied to logistics processes based on the Industry 4.0 concepts, the following can be identified: big data, cloud computing, the Internet of Things, robotics and automation, wireless sensor networks, autonomous vehicles, 3D printing, drones, blockchain, and augmented reality. The use of these technologies provides companies with better connections with customers, colleagues, and suppliers; big data and advanced analytics allow systems to make decisions; process automation helps optimize risks; and these technologies assist companies in creating innovative products and services, which enable customers to engage in the production process and create specific products, thus meeting consumer needs. Industry 5.0 brings a qualitatively new approach that combines the digitalization of logistics processes with employee empowerment, sustainability, and resilience. Industry 5.0 technologies (AI, collaborative robots, augmented reality (AR), etc.) are already serving people.

3. Digitalization of manufacturing companies' operations significantly contributes to the value of the produced product. For customers, this raises confidence in the company, as digital technologies shorten production time, orders are completed on time, and products are made without defects. Moreover, digitalizing logistics processes in manufacturing companies increases the company's efficiency, producing more goods in a shorter time.

List of references

1. Amr, M., Ezzat, M., & Kassem, S. (2019). Logistics 4.0: Definition and historical background. In 2019 *Novel intelligent and leading emerging sciences conference*, 1, 46-4.9 <https://doi.org/10.1109/NILES.2019.8909314>
2. Bardakçi, H. (2020). Benefits of digitalization in international logistics sector. *International Journal of Social Science and Economic Research*, 5(06), 1476-1489. <https://doi.org/10.46609/IJSSER.2020.v05i06.009>
3. Barreto, L., Amaral, A., & Pereira, T. (2017). Industry 4.0 implications in logistics: an overview. *Procedia Manufacturing*, 13, 1245-1252. <https://doi.org/10.1016/j.promfg.2017.09.045>
4. Becker, J., Görke, M., Felix, C., & Schmidt, M. (2016). Model-based potential analysis of the distribution logistics: a case study. *Production Planning & Control*, 27(9), 698-707. <https://doi.org/10.1080/09537287.2016.1166279>
5. Delfmann, W., Ten Hompel, M., Kersten, W., Schmidt, T., & Stölzle, W. (2018). Logistics as a science: Central research questions in the era of the fourth industrial revolution. *Logistics Research*, 11(9), 1-13. https://doi.org/10.23773/2018_9
6. El Hamdi, S., & Abouabdellah, A. (2022). Logistics: Impact of Industry 4.0. *Applied Sciences*, 12(9), 4209. <https://doi.org/10.3390/app12094209>
7. Ghobakhloo, M., Iranmanesh, M., Fathi, M., Rejeb, A., Foroughi, B., & Nikbin, D. (2024). Beyond Industry 4.0: a systematic review of Industry 5.0 technologies and implications for social, environmental and economic sustainability. *Asia-Pacific Journal of Business Administration*, (ahead-of-print).

8. Glistau, E., & Machado, N. I. C. (2019). Logistics 4.0–basics, ideas and useful methods. <https://doi.org/10.26649/musci.2019.022>
9. Grosse, E. H., Sgarbossa, F., Berlin, C., & Neumann, W. P. (2023). Human-centric production and logistics system design and management: transitioning from Industry 4.0 to Industry 5.0. *International Journal of Production Research*, 61(22), 7749–7759.
10. Grubmuller, J., Duerkop, S., & Huth, M. (2021). What To Implement? Selecting The Right Digitization Technologies for Logistics. *Business Logistics in Modern Management*, 21, 313–325.
11. Gubán, M., & Kovács, G. (2017). Industry 4.0 conception. *Acta Technica Corviniensis-Bulletin of Engineering*, 10(1).
12. Hsu, C. H., Cai, X. Q., Zhang, T. Y., & Ji, Y. L. (2024). Smart Logistics Facing Industry 5.0: Research on Key Enablers and Strategic Roadmap. *Sustainability*, 16(21), 9183.
13. European Commission. (2024). Industry 5.0 Community of Practice discuss future directions to achieve its goals. https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/industry-50-community-practice-discuss-future-directions-achieve-its-goals-2024-10-16_en
14. Jefroy, N., Azarian, M., & Yu, H. (2022). Moving from Industry 4.0 to Industry 5.0: what are the implications for smart logistics? *Logistics*, 6(2), 26.
15. Kayikci, Y. (2018). Sustainability impact of digitization in logistics. *Procedia Manufacturing* 21, 782–789. <https://doi.org/10.1016/j.promfg.2018.02.184>
16. Madsen, D.Ø., Berg, T. (2021). An exploratory bibliometric analysis of the birth and emergence of industry 5.0. *Applied System Innovation* 4, 87.
17. Minalga, R. (2008). Aprūpinimo logistika. Mykolo Riomerio universitetas. https://repository.mruni.eu/bitstream/handle/007/15382/Minalga_Logistika_w.pdf?sequence=1
18. Moldabekova, A., Philipp, R., Satybalidin, A. A., & Prause, G. (2021). Technological readiness and innovation as drivers for logistics 4.0. *The Journal of Asian Finance, Economics and Business*, 8(1), 145–156. <https://doi.org/10.13106/jafeb.2021.vol8.no1.145>
19. Mousheimish, R., Taher, Y., & Finance, B. (2015). Towards smart logistics processes: a predictive monitoring and proactive adaptation approach. *Proceedings of the 2015 International Conference on Software and System Process*. <https://doi.org/10.1145/2785592.2794403>
20. Murauskas, E. (2021). Elektroninio CMR važtaraščio diegimo galimybės Lietuvos transporto sektoriuje. *Aukštojo mokslo vaidmuo visuomenėje*, p. 141–147. <https://alytauskolegija.lt/wp-content/uploads/2021/07/>
21. Nagulevičius, E., & Jakubavičius, A. (2019). Gamybos proceso modernizavimas pramonės skaitmenizavimo iššūkių kontekste. *22nd Conference for Young Researchers „Economics and Management“*. <http://jmk.vvf.vgtu.lt/index.php/Verslas/2019/paper/view/374>
22. Nekrasov, A. G., & Sinitsyna, A. S. (2020). Digital transformation infrastructure and transportation logistics systems. *IOP Conference Series: Materials Science and Engineering* 832(1):IOP Publishing. <https://doi.org/10.1088/1757-899X/832/1/012052>
23. Nila, B., & Roy, J. (2024). Analysis of Critical Success Factors of Logistics 4.0 using D-number based Pythagorean Fuzzy DEMATEL method. *Decision Making Advances*, 2(1), 92–104. <https://doi.org/10.31181/dma21202430>
24. Oesterreich, T. D., & Teuteberg, F. (2016). Understanding the implications of digitisation and automation in the context of Industry 4.0: A triangulation approach and elements of a research agenda for the construction industry. *Computers in industry*, 83, 121–139. <https://doi.org/10.1016/j.compind.2016.09.006>
25. Olanrewaju, T., & Willmott, P. (2013). Finding your digital sweet spot. <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/finding-your-digital-sweet-spot>
26. Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. *International journal of information systems and project management*, 5(1), 63–77. <https://doi.org/10.12821/ijispm050104>
27. Pighin, M. (2017). Information Technology in Small Medium Enterprise: Logistic and Production Processes. *Journal of Information and Organizational Sciences*, 41(1), 89–104. <https://doi.org/10.31341/jios.41.1.6>
28. Qin, J., Liu, Y., & Grosvenor, R. (2016). A categorical framework of manufacturing for industry 4.0 and beyond. *Procedia CIRP*, 52, 173–178. <https://doi.org/10.1016/j.procir.2016.08.005>
29. Radivojević, G., & Milosavljević, L. (2019). The concept of logistics 4.0. In *4th Logistics International Conference* p. 23–25. https://logic.sf.bg.ac.rs/wp-content/uploads/LOGIC_2019_ID_32.pdf

30. Riazanova, V., & Žilinskienė, I. (2019). Transportavimo plėtros ekspertinis vertinimas: atvejo analizė. *Visuomenės saugumas ir viešoji tvarka*, 88-98. <https://doi.org/10.13165/PSPO-19-23-07>
31. Şerban, R. A. (2017). The impact of big data, sustainability, and digitalization on company performance. *Studies in Business and Economics*, 12(3), 181-189. <https://doi.org/10.1515/sbe-2017-0045>
32. Sližienė, G., & Zaukas, G. (2013). *Logistikos operacijų vadyba*. Kaunas: KTU leidykla „Technologija“. http://senas.lnb.lt/stotisFiles/uploadedAttachments/19_Logistikos_operaciju_vadyba201402723833.pdf
33. Timm, I. J., & Lorig, F. (2015). Logistics 4.0-A challenge for simulation. 2015 *Winter Simulation Conference (WSC)* p. 3118-3119. <https://doi.org/10.1109/WSC.2015.7408428>
34. Tofan, T., & Jakubavičius, A. (2018). Pramonės skaitmenizavimas: Iššūkiai ir tendencijos. *21st Conference „Business in XXI Century“*. <http://jmk.vvf.vgtu.lt/index.php/Verslas/2018/paper/view/240>
35. Topolšek, D., Čižiūnienė, K., & Ojsteršek, T. C. (2018). Defining transport logistics: a literature review and practitioner opinion based approach. *Transport*, 33(5), 1196-1203. <https://doi.org/10.3846/transport.2018.6965>
36. Wang, K. (2016). Logistics 4.0 solution-new challenges and opportunities. In *6th international workshop of advanced manufacturing and automation*, p. 68-74, Atlantis Press. <https://doi.org/10.2991/iwama-16.2016.13>
37. Winkelhaus, S., & Grosse, E. H. (2020). Logistics 4.0: a systematic review towards a new logistics system. *International Journal of Production Research*, 58(1), 18-43. <https://doi.org/10.1080/00207543.2019.1612964>
38. Zinkevičiūtė, V., & Vasiliauskas, A. V. (2013). Gamybos logistika. Gamybos vadyba. http://www.esparama.lt/es_parama_pletra/failai/ESFproduktai/2013_Gamybos_logistika_Gamybos_vadyba.pdf
39. Žaludienė, E., Petrauskienė, J., Ratautaitė, K., & Vienažindienė, M. (2021). Išmanios technologijos ir jų naudojimo galimybės logistikos įmonių praktikoje. *Role of higher education institutions in society: challenges, tendencies and perspectives. Aukštųjų mokyklų vaidmuo visuomenėje: iššūkiai, tendencijos ir perspektyvos*, 1(9), 285-292.

LOGISTINIŲ PROCESŲ SKAITMENIZAVIMAS GAMYBOS ĮMONĖSE

Santrauka

Ketvirtoji pramonės revoliucija (Pramonė 4.0) paskatino gamybos įmones diegti skaitmenines technologijas, tokias kaip dideli duomenys, debesų kompiuterija, daiktų internetas, robotika ir automatizavimas, keičiančias tradicines logistikos operacijas. Penktoji pramonės revoliucija (Pramonė 5.0) – nauja pramonės plėtros paradigma, kuri daugiausia dėmesio skiria gamybos automatizavimui ir efektyvumui bei siekia, kad gamyba taptų tvaresnė, labiau orientuota į žmogų ir atsparesnė išoriniams sukrėtimams. Straipsnyje analizuojamos logistikos procesų skaitmenizavimo galimybės gamyboje ir galima pažangos nauda, įskaitant didesnę efektyvumą, klaidų mažinimą, išlaidų optimizavimą ir didesnę klientų pasitenkinimą. Taip pat atskleidžiamas skaitmeninių technologijų vaidmuo supaprastinant darbo eigą, gerinant sprendimų priėmimą realiuoju laiku ir numatant tiekimo grandinės valdymo naujus modelius. Straipsnyje išryškinami iššūkiai, susiję su skaitmenizavimo įgyvendinimu, įskaitant didelių investicijų poreikį, kvalifikuotos darbo jėgos ir IT infrastruktūros plėtrą. Mokslinės literatūros analizės pagrindu atskleidžiama, kaip skaitmenizavimas gali optimizuoti tiekimo grandines, sumažinti rankinius procesus ir suteikti inovatyvių galimybių organizacijoms reaguojant į rinkos poreikius. Straipsnyje identifiкуotas transformacinis logistikos skaitmenizavimo potencialas suteikia įžvalgų gamybinių įmonių veiklos augimo strategijų rengimui.

Pagrindiniai žodžiai: logistikos procesai, gamybos įmonės, skaitmenizacija, Pramonė 4.0, Pramonė 5.0.

MANAGEMENT OF RESOURCE AND INFORMATION PROCESSES IN ENTERPRISES FOR THE DEVELOPMENT OF AN INCLUSIVE SPACE

Prof. Dr. Oksana Polinkevych

Lutsk National Technical University, Ukraine

Annotation

The article analyzes the inclusive space and identifies the features of its formation. It is noted that the foundation of the inclusive space consists of informational and resource processes of enterprises, which shape effective interaction between territorial communities and businesses. The thesis is proven that such interaction lays the groundwork for the formation of an inclusive space while adhering to the principles of sustainable development.

Key words: sustainable development, resource processes, informational processes, enterprises, management, inclusive space, inclusive entrepreneurship

INTRODUCTION

In modern conditions, a crucial element in the activities of enterprises is their ability to quickly adapt to changing circumstances, which in Ukraine are dictated by military actions as well as the consequences of pandemics and crises. Business management should be based on the principles of a process-oriented approach. With the growing digitalization, businesses have started to pay more attention to resource and informational processes. In wartime conditions, an inclusive space is the foundation of sustainable enterprise development. The inclusive space is a complex structure in terms of both its content and functional components. Its specificity determines the directions of social activity concerning people with disabilities and ensures favorable conditions for their personal well-being in various spheres of life. The inclusive space should incorporate elements of a complex system of social connections, characterized by their dynamism and the constructive activity of entities that generate informational and resource opportunities to meet the needs of people with disabilities. Enterprises, along with social institutions, form the basis of an inclusive space, promoting the philosophy of inclusion and contributing to the reorganization of the system to which they belong into an inclusive one. Therefore, this issue is relevant for research.

The research was based on the work of scientists using the systematic literature review (SLR) methodology and the PRISMA flowchart. The PRISMA flowchart illustrates the research selection process: 1. Identification of the research problem by searching databases and other sources. 2. Selection of flow management criteria based on predefined criteria. 3. Determining the place of enterprise processes in the inclusive space. 4. Developing recommendations for managing enterprise resources in an inclusive space. Let's start by identifying the research problem according to the SLR methodology.

Many researchers have studied the issues of managing resource and informational processes within enterprises. In particular, most authors separately consider the management of resource processes or informational processes within enterprises. For a successful enterprise, the key to success lies in establishing and strictly adhering to proper and effective business processes, which require continuous analysis and evaluation. With the evolution and increasing complexity of technology and technical advancements, the requirements for building business processes within economic entities will also grow (Miroshnyk, Dereroriz, 2024). The accelerating complexity of business conditions in a competitive environment necessitates a fundamental shift in the paradigm of information generation (Pushkar, Pushkar, 2021). Accordingly, informational processes occupy an essential place in enterprise activities. Such processes may include planning and resource allocation to mitigate the impact of unforeseen changes on enterprise operations, as well as ensuring the enterprise's long-term sustainability through the rational use of resources, including financial, human, and material resources (Horodianska, 2023). Thus, informational and resource processes form the foundation for building an inclusive space that creates a symbiosis between businesses and social instituti-

ons, ensuring a comprehensive understanding and resolution of social issues within territorial communities. An important process is the study of the concept of sustainable development in Ukraine, the specifics of conducting business, and security management processes (Polinkevych, 2024). The shift in enterprise process management strategy must take into account the principles of implementing inclusive business development. These principles are based on increasing the participation of all social groups in societal life, especially those with physical development difficulties (Batiyh, 2024). Researchers have proven a direct link between digitalization and increased enterprise resilience. Digitalization not only indicates the direction of new processes but also helps develop a long-term strategy that considers social changes, human needs, and environmental aspects. In this sense, digitalization and modern technologies contribute to creating a resilient organization and a sustainable humanistic society (Kuzior, Kettler, Rąb, 2021).

The aim of this study is to determine the characteristics of managing resource and information processes within an enterprise in the development of an inclusive space. The subject of the study is the inclusive space formed by enterprises through the effective management of resource and information processes. The study was conducted in 2021-2024 through a critical review of literature and the formation of own approaches to managing enterprise processes in an inclusive space.

The study employs the following research methods: 1. The method of systematic analysis of literary sources, which allowed for an in-depth understanding of the essence of informational and resource processes within an enterprise in an inclusive context, identifying key aspects of the topic, and preparing the theoretical foundation for the article. 2. The dialectical method, which enabled the justification of a new concept—“informational processes” and “resource processes” within an enterprise – linked to maintaining stability, fostering innovation, and adhering to the principles of inclusivity and sustainable development within enterprises. 3. The decomposition method, system analysis, and synthesis, which facilitated the examination of informational and resource processes as interconnected elements within the enterprise system and helped identify how changes in one aspect may impact other aspects, thereby shaping an inclusive space. 4. The method of theoretical generalizations, comparative, abstract-logical, and other approaches, which were used to define problems and identify ways to address them in the formation of both current and final conclusions.

Thus, the paper establishes the hypothesis that the management of information and resource flows of an enterprise influences the formation of an inclusive space that is able to ensure sustainable development of society.

The novelty of the work is the development of a strategy for managing enterprise flows in an inclusive space.

1. THE ROLE OF ENTERPRISE INFORMATION FLOWS IN THE FORMATION OF AN INCLUSIVE SPACE

In recent years, the topic of inclusion has spread across all areas of public life, including the economic sector. Generally, inclusivity refers to the involvement of all citizens in socially active life, regardless of physical and material capabilities. The rising prices of essential goods, the slowdown of social benefits, and the decline in demand for low-skilled labor have led to a deterioration of the already low standard of living for socially vulnerable members of society in Ukraine. Under these conditions, there is an objective need to shift the focus of business development from achieving financial results to improving the material well-being of the impoverished segments of the population.

Space is a dynamic environment that has inputs and outputs and ensures the normal functioning of the institutions that exist within it. Accordingly, an inclusive space refers to a space where business plays a key role, with resources as inputs and the product in the form of solving a socially significant problem for the territorial community as the output. In business, the main subject is the enterprise, whose activities, in modern conditions, depend on the management of information and resource flows. Thus, a new concept arises—inclusive entrepreneurship. Inclusive entrepreneurship refers to entrepreneurial activities aimed at achieving social goals. The inclusive development model involves, on one hand, creating jobs for the most socially vulnerable groups of citizens, and on the other hand, ensuring the accessibility of goods and

services for all population segments. The foundation of the inclusive development model is based on social values: equality, accessibility, tolerance, and mutual aid.

Let us present schematically the process of forming an inclusive space for enterprises (Figure 1).

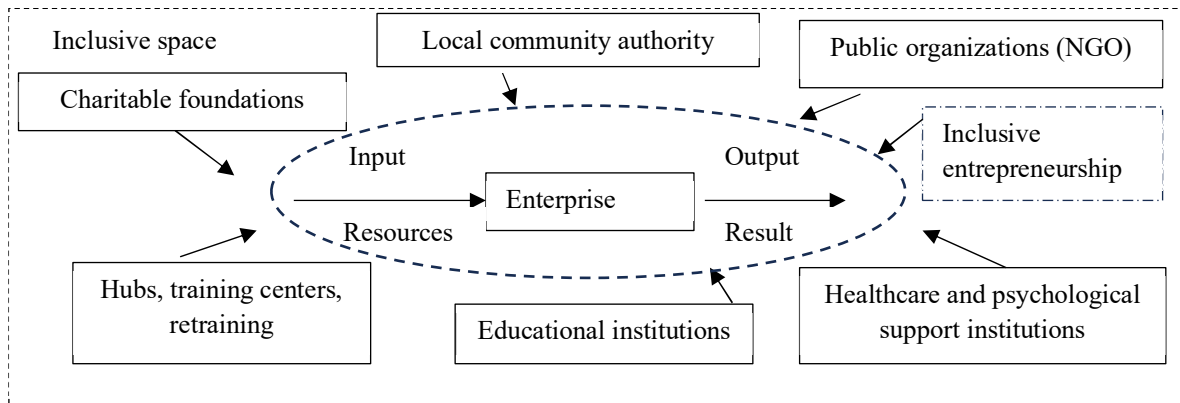


Figure 1. *Inclusive space of enterprises in the context of sustainable development*

Source: formed by the author

From Figure 1, it can be concluded that the inclusive space contains several elements: local government authority, public organizations, charitable foundations, educational institutions, healthcare and psychological support facilities, hubs, training centers, and retraining programs. The enterprise is the central element, considered as a system with inputs and outputs. It receives resources at the input, which are connected to the resources at the input and the result at the output. In general, in this context, enterprises form inclusive entrepreneurship, which is aimed not so much at maximizing profit, but at solving pressing societal issues. The block of inclusive entrepreneurship fundamentally consists of a system of enterprise activities, which together form the inclusive potential of the area capable of addressing the urgent needs of society and preventing catastrophes and imbalances in development. Local authorities, educational institutions, healthcare and psychological support services, public organizations, charitable foundations, hubs, and training centers are the organizations that diagnose societal problems, communicate them to businesses, and, through joint actions, attempt to contribute to their resolution. The block of inclusive entrepreneurship is presented in Figure 2. From Figure 2, it can be concluded that the external inclusive environment contains a set of problems that need to be addressed. These are positioned at the input of the system. By using information and resource processes, the enterprise produces a mechanism that helps to solve these problems. At the output, the enterprise receives a social or economic result. In general, the problem itself may be either solved or unsolved. However, a third situation arises—the zone of uncertainty. This zone does not predict whether the problem is solved or not; rather, it considers whether society will change after the actions taken and whether it will help regulate the problematic aspects within the inclusive space.

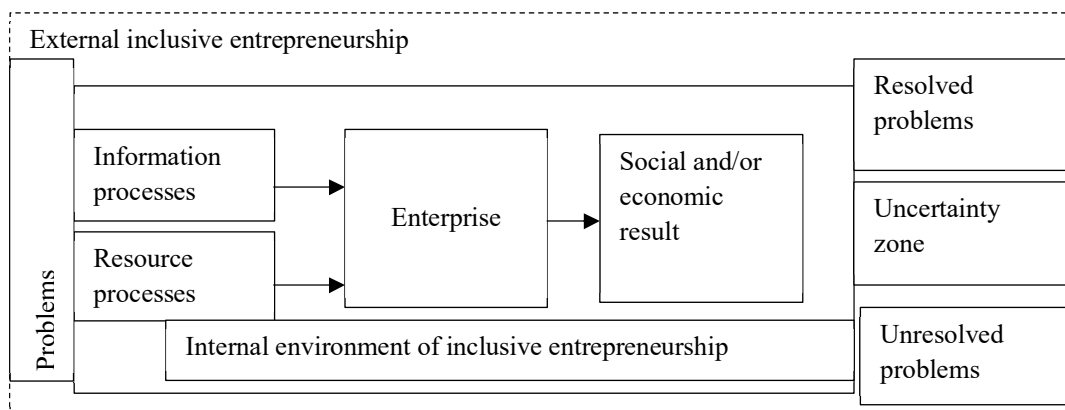


Figure 2. *The block of innovative entrepreneurship*

Source: formed by the author

2. MANAGEMENT OF RESOURCE FLOWS IN ENTERPRISES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

Resource processes in an enterprise are crucial for the restoration of operations and the implementation of innovations within business activities. The presence of resource processes in an enterprise indicates its flexibility and ability to adapt to changes in the external environment. For example, resource processes can include the planning and reserving of resources to reduce the impact of unforeseen changes on the enterprise's operations, as well as ensuring the long-term sustainability of the enterprise through the rational use of resources, including financial, human, and material resources. The application of this term helps account for the interconnection between reproduction and innovation aspects of the enterprise's activities. It emphasizes that, in modern conditions, success depends on combining resource conservation with the continuous improvement and development of technologies for their use. Therefore, resource processes in an enterprise should form the basis of a comprehensive approach to organizing business activities to ensure the effective use of resources, the development and implementation of innovations, and adaptation to changes in the surrounding environment, thus fostering a sustainable and inclusive societal space.

The formation of resource processes in an enterprise must be influenced by changes occurring in society. In the period of military actions in Ukraine, the processes of inclusion and adaptation of business to new conditions are of great importance.

Resource processes are processes that determine the ability to perform the core functions of a business within the information that comes through informational processes. In general, resource processes can be conditionally divided into the following groups: 1) human. These include categories of personnel such as youth, people with disabilities, ethnic minorities, low-income groups, elderly people, other socially vulnerable groups, and the working population. These are resources that can be managed and are directly involved in solving specific social problems and creating conditions for the further development of the business entity itself; 2) material. These include processes related to the management of raw materials, materials, semi-finished products, and other current and non-current assets that are involved in the enterprise's activities and serve as the foundation for achieving economic results in either material or immaterial form. These are the resources of the enterprise (means of production) that have physical characteristics (embodied) and are intended for use in the production process; 3) financial. These include processes related to the management of capital and reserves, current accounts, cash funds, and balances between accounts receivable and payable, etc. These are the financial resources available to the enterprise and are the primary resource for acquiring other types of resources to achieve the set goals.

We have distinguished information resources as separate processes. This is due to the fact that information changes rapidly. We all live in an information environment that is dynamic and chaotic. In it, business entities are more likely to make irrational decisions rather than rational ones. Therefore, in the context of the war in Ukraine, information processes play an important role and should be treated as separate processes, rather than considered as part of resources. Information resources refer to the set of information that functions within a company or is necessary for its normal functioning. This includes both internal information (such as accounting and statistical reports, primary accounting documents, orders, and management directives) and external information (such as regulatory documents at various levels that govern the enterprise's operations, comments on regulatory acts from various sources, advertising and information from partners and competitors, customer feedback, results of external audits, etc.). Artificial intelligence and big data flows have caused information resources to extend beyond just the internal resources of the enterprise. Therefore, information resources should be considered from a process-oriented approach. It is worth agreeing with the conclusions of the research by J. Cristiano and M. L. Rui, which note that it is inappropriate to resort to means that contribute to serious transformations, requiring an urgent response to the inevitable risk of disruption, as the efforts and investments for restructuring at such a scale are significant, and that changes of this kind are progressive and occur at a pace that also corresponds to progress in organizational culture. Therefore, when such a project is implemented, adopting a quality policy related to continuous improvement and constant attention to human resource management is paramount. Thus, human resources are a priority in business management. Managing them will contribute to the formation of an inclusive

space where many groups of subjects can interact based on the principles of inclusive entrepreneurship.

Information and resource processes are an integrated activity that intersects with functional areas. Integration occurs where communication exists and connects the internal and external environments. The role of information technology and information systems is to automate this communication so that it takes place efficiently, and its implementation should not solely adhere to technical parameters. It should be the result of the work of a multidisciplinary team that monitors the ideal capability of adhering to technological resources for business processes, aligned with the organization's mission. A company can redefine its strategic goals according to the new environment formed by new participants who are included in the concept of inclusion. Therefore, the company is ready to withstand the negative influence of the external environment as long as there is competition within the system and connections have been established with the inclusive space. This interaction should focus on the parameters of "clients," "solutions," "value," and "efficiency." These are the foundation in any business processes and a critical element of the entire system. Such a system must operate according to the principles of sustainable development, which include: integration, environmental preservation, intergenerational justice, social justice, economic efficiency, environmental responsibility, participation and partnership, scientific and technological progress, responsible governance, and global responsibility.

In Table 1, we will provide examples of managing resource processes for sustainable and inclusive development.

Table 1. *The strategy for managing resource processes within a business in a sustainable and inclusive society*

Categories	Measures	Inclusive component
Customers	Considering the entire value chain when acquiring resources – from production, transportation, and distribution to the needs of end consumers – with the goal of maximizing the value proposition. Deepening partnerships with customers, aiming to meet their needs. Understanding the environment in which the products and services of the enterprise operate to identify new opportunities for increasing efficiency, eliminating unnecessary processes, and optimizing transactions.	The effectiveness of involving inclusive groups in resource processes
Solutions	Combining products and services to create comprehensive solutions, meaning adding services that enhance their value. Using the best available talents to develop innovative solutions. This requires training and personal development, ensuring the presence of the necessary competencies and high-quality solutions.	Taking into account the diversity of personnel and societal needs
Value	If savings are achieved through increased capital investment, reduced losses, or improved margins, efforts should be made to ensure a fair distribution of these benefits among employees. Higher risks associated with creating greater value should also be shared. Services should be accessible to any supplier or consumer, regardless of their position in the value chain and resource consumption. In cases where customers have different goals or potential conflicts of interest, the primary principle should be providing the maximum value.	Non-discrimination and effective inclusion of inclusive groups in the processes of value creation within the enterprise
Efficiency	Controlling marketing programs, engineering projects, and production units to ensure customers receive the best service with maximum value. Using information technology to collect and exchange data about customer needs.	Formation of an interaction space

Source: summarized by research (Cristiano, 2021).

Based on the analysis of the data in Table 1, it can be concluded that the strategy for managing resource processes in enterprises should be based on a number of components, such as customers, efficiency, decisions, and values. The analysis should be conducted across all processes in the enterprise according to these components. Moreover, an inclusive component should be identified in each process. This allows for the formation of an inclusive space. M. Voychuk notes that two approaches to inclusive development are distinguished in the literature - as a “result” and as a “process,” to some extent viewing them as competitive. Economic inclusion is an approach to shaping social relations in the economic sphere, where equal conditions are created for access, distribution, and realization of public goods and equal opportunities for every member of society in managing and influencing economic processes at the micro-, meso-, and macro-levels (Voychuk, 2021). This definition characterizes inclusion from all aspects of societal development. The enterprise is the key entity capable of ensuring the adherence to the principles of sustainable and inclusive development.

CONCLUSIONS

1. In the context of war and pandemics, businesses operate in an inclusive space that is constantly changing. The inclusive space ensures the realization of the key goals of sustainable development and aims to draw the attention of businesses to important societal needs that require immediate resolution. The inclusive space refers to an environment in which business plays a key role, where resources enter and a product is created in the form of solving a socially important problem for the local community. We came to this conclusion on the basis of research by M. Voichuk (Voichuk, 2021), who noted that in an inclusive space, the most equal conditions are created for each member of society to manage and influence the environment. In business, the main entity is the enterprise, whose activities in the current conditions depend on the management of information and resource flows. And human resources are the primary task in enterprise management, according to research by J. Cristiano and M. L. Rui (Cristiano, Rui, 2021). They are the basis for the successful management of information and resource flows of an enterprise in an inclusive space. Information processes occupy an important place in the activities of enterprises. According to the research of L.V. Horodianska, they include planning and reserving resources to reduce the impact of unpredictable changes on the enterprise's activities (Horodianska, 2024). Under conditions of inclusion, the impact of unpredictable changes on the enterprise increases. Therefore, these processes are effective.

2. Business activity based on the concept of inclusive development should be viewed by the company's management not as a factor that hinders or burdens its growth, but as a source of new opportunities to enhance the organization's competitiveness. It is worth agreeing with R. Miroshnyk and M. Dereroriz, who noted that the key to success is the establishment and strict adherence to correct and effective processes (Miroshnyk, Dereroriz, 2024). They form the basis of sustainable development. In modern conditions, the complexity of doing business and generating information is increasing (Pushkar, Pushkar, 2021). This conclusion of M.S. Pushkar and M.R. Pushkar was confirmed in our study. The inclusive approach to business operations expands opportunities for increasing competitiveness in the market through: 1) expanding the sales market. The company faces the task of developing and adapting products for people with disabilities, increasing the share of services for this consumer category, and improving the accessibility of services. This will allow the company to significantly expand the sales market for its products and increase profitability in specific market segments; 2) creating a barrier-free environment to attract new employees. Engaging people with physical disabilities, as well as young people and retirees, on full-time or part-time terms, creates a favorable socio-psychological climate, allows the company to flexibly respond to changes in the economic market conditions, and increases production output; 3) brand value and consumer loyalty. Involving people with disabilities in the company's staff, as well as selling products intended for socially vulnerable groups, ensures consumer loyalty. This becomes especially important in conditions of intense competition; 4) investor interest. Developing and implementing an inclusive

development model contributes to attracting investors, as the company has sufficient financial resources to develop this direction; 5) creating a positive reputation in the market. Involving people with physical disabilities in the staff, as well as selling products for vulnerable populations, creates a positive image for the company in the market and increases consumer trust. As a result, the volume of product sales increases across all market segments.

3. Information and resource processes of enterprises contribute to their quick adaptation and the creation of a link between business and government. Through this, societal problems of local communities are addressed, and the foundations for forming an inclusive space based on the principles of sustainable development are laid. In the context of digitalization, modern technologies help to create a sustainable organization and a sustainable humanistic society, and to develop a long-term development strategy. This conclusion was reached by A. Kuzior, K. Kettler, Ł. Rąb (Kuzior, Kettler, Rąb, 2021). We agree with their conclusion and consider the enterprise flow management strategy to be effective for ensuring sustainable development of society. Our research has confirmed that changing the enterprise process management strategy should take into account the principles of inclusive business development. The same conclusion was reached by the results of the study by V. Batig (Batig, 2024).

The research focused on the information and resource processes of enterprises that contributed to the formation and implementation of an inclusive space. To ensure this, it is necessary to formulate a strategy that would include the management of information and resource processes of enterprises. In the future, it is necessary to develop a mechanism for ensuring the implementation of the strategy for managing the information and resource processes of enterprises in the inclusive space, taking into account the main priority of development - the welfare of society. The developed schemes of inclusive entrepreneurship and inclusive space of enterprises in the context of sustainable development will help businesses to better understand development priorities and determine their own place in ensuring sustainable development through the formation of an inclusive space. The proposal for a strategy for managing the resource processes of an enterprise in a sustainable and inclusive society can provide measures to achieve it and clearly identify the component of inclusion in the activities of enterprises. At the regional level, the authorities will be able to realize the importance of business involvement in the formation of inclusive spaces.

List of references

1. Batig, V. (2024). Transformation of enterprise development management in the context of implementing the principles of inclusive development. *Ukrainian Journal of Applied Economics and Technology*, 9(2), 340-344. doi: 10.36887/2415-8453-2024-2-58
2. Cristiano, J., & Rui, M. L. (2021). Business processes reconfiguration through the implementation of an enterprise resource planning system. *Journal of Applied Engineering Science*, 19(2), 488-497. doi:10.5937/jaes0-27393
3. Gorodianskaya, L.V. (2023). Reproduction of economic resources of the enterprise in the innovation process. *Journal of strategic economic research*, 6 (17), 177–186 doi: 10.30857/2786-5398.2023.6.18
4. Kuzior, A., Kettler, K., & Rąb, Ł. (2022). Digitalization of Work and Human Resources Processes as a Way to Create a Sustainable and Ethical Organization. *Energies*, 15(1), 172 doi: 10.3390/en15010172
5. Melnyk, O.M. (2019). Enterprise resources: conceptual aspects of the management system in conditions of sustainable development. *Scientific Bulletin of Uzhhorod National University. Series: International Economic Relations and World Economy*, 23 (2), 17–22
6. Miroshnyk, R., & Derevoriz, M. (2024). Peculiarities of analyzing business processes of enterprises in modern conditions. *Economy and society*, (62). doi: 10.32782/2524-0072/2024-62-74
7. Polinkevych, O.M. (2024). Business communications of hospitality industry enterprises in conditions of political instability. *Restaurant and hotel consulting. Innovations*, 7 (1), 31-37. doi: 10.31866/2616-7468.7.1.2024.305953
8. Polinkevych, O. M. (2024). The economic consequences of military conflicts: The Ukrainian context. *Economic Forum*, 14(1), 28-39. doi: 10.62763/cb/1.2024.28

9. Polinkevych, O.M. (2024). Safety management system of machine-building enterprises for sustainable development of territories. *Economic Sciences. „Regional Economy“*, 21 (83), 103–110. doi: 10.36910/2707-6296-2024-21(83)-10
10. Pushkar, M.S., & Pushkar, M.R. (2021). *Information resources for business: formation and use*. Ternopil: Carte Blanche.
11. Voychuk, M.V. (2021). Etymology of the concept of „economic inclusion“ in the context of cyclical economic development. *Innovative Economics*, 3–4, 28–33. doi:10.37332/2309-1533.2021.3-4.4

IŠTEKLIŲ IR INFORMACIJOS PROCESŲ VALDYMAS ĮMONĖSE, SIEKIAN- T KURTI ĮTRAUKIAJĄ ERDVĘ

Santrauka

Straipsnyje išanalizuota įtraukioji erdvė ir nustatytos jos formavimo ypatybės. Nurodyta, kad įtraukiosios erdvės pagrindą sudaro įmonių informaciniai ir ištekliniai procesai, kurie formuoja efektyvią teritorinių bendruomenių ir verslo sąveiką. Įrodyta tezė, kad tokios sąveikos dėka sukuriama įtraukiosios erdvės formavimo pagrindai, laikantis darniojo vystymosi principų.

Pagrindiniai žodžiai: darnus vystymasis, ištekliniai procesai, informaciniai procesai, įmonės, valdymas, įtraukioji erdvė, įtraukioji verslininkystė.

BALTIJOS ŠALIŲ IŠMANIOJO AUGIMO DINAMIKA ES KONTEKSTE

Dr. Viktor Kozlovskij
Vilniaus kolegija

Anotacija

Po 2007–2009 m. pasaulinės ekonominės krizės išmanusis augimas tapo svarbia ES ekonominės politikos dalimi, siekiant mažinti regioninius skirtumus ir stiprinti konkurencingumą. Baltijos šalyse (Estijoje, Latvijoje, Lietuvoje) išmaniojo augimo rodiklių analizė leidžia įvertinti jų pažangą ES kontekste, atsižvelgiant į užimtumo, aukštojo išsilavinimo lygio ir investicijų į mokslinius tyrimus (GERD) pokyčius. Tyrimo tikslas – įvertinti išmanaus augimo rodiklių raidą Baltijos šalyse. Siekiant šio tikslo, analizuojami teoriniai išmanaus augimo aspektai, vertinami pagrindiniai rodikliai bei nagrinėjama jų kaita Baltijos šalių ir ES kontekste. Rezultatai rodo, kad per 2010–2022 m. Baltijos šalys pasiekė reikšmingų rezultatų užimtumo ir aukštojo išsilavinimo srityse, dažnai lenkdamos ES vidurkius. Ypač išsiskiria Lietuva, kurioje aukštojo išsilavinimo lygis siekia beveik 60 proc. Tuo tarpu investicijos į mokslinius tyrimus ir plėtrą išlieka mažesnės nei ES vidurkis, o augimas GERD srityje per visą laikotarpį buvo minimalus.

Pagrindiniai žodžiai: išmanusis augimas, išmanioji specializacija, GERD, aukštasis išsilavinimas, užimtumas.

ĮVADAS

Išmanusis augimas (angl. Smart Growth) įgavo ypatingą reikšmę po 2007–2009 m. pasaulinės ekonominės krizės, kuri reikšmingai paveikė beveik visų ES valstybių narių ekonomiką. Atsigavimo procesas buvo sudėtingas, o ekonomikos augimas tapo netolygus, padidindamas regioninius skirtumus. Problemos, su kuriomis susidūrė silpniausieji regionai (daugiausia Pietų ir Rytų Europoje), vėl išryškėjo. Be to, produktyvumo atotrūkis tarp ES ir kitų ekonomiškai išsivysčiusių šalių, tokių kaip JAV, dar labiau išaugo (Rigby ir kt., 2022). Reaguodama į šiuos iššūkius, Europos Komisija pasiūlė naujas plėtros strategijas, tokias kaip „Europa 2020“, kurios remiasi išmanaus, tvaraus ir įtraukiojo augimo principais (Marrocu ir kt., 2023; Rigby ir kt., 2022).

Buvo sukurtos ir pradėtos įgyvendinti tokios plėtros strategijos ir programos kaip Išmaniosios specializacijos strategija (angl. *Smart Specialization Strategy* – S3), Mokslinių tyrimų ir inovacijų strategijos išmaniajai specializacijai (angl. *Research and Innovation Strategies for Smart Specialization* – RIS3) bei Regioninė veiksmų programa 2014–2020 m. (angl. *Regional Operational Programme 2014–2020*). Išmaniojo augimo principai taip pat buvo integruoti į Europos regioninės plėtros fondo (angl. *European Regional Development Fund* – ERDF), kuriam buvo skirta reikšminga finansavimo dalis, veiklą (Antonelli ir kt., 2023; Marrocu ir kt., 2023). Esminis skirtumas tarp šių ir ankstesnių strategijų yra filosofinis pagrindas: išmaniosios specializacijos (S3) ir kitų strategijų metodologija remiasi „iš apačios į viršų“ (angl. *bottom-up*) principu. Šis metodas leidžia vietos valdžios institucijoms nustatyti inovacijų, sektorių ir pramonės plėtros kryptis (Rigby ir kt., 2022).

Pasak Wojnicka-Sycz (2020) atėjo laikas apibendrinti minėtų strategijų tarpinius rezultatus ir palyginti juos su teoriniu pagrindu. Tai būtina siekiant koreguoti tolimesnius tikslus ir nustatyti naujas prioritetines sritis. Neabejotinai tinkamam vertinimui būtina turėti patikimus rodiklius ir jų sistemas.

Šio tyrimo tikslas – dalinai atsakyti į minėtus klausimus, įvertinant išmanaus augimo rodiklius ir jų raidą Baltijos šalyse per visuminės sanglaudos indeksą. Duotam tikslui pasiekti iškelti tokie uždaviniai:

- peržiūrėti teorinius išmanaus augimo aspektus bei išnagrinėti išmanaus augimo vertinimo rodiklius;

- pristatyti išmanaus augimo vertinimo Baltijos šalyse sistemą;
- pateiktos tyrimo metodikos pagrindu išanalizuoti Baltijos valstybių išmanaus augimo rodiklių pokyčius visuminės sanglaudos požiūriu.

Tyrimo metodai. Aprašomoji ir lyginamoji analizė, antrinių duomenų statistinė analizė, grafinė analizė.

1. IŠMANAUS AUGIMO KONCEPCIJOS TEORINIS PAGRINDIMAS

Išmanaus augimo koncepcija yra itin svarbi Europos Sąjungoje (ES) ir integruota į įvairias ES politikas bei strategijas, tokias kaip Išmaniosios specializacijos strategija (angl. Smart Specialization Strategy – S3), Mokslinių tyrimų ir inovacijų strategijos išmaniajai specializacijai (angl. *Research and Innovation Strategies for Smart Specialisation* – RIS3), Regioninė veiksmų programa 2014–2020 m. (angl. Regional Operational Programme 2014–2020), strategija „Europa 2020“ ir kt. Ši koncepcija siekia skatinti tvarų ir subalansuotą ekonominį, socialinį bei aplinkosaugos vystymąsi. ES požiūris išmanusis augimas yra platesnės strategijos, orientuotos į išmanų, tvarų ir įtraukiantį augimą, dalis.

Tyrėjai (Jamshidi & Barakpour, 2023; Bagheri & Shaykh-Baygloo, 2021) išskiria keletą pagrindinių išmanaus augimo aspektų:

Moksliniai tyrimai ir plėtra (angl. *Research and Development* – R&D). Inovacijos bei moksliniai tyrimai yra laikomi būtinais ekonominio augimo varikliais. Vienas iš ES plėtros tikslų – tapti technologijų ir mokslinių tyrimų lydere. Mokslas ir inovacijos glaudžiai susiję su skaitmenizavimu, kuris yra esminis veiksnys konkurencingumo didinimui bei ekonomikos augimui.

Švietimas ir kompetencijos. Investicijos į švietimą ir kompetencijų ugdymą yra esminė išmanaus augimo dalis. Be aukštojo mokslo ES taip pat remia visą gyvenimą trunkantį mokymąsi, profesinį rengimą bei iniciatyvas, siekiančias didinti darbo rinkos dalyvių įsidarbinamumą.

Regioninė plėtra. ES skatina regioninę plėtrą per įvairias programas, įskaitant sanglaudos politiką. Šios politikos tikslas – mažinti ekonominius ir socialinius skirtumus tarp regionų bei skatinti subalansuotą augimą visoje ES. Esminė šios politikos dalis – užimtumo lygio didinimas.

Verslumas ir smulkus/vidutinis verslas. ES aktyviai remia verslumą bei smulkias ir vidutines įmones (SVV) per lengvatinių finansavimą bei reguliacinio sudėtingumo mažinimą. Europos smulkaus verslo aktas („European Small Business Act“) yra vienas iš politikos pavyzdžių, skirtų SVV augimui skatinti.

Žaliojo augimas. ES įsipareigojusi siekti aplinkosaugos tvarumo kartu skatindama ekonomikos augimą. Išmaniojo ekonominio augimo kontekste būtina mažinti šiltnamio efektą sukeliančių dujų emisijas, didinti išteklių naudojimo efektyvumą bei pereiti prie mažo anglies dioksido kiekio ir žiedinės ekonomikos.

Visi šie aspektai yra glaudžiai susiję su išmaniosios specializacijos (angl. Smart Specialization) koncepcija. Išmanioji specializacija – tai inovacijomis grįstas regioninės ekonominės plėtros metodas, kuriuo siekiama identifikuoti ir stiprinti konkretaus regiono unikalius pranašumus, gebėjimus bei konkurencinius privalumus (Wu, 2023; Wojnicka-Sycz, 2020). Šią koncepciją Europos Sąjunga įvedė kaip dalį savo regioninės plėtros politikos, siekdama skatinti tvarų ir įtraukiantį augimą. Pagrindinė idėja – skatinti regionus specializuotis tose srityse, kuriose jie turi santykinį pranašumą ir gali pasiekti geriausių rezultatų, taip skatinant inovacijas, ekonominę diversifikaciją ir konkurencingumą.

Strateginiuose ES dokumentuose (pvz., Europa 2020, S3, RIS3 ir kt.) bei ataskaitose nėra pateikto galutinio ir vieningo išmanaus augimo rodiklių sąrašo. Tačiau mokslinėje literatūroje dažniausiai minimi rodikliai yra: išlaidos moksliniams tyrimams ir plėtrai (dažniausiai matuojamos kaip bendrosios išlaidos moksliniams tyrimams ir eksperimentinei plėtrai – GERD), aukštojo išsilavinimo lygis bei užimtumas.

Tyrėjai išskiria GERD kaip vieną svarbiausių išmanaus augimo rodiklių. Šio rodiklio teigiamas poveikis ekonomikos augimui yra plačiai pripažintas. Wojnicka-Sycz (2020) pabrėžia, kad išmanaus

augimo ir išmaniosios specializacijos koncepcijos neįmanomos be inovacijų. Marrocu ir kt. (2023) pažymi, jog inovacijos, skaitmenizavimas ir procesų automatizacija didina įmonių veiklos lankstumą, skatina produktyvumą ir optimizuoja kaštus. Tai didina konkurencingumą tiek vietos, tiek tarptautinėse rinkose ir prisideda prie bendro ekonomikos augimo. Uhlbach ir kt. (2022) parodo, kad moksliniams tyrimams skirtos išlaidos gali paskatinti naujas specializacijas per esamą infrastruktūrą ir pramonės ryšius, kas dar labiau spartina regionų plėtrą.

Kitas svarbus rodiklis – aukštasis išsilavinimas. Zafar ir kt. (2022) sieja jo poveikį augimui su moksliniais tyrimais ir inovacijomis. Loginė seka yra tokia: aukštasis išsilavinimas būtinas aukštųjų technologijų produktų kūrimui ir inovacijų atsiradimui, o tai skatina produktyvumo augimą ir kaštų mažinimą – šie veiksniai yra pagrindiniai išmanaus ekonomikos augimo komponentai. Kai kurie autoriai (pvz., Yang ir kt., 2022) pabrėžia ekologinį aukštojo mokslo aspektą: be aukšto lygio švietimo neįmanoma tinkamai plėtoti ekologiškai suderinamų technologijų ir inovacijų.

Dar vienas, rečiau minimas, išmanaus augimo rodiklis – užimtumas. Pavyzdžiui, Wojnicka-Sycz (2020) savo tyrimuose naudoja užimtumo lygį pramonės šakose, susijusiose su išmaniąja specializacija, kaip vieną iš rodiklių.

Apibendrinant galima teigti, kad tiek ES strateginiuose dokumentuose, tiek moksliniuose darbuose išmanus augimas dažniausiai siejamas su trimis pagrindiniais rodikliais: GERD, aukštojo mokslo lygiu ir užimtumo lygiu. Šie rodikliai sudaro metodologinį pagrindą šiam tyrimui.

2. TYRIMO METODIKOS PRISTATYMAS

Šio tyrimo metodika labai panaši į ankstesniuose autoriaus darbuose, susijusiuose su ES sanglauda, jos įvairiais aspektais ir matavimu, taikytus metodus. Pagrindą sudaro tyrimo laikotarpio, tyrimo subjektų bei rodiklių pasirinkimas ir jų skaičiavimo metodų aprašymas.

Tyrimo tikslas – apimti kuo ilgesnį laikotarpį. Tačiau statistiniai duomenys apie visus tiriamus subjektus yra prieinami tik nuo 2010 m. Ankstesnių metų duomenys yra nepilni, jų trūksta. Todėl analizuojamas laikotarpis apima 2010–2022 m.

Pasirinkti tyrimo subjektai yra Baltijos šalys: Estija, Latvija ir Lietuva.

Tyrimo rodikliai parinkti remiantis „Europa 2020“ strategijos ir Išmaniosios specializacijos strategijos (angl. *Smart Specialisation Strategy* – S3) gairėmis, aptartomis teorinėje analizėje. Pasirinkti trys esminiai rodikliai: 15–64 metų amžiaus gyventojų užimtumo lygis, skaičiuojamas kaip procentas nuo visų gyventojų; bendrosios išlaidos moksliniams tyrimams ir eksperimentinei plėtrai (GERD), skaičiuojamas kaip procentas nuo BVP; 24–65 metų amžiaus gyventojų, įgijusių aukštąjį ar jam prilygstantį išsilavinimą, dalis, skaičiuojama procentais.

Visi statistiniai duomenys imami iš ES statistikos tarnybos duomenų (Eurostat) bazės. Reikalingi skaičiavimai ir grafinis apdorojimas atlikti MS Excel pagalba.

3. IŠMANAUS AUGIMO RODIKLIŲ KAITA ES IR BALTIJOS ŠALYSE

Palyginus Baltijos šalių duomenis su ES rezultatais, matomos kelios įdomios tendencijos.

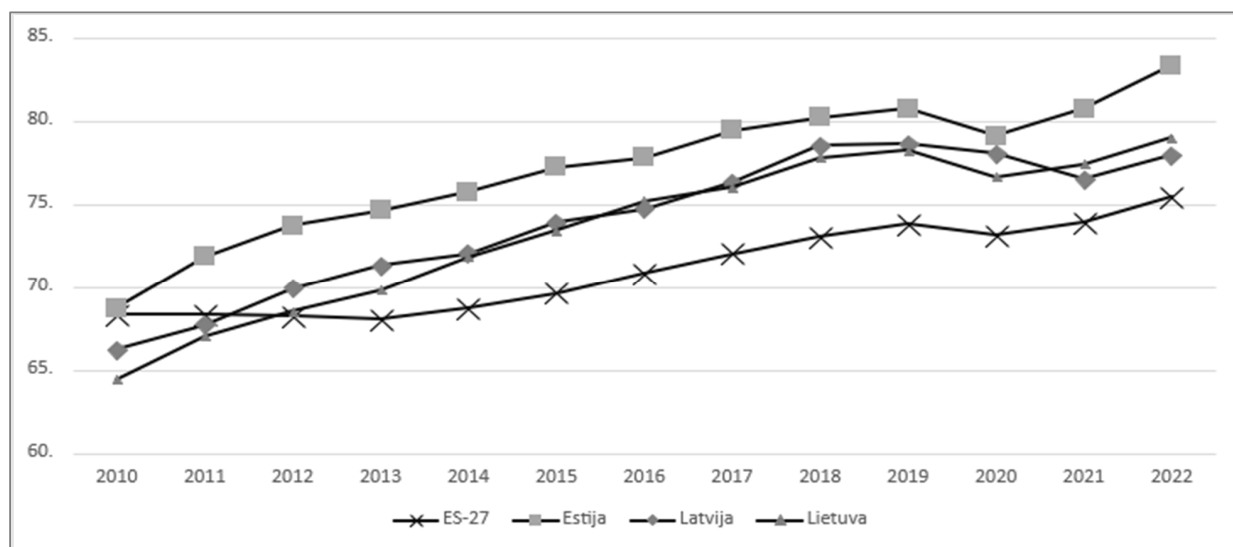
Pirma, visų trijų kaimynių statistiniai duomenys yra arba geresni už ES vidurkį (užimtumo ir aukštojo išsilavinimo lygio atvejais), arba blogesni (atitinkamai, išlaidos mokslui – GERD) (Lentelė). Užimtumo lygis Baltijos šalyse dar 2010 m. nedaug, bet atsiliko nuo ES vidurkio. Tačiau jau nuo 2012 m. visos trys šalys aplenkė ES bendrą lygį, o toliau skirtumas tik augo. Taip 2022 m. užimtumas ES bendrai sudarė 75,4 proc., o Estijoje, Lietuvoje ir Latvijoje, atitinkamai, 83,3 proc., 80,1 proc. ir 77,9 proc. (1 paveikslas).

Lentelė. ES ir Baltijos šalių palyginimas

Rodiklis		ES	Estija	Lietuva	Latvija
Užimtumas	rangas	4	1	2	3
	pokyčio tendencija	↑↑	↑↑	↑↑	↑↑
Išlaidos mokslui	rangas	0	1	2	3
	pokyčio tendencija	↑	↓↑	↑	↑
Aukštasis išsilavinimas	rangas	4	3	1	2
	pokyčio tendencija	↑↑	↑↑	↑↑	↑↑

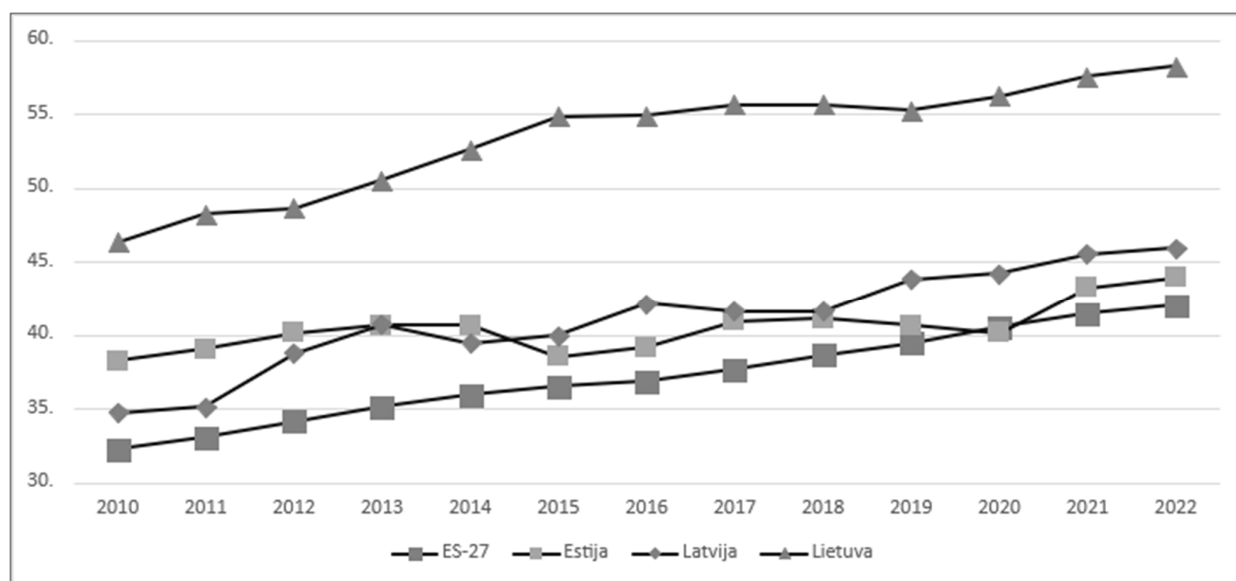
Paaiškinimas: [↑↑] – spartus augimas; [↑] – nuosaikus augimas; [↓↑] – mažėjimas, o po to augimas.

Aukšto išsilavinimo lygio atveju išsiskiria Lietuvos padėtis. Čia rodiklio reikšmės ženkliai viršija ne tik ES vidurkį, bet ir kaimynių. 2022 m. Lietuvoje aukštąjį išsilavinimą turėjo beveik 60 proc. gyventojų, tuo tarpu Latvijoje ir Estijoje, atitinkamai, 45,9 proc. ir 43,9 proc., kai ES bendrai – vos 42,0 proc. (2 paveikslas).



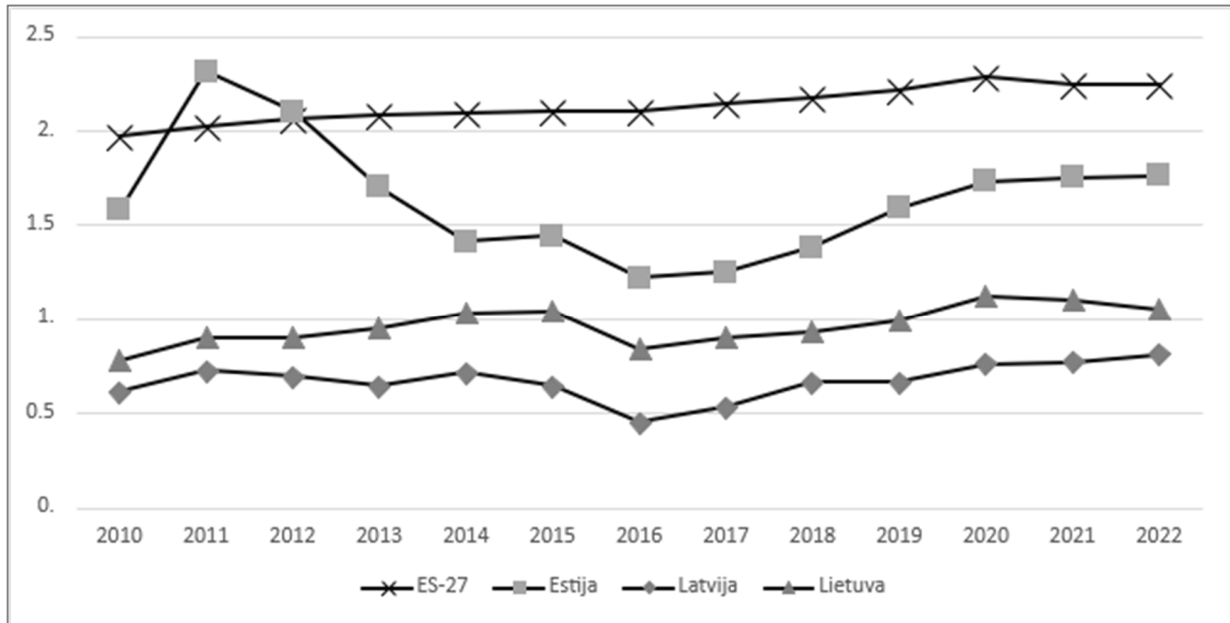
1 pav. Užimtumas ES ir Baltijos šalyse 2010-2022, proc.

Priešinga situacija yra su išlaidomis mokslui (GERD). Visos Baltijos šalys atsilieka nuo ES vidurkio. Ypač bloga yra Latvijos ir Lietuvos padėtis, kur 2022 m. išlaidos mokslui sudaro, atitinkamai, vos 0,81 proc. ir 1,05 proc. nuo BVP, kai ES – 2,24 proc. Kiek geriau atrodo Estija su 1,76 proc. 2022 m. Pastebėtina, kad 2011 ir 2012 m. Estijoje išlaidos mokslui (GERD) viršijo ES vidurkį. (3 paveiklas).



2 pav. Aukštojo išsilavinimo lygis ES ir Baltijos šalyse 2010-2022, proc.

Antra, džiuginančios yra nagrinėjamo 13 metų laikotarpio tendencijos. Visų analizuojamų rodiklių duomenys visuose subjektuose gerėjo. Ypatingai didelis augimas matomas užimtumo atveju. Estijoje užimtumas išaugo nuo 68,7 proc. 2010 metais iki 83,3 proc. 2022 metais (+14,6 proc. augimas). Lygiai tokią pat (+14,6 proc.) pažangą per tą patį laiką padarė Lietuva: nuo 64,4 proc. 2010 metais iki 79,0 proc. 2022 metais. Kiek mažiau užimtumas didėjo Latvijoje ir ES bendrai, atitinkamai, +11,7 proc. (nuo 66,2 proc. iki 77,9 proc.) bei +7,1 proc. (nuo 68,3 proc. iki 75,4 proc.).



3 pav. Išlaidos mokslui (GERD) ES ir Baltijos šalyse 2010-2022, proc.nuo BVP

Nemažiau įspūdingas yra aukštojo išsilavinimo lygio augimas, vykęs visuose subjektuose. Ypač pasižymėjo Lietuva ir Latvija, kur rodiklio reikšmės išaugo +11,9 proc. ir +11,2 proc. atitinkamai. Lietuvoje ir taip aukštas išsilavinimo lygis išaugo nuo 46,3 proc. 2010 m. iki 58,2 proc. 2022 m. Tuo tarpu Latvijoje jis didėjo nuo 34,7 proc. iki 45,9 proc. Estijoje šiuo atveju pažanga buvo mažiausia – +5,7 proc. per visą nagrinėjamą laikotarpį (nuo 38,2 proc. iki 43,9 proc.). Tai lėmė didėjančią atsilikimą nuo kaimynių. ES bendrai pažanga sudarė +9,8 proc. (nuo 32,2 proc. iki 42,0 proc.).

Ženkliai prastesnė situacija yra išlaidų mokslui (GERD) atveju. Nors visų analizuojamų subjektų rodiklio reikšmės gerėjo, tačiau augimas buvo nežymus. Taip ES bendrai išlaidos mokslui (GERD) padidėjo +0,27 proc. (nuo 1,97 proc. 2010 m. iki 2,24 proc. 2022 m.). Lygiai tiek pat (+0,27 proc.) Lietuvoje skiriama BVP dalis (nuo 0,78 proc. iki 1,05 proc.). Latvijoje ir Estijoje augimas buvo dar mažesnis, atitinkamai, +0,20 proc. ir +0,18 proc. Taip pat pažymėtina, kad Estijoje santykis tarp išlaidų mokslui ir BVP nuo 2011 m. iki 2016 m. sumažėjo beveik dvigubai (nuo 2,31 proc. iki 1,22 proc.). Tik vėliau pradėjo augti, ir 2022 m. pasiekė 1,76 proc.

IŠVADOS

1. Išmanaus augimo koncepcija Europos Sąjungoje remiasi trimis pagrindiniais rodikliais – mokslinių tyrimų ir plėtros (GERD) investicijomis, aukštojo išsilavinimo lygiu ir užimtumo rodikliais, kurie kartu sudaro esminį pagrindą tvariam ir subalansuotam ekonomikos vystymuisi. Moksliniai tyrimai ir inovacijos skatina technologinę pažangą, didina produktyvumą bei konkurencingumą tiek vietos, tiek tarptautinėse rinkose, o skaitmenizavimas ir procesų automatizavimas leidžia optimizuoti veiklos kaštus ir didinti įmonių veiklos efektyvumą. Aukštasis išsilavinimas ne tik formuoja kvalifikuotą darbo jėgą, būtina aukštųjų technologijų sektoriui ir inovacijų plėtrai, bet ir prisideda prie ekologinių bei socialinių sprendimų kūrimo, ypač plėtojant tvariąsias technologijas. Tuo tarpu užimtumo lygis atspindi darbo rinkos įtraukties ir ekonominio aktyvumo lygį, kuris

tiesiogiai susijęs su regioninės plėtros sėkme, ypač sektoriuose, susijusiuose su išmaniaja specializacija.

2. Tyrimas, apimantis 2010–2022 m. laikotarpį, leidžia įvertinti ilgalaikes užimtumo, mokslinių tyrimų ir plėtros (GERD) bei aukštojo išsilavinimo tendencijas Baltijos šalyse – Estijoje, Latvijoje ir Lietuvoje. Pasirinkti rodikliai, paremti „Europa 2020“ ir Išmaniosios specializacijos strategijos gairėmis. Duomenų analizė, paremta Eurostato statistika ir MS Excel skaičiavimais, leidžia objektyviai įvertinti Baltijos regiono pažangą inovacijų, švietimo ir užimtumo srityse, kas yra svarbu vertinant jų tvarų augimą ir konkurencingumą ES kontekste.

3. Per 2010–2022 m. laikotarpį Baltijos šalys pasiekė reikšmingų rezultatų užimtumo ir aukštojo išsilavinimo srityse, dažnai lenkdamos ES vidurkius. Ypač išsiskiria Lietuva, kurios aukštojo išsilavinimo lygis 2022 m. siekė beveik 60 proc., gerokai viršydamas tiek ES vidurkį, tiek kaimyninių šalių rodiklius. Užimtumo augimas taip pat buvo įspūdingas, ypač Estijoje ir Lietuvoje, kur per 13 metų laikotarpį užimtumas padidėjo daugiau nei 14 proc., rodydamas tvirtą darbo rinkos augimą ir ekonominį atsparumą.

4. Nepaisant teigiamų tendencijų užimtumo ir švietimo srityse, Baltijos šalys vis dar reikšmingai atsilieka nuo ES vidurkio pagal mokslinių tyrimų ir plėtros finansavimą. Latvija ir Lietuva skiria mažiau nei 1,1 proc. BVP, o Estija, nors ir rodanti šiek tiek geresnius rezultatus, vis tiek nesiekia ES vidurkio. Augimas GERD srityje per visą laikotarpį buvo minimalus, o kai kuriais metais net fiksuotas finansavimo mažėjimas, kas rodo nuoseklaus ir tvaraus investavimo į inovacijas bei mokslo plėtrą trūkumą, galintį ilginiui riboti regioninį konkurencingumą.

Literatūra

1. Antonelli, C., Feder, Ch., & Quatraro, F. (2023). Technological congruence and Smart Specialisation: evidence from European regions. *Spatial Economic Analysis*, 18(2), 173-196, DOI: <https://doi.org/10.1080/17421772.2022.2100921>
2. Bagheri, B., & Shaykh-Baygloo, R. (2021). Spatial analysis of urban smart growth and its effects on housing price: the case of Isfahan, Iran. *Sustain Cities Soc.* 68:102769. DOI: <https://doi.org/10.1016/j.scs.2021.102769>
3. Jamshidi, M. J., & Barakpour, N. (2023) Analyzing synergistic effects of tourist attractions on sustainable development of neighborhoods with emphasis on urban smart growth principles. *International Journal of Sustainable Development & World Ecology*, 30(8), 949-963, DOI: <https://doi.org/10.1080/13504509.2023.2231885>
4. Marrocu, E., Paci, P., Rigby, D., & Usai, S. (2023). Evaluating the implementation of Smart Specialisation policy. *Regional Studies*, 57(1), 112-128, DOI: <https://doi.org/10.1080/00343404.2022.2047915>
5. Rigby, D. L., Roesler, Ch., Kogler, D., Boschma, R., & Balland, P. A. (2022). Do EU regions benefit from Smart Specialisation principles? *Regional Studies*, 56(12), 2058-2073, DOI: <https://doi.org/10.1080/00343404.2022.2032628>
6. Uhlbach, W-H., Balland, P-A., & Scherngell, T. (2022). Public R&D funding and new regional specialisations: The contingent role of technological relatedness. *Industry and Innovation*, 29(4), 511-532, DOI: <https://doi.org/10.1080/13662716.2022.2043147>
7. Wojnicka-Sycz, E. (2020). Theory-based evaluation criteria for regional smart specializations and their application in the Podkarpackie voivodeship in Poland. *Regional Studies*, 54(11), 1612-1625, DOI: <https://doi.org/10.1080/00343404.2020.1802419>
8. Wu, H. (2023). The contribution of interregional and inter-field knowledge spillovers to regional Smart Specialisation. *Regional Studies*, 57(2), 356-369, DOI: <https://doi.org/10.1080/00343404.2022.2063270>
9. Yang, S., Liu, W., & Zhang, Z. (2022). The dynamic value of China's high-tech zones: Direct and indirect influence on urban ecological innovation. *Land*, 11(1), 59. DOI: <https://doi.org/10.3390/land11010059>
10. Zafar, M. W., Saleem, M. M., Destek, M. A., & Caglar, A. E. (2022). The dynamic linkage between remittances, export diversification, education, renewable energy consumption, economic growth, and CO2 emissions in top remittance-receiving countries. *Sustainable Development*, 30(1), 165–175. DOI: <https://doi.org/10.1002/sd.2236>

THE DYNAMICS OF SMART GROWTH IN THE BALTIC STATES IN THE EU CONTEXT

Summary

After the global economic crisis of 2007–2009, smart growth became an important part of the EU's economic policy aimed at reducing regional disparities and strengthening competitiveness. The analysis of smart growth indicators in the Baltic States (Estonia, Latvia, Lithuania) allows for an assessment of their progress in the EU context, taking into account changes in employment, higher education levels, and research and development investments (GERD).

The aim of this study is to partially answer the above questions by evaluating smart growth indicators and their development in the Baltic States through the Composite Cohesion Index. To achieve this objective, the following tasks were set:

- to review theoretical aspects of smart growth and examine smart growth evaluation indicators;
- to present the system for evaluating smart growth in the Baltic States;
- to analyze changes in the smart growth indicators of the Baltic States within the EU context.

Research methods: descriptive and comparative analysis, secondary data statistical analysis, graphic analysis.

The concept of smart growth in the EU is based on three indicators: GERD investments, higher education level, and employment indicators. Scientific research promotes technological progress, while digitization increases efficiency. Higher education shapes a qualified workforce, and the employment rate reflects labor market activity. Between 2010 and 2022, the Baltic states achieved significant results, often exceeding the EU average. Lithuania stands out with a high level of higher education, and employment growth in Estonia and Lithuania was notable. The Baltic states lag behind the EU average in terms of research and development funding. Latvia and Lithuania allocate less than 1.1 percent of GDP, and Estonia does not reach the EU average, with GERD growth being minimal.

Key words: smart growth, smart specialization, GERD, tertiary education, employment.

PRESSURE COOKER AS MODEL FOR SUSTAINABILITY EDUCATION

Saulius Buivys

Rotterdam Business School, The Netherlands

Assoc. Prof. Dr. Gintautė Žibėnienė

Vilniaus kolegija / Higher Education Institution, Lithuania

Annotation

The Sustainability Pressure Cooker (SPC) model is an innovative approach to sustainability education that integrates experiential, interdisciplinary, and problem-based learning. Developed at Rotterdam Business School and expanded internationally, the SPC immerses students in real-world sustainability challenges, encouraging collaboration with businesses and institutions. By fostering critical thinking, teamwork, and hands-on problem-solving, the model equips students with the competencies needed to drive sustainable business practices. This article explores the theoretical foundations, implementation strategies, and international adaptation of the SPC, highlighting its role in preparing future sustainability leaders. Additionally, it discusses potential future research directions to enhance the model's impact and scalability.

Key words: sustainability education, experiential learning, interdisciplinary collaboration, problem-based learning.

INTRODUCTION

The development of the Sustainability Pressure Cooker (SPC) model was driven by the growing necessity for business education to align with sustainability principles. This transformation was influenced by key milestones in the global sustainability agenda, particularly the adoption of the United Nations 2030 Agenda for Sustainable Development in 2015. “Under the UN Framework Convention on Climate Change and the Paris Agreement, parties commit to promoting and cooperating on climate change in the context of sustainable development in all dimensions, in particular on education, training, public awareness, public participation and public access to information”. (On learning for the green transition and sustainable development, 2022, p. 2).

At Rotterdam Business School (RBS), particularly within the Master in Consultancy and Entrepreneurship (MCE) program, sustainability was initially treated as a distinct subject. However, a shift occurred when faculty members realised that sustainability needed to be embedded across multiple disciplines, fostering a learning environment where students could develop practical skills, knowledge, and mindsets to drive sustainable change.

The foundation for the Sustainability Pressure Cooker was laid through the Responsible Business Management of SMEs (REBUSME) project, an Erasmus+ initiative launched in 2014. This international collaboration engaged students and faculty from multiple European countries in hands-on problem-solving, tackling sustainability issues within the food industry. Through immersive experiences, students conducted case studies, analysed corporate social responsibility (CSR) practices, and developed solutions for real businesses.

Building upon the REBUSME experience, the SPC model was introduced in 2016 as a fast-paced, problem-based learning approach. Designed as a one-week intensive event, the SPC challenged students to address complex sustainability problems posed by businesses and institutions. It emphasised interdisciplinary teamwork, experiential learning, and practical solution development, fostering critical thinking and collaboration.

Through continuous iterations and partnerships with both academic and industry stakeholders, the SPC evolved into a hallmark of sustainability education at RBS. Today, it serves as a powerful model that equips students with the skills and competencies needed to become effective sustainability leaders, while providing tangible, innovative solutions to pressing global challenges.

This article aims to present both the practical experience and theoretical foundation behind the execution of the Sustainability Pressure Cooker model. The SPC has been shaped by ongoing academic research and industry collaboration, reflecting best practices in sustainability education.

The topic's relevance is underscored by previous research on sustainability education, experiential learning, and interdisciplinary collaboration. Scholars such as Filho et al. (2020), Iqbal & Piwowar-Sulej (2021), and Tomasella, Wylie, & Gill (2022) have explored how higher education institutions play a crucial role in preparing students for sustainability leadership. The SPC model builds upon these insights by providing a structured, intensive format that integrates problem-based learning with industry engagement.

To support this study, the primary research methods include literature review and document analysis, examining existing sustainability education frameworks, previous case studies, and institutional reports on SPC execution. These methods provide a comprehensive understanding of how the model was developed, refined, and scaled across various academic and industry contexts.

Through its continuous iterations and growing partnerships, the SPC has become a recognized model for sustainability education, equipping students with the skills and competencies needed to address global business and environmental challenges. “Also ranking among the top 10 skills on the rise are leadership and social influence, talent management, analytical thinking, and environmental stewardship. These skills highlight the need for workers who can lead teams, manage talent effectively and adapt to sustainability and green transitions in an increasingly complex and interconnected world.” (World Economic Forum, 2025, p. 37).

1. SUSTAINABILITY PRESSURE COOKER MODEL

The Sustainability Pressure Cooker (SPC) model is designed as an intensive, hands-on learning experience that immerses students in real-world sustainability challenges. By combining academic knowledge with practical application, the SPC equips students with the skills needed to navigate complex global issues. The model is structured to maximise engagement, problem-solving, and interdisciplinary collaboration, ensuring that participants not only develop innovative solutions but also gain a deeper understanding of sustainability in a business context. To achieve this, the SPC is built upon four fundamental components that form the backbone of its dynamic and impactful learning process:

- **Live Business Challenges:** Each Sustainability Pressure Cooker centres around a sustainability issue presented by a business or social partner. We seek out “Wicked Problems”, as defined by Rittel & Webber (1973), complex issues that are difficult to define.
- **Cross-Disciplinary Collaboration:** Students from various academic backgrounds and countries work in teams, fostering a multicultural and interdisciplinary approach to problem-solving. Cross-disciplinary collaboration is critical for tackling complex challenges, as Repko & Szostak (2020) highlight, emphasising the power of interdisciplinary teams to integrate diverse perspectives.
- **Interactive Learning Environment:** Throughout the event, participants attend lectures, workshops, and coaching sessions that provide tools and techniques such as Design Thinking and scenario planning to tackle the sustainability challenge effectively. Kolb (2015) experiential learning theory underscores the importance of interactive environments, such as workshops and scenario planning, for fostering active, applied learning.
- **Deliverables and Presentations:** The culmination of the Pressure Cooker is the presentation of solutions to a panel of judges, often including the challenge owner and industry

experts. Students present their work in various formats, such as posters, Pecha Kucha presentations, or detailed reports. Fry, Ketteridge & Marshall (2015) emphasise that varied formats, such as posters and Pecha Kuch presentations are essential for developing students' ability to communicate solutions effectively.

Over the years, the Sustainability Pressure Cooker format has been continuously refined, incorporating structured phases such as field research, ideation workshops, and collaborative group work. This structured approach ensures that students develop practical, well-researched solutions that can be readily implemented by participating organizations.

The program is designed to be fast-paced and immersive, typically running for a week. During this time, student teams engage in an intensive problem-solving process, analysing a real-world sustainability challenge and devising innovative, actionable solutions. Faculty members and industry experts provide guidance and expertise, bridging academic theory with professional practice.

The event kicks off on Monday, with students meeting the Problem Owner, who outlines the challenge and its broader context. A welcome dinner follows, creating opportunities for networking and collaboration among students from different partner institutions. When needed, students may visit the Problem Owner's facilities to gain deeper insights into the issue at hand.

From Tuesday to Thursday, students focus on research, interviews, and brainstorming, developing their ideas into tangible solutions. Faculty supervisors from various higher education institutions (HEIs) offer mentorship and feedback throughout this process. By Friday, teams finalize their work and present their solutions in three distinct formats—a poster, a Pecha Kucha presentation, and a detailed written report (submitted later). A panel of judges, including faculty members and the Problem Owner, evaluates the presentations, followed by a Q&A session, where students defend and refine their ideas.

The event concludes with feedback sessions, where the Problem Owner provides insights on the proposed solutions, and the most outstanding ideas are recognized with awards. Beyond fostering critical thinking, teamwork, and problem-solving, this experience empowers students with real-world skills and a deep understanding of sustainability's role in business and society.

The Sustainability Pressure Cooker (SPC) has consistently received positive feedback from participants, who praise its immersive, collaborative, and hands-on approach to problem-solving. Students frequently highlight the fast-paced, high-intensity environment as a key driver of creativity, teamwork, and practical learning. A recurring theme in the feedback is the rich experience of working in diverse, multicultural teams, which helps students develop cross-cultural competencies and prepares them for careers in international business settings.

Participants also appreciate the well-structured format of the program, where mornings feature guest lectures by industry experts, and afternoons are dedicated to teamwork and project development. This balance between academic learning and practical application allows students to deeply engage with real-world sustainability challenges while applying theoretical knowledge to practical scenarios. The opportunity to work on real business cases, such as those presented by UNILEVER, KiesZon, and the Rotterdam Municipality, has been particularly valued for the insights it provides into current business and sustainability issues.

The international and collaborative nature of the SPC is another aspect that has received high praise. Engaging with students from different universities and backgrounds broadens participants' perspectives and expands their professional networks. The time-constrained nature of the challenge further mirrors the pressures of the professional world, equipping students with valuable problem-solving and time-management skills.

Additionally, students have repeatedly emphasized the importance of real-time feedback from industry professionals and faculty. Presenting their ideas to business leaders and receiving constructive critiques enhances their understanding of how their solutions could be implemented in a real business context. Many participants have expressed gratitude for the opportunity to pitch their proposals to companies and receive professional insights, noting that this aspect makes the experience highly relevant and impactful.

2. START YOUR OWN SPC! WHAT IS NEEDED?

Our Sustainability Pressure Cooker model is designed to be easily replicated across higher education institutions (HEIs). For professors or lecturers looking to integrate the SPC into their curriculum we recommend following a structured approach to ensure a seamless and impactful implementation. The steps outlined below provide guidance on how to successfully adopt and adapt the SPC model within different education settings.

Step 1: Obtain Institutional Support

Securing approval from the leadership is crucial to integrating the SPC into the curriculum. Key factors to consider include:

- **Scheduling & Student Participation:** The SPC is a week-long, full-time program, requiring students to be excused from other academic commitments. Adjustments to timetables and academic calendars may be necessary.
- **Facilities & Resources:** The SPC requires a central lecture hall for introductions, keynotes, and final presentations, along with breakout rooms for team discussions and brainstorming. Reliable digital infrastructure (e.g., high-speed internet, collaboration platforms) is essential, especially for virtual elements of the SPC.
- **Grading & Academic Recognition:** Institutions should establish a transparent evaluation system based on problem analysis, creativity, teamwork, and solution impact.
- **Administrative & Logistical Support:** To ensure smooth execution, universities should provide event coordination, communication with stakeholders, and technical assistance.

By addressing these foundational elements, institutions can create a supportive learning environment for the SPC, ensuring both educational impact and operational feasibility.

Step 2: Identify a Real-World Challenge

A core element of the SPC is the real-world sustainability challenge, which must be sourced from businesses, governmental bodies, or NGOs. These challenges should be complex (“wicked problems”), requiring multidisciplinary solutions. SPC organisers should proactively connect with local and international organizations, explaining the benefits of participation, such as fresh insights, innovative ideas, and collaboration with future professionals. By tackling real, pressing issues, students gain practical experience while bridging academia with industry needs.

Step 3: Plan and Execute the SPC Program

The SPC follows a structured format that ensures students’ progress from problem identification to solution development within an intensive, one-week timeline (Table). Before the event, students should receive background information on the organization, the challenge, and expected outcomes. Faculty mentors must be trained in coaching methods and sustainability frameworks, while essential materials and digital tools should be prepared to support collaboration.

Table. SPC Weekly Structure

Day	Activities	Outputs
Day 1	Kick-off session, problem introduction, team formation, keynote lectures, and team-building activities.	Clear understanding of the challenge and SPC objectives.
Day 2	Field research, data gathering, Q&A with company representatives, guest lectures on sustainability frameworks and design thinking.	Initial insights, problem exploration.
Day 3	Ideation workshops, brainstorming, introduction to tools (business modeling, scenario planning), early-stage prototyping.	Preliminary solution concepts.
Day 4	Refinement sessions, mentor feedback, preparing presentations, finalizing deliverables.	Well-structured, polished solutions.
Day 5	Final presentations (Pecha Kucha, posters, one-page summary), Q&A with judges, awards, and closing event.	Evaluated solutions, networking, and reflection.

This iterative, fast-paced approach ensures students engage in experiential learning, combining academic concepts with hands-on application.

Step 4: Develop a Student Manual

Creating a clear and structured student manual is essential for ensuring participants fully understand the Sustainability Pressure Cooker process. The manual includes the following elements:

1. **Introduction to the SPC:** The manual should begin with an overview of the SPC, explaining its objectives, expected learning outcomes, and how it aligns with sustainability principles and real-world problem-solving.
2. **Structure and Expectations:** A detailed schedule should outline the daily activities and deliverables, ensuring students understand their responsibilities. It should also clarify the roles of students, faculty mentors, and industry partners, emphasizing the importance of teamwork and active participation.
3. **Tools and Resources:** The manual must include guidance on essential digital tools for collaboration, such as brainstorming platforms and presentation software. Additionally, it should provide templates for reports, posters, and Pecha Kucha presentations to maintain consistency in student submissions.
4. **Evaluation Criteria:** Clear grading standards should be outlined so students know how their performance will be assessed. This includes problem analysis, creativity, feasibility of solutions, teamwork, and presentation quality.

By providing a well-structured manual, students can effectively navigate the SPC, remain engaged throughout the process, and maximize their learning experience.

Step 5: Deliver the SPC Event

A strong support team of faculty mentors and guest speakers must be assembled to provide guidance throughout the SPC. Student teams should be formed with diversity in mind, ensuring a mix of academic backgrounds and cultural perspectives to enhance collaboration and problem-solving. Maintaining engagement is crucial, which can be achieved by incorporating interactive workshops, real-time feedback sessions, and recognizing student achievements through awards. By creating a dynamic learning environment, the SPC fosters both theoretical understanding and practical skills.

Step 6: Review and Improve

After the SPC concludes, a thorough review process ensures continuous improvement. Collecting feedback from students, faculty, and industry partners is essential for refining the model. Insights should be gathered through surveys and reflective discussions to assess the effectiveness of the event structure, team collaboration, and the quality of proposed solutions. Evaluating final presentations and industry feedback on solution feasibility provides valuable benchmarks for future SPC iterations. Lessons learned should be incorporated into an updated student manual and program framework, while successful case studies can be shared through academic publications and conferences to further the SPC's impact.

By following these steps, higher education institutions can implement and scale the SPC model, creating a dynamic, interdisciplinary learning experience that prepares students to drive sustainable change in the business world.

3. INTERNATIONALISATION OF THE SPC MODEL

Over the years, the SPC has fostered a growing network of higher education institutions (HEIs) across multiple continents, including Lithuania, Germany, Croatia, Spain, Australia, Brazil, Chile, and New Zealand. This international expansion highlights its broad appeal and relevance in addressing sustainability challenges through experiential problem-based learning.

A key example of cross-institutional collaboration is the partnership between Rotterdam Business School (RBS) and the Federal University of Minas Gerais (UFMG) in Brazil, established in 2019. This initiative, supported by industry leaders like Samarco, introduced students to real-world

sustainability challenges in the mining sector, particularly focusing on environmental, social, and governance (ESG) practices. The project not only provided hands-on experience but also fostered cross-sector innovation in sustainable business solutions.

The collaboration has led to a cultural shift at UFMG, where active learning methodologies inspired by the SPC have been integrated into courses such as Entrepreneurship and Innovation. This shift toward interactive, student-centered education has significantly enhanced engagement and encouraged new teaching approaches.

The success of the SPC has sparked interest from other institutions. SKEMA Business School, after participating in the program, is developing its own SPC-based events, while the University of São Paulo has embraced the active learning principles pioneered by RBS and UFMG, demonstrating the model's adaptability in different educational settings.

Beyond academia, the SPC model has strengthened partnerships with industry organizations like MiningHub, creating new opportunities for collaborative projects and sustainable innovation. These engagements emphasize the real-world applicability of the SPC in fostering business and academic cooperation.

Looking ahead, the next phase of SPC's international growth involves a collaboration between RBS and Massey University in New Zealand, supported by the Erasmus+ Mobility Outside the EU Project. This partnership follows a three-phase process—Learning, Designing, and Executing—beginning with knowledge exchange, followed by the development of an SPC model tailored to Massey's sustainability-focused curriculum, and culminating in joint SPC events tackling challenges in areas like agriculture and smart city development.

As the SPC network continues to expand, providing an example for tackling complex, real-world sustainability challenges. By strengthening international collaboration, the SPC reaffirms the crucial role of higher education in developing future sustainability leaders and fostering innovative, practical solutions to global environmental and social issues.

CONCLUSIONS

1. The Sustainability Pressure Cooker (SPC) model has proven to be a highly effective educational framework for equipping students with the skills, knowledge, and competencies necessary to address complex sustainability challenges. Through its problem-based, interdisciplinary, and experiential learning approach, the SPC bridges the gap between academic theory and real-world application. By fostering collaboration between students, faculty, and industry professionals, it provides an immersive experience that not only enhances sustainability education but also drives innovation in business and society.

2. The continuous evolution and international adoption of the SPC model demonstrate its adaptability and relevance across diverse educational and professional contexts. As institutions worldwide recognize the need for sustainability-driven education, the SPC serves as a scalable and impactful method for cultivating future leaders who can navigate the complexities of sustainable development.

3. Moving forward, expanding the SPC network and integrating emerging sustainability challenges will further strengthen its impact. By fostering cross-institutional and industry partnerships, the model can continue to evolve, ensuring that students are equipped with the necessary tools to drive meaningful change in their respective fields.

4. While the SPC has shown significant success, future research could explore several key areas to enhance its effectiveness and scalability. Studies could examine the long-term impact of SPC participation on students' career trajectories and their contributions to sustainable business practices. Additionally, research could assess the effectiveness of virtual and hybrid SPC formats in expanding accessibility and participation across different regions and educational institutions. By addressing these research gaps, future studies can contribute to the continuous improvement of the SPC model, ensuring its ongoing relevance and effectiveness in preparing future sustainability leaders.

List of references

1. Filho, W.L. et al. (2020). Sustainability Leadership in Higher Education Institutions: An Overview of challenges. *Sustainability*, 12(9), 37-61. <https://doi.org/10.3390/su12093761>
2. Fry, H., Ketteridge, S., & Marshall, S. (Eds.). (2015). *A Handbook for Teaching and Learning in Higher Education*. Enhancing Academic Practice (4th ed.). Routledge.
3. Iqbal, Q., & Piwowar-Sulej, K. (2021). Sustainable leadership in higher education institutions: social innovation as a mechanism. *International Journal of Sustainability in Higher Education*, 23(8), 1–20. <https://doi.org/10.1108/ijshe-04-2021-0162>
4. Kolb, D. A. (2015). *Experiential Learning: Experience as the Source of Learning and Development*. (2nd ed.). Pearson Education.
5. Repko, A. F., & Szostak, R. (2020). *Interdisciplinary Research: Process and Theory*. (3rd ed.). SAGE Publications.
6. Rittel, H.W.J., & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), 155–169.
7. On learning for the green transition and sustainable development. (2022). Council Recommendation of 16 June 2022 on learning for the green transition and sustainable development 2022/C 243/0. Access via the Internet <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022H0627%2801%29>
8. Tomasella, B., Wylie, A., & Gill, D. (2022). The role of higher education institutions (HEIs) in educating future leaders with social impact contributing to the sustainable development goals. *Social Enterprise Journal*, 19(4), 329–346. <https://doi.org/10.1108/sej-03-2022-0027>.
9. World Economic Forum. (2025). The Future of Jobs. Access via the Internet https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf

„PRESSURE COOKER“ KAIP TVARUMO UGDYMO MODELIS

Santrauka

Šiame straipsnyje nagrinėjamas inovatyvus tvarumo ugdymo modelis „Pressure Cooker“ (angl. „Sustainability Pressure Cooker“ (SPC)), jungiantis patirtinį, tarpdisciplininį ir problemomis grįstą mokymą(si). SPC modelis buvo sukurtas Roterdamo verslo mokykloje ir išplėtotas tarptautiniu mastu, suteikiant studentams galimybę spręsti realius tvarumo iššūkius bendradarbiaujant su verslo ir visuomenės organizacijomis. Šis modelis sudaro sąlygas ugdyti kritinį mąstymą, komandinio darbo gebėjimus ir inovatyvių sprendimų kūrimą, taip paruošdamas studentus tvariam verslo vystymui. Tvarumo ugdymas tampa vis svarbesniu aukštojo mokslo institucijų prioritetu, ypač atsižvelgiant į Jungtinių Tautų 2030 darnaus vystymosi darbotvarę. SPC modelis išsiskiria tuo, kad jis ne tik teoriškai analizuoja tvarumo iššūkius, bet ir suteikia studentams galimybę praktiškai kurti inovatyvius sprendimus realioms verslo problemoms spręsti. Įgyvendinant remiamasi moksliniais darbais, nagrinėjančiais tvarumo ugdymą ir tarpdisciplininį mokymąsi. Straipsnio tikslas – pristatyti praktinę patirtį ir teorinį pagrindimą įgyvendinant „Pressure Cooker“ kaip tvarumo ugdymo modelį. Straipsnyje siekiama atskleisti, kaip šis modelis gali būti taikomas skirtingose akademinėse ir pramonės srityse, siekiant efektyviau integruoti tvarumo principus į aukštąjį mokslą. Pagrindinė straipsnyje aptariama problema yra tvarumo integracija į verslo švietimą. Daugelis universitetų vis dar traktuoja tvarumą kaip atskirą discipliną, užuot įtraukus jį į visų studijų programų turinį. SPC modelis siūlo alternatyvų požiūrį, leidžiantį studentams mokytis tvarumo per praktinę patirtį, bendradarbiavimą su įmonėmis ir dalyvaujant realių problemų sprendime. Analizuojamos tvarumo ugdymo teorijos, ankstesni atvejų tyrimai bei institucinių SPC programų įgyvendinimo ataskaitos. Tai padeda išsamiai įvertinti modelio vystymąsi, tobulinimą ir taikymo galimybes skirtingose švietimo ir verslo aplinkose.

Pagrindiniai žodžiai: tvarumo ugdymas, patirtinis mokymasis, tarpdisciplininis bendradarbiavimas, problemomis grįstas mokymasis.

FACTORS OF COMPETITIVENESS OF REGIONS IN ENSURING THE POST-WAR DEVELOPMENT OF UKRAINE

Dr. Olesya Hryhoryeva

Dr. Svitlana Kulakova

National University «Yuri Kondratyuk Poltava Polytechnic», Ukraine

Annotation

The article considers the main approaches to the formation of factors ensuring the competitiveness of regions, classifies factors depending on the strength of their influence on the competitiveness indicator and cluster of regions of Ukraine, and highlights the peculiarities of the formation of factors of regional competitiveness during the post-war reconstruction of the country.

Key words: competitiveness, region, competitiveness factors, influence of factors.

INTRODUCTION

The competitiveness of regions is a determining factor in ensuring their economic growth and sustainable development, improving the quality of life of the population and their social protection. The competitiveness of the region is formed through joint actions of government and local authorities, business and society and is ensured by attracting investments in the development of the region, increasing the quantitative and qualitative indicators of the economy, social development, etc.

War against Ukraine, unleashed by the aggressor country, significantly influenced the formation and significance of factors that determine the competitiveness of the regions of Ukraine, set new priorities and revealed new aspects of ensuring the competitive advantages of the regions of Ukraine. Therefore, the study of factors that affect the competitiveness of regions and the determination of their role in the process of ensuring the post-war recovery of the country is relevant. The problem is that the war in Ukraine resulted in a critical deterioration of the situation in the demographic, economic, social, and environmental spheres in all regions of the country without exception, and sectoral and regional disparities have acquired unprecedented proportions. Therefore, the study, analysis, and determination of factors that will determine the competitiveness of the regions of Ukraine during the post-war recovery of the country is the purpose of this article. To achieve this goal, the following tasks should be consistently solved: to study modern scientific opinions on the selected category of research; to analyze the factors that determined the competitiveness of the country's regions before the start of the full-scale invasion and solving the tasks of ensuring the country's sustainable development; to offer own vision of the formation of the competitiveness of regions and the factors that will determine it after the end of the war and the beginning of the reconstruction of the state. Taking into account the above, the object of the study is the competitiveness of the regions of Ukraine and the factors that determine it. The article uses theoretical level tools as a research methodology.

1. LITERATURE REVIEW

The scientific community has developed a stable and generally recognized opinion on the decisive role of regional competitiveness in ensuring sustainable development and long-term economic growth of any territory [2, 3, 4, 7, 8, etc.]. This concept acts as a fundamental factor that contributes to the rational use and balanced combination of financial, material, human and technological resources. It forms the basis for stimulating healthy economic competition, which has a positive impact both at the national level and in the context of the global economy. As a result, conditions

are created for accelerating economic development, introducing innovative technologies and improving the quality of life of the population within a certain region. The overall dynamics of such processes becomes an important basis for balanced development, encompassing economic efficiency, social well-being and environmental sustainability.

The concept of regional competitiveness is mainly aimed at analyzing the geographical and economic features of certain territories. In modern economic science, a significant place is occupied by the theory of Michael Porter, who is focused on the study of the competitive advantages of countries [16]. However, in his research, Porter pays more attention to the very nature of competition and its key aspects than directly to competitiveness. His approach emphasizes that a high level of regional competitiveness largely depends on technological progress, the ability to adapt production and marketing methods, as well as on the implementation of globalization strategies that provide competitive advantage. Despite the importance of these factors for the formation of regional competitiveness, they describe the favorable conditions for its achievement rather than providing a deep understanding of its essence.

Defining the concept of territorial competitiveness remains a difficult task, which generates numerous discussions and contradictions regarding its determining factors, and complicates the creation of a single and comprehensive approach to its understanding. Scientific research on regional competitiveness mostly focuses on two main approaches. The first approach considers this phenomenon as a set of factors and determinants aimed at increasing the overall productivity and competitiveness of the state within the global economy [14, 17]. In this case, attention is focused on macroeconomic processes and their impact on the functioning of regional systems. At the same time, the second approach offers a more integrative view, treating regional competitiveness as a key tool for improving the well-being of the population at the local level. This direction extends beyond the economic sphere, but also includes issues of social harmony, fair distribution of resources and environmental protection [1, 6, 10, 12]. The synergistic interaction of these elements forms the basis for ensuring the long-term, stable and harmonious development of the region, which meets modern challenges in the context of global interdependence.

Such multifacetedness complicates the creation of a single interpretation of the concept and makes its reductive or highly specialized understanding impossible.

Foreign scientists in their research focus on the relationship between the gradual growth of value and the expansion of cooperation, which serves as the basis for the introduction of innovative high-tech products [3, 4, 7, 12, 13]. Their work emphasizes the strategic importance of increasing technological capacity, modernizing production processes, optimizing marketing tools and applying other progressive methods aimed at strengthening the management potential of regional clusters. Such work directly affects the strengthening of regional development potential and creating prerequisites for economic growth [7].

Regional competitiveness, although still associated with economic performance indicators, is increasingly being assessed through the prism of the resource potential of the local business environment [5]. The main components of this analysis are indicators of human capital development, innovation potential and the level of infrastructure provision. These elements significantly affect the region's ability to form competitive advantages, especially in fast-growing industries. At the same time, external factors are also of great importance: attracting highly qualified specialists, forming a positive cultural environment and supporting multi-vector development. Such aspects contribute not only to strengthening the positions of local business, but also to the overall increase in the attractiveness of the region. In the modern context, the emphasis is increasingly shifting from tangible assets to intangible resources, such as knowledge, innovation and environmental sustainability.

Contrary to traditional approaches that emphasize the role of physical capital, the theory of endogenous growth emphasizes the key importance of knowledge for economic development and productivity growth [3]. This approach provides a deeper perspective on the mechanisms of economic progress through endogenous growth models that are gaining popularity in modern academic circles. The main idea of this theory is that the accumulation of knowledge – through the

development of human capital or the introduction of technological innovations – is crucial for the pace of economic development. In this context, endogeneity reflects the importance of internal resources and capabilities of the economy, which are able to ensure sustainable development without significant dependence on external factors.

At the current stage of development, the need for an in-depth and multidimensional analysis of the mechanisms and factors that shape the models of economic growth of regions is becoming increasingly urgent [16]. This complex process involves not only the development of adaptive development strategies and the targeted implementation of educational and socio-economic initiatives, but also a deep study of the characteristics of each individual region. This approach allows creating favorable conditions for increasing their competitiveness. In this context, a comparative analysis of the competitive advantages of regions becomes of key importance, which acts as the main tool for assessing the effectiveness of implemented strategies. In particular, it becomes an integral part of the process of identifying innovative approaches to stimulating regional development, and also contributes to the effective use of local potential.

Research into the development and strengthening of the competitiveness of regions of Ukraine in the context of martial law and post-war reconstruction is of exceptional importance due to the unique conditions caused by large-scale socio-economic, political and security challenges. The armed conflict led to massive destruction of infrastructure, significant losses of industrial and economic potential, mass resettlement of citizens and the need to reassess national and regional economic priorities. These transformations create a new reality for the functioning of the regional economy, which is significantly different from the peace period, which requires a deep revision of established approaches to assessing the competitiveness of regions and the development of specialized methodologies adapted to crisis conditions and rapid reconstruction [2, 7].

It is appropriate to study the experience of European countries that have overcome the consequences of armed conflicts. However, the full transfer of their approaches to Ukrainian realities is unlikely due to the difference in historical conditions, economic structure and scale of problems [10]. Ukraine faces unique challenges: the need to simultaneously resist military aggression, integrate millions of internally displaced persons, address the energy crisis and eliminate damage to critical infrastructure. This creates an extremely complex context for making effective management decisions.

The situation is further complicated by the specifics of the Ukrainian economy, in particular its low diversification, dependence on external finance and the peculiarities of the regulatory environment, which has no direct European analogues [15]. Despite this, selective application of European practices can be useful. For example, financial instruments to support regional development can strengthen the role of local budgets in recovery processes. The introduction of digital technologies increases the efficiency of resource management and contributes to cost reduction. The principles of sustainable development can become the basis for creating viable economic structures at the regional level [5, 6, 16].

Thus, as evidenced by a review of the scientific literature, there are quite significant differences in the definition and interpretation of the content of factors that shape the competitiveness of regions depending on the current situation. Let us consider the determining factors that, in our opinion, shaped the competitiveness of the regions of Ukraine before the start of the war in 2022 and the change in their importance and influence as a result of the armed aggression of a neighboring country.

2. ASSESSMENT OF COMPETITIVENESS FACTORS OF REGIONS OF UKRAINE

Summarizing scientific approaches to defining the concept of regional competitiveness, it can be noted that it is formed as a result of the influence of a large number of factors, the total expression of which determines either the competitive advantages or the competitive lag of the regional system compared to its analogues in a specific type of market at a given time.

It should be noted that the factors shaping the competitiveness of the region can be conditionally divided into two large groups:

- those that have a positive impact (production growth; investment inflows; compliance of the structure of the regional economy with the level of the technological process; quality of management of the region's economy; internal demand for its products;
- those that have a negative impact (unfair competition; privatization costs; negative image of the region; criminalization of regional management; state of the business environment).

Depending on the stage of formation, competitive advantage factors can be conditionally divided into three groups:

- those that reflect the natural properties of the region and its ability to compete;
- factors of competitive advantages created by the region during evolutionary development (acquired properties), reflecting the ability to be competitive;
- conditions have been created for the effective implementation of the natural and acquired properties of the region.

No less important in assessing the impact of factors on the integrated competitiveness indicator, in our opinion, is the division of factors into those that are measured quantitatively and those factors that have a qualitative (from the point of view of assessing the impact, complex and mostly evaluative) impact on the competitiveness indicator. The first category includes factors that:

- a) focused on production resources (land, labor, capital);
- b) focused on production and sales of products (proximity of cooperation partners, infrastructure, population structure and consumption);
- c) established by the state (taxes, management system, subsidies and support programs).

Qualitative factors with an estimated impact on the competitiveness indicator include:

- stability of the political situation;
- stability of the social climate;
- qualifications of employees;
- regional structure of the economy and individual enterprises;
- the quality of the education system and professional training of personnel;
- equipping the region with universities, technology centers, and research institutions;
- the presence of factors focused on the production of services (economic and tax consulting, advertising, marketing);
- the attitude to the economy of the main actors of the region (enterprises and unions of entrepreneurs, persons working as hired labor and trade unions, municipal and regional administrations, politicians);
- quality of life in the region (quality of housing, environmental situation, cultural and recreational opportunities, etc.).

In our opinion, the following generalized combination of groupings of factors that determine the competitiveness of regions is appropriate and indicative:

- natural properties of the region (natural resources and anthropological load; geopolitical location of the region);
- acquired properties of the region (level of higher education and professional training; efficiency of the goods market; efficiency of the labor market; level of development of the financial market; technological readiness of enterprises in the region; level of business development; innovative activity of enterprises in the region);
- possibilities of using available resources (functioning of public and private institutions; level of development of transport infrastructure; level of development of healthcare and primary education).

For each of the listed groups, groups of factors can be distinguished according to the strength of their influence on the formation of the region's competitiveness in their formal assessment according to the integral indicator of the competitiveness index. In our opinion, 4 such groups can be distinguished:

Level I – factors that exert a determining influence;

Level II – those that exert a moderate influence;

Level III – those that have a minor impact;

Level IV – those that, under certain conditions, have a negative impact on the competitiveness of the region.

It should also be taken into account that the regions of the country are at different levels of socio-economic development due to their own economic and political history, resource and factor characteristics, business, socio-cultural traditions and regional mentality. Therefore, to assess the factors affecting the competitiveness of regions, it is necessary to cluster regions according to certain characteristics. In our opinion, in the pre-war period, it was advisable to cluster the regions of Ukraine according to the indicator of gross regional product per capita of the region's population and, as a result of this approach, to form III clusters: with high, medium and low levels of economic and social development, respectively.

It is quite obvious that the war significantly changes the approaches to assessing the competitiveness factors of the regions of Ukraine. Moreover, it is not advisable to conduct such an assessment before its end, because at present it is not possible to determine the initial conditions of the situation of any region of the country. However, it is already clear which factors will be decisive in assessing the competitiveness of the regions of Ukraine after the end of the war and the post-war development of the country.

In our opinion, the country's regions should be divided into clusters depending on the integral indicator of war losses. The factors that will influence its value are: the number and the degree of damage to civilian, economic, social and critical infrastructure; regional security (mined territory); population outflow from the region and the possibilities for its return; the development potential of the region in terms of its geographical location and available natural resources. A generalizing indicator for clustering regions can be the indicator of the cost of restoration of 1 km² of the region's area, and regions by cluster should also be divided into regions with high, medium and low costs for restoration. Factors of competitiveness of regions of Ukraine before and after the start of the war, assessed by their importance, are presented in Table 1.

Table 1. Regional competitiveness factors

Qualitative characteristics of the cluster		The name of the factor	
<i>before the war</i>	<i>post-war recovery</i>	<i>before the war</i>	<i>post-war recovery</i>
And cluster (high level of economic development, high level of social development)	And cluster (high level of recovery costs)	And level (factors of determining influence): Efficiency of the labor market Higher education and professional training Innovations II level (factors of moderate influence): Health care and primary education IV level (factors of negative impact): The level of development of the financial market Level of business development Product market efficiency Equipment with new technologies Transport infrastructure and communication State and public institutions Provision of mineral resources	And level (factors of determining influence): State financing of the restoration of territories The volume of attracted foreign investments in the restoration of territories, The level of security of the region The presence of the development potential of the regions Equipping with new technologies II level (factors of moderate influence): Development of a state strategy for the restoration of territories Restoration of connections with other regions of the country IV level (factors of negative impact): Absence or significant damage of civil, economic, social, critical infrastructure objects Demography Social protection

Cluster II (middle level of economic development, middle level of social development)	And And cluster (middle level of recovery costs)	And level (factors of determining influence): Product market efficiency Higher education and professional training Transport infrastructure and communication IV level (factors of negative impact): Level of business development Innovations Provision of mineral resources State and public institutions Equipment with new technologies Health care and primary education The level of development of the financial market Efficiency of the labor market	And level (factors of determining influence): Public funding and investment in the restoration of damaged infrastructure Creation of new jobs Innovation Development of available natural resources II level (factors of moderate influence): Product market efficiency Higher education and professional training Transport infrastructure and communication Health care The level of development of the financial market III level (factors of minor influence): State and public institutions IV level (factors of negative impact): Deficit of working population A significant number of the population is older than the working age
III cluster (low level of economic development, middle level of social development)	III cluster (low level of recovery costs)	II level (factors of moderate influence): Higher education and professional training Equipment with new technologies III level (factors of minor influence): Transport infrastructure and communication Product market efficiency State and public institutions Level of business development IV level (factors of negative impact): Innovations The level of development of the financial market Health care and primary education Efficiency of the labor market Provision of mineral resources	And level (factors of determining influence): Development of the regional development concept Ecology Geographical location Availability of labor resources II level (factors of moderate influence): Equipping with new technologies Health care State and public institutions Higher education and professional training III level (factors of minor influence): Transport infrastructure and communication Product market efficiency Level of business development IV level (factors of negative impact): Shortage of highly qualified labor resources Quality and standard of living significantly lagging behind the European level Lower cost of labor compared to developed countries

CONCLUSIONS

1. Sustainable development of the country is impossible without economic growth and social stability of its regions. The main areas of ensuring competitiveness at the regional level are: strengthening the region's place in the territorial division of labor and inter-district integration; attracting domestic and foreign investors to implement programs for the placement and territorial organization of productive forces; strengthening the region's foreign economic potential and expanding the segment of the world market it occupies; implementing structural restructuring of the economy and increasing the share of competitive products of the region in the total volume of production; improvement and development of the region's production infrastructure as the most important condition for rationalizing the movement of goods and accelerating the turnover of material resources for reproduction; strengthening the financial, credit and budgetary systems of the region; solving the problem of forming and developing a system of regional markets and creating conditions for their reliable functioning.

2. At the same time, after the end of the war, Ukraine must form its own model for the development of regional competitiveness, taking into account all the unique challenges that the state has to face. This model must integrate not only economic aspects, but also mechanisms for ensuring national security. Such an approach will contribute to the creation of a holistic and adaptive system of regional competitiveness that would effectively respond to economic and security challenges and ensure the country's strategic stability in the context of global crises and uncertainties. In the context of modern challenges that have arisen for the regions of Ukraine as a result of the war and the need to restore the economy in the post-war period, the development of an integrated approach to their sustainable development is of particular importance. The key to this process is the formulation of systemic conceptual principles, the introduction of effective tools and the development of applied mechanisms that will ensure the adaptation of the economic systems of the regions to new conditions, taking into account existing risks and potential opportunities. This adaptation is intended not only to ensure timely resolution of urgent problems, but also to create a solid foundation for long-term socio-economic development.

List of references

1. Andryshyn, V. (2023). Regional Competitiveness under the Conditions of Marital State. *Economy and Society*, (56). <https://doi.org/10.32782/2524-0072/2023-56-46>
2. Borsekova, K., Korony, S. & Nijkamp, P. (2021). Traces of the iron curtain: a multivariate analysis of regional cohesion in Europe. *Socio-Economic Planning Sciences*, 78, 101040. <https://doi.org/10.1016/j.seps.2021.101040>.
3. Bristow, G. (2015). Critical reflections on regional competitiveness: Theory, policy, practice. Routledge.
4. Grassia, MG, Marino, M., Mazza, R., Misuraca, M., Zavarrone, E., & Friel, M. (2022). Regional competitiveness: A structural-based topic analysis on recent literature. *Social Indicators Research*, 173, 83–108. <https://doi.org/10.1007/s11205-022-02951-4>
5. Ivanov, SM (2023). Comparative Assessment of Certain Regions of Ukraine Development Effectiveness Using Data Envelopment Analysis. *Visnyk economic science Ukrainy*, 1 (44), pp . 13-23. [https://doi.org/10.37405/1729-7206.2023.1\(44\).13-23](https://doi.org/10.37405/1729-7206.2023.1(44).13-23)
6. Keretsman, N. (2023). Ways to increase the competitiveness of territorial communities in the process of the country's recovery in the post-war period. *Ukrainian Journal of Applied Economics and Technology*. 1 (8). 1, year 346 – 350. <https://doi.org/10.36887/2524-0455-2019-2-1>
7. Kouskoura, A., Kalliontzi, E., Skalkos, D., & Bakouros, I. (2024). Assessing the key factors measuring regional competitiveness. *Sustainability*, 16, 2574. <https://doi.org/10.3390/su16062574>
8. Kovacic, A. (2017). Europe, competitiveness and sustainable development. LAP LAMBERT Academic Publishing. 300 p.
9. Liba, N., & Pugachevska, K. (2022). Factors for Forming the Competitiveness of the Economy at the Regional Level. *Problems of Modern Transformations. Series: Economics and Management* , (6). <https://doi.org/10.54929/2786-5738-2022-6-05-02>

10. Lipentsev , AV, & Beltiukov, RO (2024). Approaches to understanding the competitiveness of regions in the development of the economy: a comparative analysis of the countries of Europe and Ukraine. *Efficiency of Public Administration*, 1 (78/79), 15–21. <https://doi.org/10.36930/507802>
11. Luniova, T. (2022). Assessment of the Competitiveness of Ukraine's National Economy: A Rating Approach. *Economic Space*, (181), 38-42. <https://doi.org/10.32782/2224-6282/181-6>
12. Mann, R., & Ohorodnikov, V. (2022). Competitiveness of the Region: Strategic Guidelines for the Development of the Regions of Ukraine. *Scientific Works of Interregional Academy of Personnel Management. Economic Sciences*, (67). <https://doi.org/10.32689/2523-4536/67-10>
13. McCann, P. & Ortega- Argilés, R. (2016). The early experience of smart specialization implementation in EU cohesion policy. *European Planning Studies*, 24(8), 1407-1427.
14. Palinchak, M., Tsalan, M., Brenzovych, K., Kucher, A., Kajánek, T., & Grešš, M. (2021). Competitiveness as the Basis of EU Regional Policy: Smart Specialization and Sustainability. *European Journal of Sustainable Development*, 10(4), 227-239. <https://doi.org/10.14207/ejsd.2021.v10n4p227>
15. Podzizei, O., & Shmatkovska, T. (2023). Theoretical principles of restoration of the competitiveness of territorial communities and regions. *Galician economy journal*, (82), 12-18. https://doi.org/10.33108/galicianvisnyk_tntu2023.03.012
16. Porter Michael E. Competition in Global Industries. Harvard Business School. Hard cover. 1986. 250 p.
17. Pugachevska, K., & Feier, O. (2023). Competitiveness of the Regional Economy: Approaches this Assessment. *Economy and Society*, (55). <https://doi.org/10.32782/2524-0072/2023-55-89>

UKRAINOS REGIONŲ KONKURENCINGUMO VEIKSNIAI UŽTIKRINANT POKARINĘ PLĖTRĄ

Santrauka

Straipsnyje nagrinėjami pagrindiniai požiūriai į regionų konkurencingumą užtikrinančių veiksnių formavimąsi. Veiksniai klasifikuojami pagal jų įtakos Ukrainos regionų konkurencingumo rodikliui ir jų klasterių formavimuisi stiprumą ir išryškinami regionų konkurencingumo veiksnių struktūros pokarinio šalies atkūrimo laikotarpiu ypatumai.

Pagrindiniai žodžiai: konkurencingumas, regionas, konkurencingumo veiksniai, veiksnių įtaka.

ŽALIOJI TIEKIMO GRANDINĖ: TVARUMAS IR INOVACIJOS LOGISTIKOJE

Jūratė Leonavičienė, Eglė Gotautienė
Klaipėdos valstybinė kolegija

Anotacija

Žaliosios logistikos principų taikymas tiekimo grandinėje aktuali tema ne tik moksliniu, bet ir verslo praktikos požiūriu. Spaudimas mažinti neigiamą poveikį aplinkai, socialinį ir ekonominį poveikį įmonėms, investuoti į tvarius logistikos sprendimus kelia naujų iššūkių ir spaudimo, kurie ateinančiais metais taps dar svarbesni. Įgyvendinant žaliosios logistikos principus, įmonės susiduria su įvairiais iššūkiais, tokiais kaip žinių trūkumas, finansiniai apribojimai ir technologinių sprendimų stoka. Straipsnyje analizuojamos ekologiško transporto, perdirbimo, energijos vartojimo efektyvumo didinimo, skaitmeninės pažangos sprendimai, padedantys optimizuoti žaliosios tiekimo grandinės procesus. Straipsnyje panaudoti tyrimo metodai – mokslinės literatūros analizė ir sintezė, dokumentų analizė.

Pagrindiniai žodžiai: žalioji logistika, tiekimo grandinė, žalioji tiekimo grandinė.

ĮVADAS

Pasaulinės ekonomikos augimas skatina dideles prekių gamybos, suvartojimo bei judėjimo apimtis. Logistinės įmonės vis labiau domisi pasaulinėmis aplinkos problemomis, tokiomis kaip klimato kaitos mažinimas, kenksmingų medžiagų naudojimas ir neatsinaujinančių išteklių mažėjimas. Smarkiai išaugusi prekių gamyba, jų transportavimas, sandėliavimas ir vartojimas sukelia daug aplinkosauginių iššūkių. Tiekimo grandinės valdymas tradiciškai siejamas su žaliavų įsigijimu ir gamybos procesu, kurio metu žaliavos paverčiamos galutiniais produktais. Didėjantis domėjimasis apie aplinkai draugiškus įmonių veiklos aspektus lėmė būtinybę į esamus tiekimo grandinės procesus įtraukti papildomas priemones, vadinamas žaliosiomis. Atsiranda naujos sąvokos „žalioji tiekimo grandinė“ ir „ekologiška tiekimo grandinė“, kurios susijusios su logistikos tvarumo aspektais bei mažesniu žmogaus veiklos poveikiu aplinkai. Tiekimo grandinės ekologiškumas dabar tapo svarbia tiekimo grandinės valdymo problema, kuri apima kelių tiekimo grandinės veiklų valdymą, įskaitant pirkimą, gamybos medžiagų valdymą, apyvartą, rinkodarą ir atvirkštinę logistiką. Organizuojant ir tobulinant žaliosios tiekimo grandinės praktiką, įmonės gali prisidėti prie darnaus vystymosi, atliepti Europos Sąjungos žaliojo kurso strategiją ir didinti savo konkurencingumą rinkoje. Žaliosios tiekimo grandinės koncepcija tampa strateginiu prioritetu ne tik valstybinėms institucijoms bet ir verslo įmonėms.

Tyrimo objektas – žalioji tiekimo grandinė.

Straipsnio tikslas – išanalizuoti tvarius ir inovatyvius sprendimus, kurie gali prisidėti prie žaliosios tiekimo grandinės valdymo.

Straipsnio uždaviniai: Atskleisti žaliosios tiekimo grandinės sampratą bei principus ir pateikti tvarius sprendimus, žaliosios tiekimo grandinės veiklai.

Tyrimo metodai: mokslinės literatūros analizė ir sintezė, dokumentų analizė

1. ŽALIOSIOS TIEKIMO GRANDINĖS SAMPRATA IR PRINCIPAI

Žaliosios logistikos koncepcija įgyvendinama kaip specifinė ekologinė praktika, dažniausiai naudojama logistikos procesuose, kurie yra žalingi aplinkai. Žaliosios tiekimo grandinės valdymas aplinką tausojančiais būdais reikalauja didelių išteklių tiekimo grandinės procese, apimančiame žaliavų įsigijimą, aplinką tausojančią gamybą, pakavimą, pristatymą ir produkto pateikimą (Younis, Sundarakani and O'Mahony, 2020). Įmonės, esančios žaliojoje tiekimo grandinėje, atsakingos ne

tik už įmonės procesus nuo žaliavų įsigijimo, gamybos, pakavimo, sandėliavimo, prekės pristatymo galutiniams vartotojams, bet ir atliekų perdirbimą bei šalinimą. Žalioji tiekimo grandinė apima šias sritis: tiekimo grandinės dalyvius, žaliąjį pirkimą, žaliąją gamybą, žaliąjį paskirstymą iš gamintojų vartotojams ir perdirbimą/utilizavimą (Beniušienė, Jankauskienė, 2017).

Žaliosios tiekimo grandinės samprata yra įvairiapusė ir sudėtinga, apima daugybę procesų, kuriuos sudaro žaliavų tiekimas ir aprūpinimas gamybai, pagamintos produkcijos pateikimas užsakovui, transportavimas, produkcijos paskirstymas rinkai. Norint suprasti žaliosios tiekimo grandinės sampratą, būtina nustatyti sąvokos „žalioji tiekimo grandinė“ reikšmę. Pasak Sosnowski (2022) skiriasi žaliosios tiekimo grandinės ir tradicinės tiekimo grandinės paskirtis. Tradicinė tiekimo grandinė siekia maksimaliai padidinti pelną ir sumažinti išlaidas visoje tiekimo grandinėje. Žaliosios tiekimo grandinės tikslas – sumažinti išteklių suvartojimą ir neigiamą poveikį aplinkai tiekimo grandinės procesuose. Be to, įmonių, taikančių žaliosios tiekimo grandinės principus, orientuojasi į galutinius vartotojus.

Lietuvos ir užsienio mokslininkai (Chocholač, Vančurova ir Mika (2021); Kalinowski ir kt. (2019); Beniušienė, Jankauskienė (2017); Van Hoek, (2012)) išskiria darnaus vystymosi aspektus, kurie gali būti sėkmingai taikomi žaliosios tiekimo grandinės srityse: ekonominį, socialinį ir aplinkosauginį. Ekonominis aspektas turi užtikrinti efektyvų išteklių paskirstymą gamybos procese ir racionalius vartojimo sprendimus, kurie maksimaliai padidina naudą. Pagal Rodrigue (2020) ekonominis aspektas yra sutelktas į: gyventojų gerovės skatinimą. Aplinkosauginis aspektas įgyvendinamas reguliuojant iškastinio kuro naudojimą, mažinant aplinkos ir triukšmo taršas, pasitelkiant alternatyvius kuro šaltinius ir diegiant aplinką tausojančias technologijas Socialinis aspektas apima visų tiekimo grandinės dalyvių socialinę atsakomybę, taikomus standartus, darbuotojų veiklos, saugos reikalavimus. Pagal Reyes, Villarreal, Kumar ir kt. (2016) socialinis aspektas lemia įmonės darbuotojų didesnę motyvaciją ir pasitikėjimą organizacija, o tuo pačiu visuomenės ir valstybės gerovę. Skirtingos tiekimo grandinės sritys turi skirtingą poveikį aplinkai. Žalioji tiekimo grandinė apima žaliavų, medžiagų, atsargų, prekių, atliekų ir informacijos optimizavimą visoje tiekimo grandinėje, daugiausia dėmesio sutelkiant į jau minėtus aplinkosauginius, socialinius ir ekonominius veiksnius. Autoriai Chocholač ir kt. (2021) teigia, kad socialinės, aplinkosauginės ir ekonominės veiklos yra tarpusavyje susijusios bei didele dalimi lemia ilgalaikę ekonominę naudą ir konkurencinį pranašumą įmonei. Tiekimo grandinės sričių aplinkosauginiai, ekonominiai ir socialiniai galimi komponentai, pateikiami 1 lentelėje.

1 lentelė. *Aplinkosauginio, ekonominio ir socialinio veikimo komponentai*

Aplinkosauginis	Ekonominis	Socialinis
CO2 emisijų optimizavimas	Sumažėjusios degalų sąnaudos	Triukšmo mažėjimas
Visuotinio atšilimo poveikio mažinimas	Maršrutų optimizavimas	Darbuotojų pasitenkinimas
Toksinių medžiagų kiekio mažinimas	Baudų mažėjimas dėl aplinkosauginių pažeidimų	Saugumo užtikrinimas
Atliekų kiekio mažinimas	Klientų pasitenkinimas	Sąžiningas elgesys
Veiklų sertifikavimas	Sumažėję pažeidimai	Socialinė atsakomybė

Aplinkosauginiai komponentai apima naudojimąsi atsinaujinančiais energetiniais šaltiniais, mažinant anglies dioksido emisiją, sumažinant oro ir triukšmo taršą, sertifikuojant, automatizuojant logistinę veiklą ir pasitelkiant ekologiškas transporto priemones. Įmonė, taikydamą šį principą, gali sumažinti neigiamą aplinkos poveikį, taip pat mažinti transportavimo ir gamybos išlaidas. Ekonominės srities komponentai apima produkto ar paslaugos kokybės užtikrinimą, siekiant didinti konkurencinį pranašumą ir kurti efektyvius maršrutus, kurių metu stengiamasi sumažinti transporto priemonių kuro sunaudojimą. Socialinės atsakomybės principas apima įmonių įsipareigojimą dėti pastangas socialinio pobūdžio veikloje, užtikrinant darbuotojų teisingą atlyginimą, saugias darbo sąlygas, investuojant į jų kompetencijos tobulinimą ir suteikiant geriausias galimas darbo sąlygas.

Tai įrodo, kad žaliosios tiekimo grandinės įgyvendinimas įmonėje turėtų būti remiamas ekonominės, ekologinės ir socialinės atsakomybės principais (Šimanskienė, Kutkaitis (2009); Vidova, Witkowski, (2009)). Įmonės, praktikuojančios žaliosios tiekimo grandinės sprendimus, gamina, transportuoja produktus bei teikia paslaugas su minimaliais energijos ištekliais, kurie ne tik sunaudoja mažiau energijos bet ir sukaupia mažiau atliekų. Tokios organizacijos aktyviai bendradarbiauja su kitomis įmonėmis ar institucijomis, kurios taip pat savo veikloje naudoja žaliosios logistikos principus siekdamos veikti darniau, ekologiškiau, draugiškiau aplinkai. Šie privalumai skatina verslus įvairiose pasaulio valstybėse diegti žaliosios logistikos sprendimus.

2. ŽALIEJI SPRENDIMAI IR JŲ TAIKYMAS TIEKIMO GRANDINĖJE

Žalieji sprendimai tiekimo grandinėje apima įvairius veiksmus, tokius kaip ekologiškų žaliavų naudojimas, atliekų mažinimas, tvarios logistikos taikymas, energijos taupymas bei tiekėjų atranka pagal aplinkosauginius kriterijus. Pagal YE, Lau, Teo (2024) tvarios tiekimo grandinės grindžiamos tiek ekonomine, tiek ekologine nauda. Visuotinis atšilimas ir gamtos išteklių išsekvojimas paskatino reikšmingus pokyčius organizacijose gaminant ir tiekiant produktus ir paslaugas. Daugelyje šalių buvo įvestos privalomos priemonės, pvz., anglies dioksido apmokestinimas, siekiant skatinti tiekimo grandinių ekologiškumą. 2019 m. gruodžio mėn. ES paskelbė Europos „Žaliojo kurso“ programą, kurios apimtyje yra siekiama iki 2050 m. sumažinti transporto priemonių išmetamų šiltnamio efektą sudarančių dujų (toliau – ŠESD) kiekį iki 90 proc. lyginant su 1990 m. Transporto sektorius sudaro maždaug ketvirtadalį visų išmetamų šiltnamio efektą sukeliančių dujų ES, iš kurių didžiąją dalį (72 proc.) išskiria būtent kelių transportas. Viena iš pagrindinių priemonių norint sumažinti išmetamų ŠESD efektą kelių transporte programoje yra įvardijimas perėjimas prie alternatyvių degalų (toliau – AD) rūšių, kurios skleistų mažesnę arba nulinę anglies dioksido taršą. Kaip AD čia įvardijami elektra, vandenilis, biokuras ar biodujos. 2021 m. liepos 1 dieną Lietuvoje įsigaliojo „Lietuvos Respublikos alternatyviųjų degalų“ įstatymas, kuris nustato alternatyviųjų degalų naudojimo transporto sektoriuje plėtrą, siekiant, kad 2030 metais atsinaujinančių energijos išteklių dalis transporto sektoriuje, palyginti su bendruoju galutiniu energijos suvartojimu transporto sektoriuje, sudarytų ne mažiau kaip 15 procentų. Numatyta nuosekliai didinant transporto sektoriaus energijos šaltinių įvairovę, nustatant įpareigojimus degalų tiekėjams dėl degalų iš atsinaujinančių energijos išteklių tiekimo, didinant pažangiųjų biodegalų naudojimo mastą, skatinant elektros energijos naudojimą transporte, vykdant alternatyviųjų degalų infrastruktūros plėtrą, didinant netaršių transporto priemonių, registruojamų Lietuvos Respublikoje, skaičių ir nustatant reikalavimus, keliamus viešiesiems pirkimams, atliekamiems transporto sektoriuje.

Žaliosios tiekimo grandinės valdymas kelia reikalavimus visiems tiekimo grandinės procesams, ypač gamybai. Gamyba yra vienas iš svarbiausių sektorių, kuriame įmonės mato galimybes sumažinti išteklių švaistymą. Cosimato (2015) pateikia kriterijus, kurie leidžia įvertinti gamybos procesų efektyvumą. Tai apima aplinkai draugiškų žaliavų naudojimą, proceso optimizavimą siekiant sumažinti kietųjų atliekų ir išmetamų teršalų kiekį, mažiau kenksmingų technologijų taikymą bei medžiagų perdirbimą. Pakartotinis produkto naudojimas ne tik padeda tiekimo grandinės dalyviams sumažinti neigiamą poveikį aplinkai, bet ir gerina jų reputaciją. Gamintojai skatinami tobulinti technologijas, kurios didina produktų ilgaamžiškumą, pakartotinį naudojimą ir perdirbimą (Beniušienė, Jankauskienė, 2017). Prekių gamyba, paskirstymas, ir logistika yra visi žaliosios tiekimo grandinės aplinkosaugos vadybos sistemos elementai (Han ir kt. 2022). Gaminio pakavimas yra prekės gamybos proceso baigiamoji dalis. Pakuotė ir transportavimas yra patys didžiausi aplinkos teršėjai žaliosios tiekimo grandinės procesuose. Gminių pakuotės yra svarbus vartojimo atributas, kartu viena iš tiekimo grandinės struktūrinių dalių. Besikeičiantys aplinkosauginiai reikalavimai ir stiprėjančios tvaraus vartojimo tendencijos keičia įmonių bei vartotojų požiūrį į pakuotę ir jos svarbą žaliojoje tiekimo grandinėje (Tavaresas, Vanalle, Camarotto, 2019). Pakuočių kiekio didėjimas globaliu mastu sukelia socialines bei ekonomines problemas, tai suteikia pagrindą aplinkosauginius

reikalavimus atliepiančių žaliųjų pakuočių kūrimo reikmei. Pakuotės atliekos tampa problema, tai skatina pokyčius ir inovacijas pakuočių gamyboje bei jas panaudojant daryti kuo mažesnę žalą aplinkai (Žaludienė, 2022).

Ailyn (2024) nagrinėja veiksnius, skatinantčius žaliųjų tiekimo grandinių integraciją, ypatingą dėmesį skiriant tvariam bendradarbiavimui su tiekėjais. Tačiau įmonės dažnai susiduria su kliūtimis, tokiomis kaip nepakankamas tiekėjų įsipareigojimas aplinkosaugai, informacijos stoka ir riboti ištekliai, trukdančiais efektyviam žaliųjų praktikų įgyvendinimui. Autorius pabrėžia, kad siekiant įveikti šias kliūtis, būtina stiprinti tiekėjų įsitraukimą, skatinti atvirą komunikaciją ir investuoti į bendras tvarumo iniciatyvas. YE, Lau, Teo (2024) taip pat siūlo bendradarbiauti su kitomis organizacijomis ir suinteresuotosiomis šalimis, ne tik dalinantis žiniomis ir geriausiomis praktikomis tvarumo srityje, bet ir kartu su partneriais investuoti į ekologiškas technologijas ir procesus, kurie padėtų sumažinti sąnaudas ir pagerinti aplinkosaugos rodiklius bei per bendradarbiavimą siekti efektyvesnio išteklių naudojimo ir atliekų mažinimo visoje tiekimo grandinėje. Patra (2018) siūlo turėti daugiau tarpinių paskirstymo centrų, kad sumažėtų prekių sugadinimo rizika ir pagerėtų jų pateikimas rinkai. Chen (2024) pabrėžia būtinybę integruoti pažangias technologijas, tokias kaip energiją taupantys varikliai ir alternatyvūs kuro šaltiniai, siekiant sumažinti laivų išmetamų teršalų kiekį, optimizuoti maršrutus ir krovinių paskirstymą, siekiant sumažinti degalų sąnaudas ir CO₂ emisijas, bei išskiria atvirkštinės logistikos svarbą, kai produktai ir pakuotės grąžinami perdirbimui ar pakartotiniam naudojimui, taip mažinant atliekų kiekį. Taip pat autorius rekomenduoja naudoti skaitmenines priemones tiekimo grandinės stebėsenai, siekiant užtikrinti atsakingą išteklių naudojimą ir sumažinti aplinkosauginį pėdsaką. Pipirani, Khan, Yu (2024) pabrėžia, kad tokių technologijų kaip daiktų interneto, dirbtinio intelekto integracija gali sustiprinti tiekimo grandinės efektyvumą, lankstumą ir tvarumą. Šios technologijos padeda optimizuoti procesus, sumažinti atliekas ir greičiau reaguoti į rinkos pokyčius, o naudojant realaus laiko duomenų analizę ir prognozavimo modelius, įmonės gali geriau numatyti ir valdyti tiekimo grandinės sutrikimus. Green, Zelbst., Meacham, Bhadauria (2012) teigia, kad įvairios žaliųjų tiekimo grandinės valdymo praktikos, tokios kaip ekologiškas pirkimas, ekologiška gamyba, ekologiška distribucija ir atvirkštinė logistika gali pagerinti tiek aplinkosauginius, tiek ekonominius rodiklius. Muchenje (2024) pabrėžia, kad žalieji sprendimai prisideda ir formuojant įmonės įvaizdį, nes tvarūs sprendimai gerina reputaciją bei atitinka vartotojų lūkesčius dėl aplinkosaugos. Tiekimo grandinės veikia kaip tarpinė grandis tarp tiekėjų ir klientų, užtikrindamos abipusę ryšį. Aplinkosaugos vadybos kontekste jos ne tik atitinka klientų keliamus aplinkosaugos reikalavimus, bet ir pačios taiko tvarumo standartus savo tiekėjams, skatindamos atsakingą požiūrį į aplinką visoje tiekimo grandinėje. Išanalizavus mokslinius šaltinius, galima išskirti šiuos apibendrintus tvarumo sprendimus, taikomus žaliojoje tiekimo grandinėje.

2 lentelė. Žaliosios tiekimo grandinės tvarumo sprendimai

Tvarumo sprendimai	Aprašymas	Igyvendinimas
Ekologiškas transportas ir logistikos optimizavimas	Tvari logistikos sistema remiasi energijos efektyvumu, alternatyviomis degalų technologijomis ir multimodaliu transportu. Įmonės vis dažniau naudoja elektrinius sunkvežimius, biodegalus ir vandenilio technologijas siekdamas sumažinti CO ₂ emisijas.	1. Didinti transporto priemonių kvorumą: visuose reisuose sumažinus sunkvežimių tuščios ridos galimybes, mažėtų aplinkai daroma žala ir pagerėtų įmonės ekonominiai rodikliai. 2. Krovinių paskirstymui miesto teritorijose naudoti hibridines krovines transporto priemones. 3. Atnaujinti transporto parką EURO 6 aplinkosaugos standarto transporto priemonėmis, tai sumažintų CO₂ išmetimą ir pagerintų įmonių ekonominius rodiklius.

Perdirbimas ir atliekų mažinimas	Reversinė logistika – svarbus komponentas Žaliosios tiekimo grandinės valdyje. Produktų perdirbimas ir pakartotinis naudojimas leidžia įmonėms sumažinti gamybos atliekas ir prisidėti prie žemės išteklių tausojimo.	1. Surinkti, remontuoti ir pakartotinai parduoti sugadintus ar nebereikalingus produktų 2. Naudoti daugkartinio naudojimo pakuotes (pvz., stiklo butelių, medinių padėklų) taikymas. 3. Kurti specializuotus surinkimo punktus, kad būtų išvengta aplinkos taršos.
Skaitmenizacija ir duomenų analizė	Išmaniosios tiekimo grandinės leidžia optimizuoti maršrutus, sumažinti pervežimų laiką ir efektyviau naudoti išteklius. Dirbtinio intelekto technologijos padeda stebėti realiuoju laiku tiekimo grandinės efektyvumą.	1. Optimizuoti maršrutus, išvengiant tuščios ridos 2. Prognozuoti eismo srautą ir iš anksto numatyti galimus trikdžius tiekimo grandinėje. 3. Trumpinti prekių sandėliavimo laiką 4. Numatyti prekių poreikį skirtinguose regionuose ir optimizuoti atsargų valdymą. 5. Koreguoti tiekimo strategijas, atsižvelgiant į rinkos pokyčius ir operacinius duomenis. 6. Numatyti sandėlio apkrovą ir paskirstyti resursus taip, kad sumažėtų energijos sąnaudos ir būtų efektyviau naudojamos sandėliavimo patalpos
Inovatyvūs sprendimai logistikoje	Sandėliavimo ir transportavimo procesuose plačiai naudojami autonominiai robotai, kurie padeda sumažinti energijos sąnaudas ir padidinti operacijų tikslumą.	1. Greitai ir efektyviai rūšiuoti prekes, nustatyti tinkamas vietas sandėlyje ir paruošti siuntas išvežimui. 2. Užtikrinti tikslesnę prekių krovimą ir mažinti žmonių darbo krūvį.
Tvarios pakavimo medžiagos	Plastiko naudojimo mažinimas ir biologiškai suyrančios pakuotės tampa vis labiau populiarios, skatinant aplinkosauginius standartus tiekimo grandinėse.	1. Kurti biologiškai suyrančias arba lengvai perdirbamas pakuotes.

Zowada ir Niestroj (2019) išskiria keturis žaliosios logistikos plėtros etapus, kuriuos mažos ir vidutinės įmonės gali įgyvendinti bendradarbiaudamos su kitais tiekimo grandinės dalyviais:

1 etapas. Sąmoningumo didinimas ir strategijos formavimas. Įmonės turi pirmiausia suprasti žaliosios logistikos svarbą ir jos poveikį aplinkai bei ekonomikai. Reikalingas strateginis planavimas, apimantis ilgalaikius tvarumo tikslus ir aiškiai apibrėžtas gaires žaliųjų sprendimų diegimui. Būtina skatinti darbuotojų sąmoningumą apie ekologinius procesus ir jų taikymą tiekimo grandinėje.

2 etapas. Ekologinių sprendimų diegimas vidiniuose procesuose, kuris apima tiekimo grandinės optimizavimą, siekiant sumažinti energijos ir žaliavų sąnaudas, perėjimą prie ekologiškų transporto priemonių ir maršrutų planavimo sistemų, kurios mažina degalų sąnaudas ir emisijas, tvarių pakuočių naudojimą, siekiant sumažinti atliekų kiekį ir skatinti perdirbamų medžiagų taikymą, bei Energijos taupymo priemonių tokių kaip ekologiškos sandėliavimo sistemos, LED apšvietimas, atsinaujinančios energijos šaltiniai naudojimas.

3 etapas. Bendradarbiavimas tiekimo grandinėje ir žaliųjų technologijų pritaikymas, t.y. kurti partnerystes su atsakingais tiekėjais, naudoti skaitmenines technologijas leidžiančios realiuoju laiku sekti transporto srautus, maršrutų optimizavimą ir CO₂ emisijų mažinimą, realizuoti atvirkštinės logistikos sprendimus.

4 etapas. Stebėsena, vertinimas ir nuolatinis tobulinimas, kuris apima žaliųjų iniciatyvų poveikio analizę remiantis tvarumo rodikliais, naujausių ES teisės aktų ir tarptautinių ekologinių standartų laikymąsi, užtikrinant veiklos atitiktį aplinkosaugos reikalavimams.

Šių keturių etapų taikymas leidžia įmonėms sistemingai integruoti žaliosios logistikos sprendimus į savo veiklą. Bendradarbiaudamos su kitais tiekimo grandinės dalyviais ir diegdamos technologinius sprendimus, įmonės gali pasiekti tiek ekonominę, tiek ekologinę naudą. Tvarios logistikos modelis tampa ne tik konkurenciniu pranašumu, bet ir būtinybe siekiant išlikti rinkoje, kuri vis labiau orientuojasi į atsakingą gamybą ir vartojimą. Apibendrinant žaliuosius sprendimus tiekimo grandinėje, vienas pagrindinių moksliniuose šaltiniuose pateikiamų aspektų yra energijos efektyvumas, kuris padeda mažinti anglies pėdsaką gamyboje ir transportavime. Taip pat pabrėžiama ir atliekų mažinimo, įgyvendinant perdirbimo ir pakartotinio medžiagų naudojimo strategijų svarbą. Logistikos optimizavimas leidžia sumažinti emisijas naudojant ekologiškas transporto priemones ir efektyviai planuojant maršrutus. Norint pasiekti ilgalaikius rezultatus, būtinas teisinio reguliavimo laikymasis, net viršijant nustatytus aplinkosauginius standartus. Be to, suinteresuotųjų šalių bendradarbiavimas su tiekėjais, platintojais ir kitais partneriais skatina ekologiškas praktikas visame tiekimo grandinės tinkle. Modernių technologijų integracija, įskaitant daiktų internetą ir duomenų analizę, leidžia realiuoju laiku stebėti procesus ir efektyvinti tvarumo strategijas. Galiausiai, įmonių socialinė atsakomybė tampa vis svarbesniu veiksnio, rodant organizacijų įsipareigojimą aplinkosaugai per viešinamas iniciatyvas. Visi šie elementai kartu sudaro tvarią ir inovatyvią tiekimo grandinę, kuri prisideda prie ekologinės pusiausvyros išlaikymo ir ekonominio efektyvumo.

IŠVADOS

1. Žalioji tiekimo grandinė apima žaliavų, medžiagų, atsargų, prekių, atliekų ir informacijos optimizavimą visoje tiekimo grandinėje, daugiausia dėmesio sutelkiant į aplinkosauginius, socialinius ir ekonominius veiksnis. Aplinkosauginiai komponentai apima naudojimąsi atsinaujinančiais energetiniais šaltiniais, mažinant anglies dioksido emisiją, sumažinant oro ir triukšmo taršą, sertifikuojant, automatizuojant logistinę veiklą ir pasitelkiant ekologiškas transporto priemones. Ekonominės sritys komponentai apima produkto ar paslaugos kokybės užtikrinimą, siekiant didinti konkurencinį pranašumą ir kurti efektyvius maršrutus, kurių metu stengiamasi sumažinti transporto priemonių kuro sunaudojimą. Socialinės atsakomybės principas apima įmonių įsipareigojimą dėti pastangas socialinio pobūdžio veikloje, užtikrinant darbuotojų teisingą atlyginimą, saugias darbo sąlygas, investuojant į jų kompetencijos tobulinimą ir suteikiant geriausias galimas darbo sąlygas. Žaliosios logistikos koncepcijų taikymas tiekimo grandinėje yra būtinas siekiant sumažinti neigiamą pramonės poveikį aplinkai bei skatinti tvarius verslo modelius.

2. Tvarumo ir inovacijų taikymas žaliojoje tiekimo grandinėje yra neišvengiama ateities kryptis. Europos Sąjungos „Žaliojo kurso“ iniciatyvos ir nacionalinės priemonės, tokios kaip Lietuvos „Alternatyviųjų degalų“ įstatymas, prisideda prie transporto sektoriaus transformacijos, skatinant alternatyvių degalų ir netaršių transporto priemonių naudojimą. Moksliniai tyrimai rodo, kad modernių technologijų, įskaitant dirbtinį intelektą, daiktų internetą ir pažangias tiekimo grandinės valdymo strategijas, integracija leidžia optimizuoti procesus ir mažinti atliekas. Bendradarbiavimas su tiekėjais, dalinantis žiniomis ir geriausiomis praktikomis tvarumo srityje, bei investicijų pasidalinimas diegiant ekologiškas technologijas ir procesus ir valstybinės skatinimo priemonės yra esminiai veiksniai siekiant žaliosios transformacijos. Ateityje organizacijų sėkmė priklausys nuo jų gebėjimo prisitaikyti prie naujų tvarumo reikalavimų ir taikyti ekologiškus sprendimus visoje tiekimo grandinėje.

Literatūra

1. Aijyn, D. (2024). Green supply chain integration and sustainable supplier collaboration https://www.researchgate.net/publication/382028851_Green_supply_chain_integration_and_sustainable_supplier_collaboration
2. Beniušienė, I., & Jankauskienė, A., (2017). Žaliosios tiekimo grandinės valdymas. *Management Theory and Studies for Rural Business and Infrastructure Development* ISSN 2345-0355. 2017. Vol. 39. No. 4: 399–408. Article DOI: <https://doi.org/10.15544/mts.2017.27>

3. Chen, K. (2024). An Overview of the Research Literature on the Topic of Supply Chain Management in the Shipping Trade. *Advances in Economics Management and Political Sciences*, 141(1): 214-219 DOI: 10.54254/2754-1169/2024.GA18873
4. Chocholač, J., Vančurova, Š., & Mika, M. (2021). Green logistics tools applied in selected companies in the Czech Republic: a survey. *Globalization and its Socio-Economic Consequences*, Vol. 129. DOI: <https://doi.org/10.1051/shsconf/202112909004>
5. Europos Audito Rūmai specialioji ataskaita “Elektra varomų transporto priemonių įkrovimo infrastruktūra”; Vieša prieiga: <https://op.europa.eu/webpub/eca/special-reports/electrical-recharging-5-2021/lt/index.html> [Žiūrėta 2025-01-10]
6. Elektromobilių naudojimą skatinančios priemonės LR Susisiekimo ministerija https://sumin.lrv.lt/lt/veiklos-sritys/darnus-judumas/elektromobilumas/elektromobiliu-naudojima-skatinancios-priemones/?utm_source=chatgpt.com
7. Ye Y., Lau C., & Teo L. (2023). Alignment of green supply chain strategies and operations from a product perspective. *The International Journal of Logistics Management*, 34(6): 1566-1600. DOI: 10.1108/IJLM-11-2021-0557
8. Younis H., Sundarakani, B. & O'Mahony, B., (2020). Investigating the relationship between green supply chain management and corporate performance using a mixed method approach: Developing a roadmap for future research. *IIMB Management Review*, Volume 32, Issue 3, September 2020, Pages 305-324. <https://doi.org/10.1016/j.iimb.2019.10.011>
9. Han, X., & Rani, P. (2022). Evaluate the barriers to blockchain technology adoption in sustainable supply chain management in the manufacturing sector using a novel Pythagorean fuzzy-CRITIC-CoCo-So approach. *Operations Management Research* 15 (3–4):725–42. doi: 10.1007/s12063-021-00245-5.
10. Garza-Reyes, J.A., Villarreal, B., Kumar, V. & Ruiz, P.M. (2016). Lean and green in the transport and logistics sector – a case study of simultaneous deployment, *Production Planning & Control*, 27(15): 1221–1232. 27:15, 1221-1232] <https://doi.org/10.1080/09537287.2016.1197436>
11. Green, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: impact on performance. *Supply Chain Management: An International Journal*, 17(3), 290-305.
12. Kalinowski, T. B., Rudnicka, A., Wieteska, G., Wronka, A., Diglio, A., Piccolo, C., Bruno, G., Solomon, A., Koh, S. C. L., & Genovese, A., (2019), Competences Required for environmentally responsible managers – a European perspective, *Proceedings of International Academic Conferences*. <https://doi.org/10.20472/iac.2018.036.022>
13. LR Alternatyviųjų degalų įstatymas TAR, 2021-04-08, Nr. 7413; Vieša prieiga: <https://eseimas.lrs.lt/portal/legalAct/lt/TAD/0409c522915c11eb998483d0ae31615c?jfwid=tvchbzhgg> [žiūrėta 2025-01-26]
14. Muchenje, K.C. (2024) Green Logistics and Supply Chain Management. *Contemporary Solutions for Sustainable Transportation Practices*. DOI: 10.4018/979-8-3693-3755-4.ch002
15. Patra, P. K. (2020). Green logistics: eco-friendly measure in supply-chain. *Management Insight*. 14, 1, 65-71;
16. Pipirani, A.Z, Khan, S.A.R., & Yu Z. (2024). Driving success through digital transformation: influence of Industry 4.0 on lean, agile, resilient, green supply chain practices. *Journal of Manufacturing Technology Management*, 35(1) DOI: 10.1108/JMTM-05-2023-0179
17. Rodrigue, J.P. (2020). *The Geography of Transport Systems*. New York: Routledge, 456 pages. Prieiga per Internetą: <https://transportgeography.org/contents/chapter>
18. Sosnowski, P.C. (2022). Green concepts in the supply chain. *LogForum*, 18 (1): 15-25, <http://doi.org/10.17270/J.LOG.2022.680>
19. Šimanskienė, L. ir Kutkaitis, A. (2009). Logistikos įmonių darni plėtra panaudojant logistikos lygio indeksą LPI [Sustainable Development of Logistical Organization Using the Logistic Performance Index (LPI)], *Vadybos mokslas ir studijos – kaimo verslų ir jų infrastruktūros plėtrai* [Management Theory and Studies for Rural Business and Infrastructure Development] 19(4): 84–92. Prieiga per Internetą: <http://vadyba.asu.lt/19a/84.pdf>
20. Tavares, A., Vanalle, R., & Camarotto, J. (2019). Influence of Green Initiatives on Environmental, Economic and Operational Outcomes: The Case of the Brazilian Packaging Supply Chain. *Sustainability*, 11(2), 430; prieiga per internetą: <https://doi.org/10.3390/su11020430>
21. Van Hoek, R. I. (2002). Case Studies of Greening the Automotive Supply Chain through Technology and Operations // *International Journal of Technology Management*. No. 23 (1): 89–112. – <https://doi.org/10.1504/IJTM.2002.003000>

22. Zowada, K., & Niestrój, K. (2019). Cooperation of small and medium--sized enterprises with other supply chain participants in implementing the concept of green logistics. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 63(6), 249 – 260
23. Žaludienė, E. (2022). Žaliosios pakuotės inovacijos vystant žaliąjį tiekimo grandinę: teorinis aspektas. *19-osios jaunųjų mokslininkų konferencijos straipsnių rinkinys*. p. 204-2011

GREEN SUPPLY CHAIN: SUSTAINABILITY AND INNOVATIONS IN LOGISTICS

Summary

The growth of the global economy drives increasing volumes of goods production, transportation, and consumption, along with rising environmental challenges. The logistics sector is becoming increasingly focused on sustainable solutions to reduce its negative impact on the environment. Green supply chain management is now an integral part of modern logistics, encompassing eco-friendly transportation, efficient resource utilization, renewable energy sources, and waste reduction. Research analysis has revealed that companies seeking to integrate sustainability principles into their supply chains face various challenges—ranging from high investments in green technologies to a lack of commitment to environmental responsibility among suppliers. However, a strategic transformation of supply chains based on green logistics principles helps reduce the carbon footprint, improve energy efficiency, and enhance business competitiveness. Green solutions in the supply chain include the implementation of eco-friendly transportation, route optimization, the use of recyclable packaging, the adoption of artificial intelligence and the Internet of Things technologies, and collaboration among stakeholders. The European Union's Green Deal strategy and national regulations encourage the transition to less polluting alternative fuels and environmentally friendly logistics models. In conclusion, green supply chain management is becoming not only an environmental necessity but also an economic imperative. Modern companies striving for long-term success must implement sustainable and innovative solutions that balance environmental goals with efficient and competitive business operations.

Key words: green logistics, supply chain, green supply chain.

BALANCING SUSTAINABILITY AND CONSUMER EXPECTATIONS IN PACKAGING

Dr. Rūta Petrauskienė

Kauno kolegija Higher Education Institution, Lithuania

Annotation

This article explores consumer attitudes towards packaging, focusing on sustainability-related perceptions and the factors influencing them. The study reviews the development of sustainability concepts, examines research on sustainable packaging, and analyses consumer perspectives. Findings indicate a growing preference for eco-friendly packaging, though economic factors and convenience still influence purchasing decisions. The insights presented can aid businesses and policymakers in designing strategies to enhance sustainable packaging adoption.

Key words: consumer attitudes, packaging sustainability, environmental awareness, consumer purchasing decisions.

INTRODUCTION

In recent decades, sustainability has become a central concern for consumers, influencing their purchasing decisions and perceptions of product packaging. The COVID-19 pandemic and its aftermath accelerated online shopping trends, leading to a substantial increase in packaging materials. This surge in e-commerce has contributed to higher consumption of packaging, bringing both environmental challenges and opportunities for innovation in sustainable packaging solutions.

Given the dynamic nature of consumer behaviour, the analysis of studies conducted over the past years provides a relevant perspective on shifting attitudes. This timeframe captures the impact of significant global events, such as the pandemic, economic fluctuations, and advancements in sustainable technologies, which have influenced how consumers perceive and interact with packaging.

The purpose of this article is to analyse the balance between sustainability and consumer expectations in packaging by examining the evolution of sustainability concepts, industry adaptations, and consumer perceptions of eco-friendly packaging solutions.

Tasks:

1. To review the evolution of sustainability concepts and their influence on packaging.
2. To analyse scientific studies on sustainability in relation to packaging.
3. To examine consumer attitudes toward sustainable packaging and how industry adaptations respond to these changes.

Methods. This study employs a literature review methodology, analysing existing research, market surveys, and consumer reports. Comparative analysis is used to assess changes in attitudes over time, and secondary data from research institutions and industry reports provide insights into current trends.

1. EVOLUTION OF SUSTAINABILITY CONCEPTS

The concept of sustainability has evolved significantly since its introduction in the 1980s (Brundtland Report, 1987). Initially focused on environmental conservation, it has expanded to encompass economic and social dimensions, leading to the widely accepted framework of the triple bottom line: people, planet, and profit. This holistic approach emphasizes the interconnectedness of environmental health, economic viability, and social equity.

The concept of sustainability has evolved significantly since its introduction in the 1980s (Brundtland Report, 1987). Initially focused on environmental conservation, it has expanded to encompass economic and social dimensions, leading to the widely accepted framework of the triple bottom line: people, planet, and profit. This holistic approach emphasizes the interconnectedness of environmental health, economic viability, and social equity.

The concept of sustainability gained significant prominence in the late 20th century, particularly after the publication of the Brundtland Report in 1987. This report, officially titled *Our Common Future*, was produced by the World Commission on Environment and Development and introduced the concept of *sustainable development*, defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Two key concepts were highlighted in the report, which remain relevant nearly forty years later: “the concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs” (Brundtland Report, 1987). “As sustainability becomes a primary issue, the food industry should invest in various sectors, including food packaging” (Thapliyal et al., 2024).

Regarding packaging, sustainability considerations have shifted from merely reducing material use to life cycle assessments that assess environmental impacts from production to recycling or final disposal. Innovations such as biodegradable materials, recyclable packaging, and designs that minimize waste reflect this broader understanding of sustainability (Hussain, Akhter, & Maktedar, 2024; Ramanauskaitė, Skaudaitė, and Baužaitė, 2023; Kędzia et al., 2022).

A theoretical justification for this research lies in the increasing role of consumer behavior in shaping sustainable market practices. The shift towards sustainable packaging is not only driven by environmental concerns but also by regulatory frameworks, corporate social responsibility initiatives, and economic incentives (European Commission, 2019; European Commission, 2020; Ramanauskaitė, Skaudaitė et al., 2023; Ang et al., 2022; Hamdi, 2024).

Furthermore, during the COVID-19 pandemic and the post-pandemic period, online commerce experienced a significant surge, leading to increased demand for packaging materials such as cardboard boxes. While the rise in e-commerce has contributed to higher consumption of packaging, posing both environmental challenges and opportunities for innovation in sustainable packaging solutions, it has also necessitated the development of more eco-friendly alternatives, encouraging businesses to adopt recyclable and biodegradable materials. This situation underscores the necessity of analysing sustainable packaging issues. According to Sokolova, Krishna, and Döring (2023), “waste from packaging poses a serious environmental problem”.

When different definitions of sustainable packaging are presented (Table 1), they can be analysed and compared based on their key aspects, scope, and implications. One effective approach is to examine how each definition addresses environmental, economic, and social sustainability. Some definitions may focus primarily on reducing material waste and carbon footprint, while others emphasize recyclability, biodegradability, or the use of renewable resources.

Table 1. *Different Definitions of Sustainable Packaging by Different Organizations*

Definition of Sustainable Packaging	References
The term “sustainable packaging” refers to the use of materials and design principles that reduce the environmental impact of a product’s manufacturing, use, and disposal while still satisfying functional and financial needs.	Sustainable Packaging Coalition (SPC)
Packaging should be effective, cyclical, and safe and contribute economic and social value. It should utilize as little energy and materials as possible, maximize material recovery, and not endanger users or ecosystems.	The Australian Sustainable Packaging Alliance

The design of the packaging should be comprehensive, it should be made of materials that have been obtained ethically, it should be efficient and safe during its entire life, it should be affordable, it should fulfil customer expectations and demands, and it should be recyclable or recoverable after use.	EUROPEN
---	---------

Source: Thapliyal et al., 2024, based on the works of Gustavo et al. 2018; Coalition, 2011; Kozik, 2019; and Santi et al., 2022. Current Status of Sustainable Food Packaging Regulations: Global Perspective. Sustainability 2024, 16, 5554. <https://doi.org/10.3390/su16135554>

Additionally, it is important to assess whether these definitions align with circular economy principles, regulatory requirements, and industry standards. Highlighting these differences allows for a more comprehensive understanding of sustainable packaging and helps identify the most effective approaches for its implementation in various industries.

The increasing relevance of sustainable consumption and production, along with growing restrictions on plastic, has amplified the urgency of this research. Stakeholders are paying closer attention to environmental degradation, yet there remains a lack of scientific studies on consumers' eco-friendly purchasing habits and the factors influencing them.

Moreover, legal regulations on packaging, combined with evolving concepts such as eco-friendly packaging, the green economy, and the circular economy, are becoming key drivers. These factors not only shape companies' approaches to packaging but also influence consumer perceptions and demand shifts.

2. SUSTAINABLE PACKAGING ISSUES

Product packaging design plays a crucial role in shaping food-related behaviour, as it significantly influences consumer purchasing decisions (Schifferstein, de Boer, and Lemke, 2021). Within the EU, the Food Information to Consumers (FIC) Regulation (Regulation No 1169/2011) establishes the general principles, requirements, and responsibilities governing food information, and in particular food labelling. This regulation mandates essential labelling requirements for prepacked foods to ensure transparency for consumers (EU, 2011).

Research indicates that both the exterior of the packaging and its content are important. "Materiality in this context can include the sensory experiences of sight, touch and sound" (Labbe et al., 2013, Schifferstein et al., 2013, cit. by Schifferstein, de Boer et al., 2021). When consumers receive a package made from eco-friendly materials, they expect that the internal packaging components, such as shredded paper, shredded paper or wood shavings, will also be environmentally friendly.

To ensure that packaging does not negatively impact the environment, product disposal must be environmentally friendly – meaning that all possible components should be sorted for recycling, while waste should be composted or processed according to the product type. Additionally, excessive use of raw materials and complex material compositions complicate recycling, hinder market sustainability, and increase production costs, ultimately raising the final product price (Ramanauskaitė, Skaudaitė et al., 2023).

Scientists are also seeking sustainable solutions for packaging technology and production. Their focus includes optimizing paper usage, minimizing plastic packaging, and exploring new resources and natural material diversity for packaging. This involves utilizing agricultural waste and by-products to contribute to the biological cycle of the circular economy. Researches are testing new materials and modified plastics under various conditions, including simulations of environments (Centre for Packaging Innovations and Research, 2025; Markevičiūtė et al., 2024; Fasih, 2024; Aydemir, Yenidogan, Tutak, 2023; and others).

Table 2. *Drivers for Sustainable Packaging Principles*

Design and procure more sustainable packaging formats	Design for recovery Optimise material efficiency Design to reduce product waste Eliminate hazardous materials Use recycled materials Use renewable materials Design to minimise litter Design for transport efficiency Design for accessibility
Provide consumer information	Provide consumer information on sustainability

Source: Reprinted from: Australian Packaging Covenant Organisation (2022). Sustainable packaging guidelines. (PDF) Current Status of Sustainable Food Packaging Regulations: Global Perspective. Access via the Internet [https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20\(SPGs\)](https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20(SPGs))

The principles presented in Table 2 emphasize material use, waste minimization, and the incorporation of recycled and renewable materials. They also highlight the importance of designing packaging for efficient transportation, accessibility, and consumer awareness. Additionally, they stress eliminating hazardous materials, reducing litter, and ensuring that packaging can be effectively recovered at the end of its life cycle. By following these principles, businesses can develop more sustainable and eco-friendly packaging solutions.

Through ongoing research and innovation, scientists and companies contribute to advancing sustainable packaging practices. These efforts support global initiatives to reduce environmental impact and promote circular economy principles.

3. CONSUMER PERCEPTIONS AND MARKET ADJUSTMENTS IN SUSTAINABLE PACKAGING

As Schifferstein, de Boer et al. (2021) state, “although legislation may specify the rules that producers need to meet if they offer food products to consumers, consumers may not perceive the products in the way that legislations or food companies intended”. It is also essential to understand how consumers view packaging.

Several studies have investigated consumer perceptions and behaviours related to sustainable packaging. A 2023 McKinsey survey (Feber, Goel, Nordigården, and Prasad, 2023) revealed “consumers around the world have different opinions on what type of packaging is most sustainable. That said, there is agreement on what the least-sustainable options are”. Another study (Feber, Granskog, Lingqvist, and Nordigården, 2020) examined consumer reactions to different packaging materials, finding that products in eco-friendly packaging are often perceived as higher quality. However, the study also identified a gap between consumer attitudes and actual purchasing behaviours, suggesting that factors like price and convenience still play significant roles in decision-making.

Sokolova, Krishna et al. (2023) state that “consumers judge plastic packaging with additional paper to be more environmentally friendly than identical plastic packaging without the paper”. This phenomenon, referred to as the perceived environmental friendliness (PEF) bias, occurs because consumers associate paper with environmental benefits while perceiving plastic negatively. The PEF bias leads consumers to assume that packaging with a higher paper-to-plastic ratio is more sustainable and environmentally friendly.

Research also suggests that „simply slapping some paper on top of plastic packaging makes a product seem more environmentally friendly, even if you can still see that it’s wrapped in exactly the same amount of plastic. These perceptions in turn make consumers both more likely to buy a product, and willing to pay more for it” (Krishna and Sokolova, 2023). This highlights how consumer

perception does not always align with actual environmental impact, as the combination of materials can complicate recycling and increase ecological harm.

Changing ecological attitudes are shaping consumer perceptions. Schifferstein, de Boer et al. (2021) argue that “using plastic-based materials is unlikely to give packages a natural feel and image. Also note that the materials with natural associations may actually be more sustainable as they tend to be biodegradable”.

Scientists examine how regulations, aesthetics, functionality, and marketing influence consumer decision-making regarding food packaging. They explore “how verbal claims, images and general packaging features in different contexts are perceived by consumers and how effective they are in moving consumer behaviour in a healthier or environment-friendlier direction” (Schifferstein, de Boer et al. 2021).

Over the past five years, consumer attitudes toward packaging have become increasingly focused on environmental impact. A 2023 report by the Paper and Packaging Board (Paper and Packaging Board, 2024) noted that consumers are more motivated to recycle, particularly as the rise of e-commerce has led to an increase in packaging waste. The report emphasized the need for ongoing consumer education to encourage sustainable recycling behaviours.

McKinsey Report, as cited by Feber et al. (2020), concludes that the pandemic is rapidly significantly influencing customers perceptions on sustainable packaging materials. A survey was conducted in ten countries worldwide to explore consumers’ attitudes toward sustainable packaging. Researchers suggest three actions for packaging converters: they should „take a holistic approach to sustainability“ by acting in multiple areas and making sustainable packaging „not only available but also apparent to consumers.“ A granular understanding of end-user segments will also be critical, as „there is no universal solution, and consumers do not necessarily know what to expect regarding sustainability in packaging.“ To be proactive, packaging converters should „collaborate with their value-chain partners sooner rather than later,“ adopting an experimental approach to developing solutions and „clearly communicating narratives about them.“ Finally, converters shouldn’t address sustainability in isolation, without considering broader factors such as hygiene, food safety, and „other megatrends, such as e-commerce“ (Feber et al., 2020). A comprehensive evaluation of the entire packaging value is necessary to adapt to evolving consumer behaviours. Researchers observe that retailers and packaging manufacturers face new challenges, including compliance with legal requirements, adaptation to evolving consumer needs, and aligning with corporate sustainability goals. “To act proactively, packaging players must understand, at a granular level, how consumers buy and use the products in a given category and how consumers dispose of the packaging now in use. These insights can serve as a starting point for an analysis of which kinds of sustainable packaging fit a given value chain and the range of improvement levers available. Companies will probably find it helpful to try sooner rather than later, taking an experimental approach to developing solutions with partners and then perfecting the packaging along the way” (Feber, Granskog et al., 2020). Despite growing environmental awareness, certain challenges remain. While consumer behaviour is evolving, purchasing habits are still largely driven by affordability and accessibility. Consumers are often influenced by attractive and well-designed packaging, meaning that price, quality, and convenience frequently take precedence over environmental considerations. This suggests that while sustainability is important to consumers, economic factors and ingrained purchasing habits continue to influence buying decisions.

However, sustainability initiatives and actions must not remain merely rhetorical. Efforts by scientists, policymakers, and society at large are essential in driving real changes in consumer and producer choices, fostering long-term shifts toward more sustainable packaging practices.

CONCLUSIONS

1. The evolution of sustainability concepts has significantly influenced packaging trends. Initially centered on environmental conservation, sustainability has expanded to encompass economic and social dimensions. This shift has driven the adoption of life cycle assessments and the development of innovative, eco-friendly packaging solutions. Additionally, global events, such as the COVID-19 pandemic, have accelerated e-commerce growth, leading to increased demand for sustainable packaging.
2. The role of businesses in driving sustainable packaging adoption is crucial. Companies must go beyond simply offering sustainable packaging options by clearly communicating their environmental benefits. This includes educating consumers, increasing transparency about recyclability and materials, and integrating sustainability into brand messaging. These efforts can encourage wider consumer adoption of eco-friendly packaging solutions and promote more responsible purchasing behaviors.
3. Scientific research highlights the complexity of consumer behavior toward sustainable packaging. Studies show that while consumers express strong interest in sustainability, their actual purchasing decisions are often driven by price, convenience, and perceived packaging quality. Additionally, misconceptions such as the Perceived Environmental Friendliness (PEF) bias indicate that consumers do not always accurately assess a package's environmental impact. This underscores the need for better consumer education, clearer product labeling, and improved sustainability messaging to bridge the gap between perception and reality.

List of references

1. Ang, D., Ho, J., Noblitt, M., Checa, J., & Santiago, S. (2022). Motivations for Sustainable Packaging in Green Supply Chain Management. *International Journal of business and Information Technology*, volume 9, Number 1, 1–11. Access via the Internet https://www.researchgate.net/publication/370590873_Motivations_for_Sustainable_Packaging_in_Green_Supply_Chain_Management
2. Australian Packaging Covenant Organisation (2022). Sustainable packaging guidelines. (PDF) *Current Status of Sustainable Food Packaging Regulations: Global Perspective*. Version 3, 1–39. Access via the Internet [https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20\(SPGs\)](https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20(SPGs))
3. Aydemir, C., Yenidogan, S., & Tutak, D. (2023). Sustainability In the Print and Packaging Industry. *Cellulose Chemistry and Technology*. 57(5-6): 565–577. DOI: 10.35812/CelluloseChemTechnol.2023.57.51.
4. Brundtland Report. (1987). *Our common future*. Oxford University Press. Access via the Internet <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
5. Centre for Packaging Innovations and Research (2025). Kaunas University of Technology. Access via the Internet <https://fmed.ktu.edu/cpir/>.
6. European Commission. (2019). *A European Green Deal*. Priorities. Access via the Internet https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
7. European Commission. (2020). Communications 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”. Council of the European Union. (1–20). Access via the Internet https://www.consilium.europa.eu/media/47572/st_6766_2020_init_en.pdf
8. Fasih., K. (2024). Achieving Long Term Sustainability through Green Process Innovation: A Study on Small Packaging Companies in the UK. *International Business Research*. 14(12):15–15. DOI: 10.5539/ibr.v14n12p15
9. Feber, D., Goel, A., Nordigården, D., & Prasad, M. (2023). Sustainability in packaging 2023: Inside the minds of global consumers. *McKinsey & Company*, (1–7). Access via the Internet <https://www.mckinsey.com/industries/packaging-and-paper/our-insights/sustainability-in-packaging-2023-inside-the-minds-of-global-consumers#/>
10. Feber, D., Granskog, A., Lingqvist, O., & Nordigården, D. (2020). Sustainability in packaging: inside the minds of US consumers. Article. *McKinsey & Company*. (1–8). Access via the Internet <https://>

- www.mckinsey.com/industries/packaging-and-paper/our-insights/sustainability-in-packaging-inside-the-minds-of-us-consumers#/
 11. Hamdi, M. (2024). Sustainable Packaging Trends in the Consumer Packaged Goods Market. Extension School, Harvard University. Access via the Internet https://www.researchgate.net/publication/383608198_Sustainable_Packaging_Trends_in_the_Consumer_Packaged_Goods_Market
 12. Hussain, Sh., Akhter, R., & Maktedar, Sh. (2024). Advancements in sustainable food packaging: from eco-friendly materials to innovative technologies. *Sustainable Food Technol.* 2, 1297, (1–68). DOI: 10.1039/d4fb00084f. Access via the Internet <https://pubs.rsc.org/en/content/articlepdf/2024/fb/d4fb00084f>
 13. Kędzia, G., Ocicka, B., Pluta-Zaremba, A., Rażniewska, M., Turek, J., & Wieteska-Rosiak, B. (2022). Social Innovations for Improving Compostable Packaging Waste Management in CE: A Multi-Solution Perspective. *Energies*, 15(23), 9119, 2–19. Access via the Internet <https://doi.org/10.3390/en15239119>
 14. Krishna, A., & Sokolova, T. (2023). How Unnecessary Paper Packaging Creates the Illusion of Sustainability. Retail and consumer goods. Harvard business review. Access via the Internet <https://hbr.org/2023/04/how-unnecessary-paper-packaging-creates-the-illusion-of-sustainability>
 15. Markevičiūtė, Z., Lyytikäinen, J., Leminen, V. et al. (2024). Grain by-products and *Saccharomyces cerevisiae* application in paper packaging material: impact on physical–mechanical and barrier properties. *Discov Sustain.* 5, 82. Access via the Internet <https://doi.org/10.1007/s43621-024-00257-8>
 16. Paper and Packaging Board (2024). 2023 Campaign Impact in Figures. Access via the Internet https://www.paperandpackaging.org/sites/default/files/2024-04/FINAL%202023%20Campaign%20Impact%20Report_0.pdf?utm_source=chatgpt.com
 17. Paper and Packaging Board (2024). 2023 Campaign Impact in Figures. Access via the Internet https://www.paperandpackaging.org/sites/default/files/2024-04/FINAL%202023%20Campaign%20Impact%20Report_0.pdf?utm_source=chatgpt.com
 18. Ramanauskaitė, J., Skaudaitė, K., & Baužaitė, A. (2023). Tvarios lanksčios pakuotės vystymas maisto gamybos pramonėje: reguliavimo politikos poveikis. VIEŠOJI POLITIKA IR ADMINISTRAVIMAS ISSN 2029-2872 (online) PUBLIC POLICY AND ADMINISTRATION, T 22, Nr. 1/2023, Vol. 22, Nr. 1, 91–104. (In Lithuanian). Access via the Internet <https://doi.org/10.5755/j01.ppa.22.1.33606>
 19. Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers. Official Journal of the European Union of 25 October 2011, 18–62. Access via the Internet <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011R1169>.
 20. Schifferstein, H. N. J., de Boer, A., & Lemke, M. (2021). Conveying information through food packaging: A literature review comparing legislation with consumer perception. *Journal of Functional Foods*. 86, 104734, 1–12. Access via the Internet <https://doi.org/10.1016/j.jff.2021.104734>
 21. Sokolova, T., Krishna, A., & Doering, T. (2023). Paper meets plastic: The perceived environmental friendliness of product packaging. *Journal of Consumer Research*, 50(3), 468–491. Access via the Internet <https://doi.org/10.1093/jcr/ucad008>
 22. Thapliyal, D., Karale, M., Diwan, V., Kumra, S., Arya, R. K., & Verros, G. D. (2024). Current Status of Sustainable Food Packaging Regulations: Global Perspective. *Sustainability*. 2024, 16, 5554, 2–26. Access via the Internet <https://doi.org/10.3390/su16135554>.

TVARUMO IR VARTOTOJŲ LŪKESČIŲ BALANSAVIMAS PAKUOČIŲ SEKTORIJE

Santrauka

Šiame straipsnyje nagrinėjamos vartotojų nuostatos apie pakuotes, daugiausia dėmesio skiriant su tvarumu susijusiam vartotojų suvokimui ir jį veikiantiems veiksniams. Tyrimas apžvelgia tvarumo koncepcijų raidą, analizuoja mokslinius tyrimus apie tvarias pakuotes ir vertina vartotojų požiūrį. Rezultatai rodo didėjančią ekologiškų pakuočių pasirinkimą, tačiau ekonominiai veiksniai ir patogumas vis dar daro didelę įtaką pirkimo sprendimams. Pateiktos išvalgos gali padėti verslui ir politikos formuotojams kurti strategijas, skatinančias tvarių pakuočių naudojimą.

Pagrindiniai žodžiai: vartotojų nuostatos, pakuočių tvarumas, aplinkosauginis sąmoningumas, vartotojų pirkimo sprendimai.

SUSTAINABLE CITIES IN THE CONTEXT OF CLIMATE CHANGE: AN ANALYSIS OF INNOVATION, POLICY AND PRACTICE

Vaiva Mickevičienė, Inga Piščikienė, Indrė Sprogytė-Bredelienė

Vilniaus kolegija / Higher Education Institution, Lithuania

Annotation

This article analyses contemporary trends in sustainable cities, reflecting the challenges of climate change and the need to reduce the environmental impact of urbanised areas. It examines the context and development of smart cities, highlighting the importance of sustainable planning, social inclusion and economic resilience. The paper presents national and international examples to illustrate the effectiveness of different strategies and their applicability. The analysis contributes to the academic debate on the future direction of urban development by providing a systematic approach to the interaction between technology, ecology and governance in the construction sector.

Key words: climate neutral urbanisation, sustainable cities, influence to environment.

INTRODUCTION

This paper explores the principles of sustainable urban development in the context of global warming and examines innovative technologies and their application in urban planning to enhance urban eco-efficiency, social inclusion and economic resilience. This analysis can make an important contribution to the academic debate on future trajectories of urban development by providing a systematic approach to the synergies between technology, ecology and policy in the context of urbanisation and climate change. Another aspect the review article focused on is the growing disparity between the accelerating pace of climate change and the limited capacity of urban systems to implement effective adaptation and mitigation strategies. This phenomenon, often referred to as the “slow city, fast climate change” paradox, underscores the structural inertia of cities in contrast to the rapid shifts in climate dynamics. Scientific evidence indicates that urban infrastructure, planning, and governance structures are predominantly designed for historical climate conditions rather than for the increasingly extreme and unpredictable climate regimes of the 21st century. Studies show that urban areas, which cover only 3 percent of the Earth’s land surface, account for over 70 percent of global CO₂ emissions, intensifying their vulnerability to climate-induced risks such as heatwaves, flooding, and sea-level rise (IPCC, 2023).

The challenge is particularly acute in cities with aging infrastructure and rigid regulatory frameworks, which hinder the swift integration of climate-resilient solutions. Research suggests that most metropolitan regions exhibit a temporal mismatch: the climate regime for which their infrastructure was originally developed no longer corresponds to present-day climatic realities (Klein et al., 2021). Furthermore, climate projections indicate that by 2050, over 570 coastal cities could experience sea level rises of at least 0.5 meters, endangering over 800 million people globally (C40 Cities, 2022). Despite international climate agreements and urban resilience policies, many cities struggle to operationalize systemic transitions at the speed necessary to counteract climate risks effectively (United Nations, 2022).

To address this misalignment, urban planning must shift toward adaptive governance, nature-based solutions, and climate-responsive infrastructure. Open-access datasets such as NASA’s Earth Observatory and the World Bank’s Climate Change Knowledge Portal provide real-time climate analytics, supporting data-driven urban adaptation strategies. Further interdisciplinary research is required to identify scalable mechanisms that enhance urban resilience without exacerbating socio-economic inequalities.

1. THE RELEVANCE OF THE TOPIC

Since the onset of the Industrial Revolution, anthropogenic activities have been the primary driver of contemporary climate change. Empirical data indicate that in 2023, the global land and ocean surface temperature was approximately 1.2°C above the 20th-century average, aligning with the persistent upward trend of record-breaking temperatures (IPCC, 2023). The escalation in surface temperature has triggered cascading environmental impacts, including sea level rise, accelerated Arctic ice loss, and an increase in extreme weather events, which collectively challenge the adaptive capacity of human and ecological systems (NASA, 2024). The principal mechanism underlying global warming is the accumulation of greenhouse gases (GHGs) in the atmosphere, which function as an additional radiative forcing layer, trapping outgoing infrared radiation and amplifying the greenhouse effect (Stocker et al., 2013). The combustion of fossil fuels remains the dominant source of GHG emissions, which have exhibited an uninterrupted increase over past decades, culminating in a record 53.8 billion metric tons of CO₂-equivalent emissions in 2022 (Global Carbon Project, 2023). Additionally, the degradation of natural carbon sinks exacerbates climate change, as terrestrial and marine ecosystems play a critical role in sequestering atmospheric carbon (Friedlingstein et al., 2022). When these ecosystems, such as forests, wetlands, and mangroves, experience deforestation or degradation, they transition from carbon sinks to carbon sources, releasing stored carbon and diminishing their sequestration potential (Griscom et al., 2017). Notably, global tree cover loss reached 28.3 million hectares in 2023, representing more than a twofold increase compared to 2001 levels, further intensifying the climate crisis (Hansen et al., 2024). The impacts of climate change on land are complex and varied. Global warming is causing more frequent heat waves, longer warm seasons and shorter cold seasons (Shorts, Farmer, 2021). Already, parts of the world are experiencing an increase in intense rainfall and associated flooding. Others are experiencing more droughts that threaten desertification. In regions with winter, the winter season may be shorter, and snowstorms may be more intense. Coastal areas are threatened by sea-level rise. They will be most affected by heat waves, ocean acidification, reduced oxygen levels and more intense hurricanes. The trend towards more extreme events is becoming clearer.

Although Lithuania is still considered to be one of the least affected countries in the world, warming climate is already starting to have an impact on Lithuania's water resources, landscape, ecosystems and biological biodiversity, ambient air quality, public health, waste management, forestry, agriculture and other areas. The devastating effects of climate change in the global world are also economically indirect impacts on Europe and Lithuania as a whole (LRV.lt, 2020). The EU is highly urbanised, with almost 75 percent of its citizens living in cities and towns and 80 percent of its citizens expected to live in cities and towns by 2050 (EC, 2021). Cities and metropolitan areas are not only the main centres of economic activity. They are also the main emitters of greenhouse gases, air, water and sources of air, gas and soil pollution. The use of technology to improve urban governance can contribute to three EU priorities: the Green Deal, the focus on digital technologies and the human economy. Today's cities are major sources of greenhouse gas emissions and therefore play a key role in the context of climate change. For example, according to the Lithuanian Association of Heat Suppliers (2025), in Lithuania in 2021 the transport sector accounted for 30.3 percent of total GHG emissions, while the energy sector accounted for 30.1 percent. According to the European Environment Agency, urban areas account for a large share of anthropogenic GHG emissions, leading to accelerated climate warming. In addition, urbanisation is often associated with the loss of natural ecosystems, which reduces the capacity to absorb carbon dioxide and contributes to climate change (eca.europa.eu, 2025).

Analysing the interaction between cities and climate change is essential for developing sustainable urban strategies. Such analysis allows the main sources of emissions to be identified and effective measures to reduce them to be implemented. For example, NASA studies show that inte-

grating green spaces in cities can help reduce temperatures and thus contribute to climate change mitigation (science.nasa.gov, 2025). Cities can also become innovation hubs, promoting renewable energy, resource efficiency and sustainable infrastructure. Integrated transport systems, energy efficiency standards and the development of green spaces can make a significant contribution to reducing GHG emissions and adapting to the impacts of climate change. Early researchers such as James Hansen (2024) and Michael Oppenheimer began to look at the impact of cities on climate change, highlighting the influence of urbanisation and industry on environmental change. Their work has contributed to understanding how urban development and activities contribute to global climate processes and has led to the search for solutions for more sustainable urbanisation. In addition, a wide range of governmental and non-governmental organisations, such as the Tyndall Centre for Climate Change Research in the UK, are conducting in-depth research on the impact of cities on climate change, looking at sustainable urbanisation strategies and policies to reduce emissions in urbanised areas. Analysing the role of cities in the context of climate change is essential to understand and manage the impact of anthropogenic factors on the environment and to create sustainable living spaces for future generations.

The relevance of this paper for the academic community is based on a systematic literature analysis that identifies existing knowledge, theoretical models and methodological approaches to sustainable inclusive green cities. In the context of contemporary urban trends and climate change challenges, a critical assessment of existing research will help to highlight both best practices and theoretical gaps. The literature analysis will enable the conceptualisation of key factors influencing urban sustainability and inclusiveness, which is essential for further research.

The paper can contribute to the academic debate by systematically summarising existing research and providing a theoretical basis for future empirical work. Moreover, by analysing different approaches and urban policy contexts, it will help to identify effective strategies to promote social justice and ecological resilience in urban development. Such an approach will not only fill theoretical gaps but also generate new insights that can benefit both researchers and policy makers.

Empirical research is often limited to specific geographical areas, so a detailed theoretical analysis allows for a broader context to be assessed without being tied to specific cases. In addition, an interdisciplinary approach combining urban, environmental and social science perspectives will ensure a comprehensive and coherent understanding of the field. Thus, the literature analysis presented in this paper will not only enhance the scientific dialogue but also contribute to the development of the concept of sustainable, inclusive cities.

2. METHODOLOGY

The chosen methodology for this review article—analysis of relevant scientific literature and best practice case studies—is grounded in its ability to provide a comprehensive, evidence-based synthesis of climate resilience in urban environments. A literature review allows for systematic identification of key theoretical frameworks, empirical findings, and policy implications, ensuring that conclusions are derived from rigorous academic discourse (Snyder, 2019). This approach is particularly relevant for climate resilience studies, where insights from multiple disciplines—urban planning, environmental science, and governance—must be integrated (Berrang-Ford et al., 2021). The inclusion of best practice case studies enhances the practical applicability of the findings by showcasing real-world implementations of resilience strategies (Flyvbjerg, 2006). Cities such as Rotterdam, Copenhagen, and Singapore provide replicable models that demonstrate how theoretical principles translate into effective adaptation measures (IPCC, 2023). Moreover, reviewing diverse urban contexts ensures that conclusions are globally relevant rather than limited to a single regional framework (Anguelovski et al., 2014). This methodological approach is justified as it avoids the limitations of single-case empirical research, which may lack generalizability (Yin, 2018). By synthesizing findings from multiple high-quality academic sources and practical examples, the

study enhances its validity, reliability, and policy relevance (Gough et al., 2012). Ultimately, this methodology provides a holistic understanding of climate resilience, facilitating well-informed recommendations for urban policymakers and researchers.

3. ISSUES IN INCLUSIVE, GREEN URBAN DEVELOPMENT – THEORETICAL VIEW

Scientists have identified over the last century that urbanisation contributes significantly to climate warming through several mechanisms. One of these is the urban heat island effect, whereby asphalt, concrete and other building materials cause urban areas to absorb and retain more heat, increasing local temperatures (Oke, 1982). Recent data show that 65 US cities are on average 4.4 °C warmer than surrounding rural areas due to this effect (Climate Central, 2024). In addition, urbanised areas encourage more intense summer rains, increasing the risk of flash floods. An analysis by Torelló-Sentelles et al. (2024) showed that larger cities, such as London or Phoenix, have summer rainfall intensities that are up to 11 percent higher and concentrations that are 15 percent higher than in surrounding areas.

Urban sprawl often leads to the loss of natural ecosystems, reducing the capacity to absorb carbon dioxide and thus contributing to increasing atmospheric CO₂ concentrations (Seto, Güneralp & Hutya, 2012). In addition, urbanisation alters local climate patterns, including wind flows and moisture balance, which may have further consequences for regional climate (Grimm et al., 2008). In light of these factors, researchers are highlighting the importance of sustainable urban planning practices to mitigate the impacts of urbanisation on climate change (Newman & Kenworthy, 2015).

Sustainable, inclusive and climate-resilient cities have a number of key criteria that help ensure their viability and adaptability to changing environmental conditions. According to the European Commission, the effects of climate change, such as declining water availability, increasing risk of droughts and biodiversity loss, forest fires and heat waves, are having a major impact on urban life. It is becoming essential to analyse all relevant aspects of urban life, including social, economic and environmental criteria (climate.ec.europa.eu, 2024).

The 2021 study *Green Infrastructure and Urban Sustainability: A Review* (Matthews et al., 2021) provides an overview of the role of green infrastructure in urban sustainability. The authors argue that green infrastructure, such as parks, green roofs and urban gardens, can improve air quality, reduce urban heat island effects and increase biodiversity, thereby contributing to sustainable urban ecosystems. In addition, the 2022 study *Social Equity in Urban Green Space Accessibility: A Global Perspective* (Wang et al., 2022) examines the social equity aspects of access to urban green spaces. The authors found that inequalities in access to green space exist in many cities, which can have negative consequences for social inclusion and the health of the population. The study highlights that in order to create inclusive green cities, it is essential to ensure equal access to green spaces for all residents, regardless of their socio-economic status. The importance of community participation in urban planning is also underlined by the 2023 study on *Participatory Urban Planning for Sustainable and Inclusive Green Cities* (Smith and Brown, 2023). It argues that involving local communities in decision-making processes can create cities that better meet the needs of their citizens and promote social inclusion and sustainability. These and other studies provide valuable insights into creating sustainable and inclusive green cities, highlighting the importance of green spaces for population health, social justice and community participation in urban planning. Many authors stress that an urban greening strategy involves many interrelated socio-economic aspects. Solution, as studies show (E. Ramanauskas, others, 2024), is the complex formation of new, sustainable urban structures that take into account the social, ecological and economic factors of climate change and other rising threats. For example, the 2020 study *Urban Green Space and Its Impact on Human Health* (Lee and Maheswaran, 2020) examines the impact of urban green spaces on human health. The authors found that green spaces in cities can reduce stress levels, improve mental health and promote physical activity, thus contributing to the overall well-being of the population. This study

highlights that sustainable design of green spaces is key to creating healthy and inclusive urban communities. Another important work is *Inclusive Green Growth: The Pathway to Sustainable Development* (World Bank, 2020), which analyses how inclusive green development can contribute to sustainable development. The report highlights that integrating social, economic and environmental considerations into urban planning can create cities that are not only green but also socially just and economically viable.

4. KEY CONDITIONS FOR CITIES TO BECOME CLIMATE NEUTRAL AND ANALYSIS OF REAL EXAMPLES AND GOOD PRACTICES

The European Union (EU) is committed to becoming a climate-neutral continent by 2050, and a number of strategies and guidelines for cities have been developed to achieve this goal. One of the key documents is the *European Climate Act*, which entered into force in July 2021, enshrines the EU's commitment to achieving climate neutrality by 2050 (Parliament, 2025). To accelerate this process, the European Commission has launched the *100 Climate Neutral and Smart Cities* mission, which aims to help at least 100 European cities become climate neutral by 2030. The mission encourages cities to implement innovative solutions in energy, transport and other areas, and to share best practices with other regions (europoshorizontas.lt, 2025). Climate resilience, as shown before, in urban areas is a multidimensional concept that integrates environmental, infrastructural, socio-economic, and governance factors to enhance cities' ability to withstand and adapt to climate-related stressors (IPCC, 2023). Climate resilience requires a holistic approach, combining infrastructure adaptation, ecosystem-based strategies, inclusive governance, and technological innovation. Without these components, cities will struggle to keep pace with accelerating climate change and growing urban vulnerabilities (Pelling et al., 2018/Meerow et al., 2016).

- **Integration of green infrastructure or nature-based solutions:** Cities with parks, green roofs and other green spaces can reduce heat island effects, improve air quality and provide recreational spaces for residents. The total area of green infrastructure in the **Tauragė** region at the end of 2021 amounted to 1705 km² and accounted for about 38.7 percent of the total area (compared to the national average of 41.7 percent) (Tauragės regiono plėtros planas, 2024). Green infrastructure, such as permeable pavements, urban forests, enhances resilience by reducing urban heat island (UHI) effects and improving stormwater management (Kabisch et al., 2017). A study on **Singapore's** urban forests found that tree canopies reduce local temperatures by up to 4°C, significantly lowering energy demands for cooling (Tan et al., 2013). According to the 2023 Quality of Life in European Cities survey, around 76 percent of people living in European cities were satisfied with the green spaces in their city. This satisfaction rate was lower among residents of capital cities (73 percent) compared to non-capital cities (78 percent) (EC, 2022).

- **Adaptive urban planning:** Resilient cities prioritize flexible urban planning frameworks that incorporate climate projections and disaster risk assessments (Ahern, 2011). Research indicates that cities integrating adaptive zoning laws and decentralized urban systems can mitigate flooding and heat stress more effectively (Davoudi et al., 2012). **Copenhagen** aims to become the world's first carbon-neutral city by 2025 through extensive sustainable urban planning and renewable energy use (Kuei et al., 2020). The city implemented the Cloudburst Management Plan, which includes underground reservoirs and green corridors to manage extreme rainfall (Dahl et al., 2022). Furthermore, Copenhagen's district heating system, powered by biomass and wind energy, reduces CO₂ emissions by over 50 percent compared to conventional heating (Danish Energy Agency, 2021).

- **Climate-responsive governance:** Effective governance ensures that resilience strategies are mainstreamed into urban policies and budgets (Bulkeley & Betsill, 2013). Cities with participatory governance models, such as **Copenhagen**, successfully integrate multi-stakeholder climate adaptation plans, including flood risk management and carbon-neutral initiatives (Anguelovski et al., 2014).

- **Developing sustainable transport systems:** Encouraging the development of public transport, cycle paths and pedestrian areas reduces emissions and improves the health of residents. Cities around the world are working hard to organise mobility and transport in a sustainable and inclusive way (A. Grisanti, 2024). **Kaohsiung** is the first city in Chinese Taipei to fully digitise its public transport ticketing system. This system allows mobile payment for a wide range of transport modes, making public transport easier to use (ICLEI, 2025). Integration with neighbouring cities such as Tainan and Pingtung are planned to provide a seamless and convenient monthly commuter ticket across several regions. In addition, the local government aims to move towards a fully electric bus fleet by 2030 and to develop an interconnected intelligent transport system, including clean energy buses such as hydrogen-powered models.

- **Energy efficiency and renewable energy:** Building insulation, energy-saving technologies and the use of solar and wind energy help reduce dependence on fossil fuels. In 2023, the World Economic Forum (WEF, 2024) reported that more than 830 cities in 72 countries have set renewable energy targets in at least one sector (electricity, heating and cooling and/or transport). Around 800 municipal administrations have implemented regulatory policies, financial and tax incentives and indirect support policies to enable the uptake of renewable energy in buildings and transport across the city. Contrary to national trends, the portfolio of city-level policies is expanding rapidly beyond the energy sector, reflecting the increasing efforts of cities to decarbonise heating and cooling and transport.

- **Smart technologies and data-driven adaptation (AI):** The integration of climate data analytics and smart urban systems improves predictive modelling for extreme weather events (Gouldson et al., 2015). **Tokyo's** early warning systems and automated flood barriers exemplify data-driven resilience, reducing flood damages by 80 percent over the past two decades (Takeuchi et al., 2019).

- **Water resource management:** Water efficiency, rainwater harvesting systems and wastewater treatment help to ensure water availability, even in dry periods. Rotterdam has implemented floating urban structures to accommodate sea-level rise. **Rotterdam** is a global leader in flood resilience, utilizing a multi-layered water management system that includes floating urban structures, underground water storage, and flood-resilient infrastructure (Zevenbergen et al., 2013). The Rotterdam *Climate Proof Plan* integrates nature-based solutions, such as green roofs and water plazas, reducing the city's vulnerability to sea-level rise (Deltares, 2020).

- **Social inclusion and community participation:** Involving citizens in decision-making processes and ensuring equal access to urban resources strengthens social cohesion and community resilience. Equitable resilience frameworks take into account the vulnerabilities faced by marginalised populations disproportionately exposed to climate hazards (Shi et al., 2016). Research shows that in **New York City**, post-Hurricane Sandy recovery efforts revealed deep social inequalities. New York City launched a resilience strategy focusing on coastal protection, social justice and energy resilience (Rosenzweig and Solecki, 2014). Investments in better infrastructure, flood-resistant buildings and micro-grids have improved preparedness for future storms (Shi et al., 2016). New York City's *Cool Neighbourhoods* programme has expanded the number of tree canopies and reflective surfaces to counteract heat stress, benefiting low-income communities that are disproportionately impacted by climate change (City of New York, 2020).

These cities exemplify best practices in climate resilience, demonstrating that integrating technology, urban nature, and inclusive governance can significantly reduce climate risks. While challenges persist, their innovative strategies offer scalable solutions for global urban adaptation. Future climate resilience efforts should emphasize long-term governance, multi-sectoral collaboration, and data-driven decision-making to ensure sustainable urban futures (IPCC, 2023).

CONCLUSIONS

1. Anthropogenic climate change has fundamentally altered the Earth's climate system, with scientific evidence confirming that greenhouse gas emissions from human activities are the dominant forcing factor. The persistent rise in global surface temperature, currently exceeding 1.2°C above pre-industrial levels, has set off a cascade of environmental and socio-economic consequences, including accelerated sea level rise, cryosphere degradation, biodiversity loss, and intensifying climate extremes. The frequency and severity of climate-related disasters, such as heatwaves, hurricanes, droughts, and wildfires, highlight the growing vulnerability of both human and ecological systems. Despite extensive scientific consensus, the rate of urban adaptation and mitigation remains inadequate, constrained by outdated governance structures, financial limitations, and political inertia.

2. A critical challenge in climate governance is the mismatch between the rapid acceleration of climate change and the slow pace of urban and infrastructural adaptation—a phenomenon described as the “slow city, fast climate change” dilemma. Empirical studies suggest that cities must transition from reactive, incremental adaptation strategies to systemic, transformative resilience-building approaches. Case studies of highly adaptive cities, including Rotterdam, Copenhagen, and Singapore, illustrate the efficacy of integrated, multi-sectoral approaches, such as nature-based solutions, climate-responsive urban planning, and AI-driven risk assessment technologies. These cities exemplify the potential of climate-resilient urban governance, but global implementation remains fragmented and regionally uneven, especially in developing economies facing structural and financial constraints.

3. The systematic review of scientific literature and best practice case studies in this study reinforces the critical role of evidence-based, interdisciplinary climate resilience strategies. The findings emphasize the necessity of preserving and restoring carbon sinks, reducing emissions through deep decarbonization, and enhancing climate modelling for predictive risk assessment. Furthermore, the complex interplay of environmental, economic, and social factors necessitates a multi-level governance approach, incorporating local, national, and international cooperation to ensure comprehensive and equitable climate adaptation policies.

4. Moving forward, achieving climate resilience will require accelerated policy implementation, robust financial investments in sustainable infrastructure, and the integration of real-time climate data into urban decision-making. Failure to act at the necessary scale and speed will exacerbate climate-driven risks, disproportionately affecting marginalized communities and widening socio-economic inequalities. Ultimately, climate resilience is not only an environmental imperative but also a fundamental determinant of global socio-economic stability and human well-being in the 21st century.

List of references

1. Berrang-Ford, L., Siders, A. R., Lesnikowski, A., Poutiainen, C., & Fischer, A. P. (2021). A systematic global stocktake of evidence on human adaptation to climate change. *Nature Climate Change*, 11(11), 989-1000. <https://doi.org/10.1038/s41558-021-01170-y>
2. Chow, W. T., & Roth, M. (2018). The impact of urban greenery on microclimates in Singapore. *Urban Climate*, 23, 35-50. <https://doi.org/10.1016/j.uclim.2017.05.008>
3. Dahl, K., Lerer, S. M., & Bertelsen, I. M. (2022). Copenhagen's approach to climate adaptation: Lessons from the Cloudburst Management Plan. *Climate Policy*, 22(2), 178-192. <https://doi.org/10.1080/14693062.2022.2035512>
4. Deltares. (2020). Resilient Rotterdam: Adapting to climate change. Online: <https://www.deltares.nl/en/projects/rotterdam-climate-proof/>
5. European Commission (2022), Zero Pollution Monitoring and Outlook Report. / 100 climate-neutral and smart cities by 2030: Info kit for cities. Online: https://ec.europa.eu/info/publications/100-climate-neutral-and-smart-cities-2030-info-kit-cities_en
6. European Environment Agency (2023), 8th Environment Action Programme: Premature deaths due to

- exposure to fine particulate matter in Europe
7. Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Gregor, L., Hauck, J., ... & Zaehle, S. (2022). Global carbon budget 2022. *Earth System Science Data*, 14(11), 4811-4900. Online: <https://doi.org/10.5194/essd-14-4811-2022>
 8. Grisanti, A. (2024). Cities in Motion: Sustainable urban transport solutions around the globe. Online: Cities in Motion: Sustainable urban transport solutions around the globe - ICLEI Sustainable Mobility
 9. Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., ... & Townshend, J. R. G. (2024). Global forest change 2000–2023. *Science Advances*, 10(4), eabg8463. Online: <https://doi.org/10.1126/sciadv.abg8463>
 10. Intergovernmental Panel on Climate Change (IPCC). (2023). Climate change 2023: Synthesis report Geneva, Switzerland: IPCC. Online: <https://www.ipcc.ch/report/ar6/syr/>
 11. Kabisch, N., Qureshi, S., & Haase, D. (2017). Urban nature for sustainable development: The role of green infrastructure in the 21st century. *Land Use Policy*, 69, 293–306. Online: <https://doi.org/10.1016/j.landusepol.2017.08.020>
 12. Kondo, M. C., Fluehr, J. M., McKeon, T., & Branas, C. C. (2018). Urban green space and its impact on human health. *International Journal of Environmental Research and Public Health*, 15(3), 445. Online: <https://doi.org/10.3390/ijerph15030445>
 13. Kuei, C. Y., Olesen, J. E., & Petersen, L. K. (2020). Copenhagen's Climate Neutrality Roadmap: A systemic approach. *Sustainability Science*, 15(3), 451-465. Online: <https://doi.org/10.1007/s11625-020-00786-1>
 14. LR Aplinkos ministerija. (2023). Europos žaliosios transformacijos iššūkiai ir galimybės. Online <https://am.lrv.lt/lt/naujienos/europos-zaliosios-transformacijos-issukiai-ir-galimybes/>
 15. LR Energetikos ministerija. (2022). Tauragėje patvirtinta klimato neutralumo strategija. Online: <https://enmin.lrv.lt/lt/naujienos/taurageje-patvirtinta-klimato-neutralumo-strategija>
 16. Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, 147, 38–49. Online: <https://doi.org/10.1016/j.landurbplan.2015.11.011>
 17. NASA Earth Observatory. (n.d.). Climate data and urban resilience. National Aeronautics and Space Administration. Online: <https://earthobservatory.nasa.gov/>
 18. Pelling, M., O'Brien, K., & Matyas, D. (2018). Adaptation and transformation. *Climate Change*, 7(1), 8–14. Online: <https://doi.org/10.1002/wcc.316>
 19. Ramanauskas, E., Bukantis, A., Dringelis, L., Kaveckis, G., & Jonkutė-Vilkė, G. (2024). Climate Change and Cities of Lithuania: Threats, Problems and Prerequisites for Solution. *Urban Science*, 8(4), 186. Online: <https://doi.org/10.3390/urbansci8040186>
 20. Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., & Roberts, D. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, 6, 131–137. Online: <https://doi.org/10.1038/nclimate2841>
 21. Short, J. R., & Farmer, A. (2021). Cities and Climate Change. *Earth*, 2(4), 1038-1045. Online: <https://doi.org/10.3390/earth2040061>
 22. Takeuchi, K., Tamura, K., & Tanaka, Y. (2019). Smart adaptation to climate change in urban flood risk management. *Sustainability Science*, 14(4), 1025–1037. Online: <https://doi.org/10.1007/s11625-018-0577-x>
 23. Torelló-Sentelles, H., et al. (2024). Soakings and the city: Urban areas found to intensify summer storms. *Earth's Future*. Online: <https://www.theguardian.com/news/2024/oct/03/soakings-and-the-city-urban-areas-found-to-intensify-summer-storms>
 24. Tyndall Centre for Climate Change Research. (n.d.). Urbanization and Climate Change. Online: Tyndall Centre for Climate Change Research
 25. Yoshino, H., & Nakagami, H. (2020). Energy-efficient building strategies in Japan: Lessons for global cities. *Building and Environment*, 180, 107040. Online: <https://doi.org/10.1016/j.buildenv.2020.107040>
 26. Zevenbergen, C., Veerbeek, W., Gersonius, B., & Van Herk, S. (2013). Challenges in urban flood management: Traveling across spatial and temporal scales. *Journal of Flood Risk Management*, 6(4), 238–247. Online: <https://doi.org/10.1111/jfr3.12020>

TVARŪS MIESTAI KLIMATO KAITOS KONTEKSTE: TAIKOMŲ INOVACIJŲ, POLITIKOS IR PRAKTIKOS ANALIZĖ

Santrauka

Spartėjant klimato kaitai, miestai sunkiai prisitaiko prie jos dėl pasenusios infrastruktūros ir lėto valdymo, todėl kyla dilema, vadinama „lėtas miestas, greita klimato kaita“. Šioje apžvalgoje nagrinėjami pagrindiniai atsparumo klimato kaitai kriterijai, pabrėžiant integruotą planavimą, žaliąją infrastruktūrą, išmaniąsias technologijas ir socialinį teisingumą. Pirmaujantys miestai, tokie kaip Roterdamas, Kopenhaga, Singapūras, Tokijas ir Niujorkas, demonstruoja geriausią praktiką, įskaitant adaptyvųjį vandens valdymą, anglies dioksido neutralumą, miesto karščio salos mažinimą, dirbtinio intelekto valdomą potvynių kontrolę ir teisingo atsparumo strategijas, tačiau ir Lietuvoje yra miestų, tokių kaip Tauragė, kurie taiko pažangią praktiką. Atvejų studijos suteikia realių įžvalgų apie sėkmingas prisitaikymo priemones ir sustiprina teorinių sistemų pritaikomumą. Pasirinkta metodika - sisteminė literatūros apžvalga ir gerosios praktikos analizė - užtikrina išsamią, įrodymais pagrįstą atsparumo klimato kaitai strategijų sintezę. Šis metodas didina tyrimo pagrįstumą, patikimumą ir aktualumą, nes pateikia praktiškai pritaikomų įžvalgų. Galiausiai, norint pasiekti atsparumą klimato kaitai, reikia ilgalaikio valdymo, gamta pagrįstų sprendimų ir duomenimis pagrįstų sprendimų priėmimo, kad miestai galėtų atlaikyti būsimus aplinkosaugos iššūkius.

Pagrindiniai žodžiai: klimatui neutrali urbanizacija, tvarūs miestai, poveikis aplinkai.

UTENOS RAJONO TURIZMO IŠTEKLIŲ VERTINIMAS LANKYTOJŲ POŽIŪRIU PATRAUKLUMO ASPEKTU

Doc. dr. Ramutė Narkūnienė, doc. dr. Jurgita Daubarienė, Jūratė Aksomitienė
Utenos kolegija

Anotacija

Straipsnyje autorės analizuoja Utenos rajono turizmo išteklių vertinimą lankytojų požiūriu pagal patrauklumą. Tyrimo tikslas – atlikti Utenos rajono turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu analizę. Tyrimo uždaviniai yra atlikti turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu analizę teoriniu požiūriu bei Utenos rajono turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu tyrimą. Straipsnyje aptariamas turistinių išteklių vertinimas lankytojų požiūriu pagal patrauklumą ir pristatomi tyrimo rezultatai.

Pagrindiniai žodžiai: turizmo išteklių vertinimas, patrauklumo aspektai, lankytojų požiūris, Utenos rajonas.

IVADAS

Daugeliui regionų ir savivaldybių turizmo plėtra suteikia galimybių atgaivinti ekonomiką, skatinti vietos verslumą ir dėl to padidinti biudžeto pajamas. Tačiau prieš sėkmingai siekiant tokių tikslų, būtina atidžiai apsvarstyti, kiek konkrečioje teritorijoje esančios sąlygos yra palankios turizmo plėtrai, įskaitant jos turizmo išteklius ir esamą išsivystymo lygį.

Temos aktualumas. Dauguma šiuolaikinių tyrimų rodo, kad egzistuoja ryšys tarp turizmo plėtros ir vietovės socialinio-kultūrinio bei istorinio potencialo, šių elementų patrauklumo. Didėjanti turizmo sektoriaus svarba regioninei, nacionalinei ir pasaulinei ekonomikai bei didėjanti konkurencija turizmo versle skatina nuolat tirti lankytojų (turistų) požiūrį į vietovių turizmo išteklius, siekiant išsiaiškinti jų patrauklumą ir poreikį tą patrauklumą didinti. Tokie tyrimai padeda spręsti turizmo išteklių bei lankytinų vietų plėtojimo kryptis. Svarbu nuolat stebėti rinkos pokyčius, reaguoti į pokyčius įvairiose su turizmu susijusiose veiklos srityse, siekiant sukurti naujus, vartotojams įdomius turizmo produktus, diegti naujus informavimo apie turizmo paslaugas būdus, kurti turistams patogią aptarnavimo sistemą.

Turizmo mokslinėje literatūroje nemažai dėmesio skiriama turizmo vietovės patrauklumo sąvokai (Havryliuk ir kt., 2021; Bernd ir Brunner-Sperdin, 2015; Ariya et al. 2017 ir kt.) bei teigiama, kad vietovės patrauklumas yra turizmo varomoji jėga, be kurios turizmas beveik neegzistuos. Kai kurie taip pat sutinka, kad kuo labiau vietovė gali patenkinti turistų poreikius, tuo didesnė tikimybė, kad vietovė bus pasirinkta pirmenybine prieš konkuruojančias vietas. (Vengesayi, Mavondo ir Reisinger, 2009; Krešić ir Prebežac, 2011; Formica ir Uysal, 2006; Bernd ir Brunner-Sperdin, 2017 ir kt.).

Šio tyrimo **mokslinė problema** formuluojama klausimu – kaip lankytojai (turistai) vertina Utenos rajono turizmo išteklius pagal jų patrauklumą? Turizmo vystymas verčia konkuruoti atskiras turistines vietas tarpusavyje, siekiant pritraukti didesnę lankytojų skaičių, todėl yra svarbu išsiaiškinti turizmo išteklių vertinimą lankytojų (turistų) požiūriu, o tuo pačiu ir turistinės vietovės patrauklumą formuojančius veiksnius.

Tyrimo objektas – Utenos rajono turizmo išteklių vertinimas lankytojų požiūriu patrauklumo aspektu.

Tyrimo tikslas – atlikti Utenos rajono turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu analizę.

Tyrimo uždaviniai:

1. Atlikti turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu analizę teoriniu požiūriu.

2. Atlikti Utenos rajono turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu tyrimą.

Tyrimo metodika. Straipsnyje naudoti mokslinės literatūros šaltinių analizė, kiekybinis tyrimas – anketinės apklausos metodas bei duomenų apibendrinimas.

Tyrimo imtis. Imties dydis tyrimui apskaičiuotas pagal Paniotto formulę. Apklausoje dalyvavo 209 respondentai (pagal formulę pakankamas dydis tyrimo imties reprezentatyvumui užtikrinti yra 204 respondentai). Anketa buvo apdorota Excel programos pagalba.

Straipsnyje aptariami turistinių išteklių vertinimo lankytojų požiūriu patrauklumo aspektai ir pristatomi tyrimo rezultatai.

1. TURIZMO VIETОВIŲ PATRAUKLUMO SAMPRATA IR PATRAUKLUMĄ FORMUOJANTYS VEIKSNIAI

Vietovės patrauklumas turistams yra vienas svarbiausių veiksnių, pasirenkant ir planuojant kelionės maršrutą. Turistinės vietovės yra skirtingos, unikalios, todėl turistai jas vertina skirtingai. Norint įvertinti tam tikros *turistinės vietovės patrauklumą*, būtina išsiaiškinti *turistinės vietovės patrauklumo* sąvoką, nustatant ir apibūdinant veiksnius, kurie lemia jos patrauklumą.

Mokslinėje literatūroje galima sutikti tokią sąvoką kaip turistinės vietovės patrauklumas, kuris susideda iš turistinės vietovės ir patrauklumo sąvokų. Turistinė vietovė yra fizinė erdvė, kurioje lankytojai praleidžia tam tikrą laiką. Joje yra turizmo produktai – paslaugos ir pramogos bei turistiniai ištekliai būtini vienos paros kelionei. Ji turi fizines ir administracines ribas, nustatančias valdymą ir vadybą, jai būdingas įvaizdis, nulemiantis jos konkurencingumą rinkoje. Vietinės turistinės vietovės apjungia įvairius suinteresuotus veikėjus, dažnai ir vietinę bendruomenę, ir gali būti turizmo centru ar didesnės turistinės vietovės tinklo dalimi. Tai konkurencingas atvykstamojo turizmo elementas, kuris turi veikti kaip strateginis verslo vienetas. (Andrulienė ir kt., 2011).

Anot Bernd ir Brunner-Sperdin (2015) turistinės vietovės sudaro specifiniai fiziniai, gamtiniai ir kultūriniai ištekliai, kurie yra unikalūs, išskirtiniai ir nepakeičiami. Šiuo metu turistinė vietovė (pvz., miestas, regionas ar vietovė) dažnai suvokiama nebe kaip atskirų gamtinių, kultūrinių, meninių ar aplinkos išteklių visuma, o kaip bendras patrauklus produktas, kurį galima įsigyti tam tikroje vietovėje: sudėtingas ir integruotas turistinės vietovės siūlomų paslaugų rinkinys, kuris suteikia turistų poreikius atitinkančią atostogų patirtį. Turistinė vietovė sukuria sudėtinį turizmo paslaugų paketą, pagrįstą vietiniu pasiūlos potencialu. (Bernd ir Brunner-Sperdin, 2015).

Žodis „patrauklumas“ kilęs iš lotynų kalbos veiksmazodžio „atrathere“, reiškiančio trauką. (Ariya et al. 2017). Kaip teigia Havryliuk et al. (2021), *patrauklumo* sąvoką galima apibrėžti kaip savybę kelti susižavėjimą ir pritraukti ypatingas savybes ir bruožus. Patrauklumo sąvoka apibrėžia tokias svarbias turizmo išteklių savybes kaip jų rekreacinė vertė. Patrauklumas yra jėga, kuri pritraukia turistus dėl „visų tam tikroje vietoje tam tikru metu esančių atrakcijų“ (Formica, Uysal, 2006: 419). Anot Ariya et al. (2017), patrauklumas dažnai apibrėžiamas atsižvelgiant į konkrečios turizmo vietovės ypatybes ar savybes. Pavyzdžiui, turistinės vietovės patrauklumas gali būti vertinamas tiriant esamų turistinės vietovės išteklių ir atrakcijų inventorių arba turistų suvokimą apie turistinės vietovės išteklius ir atrakcijas. Taigi galima teigti, kad jeigu norima, kad tam tikra turizmo vietovė būtų laikoma turizmo traukos objektu, ji būtinai turi turėti savybių, kurios būtų įdomios ir patrauklios potencialiems turistams.

Turistinės vietovės patrauklumą nulemia gamtiniai ištekliai ir jų potencialas, kraštovaizdis, hidrologinės vertybės, klimatas. (Vukoičić et al., 2023). Teritorijos turistinį patrauklumą formuoja gamtinių, istorinių ir kultūrinių turizmo išteklių derinys, jį lemia lankytinų objektų (istorijos ir kultūros paminklų, gamtos paveldo ir kt.) buvimas, išvystyta turizmo infrastruktūra (viešbučių

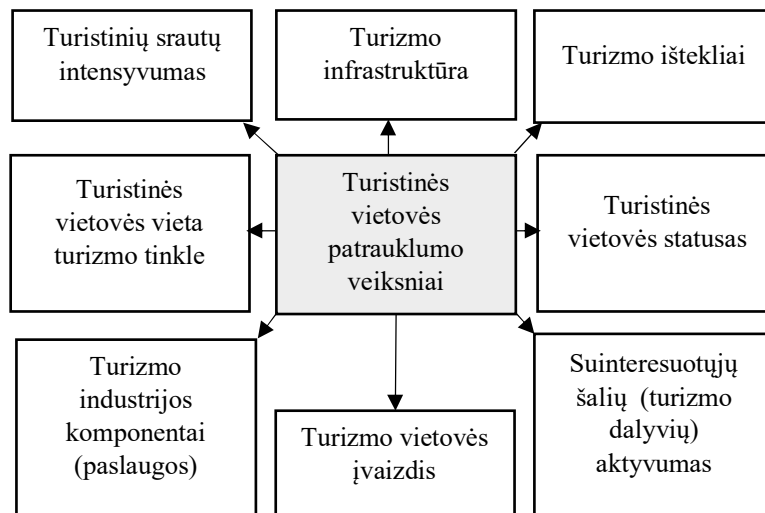
sektoriaus įmonės, restoranai, transportas, pažintinės paslaugos, informacinės paslaugos ir t. t.), saugumo ir teisėtvarkos lygis, visuomenės tendencijos (tam tikros poilsio rūšies mada) ir panašiai (Havryliuk ir kt., 2021). Turistinės vietovės patrauklumas priklauso nuo turizmo išteklių gausos ir ypatumų, tačiau daugelis autorių įvardija ne tik išteklius, kaip aspektus svarbius vietovės patrauklumui. Pavyzdžiui, Cooper ir Hall (2008) išskiria keturis pagrindinius aspektus, kurie lemia vietovės patrauklumą turistams: 1) Ištekliai - gaminiai ir kultūriniai ištekliai, kurie pritraukia ir motyvuoja turistus lankytis konkrečiose vietovėse; 2) Prieinamumas - tai apgyvendinimo bei kitos paslaugos ir žmogiškieji ištekliai, leidžiantys turistams apsistoti konkrečioje vietovėje; 3) Infrastruktūra pagerina vietovės prieinamumą ir pagerina bendrą turistų patirtį, lankant įvairias vietas ir paslaugas; 4) Informacija, nes turistams būtina informacija apie vietovę ir jos išteklius. Turizmo plėtros potencialą tam tikroje teritorijoje lemia jos gamtiniai, kultūriniai ir socialiniai ištekliai - klimato sąlygos, vandens telkiniai, miškai, architektūros, istorijos ir kultūros paminklai, etnografiniai, religiniai ir kiti turizmo paslaugoms naudojami objektai. Konkrečios teritorijos patrauklumas turistams vertinamas pagal šių išteklių kiekį, būklę.

Formica ir Uysal (2006), nagrinėdami turistinės vietovės patrauklumą pagal pasiūlos ir paklausos rodiklius, pripažįsta, kad bendras turistinės vietovės turizmo patrauklumas priklauso nuo esamų lankytinų objektų prieinamumo ir jų suvokiamos svarbos santykio. Jie nustatė, kad turistų traukos objektų pasiūlos kintamieji yra šie: turizmo paslaugos ir objektai, maitinimo ir gėrimų teikimo vietos, mažmeninė prekyba, suvenyrų įmonės, kelionių agentūros, viešbučių ir motelių kambariai, golfo aikštynai, kultūriniai / istoriniai, istoriniai pastatai, muziejai, istoriniai rajonai, pilietinio karo vietos, festivaliai, vyno daryklos, kaimo apgyvendinimo vietos, stovyklavietės, nameliai / nameliai, nakvynės ir pusryčių vietos, poilsinių transporto priemonių parkai, poilsis gamtoje, jodinėjimas žirgais, kriokliai, žygiai pėsčiomis ir dviračiais. Kai turistai lanko vietos įmones, jie susiduria su pagrindiniais turizmo elementais, tokiais kaip gamtinės, socialinės ir kultūrinės bei žmogaus sukurtos lankytinos vietos, kurios dažnai yra pagrindinės turistų kelionės priežastys. Šie elementai kartu sukuria galutinę turizmo patirtį ir gali būti nagrinėjami tuo pačiu metu tame pačiame kontekste. Italijoje apsilankiusių turistų apklausos parodė, kad šalies ir atskirų jos regionų turistinio patrauklumo vertinimui didelę įtaką daro: 1) atstumas iki turistinės vietovės; 2) laikas; 3) kelionės kaina; 4) kelionės tikslas; 5) vietovės reputacija tarp keliautojų ir kelionių organizatorių; 6) saugumas; 7) kultūra (Labanauskaitė, 2020).

Mokslinėje literatūroje sutinkamas ir kitas požiūris į turistinės vietovės patrauklumą. Šiuo požiūriu, sutelkiamas dėmesys ne į paskirties vietą o į turistą, todėl galima sakyti, kad tai patrauklumo vertinimas „pagrįstas paklausa“ (Formica ir Uysal, 2006). Pagal šį požiūrį patrauklumas priklauso nuo turisto suvokimo, kad vietovė gali patenkinti jo poreikius ir suteikti asmeninės naudos. Dėl šio daugialypiškumo kyla nemažas iššūkis suderinti turizmo išteklius ir lankytinas vietas su turistų motyvais ir pageidavimais (Ariya et al., 2017).

Bernd ir Brunner-Sperdin (2017) teigia, kad turistinės vietovės patrauklumas gali būti vertinamas atsižvelgiant į turistų jausmus ir nuomonę apie turistinės vietovės gebėjimą patenkinti jų poreikius. Vietovės patrauklumas turistine prasme negali būti abstraktus, jis kyla iš turistinės vietovės patrauklumo požymių (kiek ji yra rekreacinė, įdomi, estetiška, garsi). Vengesayi et al. (2009) mano, kad kelionės vietos patrauklumas yra jausmai, įsitikinimai ir nuomonės, kurias asmuo turi apie suvokiamą vietovės gebėjimą patenkinti jo specialius atostogų poreikius.

Lietuvos turizmo potencialo įvertinimo, nustatant didžiausias turizmo traukos vietas ir jų panaudojimo prioritetus, studijoje (Andrulienė ir kt., 2011) įvardinta, kad turizmo vietovės (regiono) turistinio patrauklumo struktūrą sudaro: turizmo ištekliai (gamtiniai, kultūriniai, socialiniai / žmogiškieji) ir infrastruktūra; turizmo industrijos komponentai (apgyvendinimo, maitinimo, transporto, pramogų, informacijos, vadybos, kelionių, mokymo paslaugos); turistų srantai; vietovės statusas (kurortas, UNESCO pasaulio paveldo vietovė ir kt.); turizmo vietovės įvaizdis; turizmo dalyvių veikla; turizmo vietovės vieta turizmo tinkle. 1 paveiksle parodyta turizmo vietovės patrauklumo veiksmų struktūra (1 paveikslas).



1 pav. *Turizmo vietovės patrauklumo veiksnių struktūra*

Šaltinis: sudaryta autorių pagal Andrulienė ir kt., 2011

Ariya et al. (2017) apibrėžia kelionės tikslo patrauklumo sąvoką kaip santykinės individualios naudos, svarbos ir suvokiamo kelionės tikslo gebėjimo suteikti individualią naudą derinį. Šį gebėjimą didina konkrečios paskirties vietos savybės, kurios daro ją patrauklią, pavyzdžiui, lankytinos vietos, infrastruktūra ar paslaugos ir šias paslaugas teikiantys žmonės. Vietovės patrauklumas – tai turistų įsitikinimų, idėjų ir išpūdžių apie ypatybes ar savybes, kurias turistai turi apie vietovę, visuma. Taigi turizmo vietovės patrauklumas suvokiamas kaip turizmo objektų ir paslaugų visuma bei lankytojų nuomonė apie turistinės vietovės gebėjimą patenkinti jų poreikius ar tikslus. Šios savybės padeda turistams įvertinti vietovės patrauklumą ir ją pasirinkti. Kuo labiau vietovė geba patenkinti lankytojų poreikius, tuo labiau ji suvokiama kaip patraukli ir tuo didesnė tikimybė, kad ji bus pasirinkta kaip galutinė paskirties vieta. Kartu reikėtų pažymėti, kad turizmo patrauklumas yra kintamas reiškinys, kuris gali kisti priklausomai nuo įvairių ekonominių, socialinių, gamtinių ir kitų rūšių veiksnių poveikio. Krešić ir Prebežac (2011) pažymi, kad turizmo patrauklumo lygis nustatomas pamatuojant patrauklumą kiekvienam asmeniui atskirai (individuali nuomonė) ir sujungiant šias vertes į vieną rodiklį. Dėl to, kiekvieno asmens nuomonė prisideda prie bendro turistinės vietovės ar regiono turistinio patrauklumo. Kitaip tariant, turizmo charakteristikas, kurias turistai suvokia kaip svarbiausias (arba įdomiausias) ir kurios sukelia stipriausius ir teigiamiausius turistų jausmus, galima apibrėžti kaip svarbiausius turizmo patrauklumo formavimo komponentus. Šis metodas yra labai naudingas nustatant atskirų istorinių ir kultūrinių, gamtinių objektų ar jų grupių patrauklumą, siekiant nustatyti pagrindinius veiksnius, sukeliančius turistų norą keliauti tam tikra kryptimi. Taip galima analizuoti patrauklumo struktūrą ir nustatyti santykinę įvairių vietovės elementų svarbą bendram patrauklumui.

Tačiau turizmo išteklių patrauklumo vertinimas yra labai sudėtingas objektyvumo požiūriu, nes objekto patrauklumo suvokimas priklauso nuo daugelio veiksnių, kurių daugelis yra labai subjektyvūs. Žmonės turizmo išteklius vertina tiek sąmoningai, tiek pasąmoningai lygmeniu, sukeldami tam tikrus įsimintinus modelius, susijusius su ankstesne patirtimi ar pageidavimais. Tačiau suvokiamas tam tikros vietovės turizmo išteklių patrauklumas yra labai svarbus, nes jis daro didelę įtaką sprendimams, susijusiems su turizmu ir poilsiu. Nors patrauklumo vertinimai visada bus subjektyvūs, vis dėlto paprastai manoma, kad tam tikros grupės panašiai suvokia ir patiria tam tikrus aplinkos tipus. Todėl siekdami įvertinti konkrečių turizmo išteklių patrauklumą, galima stengtis nustatyti tam tikras gana universalias estetiškas kategorijas, padedančias susidaryti patrauklumo išpūdį: tai gali būti „taisyklingumas, simetrija, proporcijos ir pusiausvyra“ arba „harmonija, tvarumas, unikalumas, gilumas, ramybė ir didingumas“. (Ziarnicka-Wojtaszek, Malec, 2022). Berar-

di (2002) pabrėžia, kad turistiniam patrauklumui vertinti svarbios yra turistų asmeninės savybės: amžius, išsilavinimas, finansinė padėtis, priklausymas tam tikram socialiniam sluoksniui, profesija ir einamos pareigos. Taigi nors kiekvieno žmogaus nuomonė apie turizmo išteklius yra subjektyvi, apklausus daug įvairių žmonių ir sujungus jų atsakymus, galima gauti bendrą vaizdą, kuris jau bus artimesnis objektyviam vertinimui.

Turistinės vietovės patrauklumas yra daugiafaktoris reiškinys, kurį lemia įvairūs tarpusavyje susiję elementai. Šie elementai gali būti suskirstyti į kelias pagrindines kategorijas: natūralūs ir kultūriniai ištekliai, infrastruktūra, turizmo paslaugos, vietovės įvaizdis, saugos jausmas, kaina, prieinamumas. Vertinant turistinės vietovės patrauklumą, svarbu atsižvelgti į tiek objektyvius, tiek subjektyvius veiksnius. Objektyvūs veiksniai gali būti išmatuojami (pvz., infrastruktūros lygis, atstumas iki didžiųjų miestų), o subjektyvūs – susiję su turistų asmeninėmis nuomonėmis ir preferencijomis (pvz., patirtos emocijos, kultūrinis artumas). Turistinės vietovės patrauklumas nėra statinis, o dinamiškas reiškinys. Jis nuolat kinta, veikiamas įvairių veiksnių, tokių kaip technologijos, konkurencija, aplinkos pokyčiai. Norint sėkmingai vystyti turizmą, svarbu nuolat vertinti ir analizuoti turistinės vietovės patrauklumą. Tai leidžia identifikuoti stipriąsias ir silpnąsias puses, nustatyti tobulėjimo kryptis ir priimti pagrįstus sprendimus.

Tyrimo metodologija.

Tyrimo tikslas: atlikti Utenos rajono turizmo išteklių vertinimo lankytojų požiūriu patrauklumo aspektu tyrimo analizę.

Tyrimo imtis. Anketinės apklausos respondentai – Utenos rajono gyventojai arba atvykę iš kito miesto. Apklausa vykdyta 2024 m. spalio – lapkričio mėnesiais. Iš viso apklausti 209 respondentai. Remiantis Lietuvos statistikos departamento duomenimis, 2023 m. Utenos rajone buvo 37 555 tūkst. gyventojų. Tyrimo imtį galima apskaičiuoti pagal Paniotto formulę: $n=1/(\Delta^2+1/N)$, kai: n – imties dydis; Δ – leistina paklaida; N – populiacijos dydis. Tyrimo imtis apskaičiuota pagal Paniotto formulę. Pagal Paniotto formulę pakankamas dydis tyrimo imties reprezentatyvumui užtikrinti $n = 204$.

Tyrimo metodika ir instrumentas. Tyrimui atlikti pasirinktas kiekybinis metodas – anketinė apklausa. Buvo sudarytas klausimynas, kurį sudarė 21 klausimas. Klausimyno įvadinėje dalyje buvo pristatytas tyrimo tikslas, nurodyta, kokiam tikslui bus naudojami surinkti duomenys bei užtikrintas anonimiškumas. Sudarant anketą, buvo naudojamos klausimų grupės/ blokai: vienas klausimų blokas susijęs su apsilankymo Utenos rajone tikslais ir dažniu, kitas blokas susijęs su Utenos rajono gamtinių ir kultūrinių išteklių bei istorinių objektų vertinimu, dar vienas klausimų blokas susijęs su lankomų turizmo objektų patrauklumu bei patrauklumą įgalinančiais veiksniais bei demografinių klausimų bloku. Kiekybinio tyrimo dalyvių anketų rezultatų apdorojimas ir analizė vykdyta Excel programiniu paketu.

Tyrimo etika. Platinant anketas, laikytasi etikos principų (privatumo, konfidencialumo, laisvoriško apsisprendimo ir pan.) Kiekvienas respondentas galėjo laisvai rinktis, ar dalyvauti tyrime. Duomenys naudojami apibendrinti, išsaugant respondentų anonimiškumą.

2.UTENOS RAJONO TURIZMO IŠTEKLIŲ VERTINIMO LANKYTOJŲ POŽIŪRIU PATRAUKLUMO ASPEKTU TYRIMAS

Respondentų demografinės ir socialinės charakteristikos. Anketinėje apklausoje dalyvavo 209 respondentai, iš jų 13 proc. vyrų ir 87 proc. moterų. Keturi iš dešimties respondentų (41 proc.) priklauso 18 - 25 m. amžiaus grupei, 9 proc. respondentų priklauso 26 - 35 m. amžiaus grupei, 11 proc. respondentų priklauso 36 - 45 m. amžiaus grupei, 17 proc. respondentų priklauso 46 - 55 m. amžiaus grupei, 13 proc. respondentų priklauso 56 - 65 m. amžiaus grupei ir 7 proc. respondentų priklauso daugiau kaip 65 m. amžiaus grupei. Nemaža dalis respondentų (37 proc.) yra įgiję aukštąjį universitetinį išsilavinimą, 17 proc. - aukštąjį neuniversitetinį išsilavinimą, 21 proc. respondentų turi vidurinį išsilavinimą, 17 proc. respondentų turi pagrindinį išsilavinimą ir 9 proc. respondentų

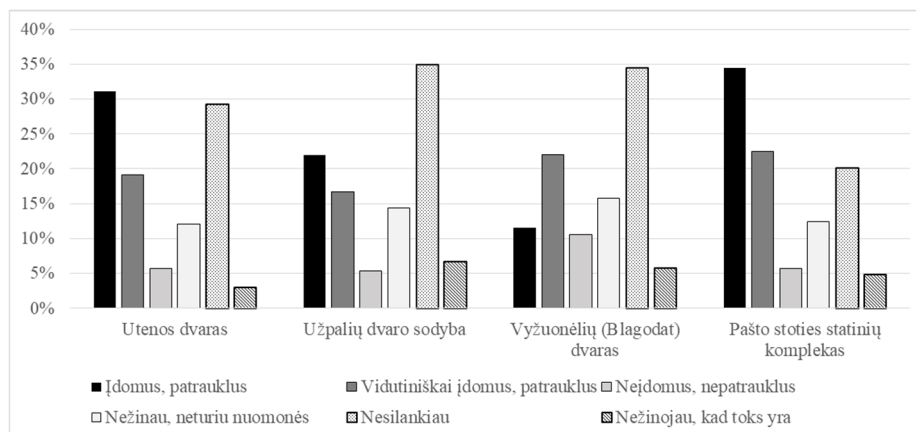
yra įgiję profesinį išsilavinimą. Didžioji dauguma (82 proc.) respondentų gyvena Utenos apskrityje, 18 proc. respondentų yra atvykę iš kitos apskrities (Vilniaus apskritis, Kauno apskritis, Panevėžio apskritis ir kt.). 23 proc. atsakiusių į anketos klausimus respondentų yra moksleiviai, atitinkamai po 21 proc. yra studentai ir samdomi darbuotojai, 13 proc. respondentų yra tarnautojai, 9 proc. – senjorai, 6 proc. respondentų įvardija save kaip verslininkus, atitinkamai po 2 proc. respondentų yra namų šeimininkės (-ai) ir valdininkai, 2 proc. respondentų pasirinko atsakymą „kita“.

Į klausimą, su kuo labiausiai asocijuojasi Utenos rajonas, gauti tokie respondentų atsakymai: trys respondentai iš dešimties (28 proc.) Utenos miestą traktuoja kaip 5 min miestą (viskas arti, lengvai pasiekama), 25 proc. respondentų Utenos rajonas asocijuojasi su ežerų kraštu, 22 proc. respondentų kyla asociacijos su labai gražia gamta, žaliu miestu, 10 proc. respondentų – su stipria pramone ir kokybiškais prekiniais ženklais, 6 proc. respondentų – su kokybiškais renginiais, pramogomis, 5 proc. respondentų – su kaimo turizmu/poilsiu kaime, 1 proc. respondentų kyla asociacijos su sportu ir sveikatingumu. 3 proc. respondentų pasirinko atsakymą „kita“ (su Utenos kolegija, studijomis, įmone „Švyturys - Utenos alus“, vaikystės prisiminimais, automobilių turgumi, LKL krepšinio klubu, gimtuoju kraštu ir kt.). *Apibendrinant respondentų atsakymus, prieinama išvados, kad Utenos rajonas respondentams labiausiai asocijuojasi su gamtiniais ištekliais: su ežerų kraštu, labai gražia gamta, žaliu miestu, o Utenos miestas traktuojamas kaip 5 minučių miestas (viskas arti, lengvai pasiekama).*

Respondentai kaip patraukliausius gamtinius išteklius Utenos rajone įvardija Dauniškio parką (50,2 proc. respondentų), Triušiuų slėnį (48,3 proc. respondentų), Alaušo ežero pakrantę (47,4 proc. respondentų), Tauragno ežero pakrantę (43,5 proc. respondentų), Šeimyniškių atodangą ir konglomerato uolą (35, proc. respondentų), Krokulės šaltinį (32,5 proc. respondentų) ir kt.

Respondentai vertino ir Utenos rajono kultūros objektus. *Apibendrinant respondentų atsakymus, įdomiausi ir patraukliausi kultūros objektai yra šie: Utenio aikštės stiklo galerija, Vytauto Vailiušio keramikos muziejus ir meno centras, Utenos kraštotyros muziejus, Vestuvių kalnelis, Utenos kultūros centro galerijos ir Taurapilio piliakalnis. Pastebėtina, kad daugelio išvardintų kultūros objektų respondentai nėra lankę ar net nežino, kad tokie yra. Apie 40 proc. visų apklaustųjų nėra buvę Raganų muziejuje Pačkėnuose, Vaizduotės parke, Prieškario ūkininko sodybos ekspozicijoje, Tomo Kleinio Aukštaitijos regiono sendaikčių muziejuje, Odetos galerijoje Vaikutėnuose. Vaizduotės parkas, Prieškario ūkininko sodybos ekspozicija, Tomo Kleinio Aukštaitijos regiono sendaikčių muziejus yra mažiausiai žinomi kultūros objektai Utenos rajone.*

Respondentai vertino ir Utenos rajono istorinius bei kultūrinius objektus (žr. 2 pav.). *Įdomiausi ir patraukliausi Utenos rajono istoriniai, kultūriniai objektai respondentų nuomone, yra Pašto stoties statinių kompleksas ir Utenos dvaras. Užpalių dvaro sodyba ir Vyžuonėlių (Blagodat) dvaras yra vidutiniškai įdomūs ir patrauklūs. Utenos rajono istoriniai, kultūriniai objektai yra žinomi respondentų, nes vos keletas procentų (3 –7 proc.) apklaustųjų šių objektų nežinojo. Vidutiniškai 35 proc. apklaustųjų nesilankė šiuose objektuose. Lankomiausias yra Pašto stoties statinių kompleksas – jame lankėsi 75 proc. visų apklaustųjų.*



2 pav. Utenos rajono istorinių, kultūrinių objektų vertinimas, proc.

Šaltinis: sudaryta autorių pagal tyrimo rezultatus

Respondentai vertino Utenos rajono turizmo išteklių bendrą patrauklumą vertinimo skalėje nuo 1 iki 5, kur 1 – labai blogai, 5 – labai gerai. Tyrimas parodė, kad Utenos rajono turizmo išteklius respondentai vertina vidutiniškai – 3,4 balo iš 5. Geriausiai yra vertinami gamtiniai turizmo ištekliai: 26 proc. apklaustųjų juos vertina labai gerai, 36 proc. – gerai; bendras balas – 3,8 iš 5 (1 lentelė).

1 lentelė. Utenos rajono turizmo išteklių patrauklumo vertinimas, balais

Ištekliai	1 (labai blogai)	2 (blogai)	3 (vidutiniškai)	4 (gerai)	5 (labai gerai)	Vidutinis balas
Gamtinių išteklių patrauklumas	2.4	2.9	33	35.9	25.9	3.8
Kultūrinių išteklių patrauklumas	1.9	11.5	41.1	33	12.4	3.4
Istorinių, architektūrinių išteklių patrauklumas	3.8	13.9	41.1	28.2	12.9	3.3
Bendras rajono turistinis patrauklumas	4.3	10.5	39.7	30.60	14.80	3.4

Šaltinis: sudaryta autorių pagal tyrimo rezultatus

Utenos rajonas, kaip turistinė vietovė, asocijuojasi su tokiomis turizmo paslaugų vertę formuojančiomis savybėmis, kaip *lietuviškas, ramus, natūralus, švarus, saugus*. Graži ir prižiūrėta aplinka, sutvarkyta infrastruktūra, patogus privažiavimas, teikiamų paslaugų kokybė, pritaikymas įvairaus amžiaus lankytojams – yra svarbiausi veiksniai, nulemiantys lankomų turizmo objektų patrauklumą. Dauguma respondentų patraukliu kultūros objektu įvardijo bei aplankyti kitiems siūlo Utenos dvarą, Pašto stoties statinių kompleksą, Vytauto Valiušio keramikos muziejų, iš gamtinių objektų – Dauniškio parką, Tauragno ežerą ir poilsiavietę.

Buvo siekiama išsiaiškinti veiksnius, nulemiančius lankomų turizmo objektų patrauklumą. Gauti atsakymai pateikti 2 lentelėje. Graži ir prižiūrėta aplinka, sutvarkyta infrastruktūra, patogus privažiavimas, teikiamų paslaugų kokybė, objekto pritaikymas įvairaus amžiaus lankytojams – yra svarbiausi veiksniai, nulemiantys lankomų turizmo objektų patrauklumą (2 lentelė). Mažiausiai svarbu, kad objektas būtų nuolat atnaujinamas.

2 lentelė. Veiksniai, nulemiantys lankomų turizmo objektų patrauklumą, proc.

Veiksniai	Sutinku	Iš dalies sutinku	Neis sutinku, nei nesutinku	Labiau nesutinku	Nesutinku
Gražus objektas	62.2	24.9	10	1.4	1.4
Graži ir prižiūrėta aplinka	71.8	20.1	6.2	1	1
Sutvarkyta infrastruktūra	71.8	15.3	10.5	1.4	1
Patogus privažiavimas	69.9	18.2	10	1.4	0.5
Įdomus, interaktyvus objektas	62.2	17.7	17.2	1.4	1.9
Nuolat atnaujinamas objektas	48.3	30.1	16.3	3.3	1.9
Pritaikytas įvairaus amžiaus lankytojams	64.6	21.1	11.5	1.9	1
Teikiamų paslaugų įvairovė	62.2	20.1	13.9	2.4	1.4
Teikiamų paslaugų kokybė	67.9	16.7	11.5	2.4	1.4

Šaltinis: sudaryta autorių pagal tyrimo rezultatus

Respondentų buvo paklausta, kas galėtų pagerinti rajono turistinį patrauklumą. Respondentų nuomone, turistinį patrauklumą padidintų didesnis informacijos srautas, daugiau maitinimo vietų, daugiau aktyvių pramogų, renginių, tokių kaip spektakliai, koncertai ir pan. bei didesnis turistinių paslaugų spektras ir pasiūla. Taip pat dalis apklaustųjų pastebėjo, kad didesnis kiekis pramogų ir turizmo paslaugų, skirtų vaikams ir paaugliams pagerintų Utenos rajono turizmo infrastruktūrą ir lankomumą. Dalis respondentų atsakė, kad objektų atnaujinimas, infrastruktūros sutvarkymas ir jų priežiūra taip pat prisidėtų prie turizmo paslaugų rinkos plėtros. Galima teigti, kad respondentai, kurie išskyrė problemas Utenos turizmo paslaugų rinkoje, tų problemų panaikinimą.

IŠVADOS

1. Turistinės vietovės patrauklumas yra daugiafaktoris reiškinys, kurį lemia įvairūs tarpusavyje susiję elementai. Šie elementai gali būti suskirstyti į kelias pagrindines kategorijas: natūralūs ir kultūriniai ištekliai, infrastruktūra, turizmo paslaugos, vietovės įvaizdis, saugos jausmas, kaina, prieinamumas. Vertinant turistinės vietovės patrauklumą, svarbu atsižvelgti į tiek objektyvius, tiek subjektyvius veiksnius. Siekiant sėkmingai vystyti turizmą, svarbu nuolat vertinti ir analizuoti turistinės vietovės patrauklumą. Tai leidžia identifikuoti stipriąsias ir silpnąsias puses, nustatyti tobulėjimo kryptis ir priimti pagrįstus sprendimus.

2. Utenos rajone kaip patraukliausi gamtiniai ištekliai įvardijami Dauniškio parkas, Triušiuų slėnis, Alaušo ežero pakrantė, Tauragno ežero pakrantė, Šeimyniškių atodanga ir konglomerato uola bei Krokulės šaltinis Užpaliuose ir kt. Įdomiausi ir patraukliausi kultūros objektai yra Utenio aikštės stiklo galerija, VytautoValiušio keramikos muziejus ir meno centras, Utenos kraštotyros muziejus, Vestuvių kalnelis, Utenos kultūros centro galerijos ir Taurapilio piliakalnis. Lankomiausi Utenos rajono kultūros objektai yra Vestuvių kalnelis, Utenos kultūros centro galerijos, Utenos aikštės stiklo galerijos, Utenos kraštotyros muziejus, Narkūnų piliakalnis, Angelų skveras Utenoje. Įdomiausi ir patraukliausi Utenos rajono istoriniai, kultūriniai objektai yra Pašto stoties statinių kompleksas ir Utenos dvaras. Lankomiausias – Pašto stoties statinių kompleksas. Utenos rajono turizmo išteklių patrauklumas yra vertinamas vidutiniškai – 3,4 balo iš 5. Geriausiai yra vertinami gamtiniai turizmo ištekliai – 3,8 balai. Utenos rajonas, kaip turistinė vietovė, asocijuojasi su tokiais turizmo paslaugų vertę formuojančiomis savybėmis, kaip lietuviškas, ramus, natūralus, švarus, saugus. Graži ir prižiūrėta aplinka, sutvarkyta infrastruktūra, patogus privažiavimas, teikiamų paslaugų kokybė, objekto pritaikymas įvairaus amžiaus lankytojams – yra svarbiausi veiksniai, nulemiantys lankomų turizmo objektų patrauklumą). Turistinį patrauklumą padidintų didesnis informacijos srautas, daugiau maitinimo vietų, daugiau aktyvių pramogų, renginių, tokių kaip spektakliai, koncertai ir pan. bei didesnis turistinių paslaugų spektras ir pasiūla. Taip pat didesnis kiekis pramogų ir turizmo paslaugų, skirtų vaikams ir paaugliams pagerintų Utenos rajono turizmo infrastruktūrą ir lankomumą.

Literatūra

1. Andrulienė, R., Armaitienė, A., Povilanskas, R., Janulienė, R., & Dulskis, D. (2011). *Study of Lithuanian Tourism Potential Assessment in Determining the Maximum Tourist Attraction Areas and Priorities for Their Uses*. Vilnius.
2. Ariya G., Wishitemi B., Sitati N. (2017). Tourism Destination Attractiveness as Perceived by Tourists Visiting Lake Nakuru National Park, Kenya. *International Journal of Research in Tourism and Hospitality (IJRTH)*, 3 (4), 1-13.
3. Berardi, S. (2002). *Development of tourism*. Milano.
4. Bernd, F. R., & Brunner-Sperdin, A. (2015). Tourist destination perception and well-being: What makes a destination attractive? *Journal of Vacation Marketing*, 23(1), 55–72.
5. Cooper C., Hall M.C. (2008). *Contemporary tourism: an international approach*. USA.
6. Formica, S., & Uysal, M. (2006). Destination attractiveness based on supply and demand evaluations: An analytic framework. *Journal of Travel Research*, 44, 418–430.
7. Havryliuk, S., Melko, L., Uvarova, G., Karyuk, V., & Mihus, I. (2021). Implementation of the model of

- innovative tourist product in Ukraine: financial and economic aspects. *Financial and Credit Activity Problems of Theory and Practice*, 1(36), 219–232.
8. Krešić, D., & Prebežac, D. (2011). Index of destination attractiveness as a tool for destination attractiveness assessment. *Tourism: An International Interdisciplinary Journal*, 59(4), 497–517.
 9. Labanauskaitė, D. (2020). *International Tourism Development and Economic Evaluation*. Monograph. Klaipėda: Klaipėda University Publishing House.
 10. Vengesai, S., Mavondo, F. T., & Reisinger, Y. (2009). Tourism destination attractiveness: attractions, facilities, and people as predictors. *Tourism Analysis*, 14, 621–636.
 11. Vukoičić, D., Ristić, D., Milinčić, U., Petrović, D., Mihajlović, L., Božović, S., & Protić, B. (2023). Assessment of the attractiveness of natural resources and landscapes of the Kopaonik National Park (Serbia): Framework and importance for tourism development. *Polish Journal of Environmental Studies*, 32(1), 281–295.
 12. Ziernicka-Wojtaszek, A., & Malec, M. (2022). Evaluating local attractiveness for tourism and recreation—A case study of the communes in Brzeski County, Poland. *Land*, 11(1), 39.

EVALUATION OF UTENA DISTRICT TOURIST RESOURCES FROM THE POINT OF VIEW OF VISITORS IN TERMS OF ATTRACTIVENESS

Summary

In the article the authors analyse the attractiveness aspects of the evaluation of the tourist resources of the Utena district from the visitors' point of view. The aim of the research is to carry out an evaluation of the tourist resources in the Utena district from the point of view of the visitors in terms of attractiveness. The research tasks are to conduct an analysis of the evaluation of the tourist resources in the Utena district from the visitors' point of view in terms of attractiveness from a theoretical perspective and to conduct a study of the evaluation of the tourist resources in the Utena district from the visitors' point of view in terms of attractiveness. The article discusses the attractiveness aspects of the assessment of tourism resources from the visitors' point of view and presents the results of the study. It can be concluded that Utena district, as a tourist destination, is associated with such characteristics that determine the value of tourism services as Lithuanian, quiet, natural, clean, safe. Beautiful and well-kept environment, well-kept infrastructure, convenient access, quality of provided services, adaptation of the facility to visitors of different ages - these are the most important factors determining the attractiveness of visited tourist facilities. The least important is that the facility is constantly updated.

Key words: evaluation of tourist resources, factors of attractiveness, visitors' point of view, Utena district.

DARBO RINKOS POKYČIAI IR STUDENTŲ BAIGIAMŲJŲ DARBŲ TEMATIKA LIETUVOS UNIVERSITETUOSE: DIRBTINIO INTELEKTO POVEIKIS

Dr. Lina Kankevičienė

Kauno kolegija

Anotacija

Dirbtinis intelektas (DI) vis labiau keičia darbo rinkos struktūrą, skatindamas naujų profesijų, susijusių su DI, atsiradimą. Lietuvos DI strategijoje (2019) pabrėžiama, kad DI gali optimizuoti darbą, o darbuotojai turi būti pasirengę dirbti su DI. Tyrimo tikslas – įvertinti darbo rinkos pokyčius, kuriuos lemia DI plėtra, ir išanalizuoti, kaip šie pokyčiai atsispindi Lietuvos universitetuose parengtų 2023–2024 m. baigiamųjų darbų tematikoje, nustatant pagrindines DI tyrimų kryptis ir jų praktinį pritaikymą. Rezultatai rodo, kad DI tematika universitetuose sparčiai populiarėja, ypač informatikos srityje. Analizuojant darbų pasiskirstymą pagal temas, išskiriamos dvi pagrindinės grupės: tiriamieji ir taikomieji darbai. Tiriamieji darbai orientuoti į naujų DI metodų vystymą, neuroninių tinklų tyrimus, modelių interpretaciją bei optimizavimą. Taikomieji darbai nagrinėja DI sprendimų pritaikymą įvairiose srityse, tokiose kaip e. prekyba, finansų analitika, automatizuotas klientų aptarnavimas, autonominės transporto sistemos, sveikatos priežiūra ir pramonė. Tyrimo rezultatai gali būti naudingi tiek akademinėi bendruomenei, siekiant tobulinti studijų programas, tiek verslo sektoriui, siekiant geriau suprasti būsimų specialistų kompetencijas ir jų pasirengimą dirbti su DI technologijomis.

Pagrindiniai žodžiai: darbo rinka, dirbtinis intelektas, mašininis mokymas, studijos.

IVADAS

DI keičia darbo pobūdį, darbuotojams keliamus reikalavimus ir daro įtaką darbo rinkos struktūrai. Auganti DI reikšmė verčia peržiūrėti specialistų rengimo kryptis ir skatina švietimo įstaigas atnaujinti studijų programas. Lietuvos DI strategijoje (2019) pabrėžiama, kad siekiant užtikrinti šalies konkurencingumą DI srityje, būtina skirti daugiau dėmesio specialistų rengimui ir kvalifikacijos kėlimui. Atsižvelgiant į tai, šiame straipsnyje siekiama išanalizuoti Lietuvos universitetuose parengtų DI baigiamųjų darbų tematikos pagrindines kryptis, jų aktualumą ir praktinį pritaikomumą.

Tyrimo tikslas – įvertinti darbo rinkos pokyčius, kuriuos lemia DI plėtra, ir išanalizuoti, kaip šie pokyčiai atsispindi Lietuvos universitetuose parengtų 2023–2024 m. baigiamųjų darbų tematikoje, nustatant pagrindines DI tyrimų kryptis ir jų praktinį pritaikymą.

Tyrimo uždaviniai:

- apžvelgti pagrindinius darbo rinkos pokyčius, susijusius su DI plėtra, bei specialistams keliamus naujus reikalavimus;
- išanalizuoti 2023–2024 m. Lietuvos universitetuose parengtus bakalauro ir magistro baigiamuosius darbus, susijusius su DI, mašininio mokymusi ir neuroniniais tinklais;
- nustatyti dažniausiai nagrinėtas DI baigiamųjų darbų sritis ir jų praktinį pritaikomumą.

Šiame straipsnyje atlikta mokslinės literatūros analizė, siekiant išnagrinėti teorinius darbo rinkos pokyčių ir DI poveikio specialistų rengimui aspektus, bei Lietuvos universitetuose parengtų baigiamųjų darbų tematinę analizę, siekiant nustatyti, kokios tyrimų bei taikomųjų darbų kryptys yra dominuojančios. Tyrimo rezultatai gali būti naudingi tiek akademinėi bendruomenei, siekiant atnaujinti studijų programas, tiek verslo sektoriui, siekiant geriau suprasti būsimų specialistų pasirengimą ir reikalingas kompetencijas. Be to, ši analizė prisideda prie platesnės diskusijos apie DI poveikį darbo rinkai ir specialistų ugdymo strategijas.

1. DIRBTINIS INTELEKTAS ŠIUOLAIKINĖJE VISUOMENĖJE

DI – tai viena iš sparčiausiai besivystančių technologijų, kuri jau dabar keičia daugelį visuomenės veiklos sričių. DI sistemų galimybės apima sudėtingų duomenų analitiką, automatizuotą sprendimų priėmimą, mašininių mokymąsi ir natūralios kalbos apdorojimą. Šių technologijų pažanga skatina reikšmingus pokyčius ekonomikoje, sveikatos priežiūroje, švietime, transporto ir kituose sektoriuose.

Lietuvos DI strategija ir švietimo iššūkiai. 2019 m. ekspertų grupė parengė ataskaitą *Lietuvos dirbtinio intelekto strategija*, kurioje įvardintas šalies siekis tapti regiono lydere DI srityje. Dokumente pateiktos strateginės rekomendacijos, apimančios DI įgūdžių vystymą nuo mokyklinio amžiaus iki aukštojo mokslo, taip pat dabartinių darbuotojų perkvalifikavimą, atsižvelgiant į besikeičiančius darbo rinkos poreikius. Strategijoje akcentuojama būtinybė investuoti ne tik į technologijų plėtrą, bet ir į skaitmeninio raštingumo didinimą bei etinių DI taikymo principų užtikrinimą. Taip pat 2023 m. buvo atlikta *Darbo rinkos tyrimo ataskaita* (Strata, 2023), kurioje analizuojamas DI technologijų pasekmės ir būtinybė pasiruošti būsimiems pokyčiams. Tyrimo duomenys rodo, kad Lietuvos švietimo sistema vis dar nėra pakankamai pasirengusi DI integracijai – trūksta infrastruktūros, pedagogų kompetencijų ir aiškos strategijos, kaip įtraukti DI į mokymo procesą. Be to, 2023 m. *Transparency International* atliko žvalgomojo skaidrumo tyrimą apie DI naudojimą Lietuvos viešajame sektoriuje. Tyrimas parodė, kad nors DI įrankiai jau naudojami viešųjų paslaugų optimizavimui, trūksta aiškos reguliavimo sistemos, užtikrinančios jų skaidrumą ir etišką naudojimą.

DI įtaka darbo rinkai. DI daro didelę įtaką darbo rinkai, keisdamas darbo pobūdį, darbuotojams keliamus reikalavimus bei pačių profesijų struktūrą (Strata, 2023). DI technologijų plėtra skatina naujų metodų, tokių kaip gilusis mokymasis ir neuroniniai tinklai, atsiradimą, leidžiantį spręsti sudėtingas problemas tiksliau ir efektyviau. Šios technologijos ne tik transformuoja darbo procesus, bet ir kuria naujas tyrimų kryptis, susijusias su mašininiu mokymusi ir pažangiomis DI sistemomis (Benhayoun et al., 2021). Vienas didžiausių iššūkių, su kuriuo susiduria darbo rinka, yra skaitmeninių įgūdžių, ypač pažangių DI kompetencijų, trūkumas. Tai pastebima ne tik Lietuvoje, bet ir visoje Europos Sąjungoje, kur DI naudojimas įmonėse auga sparčiai, tačiau trūksta specialistų, turinčių reikiamų įgūdžių. Darbuotojai, išmanantys DI, duomenų analizę ir mašininių mokymąsi, turi didesnes įsidarbinimo galimybes ir gauna aukštesnį darbo užmokestį.

DI poveikis darbo rinkai pasireiškia keliais pagrindiniais aspektais. Pirma, automatizacija keičia darbo vietų struktūrą – pasikartojančios užduotys vis dažniau atliekamos DI pagrindu veikiančiomis sistemomis, todėl tam tikros darbo vietos nyksta, tačiau tuo pačiu atsiranda naujų, reikalaujančių DI kūrimo, valdymo ir priežiūros kompetencijų (DI strategija; Frank et al., 2019; Benhayoun & Lang, 2021). Antra, DI padeda didinti darbo efektyvumą, nes optimizuoja procesus, mažina klaidų tikimybę ir didina produktyvumą įvairiuose sektoriuose, ypač pramonėje ir logistikoje (Kanagarla & Brahmani, 2024). Trečia, DI keičia specialistams keliamus reikalavimus – auga poreikis darbuotojų, turinčių DI, duomenų analizės, mašininio mokymosi ir programavimo įgūdžių (Benhayoun & Lang, 2021).

Vis dėlto, nors DI suteikia naujų galimybių, jis taip pat gali didinti socialinę nelygybę. Aukštos kvalifikacijos specialistai tampa vis labiau paklausūs ir turi didesnes karjeros galimybes, o mažiau kvalifikuoti darbuotojai susiduria su rizika prarasti darbo vietas (Carbonero, 2023; Jaleel & Kurbanazarovich, 2024; Kanagarla & Brahmaji, 2024). Siekiant sumažinti neigiamą DI poveikį darbo rinkai, būtina investuoti į švietimą, darbuotojų mokymus bei darbo rinkos prisitaikymo mechanizmus. Tik tokiu būdu galima užtikrinti, kad technologinės pažangos teikiamos naudos bus prieinamos visiems visuomenės nariams (Web, 2020).

Kompetencijos, susijusios su DI ir mašininiu mokymusi. DI ir mašininio mokymosi specialistams reikalingos įvairios kompetencijos, įskaitant techninius, analitinius ir organizacinius gebėjimus. Šių sričių specialistai turi gebėti ne tik kurti ir taikyti DI sprendimus, bet ir suprasti jų poveikį visuomenei bei verslui.

Techninės žinios sudaro pagrindą DI specialistų darbui. Viena iš svarbiausių sričių – programavimas, nes DI ir mašininio mokymosi algoritmai dažniausiai įgyvendinami naudojant tokias programavimo kalbas kaip Python, R, Java, C++, Julia ir Scala (Benhayoun & Lang, 2021). Python yra ypač populiarus dėl atvirojo kodo bibliotekų palaikymo, įskaitant *TensorFlow*, *PyTorch*, *Scikit-learn* (Benhayoun & Lang, 2021; Goodfellow et al., 2016). Taip pat būtina išmanyti mašininio mokymosi algoritmus, tokius kaip prižiūrimas ir neprižiūrimas mokymasis, gilusis mokymasis (CNN, RNN, LSTM), stiprinamasis mokymasis ir neuroniniai tinklai (LeCun et al., 2015). Dar viena svarbi DI kompetencijų sritis – didžiųjų duomenų apdorojimas, apimantis tokių technologijų kaip *Apache Spark*, *Hadoop*, *SQL* ir *NoSQL duomenų bazės* naudojimą (Zaharia et al., 2016). Taip pat DI specialistams reikalingos žinios apie debesų kompiuteriją ir pagrindines debesijos platformas – *AWS*, *Google Cloud*, *Microsoft Azure*, kurios teikia specializuotas DI paslaugas (*SageMaker*, *Vertex AI*, *Azure ML*) (Dean et al., 2018; Benhayoun & Lang, 2021). DI taikymo srityse taip pat reikalingi kompiuterinės regos įgūdžiai, apimantys vaizdų atpažinimą ir segmentaciją naudojant tokias bibliotekas kaip *OpenCV*, *YOLO*, *Mask R-CNN* (Redmon et al., 2016), bei natūralios kalbos apdorojimas, kurio pagrindą sudaro tokios technologijos kaip *BERT*, *GPT*, *Transformer* architektūros (Vaswani et al., 2017).

Be techninių žinių, DI specialistams reikalingos ir analitinės kompetencijos. Gebėjimas analizuoti didelius duomenų rinkinius, interpretuoti DI modelių išvestis ir optimizuoti algoritmus yra esminis DI taikymo elementas (Benhayoun & Lang, 2021). Taip pat svarbus problemų sprendimas, leidžiantis pritaikyti DI realioms problemoms spręsti ir kurti inovatyvius sprendimus skirtingose pramonės šakose (Benhayoun & Lang, 2021).

Darbo rinkoje vis labiau akcentuojami ir organizaciniai įgūdžiai. DI projektų valdymas, gebėjimas dirbti komandoje ir tarpdisciplininis bendradarbiavimas tampa būtini siekiant efektyviai integruoti DI sprendimus. Svarbu suprasti savo ir kitų emocijas, valdyti stresą, kurti efektyvius santykius ir dirbti komandoje (Benhayoun, Lang, 2021).

Kūrybiškumas, originalumas ir iniciatyvumas yra ypač svarbūs kuriant naujus DI sprendimus bei pritaikant esamas technologijas netikėtoms problemoms spręsti (Benhayoun & Lang, 2021; Kanagarla & Brahmaji, 2024). Kritinis mąstymas yra svarbus vertinant informaciją, atpažįstant šališkumą ir priimant pagrįstus sprendimus, o mokėjimas mokytis leidžia specialistams greitai prisitaikyti prie besikeičiančios technologinės aplinkos (Benhayoun & Lang, 2021). Svarbi kompetencijų sritis yra kūrybiškumas, leidžiantis generuoti naujas idėjas, kurti originalius sprendimus ir būti iniciatyviems.

Be to, DI specialistams būtina išmanyti ir etinius bei teisės aspektus. Algoritmų šališkumo mažinimas, duomenų privatumo užtikrinimas ir DI reguliavimo žinios yra būtini siekiant užtikrinti atsakingą DI naudojimą (DI strategija, 2019).

2. DIRBTINIO INTELEKTO SPECIALISTŲ PAKLAUSA DARBO RINKOJE

Organizacijos vis dažniau ieško specialistų, turinčių gilių žinių apie mašininį mokymąsi, duomenų analizę, algoritmų kūrimą ir debesų kompiuteriją (Benhayoun & Lang, 2021; Unicorns Lietuva, 2023). Tačiau aukštosios mokyklos ne visada geba prisitaikyti prie sparčiai besikeičiančių technologinių tendencijų, todėl absolventai neretai neturi reikiamų DI įgūdžių, kurie yra paklausūs darbo rinkoje (Yan et al., 2024). Darbo rinka reikalauja ne tik naujų DI specialistų, bet ir esamų darbuotojų perkvalifikavimo, kad jie galėtų dirbti su išmaniosiomis technologijomis ir automatizuotomis sistemomis (Zarifhonarvar, 2023).

Remiantis *Unicorns Lietuva* (2023) atliktu tyrimu, iki 2025 m. labiausiai paklausūs šie specialistai: *Back-End* (1427 darbo vietos), *Front-End* (1012 darbo vietų) programuotojai, infrastruktūros inžinieriai (431 darbo vieta) bei *Full-Stack* (379 darbo vietos) programuotojai. Taip pat pastebima auganti paklausa duomenų mokslininkams (309 darbo vietos), testavimo inžinieriams (232 darbo vietos) ir sistemų inžinieriams (282 darbo vietos), kas rodo, jog organizacijos vis labiau remiasi

duomenimis grįžtais sprendimais ir skaitmeninių sistemų automatizacija.

Be konkrečių profesijų, *Unicorns Lietuva* tyrimas atskleidė ir pagrindines kompetencijas, kurios bus būtinos IT specialistams iki 2025 m. Svarbiausia kompetencija išlieka DI ir mašininio mokymosi žinios – jas svarbiomis įvardijo net 62 proc. apklaustų įmonių. Toliau rikiuojasi infrastruktūros inžinerija (59 proc.), UI/UX dizainas (52 proc.), didžiųjų duomenų analizė (49 proc.), kibernetinė sauga (49 proc.), interneto svetainių kūrimas (49 proc.), verslo analitikos (40 proc.), mobiliosios aplikacijų kūrimo (39 proc.), debesų kompiuterijos (38 proc.) bei duomenų bazių vystymo (37 proc.) kompetencijų svarbą.

2023 m. lapkričio mėn. duomenimis (*Unicorns Lietuva*), Lietuvos technologijų sektoriui trūko daugiau nei 7,6 tūkst. kvalifikuotų specialistų. Tai atspindi nuolatinį darbo rinkos poreikį specialistams, gebantiems dirbti su DI, duomenų analitika ir IT infrastruktūra. Be to, Užimtumo tarnybos duomenimis (2024 m. gruodžio mėn.), sparčiai auga susidomėjimas aukštą pridėtinę vertę kuriančiomis kvalifikacijomis ir kompetencijomis. Visuose Lietuvos regionuose populiariausios sritys yra *No-code* ir robotinių procesų automatizavimas, duomenų analitika bei CNC staklių programavimas. Ši tendencija rodo, kad darbo rinka siekia prisitaikyti prie inovacijų ir technologijų pažangos, tačiau kvalifikuotų specialistų poreikis vis dar viršija pasiūlą.

3. DIRBTINIO INTELEKTO BAIGIAMŲJŲ DARBŲ TEMŲ ANALIZĖ

Aukštasis mokslas atlieka svarbų vaidmenį rengiant specialistus, turinčius reikiamų kompetencijų ir atitinkančius darbo rinkos poreikius (Benhayoun et al., 2021). Tačiau akademinių programų turinys neretai atsilieka nuo sparčiai kintančių technologijų, todėl absolventai gali neturėti naujausių praktinių žinių, reikalingų šiuolaikiniam darbo pasauliui (Benhayoun et al. 2021; Yan et al., 2024). Vis daugiau universitetų įtraukia DI bakalauro ir magistro studijų programas, kuriose dėstomi mašininio mokymosi, neuroninių tinklų, didžiųjų duomenų analizės ir DI etikos principai (Kanagarla & Brahmani, 2024).

Baigiamųjų darbų analizė buvo atlikta naudojant Nacionalinės švietimo agentūros duomenis iš Lietuvos atvirų duomenų portalą. Analizuoti 2023–2024 metų bakalauro ir magistro baigiamieji darbai, kurių pavadinimai susiję su DI, mašininio mokymosi ir neuroniniais tinklais. Atranka atlikta naudojant Python programavimo kalbą ir automatizuotas teksto apdorojimo priemonės. Atrankos kriterijai: raktažodžių paieška baigiamųjų darbų pavadinimuose: „dirbtin“, „mašin“, „neuron“, taip pat įtrauktos studijų programos, kuriose paminėtas „dirbtin“ žodžio fragmentas. Surinkti duomenys buvo apdoroti ir analizuoti taikant tematinę analizę – išskirtos pagrindinės DI tyrimų kryptys. Kauno technologijos universitetas (KTU) jau yra išleidęs absolventus, baigusius specializuotas studijų programas „Dirbtinis intelektas“ ir „Dirbtinio intelekto informatika“. Vilniaus Gedimino technikos universitetas (VILNIUS TECH) taip pat realizuojamos bakalauro studijų programos „Dirbtinio intelekto sistemos“, „Taikomasis dirbtinis intelektas“, tačiau nagrinėjamu laikotarpiu baigiamųjų darbų dar nebuvo.

Bendras analizuotų darbų skaičius sudarė 233: 2023 m. – 89 darbai (39 magistro, 50 bakalauro), 2024 m. – 144 darbai (47 magistro, 97 bakalauro).

Lentelė. 2023–2024 metų baigiamųjų darbų pasiskirstymas pagal universitetus ir metus

Universitetas	2023 m.	2024 m.	Iš viso	Proc.
Vilniaus universitetas	43	63	106	46
Kauno technologijos universitetas	24	37	61	26
Vilniaus Gedimino technikos universitetas	14	24	38	16
Vytauto Didžiojo universitetas	7	18	25	11
Klaipėdos universitetas	1	2	3	1
Iš viso:	89	144	233	100

Šiame tyrime reikia atkreipti dėmesį, kad analizuotų baigiamųjų darbų temų skaičius yra ribotas, nes ne visose temose gali aiškiai atsispindėti atrankai pasirinkti raktiniai žodžiai. Pavyzdžiui, kai kurios temos gali būti susijusios su DI, tačiau jų pavadinimai neidentifikuojami pagal atrankos kriterijus, todėl jos nebuvo įtrauktos į analizę. Tokios temos kaip Prekių identifikacijos ir atpažinimo sistema protingame šaldytuve; El. komercijos rekomendacijų sistema grafų duomenų bazėje ir panašios gali būti tiesiogiai susijusios su DI, tačiau dėl naudojamos terminologijos nepateko į tyrimo duomenų rinkinį. Dėl šios priežasties analizė nėra visiškai tiksli, tačiau ji leidžia pamatyti DI baigiamųjų darbų tematikos tendencijas ir nustatyti pagrindines sritis, kurias studentai tyrinėja ir taiko DI technologijas. Tolesni tyrimai galėtų papildyti šią analizę, įtraukdami semantinius metodus arba detalesnį darbų turinio nagrinėjimą, siekiant dar tiksliau identifikuoti su DI susijusius projektus.



Šaltinis: sudaryta autorės, remiantis baigiamųjų darbų temų analize

Tiriamieji darbai dažniausiai orientuojasi į naujų DI metodų vystymą, algoritmų efektyvumo analizę bei modelių interpretaciją. Pavyzdžiui, giluminių neuroninių tinklų tyrimai dažnai susiję su jų taikymu vaizdų segmentavimui, natūralios kalbos apdorojimui ar prognozavimo modeliams. Taip pat didelis dėmesys skiriamas anomalijų aptikimo sistemoms ir jų taikymui pramonės ir saugumo srityse. Keletas pavyzdžių: *Naujai atsirandančių dirbtinio intelekto metodų efektyvumo tyrimas kompiuterių tinklo srauto anomalijų aptikimui, Judančio teksto atpažinimo problemų tyrimas, Daugiakomponenčių biocheminių tyrimų kokybės kontrolės statistinių procesų optimizavimas pasitel-*

kiant mašininio mokymosi technologijomis pagrįstus anomalijų aptikimo metodus, Kristalų struktūrų tyrimas naudojant mašininį mokymąsi, dirbtinius neuroninius tinklus ir pan.

Tuo tarpu praktiniai taikomieji darbai yra orientuoti į DI integravimą į realias sistemas ir verslo procesus. Čia galima pastebėti DI pritaikymą e. prekyboje, finansų analitikoje, automatizuotame klientų aptarnavime, autonominėse transporto sistemose ir socialiniuose tinkluose. Taip pat yra darbų, susijusių su DI naudojimu medicinos diagnostikoje ar pramoninių procesų automatizavime. Pagrindinės problemos, kurias nagrinėja studentai, yra susijusios su duomenų analizės, prognozavimo ir sprendimų priėmimo automatizavimu. Pavyzdžiai: *Išsamios mašininio mokymosi sistemos, skirtos el. prekybai, kūrimas: suasmenintų rekomendacijų integravimas su paklausos prognozavimu; Žmogaus fizinės būklės nustatymas mašininio mokymosi pagalba; Skatinamojo mokymosi taikymas autonominiam vairavimui ir kliūčių išvengimui; Preliminari širdies kraujagyslių sistemos patologijų diagnostika, naudojant mašininio mokymosi metodus.*

Dažniausiai analizuojamos temos:

- Natūralios kalbos apdorojimas – tekstinių duomenų analizė, melagingų naujienų atpažinimas, automatinis vertimas, pokalbių robotų kūrimas.
- Vaizdų atpažinimas ir kompiuterinė rega – medicininių vaizdų analizė, anomalijų aptikimas, objektų sekimas, vaizdo segmentacija.
- Finansų technologijos – automatizuota rizikos analizė, kriptovaliutų kainų prognozavimas, sukčiavimo aptikimas.
- Saugumas ir kibernetinis saugumas – DDoS atakų prevencija, įsilaužimų aptikimas, tinklo srauto analizė naudojant DI modelius.
- Sveikatos priežiūra – DI pritaikymas diagnostikoje ir pacientų ligų prognozavimas.
- Autonominės sistemos ir robotika – savarankiškų transporto priemonių valdymas, sustiprinamasis mokymasis robotų mokyme.

Studentų baigiamųjų darbų apie DI taikymą ir tyrimus analizė rodo, kad ši sritis yra itin dinamiška ir plačiai pritaikoma. Dalis darbų yra orientuoti į DI metodų tobulinimą, neuroninių tinklų tyrimus, modelių interpretaciją bei optimizavimą. Kita dalis – į praktinį DI pritaikymą, kuriant inovatyvius produktus ar sprendžiant realias verslo ar pramonės problemas. Ši analizė rodo, kad DI technologijos tampa neatsiejama įvairių sričių dalimi, o studentų atliekami darbai prisideda prie naujų inovacijų kūrimo ir DI integracijos į kasdienį gyvenimą.

IŠVADOS

1. DI iš esmės keičia darbo rinkos struktūrą, kurdamas naujas profesijas, susijusias su DI sistemų kūrimu, valdymu ir priežiūra. Aukštos DI kompetencijos tampa vis svarbesnės darbo rinkoje, o specialistų paklausa nuolat auga.

2. Atlikta baigiamųjų darbų analizė rodo, kad DI tematika universitetuose sparčiai populiarėja, ypač informatikos srityje. Vilniaus universitetas, Kauno technologijos universitetas ir Vilniaus Gedimino technikos universitetas yra pagrindiniai DI studijų centrai Lietuvoje, rengiantys didžiąją dalį absolventų šioje srityje. Specialistų rengimas pagal specializuotas DI programas rodo, kad aukštasis mokslas prisitaiko prie darbo rinkos poreikių.

3. Išanalizavus baigiamųjų darbų tematiką, išskiriamos dvi pagrindinės grupės – tiriamieji ir taikomieji darbai. Tiriamieji darbai dažniausiai atliekami magistrantų ir orientuoti į naujų DI metodų kūrimą, neuroninių tinklų tyrimus, modelių interpretaciją ir jų optimizavimą. Taikomieji darbai nagrinėja praktinį DI pritaikymą įvairiose srityse: e. prekyboje, finansų analitikoje, automatizuotame klientų aptarnavime, autonominėse transporto sistemose, socialiniuose tinkluose, sveikatos priežiūroje ir pramonėje.

Literatūra

1. Benhayoun, L., & Lang, M. (2021). The role of AI in workforce transformation. *Human Systems Management*, 40(5), 1-15.
2. Carbonero, F. (2023). AI and the evolving labor market. *Journal of Economic Behavior & Organization*, 191, 1-19.
3. Dean, J., Corrado, G., Monga, R., Chen, K., Devin, M., Le, Q. V., ... & Ng, A. Y. (2018). Large scale distributed deep networks. *Advances in Neural Information Processing Systems*.
4. Frank, M. R., Autor, D., Bessen, J. E., Brynjolfsson, E., Cebrian, M., Deming, D. J., ... & Rahwan, I. (2019). Toward understanding the impact of artificial intelligence on labor. *Proceedings of the National Academy of Sciences*, 116(14), 6531-6539.
5. Goodfellow, I. (2016). *Deep learning* (Vol. 196). MIT press.
6. Yan, R. (2024). The Impact of Artificial Intelligence on the Labor Market. *International Journal of Global Economics and Management*, 2(1), 233-238.
7. Jaleel, K., & Kurbannazarovich, K. (2024). AI and economic polarization. Preprints, 11(0875), 1-25.
8. Kanagarla, K. P., & Brahmani, A. (2024). Artificial intelligence and workforce productivity. *SSRN Electronic Journal*, 5015970.
9. LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436-444.
10. Lietuvos dirbtinio intelekto strategija. Ateities vizija. 2019. Prieiga per internetą: <https://eimin.lrv.lt/lt/veiklos-sritys/skaitmenine-politika/dirbtinis-intelektas>
11. Redmon, J. (2016). You only look once: Unified, real-time object detection. In *Proceedings of the IEEE conference on computer vision and pattern recognition*.
12. STRATA (2023). Darbo rinkos tyrimo ataskaita „Dirbtinis intelektas: įgūdžių problematika Lietuvoje“. Prieiga per internetą: <https://strata.gov.lt/veikla/tyrimai/>
13. Transparency (2023). Žvalgomas skaidrumo tyrimas „Beieškant dirbtinio intelekto viešajame sektoriuje“. Prieiga per internetą: <https://transparency.lt/wp-content/uploads/2023/11/Leidiny-Dirbtinis-intelektas-2023-1.pdf>
14. Unicorns Lietuva (2023). IRT specialistų poreikis ir darbo rinkos prognozė Lietuvoje. Prieiga per internetą: https://unicorns.lt/storage/app/media/Modeliniai%20dokumentai/Modeliniai%20dokumentai%202023-2024/Talentu%20tyrimo%20ataskaita_final.pdf
15. Užimtumo tarnyba (2024 m. gruodis). Investicijų plėtra regionuose sparčiai didina specialistų paklausą. Prieiga per internetą: https://uzt.lt/naujienos/8/investiciju-pletra-regionuose-sparciai-didina-specialistu-paklausa%3A439?utm_source=chatgpt.com
16. Vaswani, A. (2017). Attention is all you need. *Advances in Neural Information Processing Systems*.
17. Web, P. (2020). AI and the future of employment. *SSRN*, 3482150.
18. Zaharia, M., Xin, R. S., Wendell, P., Das, T., Armbrust, M., Dave, A., ... & Stoica, I. (2016). Apache spark: a unified engine for big data processing. *Communications of the ACM*, 59(11), 56-65.
19. Zarifhonorvar, M. (2023). The role of AI in labor dynamics. *Journal of Economic Behavior and Decision-making*, 10(2023), 1-18.

LABOUR MARKET CHANGES AND THE TOPICS OF STUDENTS' FINAL THESES AT LITHUANIAN UNIVERSITIES: THE IMPACT OF ARTIFICIAL INTELLIGENCE

Summary

Artificial intelligence (AI) is increasingly changing the labour market structure, fostering the emergence of new professions related to AI. The Lithuanian AI Strategy (2019) emphasizes that artificial intelligence can improve and optimize existing work processes, therefore employees must be prepared to work with AI technologies. The aim of this study is to assess the labor market changes driven by AI development and to analyze how these changes are reflected in the topics of bachelor's and master's theses prepared at Lithuanian universities in 2023–2024, identifying the main AI research directions and their practical applications.

The results indicate that AI-related topics are rapidly gaining popularity in universities, particularly in the field of informatics. Based on the thematic distribution of the theses, two main categories are distinguished: research-oriented and applied studies. Research-oriented theses focus on the development of new AI methods, neural network research, model interpretation, and optimization. Applied theses examine the implementation of AI solutions in various domains, such as e-commerce, financial analytics, automated customer service, autonomous transport systems, healthcare, and industry. The findings of this study can be valuable both for the academic community in improving study programs and for the business sector in better understanding the competencies and readiness of future specialists to work with AI technologies.

Key words: labour market, artificial intelligence, machine learning, studies.

ORGANIZATIONAL MECHANISMS FOR THE IMPLEMENTATION OF THE CONCEPT OF THE CREATION IN UKRAINE OF MARINE ROBOTICS FOR ENVIRONMENTAL PURPOSES

Dr. Prof. Iryna Nadtochii

Assoc. Prof. Anatolii Nadtochyi

*Admiral Makarov National University of Shipbuilding,
Kherson Educational-Scientific Institute, Ukraine*

Annotation

The development of marine robotics is an important direction in the field of environmental protection, since modern robotic systems allow for effective monitoring of marine ecosystems, detection and elimination of pollution, and prevention of environmental disasters. The article considers the organizational mechanisms for implementing the Concept of creating marine robotics for environmental protection purposes in Ukraine. The key elements of an effective organizational structure that ensures the interaction of research institutions, production enterprises, state bodies, and international partners are identified. The global and domestic experience of implementing marine robotic systems in environmental protection is analyzed. A model of interaction between the subjects of the process of development, testing, implementation, and operation of marine robotic platforms is proposed. The main attention is paid to the interdisciplinary approach, integration of innovative technologies, staffing, and international cooperation.

Key words: marine robotics, environmental protection activities, organizational structure, environmental monitoring, automated systems, public administration, innovative technologies, international cooperation, development and implementation, underwater autonomous vehicles.

INTRODUCTION

The implementation of the “Concept of creating marine robotics for environmental protection in Ukraine” requires a comprehensive approach based on a clear and effective organizational structure. This structure ensures the interaction of all necessary elements: scientific research, design, production (including testing) and personnel training for all stages of implementation. It is aimed at achieving the key goals of the concept, in particular, the creation of high-tech solutions for environmental protection activities, the formation of an innovative production sector and the integration of Ukraine into the international environmental community. The main task of the organizational structure is to ensure clear coordination between various participants in the process, including state bodies, scientific institutions, design bureaus, manufacturing enterprises, educational institutions and operating organizations. The structure should guarantee the efficiency of work at each stage, from conducting fundamental research to serial production and the introduction of robotic systems into environmental protection activities.

Relevance of the research. The increase in anthropogenic input to the marine ecosystems of Ukraine requires the development and introduction of effective environmental technologies. One of the promising directions is the use of marine robotics, which allows monitoring of the environmental situation, eliminating the legacy of pollution and supporting the development of pollution. marine resources. In this context, it is important to create an effective organizational structure for the implementation of the “Concept of marine robotics for environmental purposes created in Ukraine” to ensure mutual cooperation government bodies, scientific institutions, industrial enterprises and international partners.

Tracking problem. One of the main problems is the lack of an integrated approach to the development of marine robotics technology in Ukraine. The original initiatives are fragmentary, and

their implementation is complicated by the lack of coordination between the scientific sphere, industry and government structures. Nowadays there is light evidence of the importance of integration of these sectors within the framework of a single organizational structure.

Meta and task of investigation. The purpose of this article is to develop an organizational structure for the implementation of the concept of the development of marine robotics in Ukraine, to ensure effective interaction between key participants in the process, Acceptable integration of Ukraine with international environmental awareness and advancement of the technological level of Galusia.

To achieve this goal, the following tasks were set:

- analyze the light evidence of the creation of organizational structures for the development and implementation of environmental technologies;
- identify key benefits to the organizational structure of concept implementation;
- develop a model of interaction between scientific institutions, government bodies, enterprises and international partners;
- evaluate mechanisms for coordination and financing of marine robotics;
- develop recommendations for the integration of lighting programs in the process of implementing the concept.

Object of investigation. The object of investigation is the organizational structure of the implementation of the concept of the creation of marine robotics for environmental purposes in Ukraine.

Research methodology. The investigation is based on a variety of such methods:

- system analysis - to examine the interconnections between warehouse organizational structures;
- annual analysis – to assess the light evidence of the implementation of marine robotic systems in environmental activities;
- expert assessment – to formulate propositions in order to thoroughly develop the organizational structure;
- economic and mathematical modeling – to analyze the effectiveness of resource provision for the implementation of the concept.

Scientific novelty. The scientific novelty of the article lies in the development of an organizational structure adapted to Ukrainian conditions for the implementation of the concept of marine robotics, which combines modern technological approaches and effective management mechanisms.

1. LITERATURE REVIEW

The development of marine robotics for environmental protection purposes is a relevant area of research both in Ukraine and abroad. Domestic scientists are actively working on creating effective organizational models for the implementation of marine robotic systems, in particular for environmental monitoring and pollution elimination.

The development of organizational structures for the implementation of high-tech environmental projects is the subject of numerous scientific studies. In particular, international experience indicates the effectiveness of such management models as public-private partnerships, the integration of academic science into industrial projects [1], as well as an interdisciplinary approach to creating technologies to protect marine ecosystems [2].

A significant contribution to the development of this area was made by V.S. Blintsov, who studied methodological approaches to the design of autonomous underwater vehicles and the development of integrated control systems for underwater robots [3]. His works outline the main requirements for navigation and control systems for underwater unmanned platforms used for environmental monitoring and pollution search.

O.V. Blintsov and V.A. Nadtochiy considered the problems of automation of marine technological complexes with remotely controlled underwater vehicles of the working class. In their research [4] they focus on the adaptation of modern digital technologies to environmental underwater systems, in particular the use of artificial intelligence and data analysis to automate the processes of information collection.

Research by G.V. Babkin [5] is aimed at the development of project management models in the field of marine robotics. In particular, he proposed the concept of integrated management of the processes of design, testing and implementation of marine robotic systems for environmental tasks.

In addition, the works of V.O. Stepanenko [6] emphasize the importance of developing marine infrastructure, in particular for the use of robotic systems in the field of environmental monitoring and control of the state of water resources.

Thus, Ukrainian scientists, in particular, are actively researching and implementing marine robotics technologies to solve environmental problems, which contributes to the preservation and restoration of Ukraine's marine ecosystems.

2. REQUIREMENTS FOR THE ORGANIZATIONAL STRUCTURE FOR IMPLEMENTING THE CONCEPT

The implementation of the „Concept of creating marine robotics for environmental protection purposes in Ukraine“ requires the creation of an organizational structure that will meet modern challenges and ensure the achievement of the set goals. The requirements for this structure should take into account the specifics of working with high-tech solutions, effective resource management, and the integration of all necessary areas of activity, are presented in table 1.

Table 1. *Requirements for the organizational structure of the „Concept for the creation of marine robotics for environmental protection purposes in Ukraine“*

Requirements	Realization
Complexity and interdisciplinarity	The organizational structure should cover all aspects of the concept implementation: from scientific research and design to production, testing, operation and training.
	Ensuring an interdisciplinary approach through the interaction of scientists, engineers, ecologists, economists and robotics specialists
Clear division of functions	Definition of separate functional blocks for each area of activity (science, design, production, testing, operation, personnel training)
	Avoiding duplication of tasks between different participants
Flexibility and adaptability	The ability to adapt the structure to changes in technological, environmental or economic conditions
	Ensuring a rapid response to new challenges and tasks, including international environmental initiatives or new standards
Integration with international partners	Providing opportunities for cooperation with international organizations, companies and scientific institutions
	Compliance with international standards in the field of environmental protection, robotics and innovation
Innovation orientation	Creating conditions for the development and implementation of the latest technologies
	Promoting innovation through support for startups, scientific research and pilot projects
Transparency and accountability	Establishing mechanisms for monitoring task performance at each stage of implementation
	Transparency in financial transactions, resource use and performance evaluation
Ensuring human resource potential	Integration of the training system into each stage: science, design, production, testing and operation
	Organization of educational programs, trainings and internships for specialists of various levels
	Attracting young people and retraining existing staff to work with new technologies
Effective resource management	Optimization of the use of financial, human and technical resources
	Ensuring coordination between different participants to avoid resource losses
Implementation of digital solutions	Using modern IT systems for project management, progress monitoring, and information exchange
	Integration of digital platforms for collecting, analyzing and using environmental data

Long-term and sustainable	Creating a structure capable of ensuring sustainable development of the industry even after the completion of the initial stage of concept implementation
	Integration of mechanisms to support national production, science and education to ensure continuous progress
Compliance with national interests	The structure should contribute to the country's economic development, in particular through the creation of new jobs and the development of the high-tech sector
	Ensuring the protection and restoration of Ukraine's natural resources to improve the quality of life of the population
Compliance with regulatory requirements	Alignment of the structure with the current legislation of Ukraine
	Implementation of mechanisms that meet international legal standards
Synergy of participants	Ensuring effective interaction between government agencies, scientific institutions, manufacturing enterprises, international partners and public organizations
	Creating conditions for collective decision-making and integration of efforts of all stakeholders

The requirements for the organizational structure emphasize its flexibility, multifunctionality, and compliance with modern challenges. Such a structure will become a reliable basis for the implementation of the concept, ensuring not only the successful development and implementation of technologies, but also the long-term development of the industry in the context of environmental protection activities in Ukraine.

3. FEATURES OF FORMING AN ORGANIZATIONAL STRUCTURE FOR IMPLEMENTING THE CONCEPT

The formation of an organizational structure for the implementation of the „Concept of creating marine robotics for environmental protection purposes in Ukraine“ requires taking into account a number of key features. These features ensure management efficiency, integration of various areas of activity, and achievement of the strategic goals of the concept, are presented in table 2.

Table 2. *Formation of an organizational structure for the implementation of the concept*

Features	Directions	Realization
Orientation to an interdisciplinary approach	Interaction of different industries	Integration of knowledge and experience in the fields of science, engineering, ecology, economics, education and management
		Ensuring communication between specialists from different disciplines to achieve synergy
		Integration of knowledge and experience in the fields of science, engineering, ecology, economics, education and management
	Harmonization of tasks	Coordination of the goals of each direction to jointly achieve the results of the concept
Involving a wide range of participants	Public sector	Governments providing funding, regulation and strategic support
	Scientific institutions	Institutes, universities, research centers conducting fundamental and applied research
	Private sector	Innovative companies, startups, manufacturing enterprises and investors
	International partners	Technology companies, scientific institutes and international organizations that contribute to Ukraine's integration into the global innovation market

Flexibility and adaptability	Ability to change	The ability to quickly make changes to the structure to adapt to new challenges, including changes in international standards, technologies, or the environmental situation
	Pilot projects	Introducing pilot programs to test new ideas and solutions before their large-scale implementation
Integration of innovative technologies	Digitalization of management	Using modern IT solutions for project management , data exchange and progress monitoring
	Implementation of the latest technologies	Application of artificial intelligence, automation, big data (Big Data) to improve work efficiency
Transparency and accountability	Open management	Ensuring transparency in decision-making, resource allocation, and task execution
	Monitoring and reporting	Regular assessment of task performance with public presentation of results
Formation of human resources potential	Training of specialists	Creation of programs for training specialists in the fields of science, design, production, and operation
	Educational initiatives	Engaging universities, vocational schools, and training centers to ensure access to quality education
	Internships and trainings	Organization of experience exchange programs with international partners
Centralized management with decentralized execution	Single coordination center	Centralized management of all stages of concept implementation
	Autonomy of functional blocks	Granting autonomy to individual units to perform specific tasks
Distribution of functions and responsibilities	Clear specialization	Defining specific functions for each unit or division
	Integration of activities	Coordination of the work of different units to achieve a common goal
Orientation to international standards	Harmonization of processes	Compliance with international standards and best practices in the field of ecology, engineering and management
	Certification	Ensuring compliance of developed technologies with international quality certificates
Sustainable development	Long-term effectiveness	Formation of a structure that ensures sustainable development of the industry after the completion of the initial stages of concept implementation
	Rational use of resources	Minimizing costs and maximizing efficiency in all processes

The specifics of forming an organizational structure for the implementation of the concept are based on the principles of integration, flexibility, transparency, and innovation orientation. Such a structure should ensure effective interaction between all participants, guaranteeing the achievement of the goals of the concept and contributing to the sustainable development of the high-tech industry in the interests of Ukraine.

4. ORGANIZATIONAL STRUCTURE FOR IMPLEMENTING THE CONCEPT

Successful implementation of the concept requires a clear, multi-level organizational structure that ensures effective interaction between the scientific sphere, design, production, testing, personnel training and operation. The proposed organizational structure is presented below, are presented in table 3.

Table 3. *Organizational structure for implementing the concept*

Elements	Structure
1. Central Coordination Body	
Goal	Management of the implementation of the concept, coordination of interaction between all participants, monitoring of task performance
Functions	Development of an overall strategy and plans for implementing the concept
	Monitoring the implementation of project stages
	Allocation of resources between participants
	Monitoring and evaluation of results
Composition	Representatives of government bodies (Ministry of Environmental Protection, Ministry of Education and Science, Ministry of Economy)
	Heads of key scientific institutions, universities, design and production centers
	International experts (if necessary)
2. Research unit	
Goal	Conducting fundamental and applied research to create technologies that will become the basis for robotic systems
Functions	Development of new materials, sensors and energy-saving systems
	Conducting environmental monitoring and studying the state of the marine environment
	Development of algorithms and software for robotic systems
Composition	Academic institutions (Institutes of the National Academy of Sciences of Ukraine in Physics, Chemistry, Ecology, Robotics)
	Universities (specialized departments in robotics, marine ecology, and programming)
	Research centers
3. Design unit	
Goal	Transforming scientific developments into practical engineering solutions ready for production
Functions	Design of autonomous underwater vehicles, remotely controlled robots and sensor systems
	Developing prototypes and testing their functionality
	Ensuring the integration of modern technologies (artificial intelligence, sensors, energy-saving solutions)
Composition	Engineering and design offices
	Startups and innovative companies in the field of robotics
	Consortia with international partners
4. Production unit	
Goal	Mass production of robotic systems and components for the implementation of environmental protection tasks
Functions	Production of housings, sensors, power sources and other robot components
	Assembly of autonomous and remotely controlled devices
	Integration of technologies into finished products
Composition	State and private enterprises with experience in mechanical engineering, electronics and software
	Component manufacturers (batteries, sensors, etc.)
	International partner production platforms

5. Test unit	
Goal	Testing robotic systems in real marine environment conditions
Functions	Assessment of the performance of developed systems
	Testing systems in various environmental conditions (depth, temperature, pollution)
	Adaptation of designs and algorithms based on test data
	Assessment of the performance of developed systems
Composition	Test ranges in the Black and Azov Seas
	Laboratories for modeling marine environmental conditions
	Robotic systems certification and standardization centers
6. Educational block	
Goal	Training personnel for work in the field of science, design, production, testing and operation of robotic systems
Functions	Development of educational programs for universities, training centers and technical schools
	Conducting trainings, workshops and internships
	Integrating learning with practice by involving students in real projects
Composition	Universities with programs in robotics, ecology, and engineering
	Training centers for retraining specialists
	Cooperation with international educational institutions
7. Operational unit	
Goal	Application of created robotic systems for environmental protection activities
Functions	Monitoring the state of the marine environment
	Pollution elimination, biodiversity restoration
	Maintenance and modernization of robotic systems
Composition	Environmental organizations and state environmental inspections.
	Private companies specializing in environmental monitoring
	Local communities and volunteer organizations
8. Interaction of blocks	
Inter-block communication	The central coordinating body ensures coordination of actions between all blocks
	The research unit generates ideas and technologies that are transferred to the design unit for engineering implementation
	The production unit receives designs for serial production, while the test unit verifies their functionality.
	The educational unit provides training for each stage of the process
	The operational unit integrates the created systems into environmental protection activities
9. Advantages of the structure	
Realization	Ensuring a comprehensive approach to the implementation of the concept
	Clear division of functions between participants
	Maximum resource efficiency
	Flexibility in responding to changes and challenges

A feature of the concept implementation is the multi-level interaction between state bodies, research institutions, design and production enterprises, educational institutions and the private sector. The organizational structure should ensure synergy between these elements, allowing for the effective use of resources, the introduction of advanced technologies and the development of the country's human resources. The formation of such a structure is aimed at developing an effective

system that will become the basis for the creation of high-tech robotic solutions for environmental protection that meet the interests of Ukraine and contribute to its sustainable development in the international context.

CONCLUSIONS

1. The implementation of the Concept for the creation of marine robotics for environmental protection purposes in Ukraine requires a comprehensive approach, which includes research, design, production and operational components. The study determined that an effective organizational structure is a key factor in the successful implementation of marine robotics systems in environmental protection activities.

2. The proposed organizational model involves the interaction of state bodies, scientific institutions, industrial enterprises, educational institutions and international partners. Particular attention is paid to the issues of staffing, which is critically important for the formation of a high-tech marine robotics sector in Ukraine.

3. World experience proves that the implementation of marine robotics systems contributes to increasing the efficiency of environmental monitoring, timely detection of threats to the marine environment and rapid response to emergencies. The analysis of existing practices allowed us to formulate recommendations for improving project management mechanisms in this area, as well as to outline the prospects for Ukraine's integration into the international scientific and technical community.

4. Thus, the creation and implementation of an organizational structure for the development of marine robotics in Ukraine will contribute not only to solving environmental problems, but also to the formation of a competitive high-tech sector. The implementation of the proposed model will ensure the sustainable development of this industry, the rational use of natural resources and the effective protection of the marine environment.

List of references

1. Smith, J., & Brown, P. (2020). Global trends in marine robotics and their application in environmental monitoring. *International Journal of Marine Engineering*, 45(3), 112-130.
2. García, R., Torres, A., & Liu, H. (2021). Innovations in autonomous underwater vehicles for marine conservation. *Journal of Environmental Robotics*, 12(1), 45-60.
3. Blintsov, V.S. (2020). Theoretical foundations of designing underwater robotic systems. *Shipbuilding Scientific and Technical Journal*. Available at: <https://shipbuilding.mk.ua/?p=3760>.
4. Blintsov, O.V., & Nadtochii, V.A. (2019). Automation of maritime technological complexes with tethered underwater vehicles of the working class. *Scientific Bulletin of the Odessa National Maritime Academy*. Available at: https://www.researchgate.net/publication/311974015_Automation_of_maritime_technological_complex_with_tethered_underwater_vehicle_of_working_class.
5. Babkin, G.V. (2020). Models of project management in the development of marine robotic technology. *Scientific Bulletin of the Admiral Makarov National University of Shipbuilding*. Available at: <https://eir.nuos.edu.ua/bitstreams/392af363-6862-4c19-934f-d7c768a6b30a/download>.
6. Stepanenko, V.O. (2021). Ensuring the competitiveness of Ukraine's maritime transport infrastructure in the context of European integration. Dissertation, Vasyli' Stus Donetsk National University. Available at: https://r.donnu.edu.ua/bitstream/123456789/2409/1/Дисертація_Степаненко.pdf.

JŪRŲ ROBOTIKOS KONCEPCIJOS ĮGYVENDINIMO APLINKOSAUGOS TIKSLAIS UKRAINOJE ORGANIZACINIAI MECHANIZMAI

Santrauka

Šiuolaikinės robotikos sistemos leidžia veiksmingai stebėti jūrų ekosistemas, nustatyti ir pašalinti taršą bei užkirsti kelią ekologinėms nelaimėms. Jūrų robotikos vystymas yra svarbi aplinkos apsaugos srities kryptis. Straipsnyje nagrinėjami organizaciniai mechanizmai, skirti įgyvendinti jūrų robotikos kūrimo aplinkosaugos tikslais Ukrainoje koncepciją. Išskiriami pagrindiniai veiksmingos organizacinės struktūros, užtikrinančios mokslinių tyrimų institucijų, gamybos įmonių, valstybės institucijų ir tarptautinių partnerių sąveiką, elementai. Analizuojama pasaulinė ir vidaus patirtis diegiant jūrų robotikos sistemas aplinkosaugos srityje. Siūlomas jūrinių robotizuotų platformų kūrimo, testavimo, diegimo ir eksploatavimo proceso subjektų sąveikos modelis. Daugiausia dėmesio skiriama tarpdisciplininiam požiūriui, inovatyvių technologijų integravimui, personalo kompletavimui ir tarptautiniam bendradarbiavimui.

Pagrindiniai žodžiai: jūrų robotika, aplinkos apsaugos veikla, organizacinė struktūra, aplinkos stebėsena, automatizuotos sistemos, viešasis administravimas, inovatyvios technologijos, tarptautinis bendradarbiavimas, kūrimas ir diegimas, povandeninės autonominės transporto priemonės.

AUTOMOBILIŲ GAMINTOJŲ PREKĖS ŽENKLO LOJALUMO DETERMINANTAI: EMPIRINIS TYRIMAS

*Dr. Rytis Zautra, dr. Lina Kankevičienė, Tadas Mažliakas, Modestas Juškauskas,
Gantas Brazaitis, Laurynas Žemčiūgas, Mantas Rastapkevičius
Kauno kolegija*

Anotacija

Šiame tyrime analizuojami automobilių gamintojų prekės ženklo lojalumo veiksniai ir jų įtaka vartotojų elgsenai. Dėmesys skiriamas lojalumo pokyčiams per du skirtingus laikotarpius (2020–2022 m. ir 2022–2024 m.), vertinant tiek prekės ženklo, tiek autoserviso lojalumo rodiklius. Empiriniame tyrime dalyvavo 39 skirtingų automobilių gamintojų prekės ženklų automobilių savininkai. Tyrimas pagrįstas autoserviso klientų apsilankymų duomenimis, o taikyti metodai – mokslinės literatūros apžvalga bei statistinių duomenų rinkimas ir analizė. Tyrime buvo nustatyti keli kriterijai: bendras unikalių klientų skaičius, kurie per visą tyrimo laikotarpį lankėsi autoservise ir pakartotinai apsilankiusių klientų skaičius, t. y., kiek klientų sugrįžo su ta pačia transporto priemone per dvejų metų laikotarpį. Tyrimo rezultatai parodė, kad klientų grįžtamumo rodiklis per antrąją analizuojamą laikotarpį siekė vos 10,35 proc. Šį pokytį galėjo lemti didėjanti konkurencija, klientų perėjimas į kitus servisus, kintantys automobilių priežiūros poreikiai bei paslaugų kokybės ar kainodaros veiksniai. Lyginant abu laikotarpius, pastebėti ryškūs lojalumo pokyčiai tarp skirtingų automobilių gamintojų. Pirmuoju laikotarpiu lojalumo lyderiais buvo „Land Rover“, „Hyundai“ ir „Citroen“, tuo tarpu antrajame laikotarpyje dominavo „Dacia“, „Lexus“ ir „Honda“. Tyrimo rezultatai rodo, kad lojalių klientų išlaikymui svarbūs ne tik aukštos kokybės autoserviso paslaugos, bet ir lojalumo programos bei tikslinės rinkodaros strategijos, skatinančios pakartotinius apsilankymus. Šie rezultatai suteikia naudingų įžvalgų tiek akademinei bendruomenei, tiek praktiniam verslo sektoriui, padedant suprasti vartotojų elgsenos tendencijas ir optimizuoti klientų lojalumo strategijas.

Pagrindiniai žodžiai: lojalumas, autoservisas, prekės ženklas, empirinis, tyrimas, analizė.

ĮVADAS

Automobilių pramonė yra viena didžiausių ir konkurencingiausių pasaulyje, kurioje prekės ženklo lojalumas vaidina svarbų vaidmenį vartotojų sprendimuose. Siekdami išlaikyti ir pritraukti klientus, gamintojai turi suprasti, kokie veiksniai lemia vartotojų lojalumą ir grįžtamumą į autoservisus.

Lojalumą gali lemti tiek objektyvūs, tiek emociniai veiksniai: automobilio kokybė, technologijos, dizainas, aplinkosauginiai aspektai, taip pat vartotojų pasitikėjimas gamintoju ar servisu. Pastaraisiais metais rinkoje stebimos tendencijos – auganti konkurencija, naujų technologijų plėtra ir besikeičiantys vartotojų lūkesčiai – daro įtaką lojalumo formavimuisi. Nors tyrimų apie automobilių gamintojų prekės ženklo determinantus vis dar trūksta, empiriniai duomenys gali suteikti vertingų įžvalgų apie tai, kaip šie veiksniai veikia vartotojų elgseną. Toks tyrimas yra ypač svarbus, nes automobilių pramonė šiandien pereina į naujas fazes, kur dominuoja ne tik techniniai pokyčiai, bet ir didėjantis vartotojų dėmesys tvarumui, aplinkosaugai ir socialinei atsakomybei.

Šis straipsnis pristato empirinį tyrimą, pagrįstą autoserviso klientų apsilankymų dažnumo duomenimis per du laikotarpius: 2020–2022 m. ir 2022–2024 m. Tyrimo rezultatai padeda giliau suprasti, kaip veikia prekių ženklų strategijos automobilių pramonėje, ir kokie determinantai turėtų būti įtraukti į gamintojų strategijas, kad pasiektų maksimalų poveikį vartotojų pasirinkimams. Be to, tyrimas suteikia praktinių įžvalgų gamintojams, kaip optimizuoti savo prekės ženklo valdymą ir komunikaciją, atsižvelgiant į vartotojų lūkesčius ir poreikius.

Tyrime nagrinėjama, kaip dažnai klientai sugrįžta į tą patį autoservisą per dvejų metų laikotarpį, taip pat analizuojamos lojalumo tendencijos tarp skirtingų automobilių gamintojų.

Tyrimo objektas – automobilių priežiūros įmonės klientų lojalumas.

Tyrimo tikslas – išanalizuoti automobilių gamintojų prekės ženklo lojalumo determinantus ir jų įtaką vartotojų elgsenai, remiantis 2020–2024 m. duomenimis. Tyrimas siekia išsiaiškinti, kokie determinantai (kokybė, technologijos, dizainas, aplinkosaugos aspektai, emociniai ryšiai ir kt.) turi didžiausią įtaką vartotojų sprendimams.

Tyrimo uždaviniai:

1. Išanalizuoti automobilių pramonės lojalumo determinantus, atskiriant prekės ženklo ir autoserviso lojalumo aspektus bei jų įtaką vartotojų pasirinkimams.
2. Atlikti empirinį tyrimą, nustatyti klientų grįžtamumo rodiklį ir įvertinti pagrindinius determinantus, lemiančius pakartotinius apsilankymus autoservise.
3. Įvertinti lojalumo pokyčius, nustatant, kaip skirtingi prekės ženklo lojalumo determinantai veikia vartotojų pasirinkimus ir lojalumą.

Tyrimo metodai – statistinių duomenų rinkimas ir analizė, mokslinės literatūros apžvalga.

Tyrimas buvo vykdomas keturiais etapais, sutampančiais su kalendoriniais metais: 1 etapas – 2020 m., 2 etapas – 2021 m., 3 etapas – 2023 m. ir 4 etapas – 2024 m. Apdoroti visų keturių tyrimo etapų duomenys buvo susisteminti ir suskirstyti į dvi laikotarpių grupes: 2020–2022 m. (I laikotarpis) ir 2022–2024 m. (II laikotarpis). Tyrimo pagrindu buvo nustatyti keli kriterijai: bendras unikalų klientų skaičius, kurie per visą tyrimo laikotarpį lankėsi autoservise ir pakartotinai apsilankiusių klientų skaičius, t. y., kiek klientų sugrįžo su ta pačia transporto priemone per dvejų metų laikotarpį.

1. KLIENTŲ LOJALUMO DINAMIKA IR VEIKSNIAI AUTOMOBILIŲ PRAMONĖJE

Lojalumas yra vienas svarbiausių veiksnių automobilių aptarnavimo sektoriuje, nes jis glaudžiai siejasi su klientų pasitenkinimu ir paslaugų kokybe. Pastaraisiais dešimtmečiais vartotojų elgsena tapo sudėtingesnė ir labiau emocinė – pirkėjai ne tik ieško transporto priemonės, atitinkančios jų kasdienes poreikis, bet ir vis dažniau per ją išreiškia savo socialines vertybes, tapatybę ar net moralines nuostatas. Pavyzdžiui, ekologiškų automobilių pasirinkimas ar gamintojų, skiriančių dėmesį tvarumui, palaikymas tampa reikšmingais sprendimų priėmimo kriterijais.

Vartotojai pasitiki prekės ženklais, kurie užtikrina aiškią ir nuoseklią komunikaciją bei diegia inovacijas, atitinkančias šiuolaikinius technologinius ir socialinius iššūkius. Elektriniai automobiliai, autonominės transporto priemonės ir išmaniosios vairavimo sistemos keičia prekės ženklų vertės suvokimą bei formuoja naujus rinkos standartus. Globalios tendencijos – elektromobilių populiarėjimas, autonominių technologijų plėtra ir augantis dėmesys aplinkosaugai – didina gamintojų atsakomybę ne tik kuriant produktus, bet ir išlaikant konkurencinį pranašumą bei kuriant vartotojams reikšmingą vertę.

Lojalumas automobilių pramonėje gali būti nagrinėjamas dviem pagrindiniais aspektais: prekės ženklo lojalumas, kuris parodo, kiek klientai yra linkę vėl įsigyti to paties gamintojo automobilį, ir autoserviso lojalumas, kuris atspindi, ar vairuotojai sugrįžta į tą patį autoservisą techninei priežiūrai ir remontui. Nors šios dvi lojalumo formos gali būti tarpusavyje susijusios, jas lemia skirtingi veiksniai – prekės ženklo lojalumui didžiausią įtaką daro produkto kokybė, inovacijos ir emocinis ryšys su gamintoju, o autoserviso lojalumui – paslaugų kokybė, aptarnavimas ir kainodara.

1 lentelėje pateikti automobilių gamintojai su didžiausiu klientų lojalumu, palyginant dabartinius ir praėjusių metų duomenis.

1 lentelė. Užsienio automobilių pardavimo lojalumo statistiniai duomenys (proc.)

Prekės ženklas	Dabartinių metų lojalumas	Praėjusių metų lojalumas	Metinis pokytis
Ferrari	71,4	66,7	4,7
Hyundai	66,8	67,8	-1,0
Honda	66,4	68,6	-2,2

Kia	66,0	68,2	-2,2
Toyota	65,6	63,6	2,0
Subaru	65,0	73,2	-8,2
BMW	64,1	66,7	-2,6
Ford	62,1	73,1	-11,0
RAM	61,9	62,7	-0,8
Chevrolet	61,8	66,4	-4,6

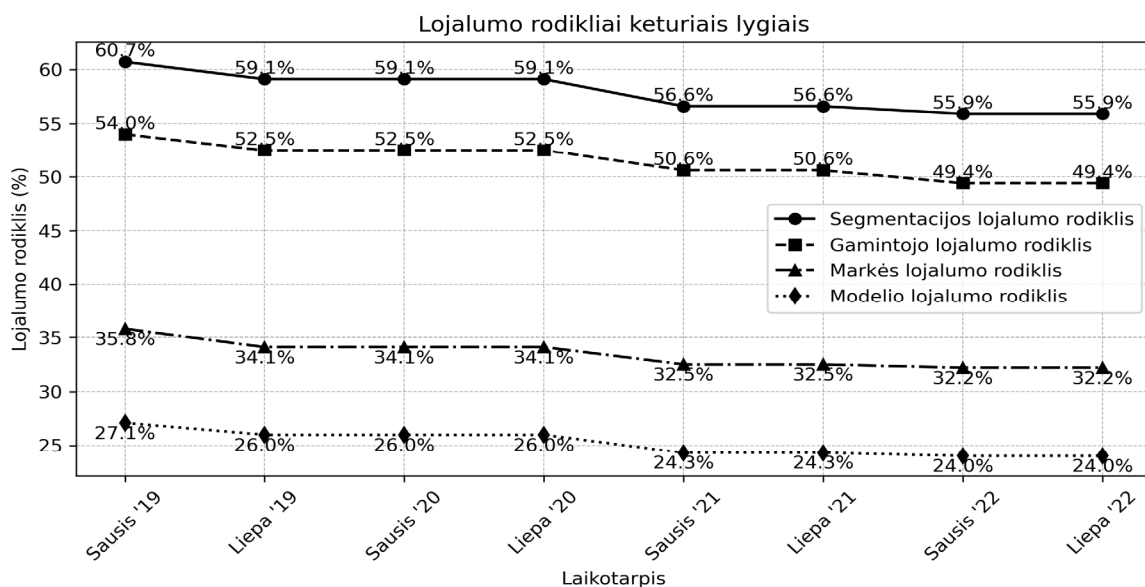
Šaltinis: Zach Shefska (2021). Automakers With the Most & Least Loyal Customers. Auto advocate. Prieiga per internetą <https://caredge.com/guides/automaker-loyalty>

Prekės ženklo lojalumą dažniausiai nulemia automobilio patikimumas, eksploatacijos išlaidos, vairavimo patirtis ir bendras pasitenkinimas gamintojo siūlomais modeliais bei paslaugomis. Pavyzdžiui, „Ferrari“ yra lojalumo lyderis su 71,4 proc. šių metų lojalumu, kuris išaugo 4,7 proc. lyginant su praėjusiais metais (1 lentelė). Tai vienintelis prekės ženklas, peržengęs 70 proc. lojalumo ribą. Tarp masinės rinkos gamintojų pirmauja „Hyundai“ su 66,8 proc. lojalumo rodikliu, o šalia rikiuojasi „Honda“ (66,4 proc.) ir „Kia“ (66 proc.). „Toyota“ ir „Subaru“ taip pat patenka į penktą labiausiai „prieinamų“ prekės ženklų, o toliau seka „BMW“, „Ford“, „RAM“ ir „Chevrolet“ (Shefska, 2021).

Tačiau, vertinant prekės ženklo lojalumo pokyčius per tam tikrą laikotarpį, matyti, kad kai kurie gamintojai susidūrė su sunkumais išlaikant klientus. Pavyzdžiui, „Subaru“ ir „Ford“ lojalumo rodikliai per pastaruosius metus smarkiai sumažėjo, iš dalies dėl puslaidininkių trūkumo ir nesugebėjimo gaminti pakankamą kiekį transporto priemonių, atitinkančių paklausą. Tuo tarpu tik dvi markės – „Ferrari“ ir „Toyota“ – sugebėjo išlaikyti teigiamą lojalumo augimą, kas gali būti siejama su stipriu prekės ženklo įvaizdžiu, patikimumu ir nuosekliu klientų pasitikėjimu (Shefska, 2021).

Autoserviso lojalumas, kita vertus, priklauso nuo paslaugų kokybės, aptarnavimo patirties, kainodaros ir klientų pasitikėjimo mechanikais bei naudojamomis detalėmis. Nors vartotojai gali būti lojalūs konkrečiam automobilių gamintojui, tai nebūtinai reiškia, kad jie nuolat lankysis oficialiose atstovybėse ar tam tikruose servisuose. Autoservisai, norėdami išlaikyti lojalius klientus, turi ne tik užtikrinti aukščiausios kokybės paslaugas, bet ir pasiūlyti konkurencingas kainas bei pridėtinę vertę, tokią kaip garantiniai remontai, nuolaidos ar patogios klientų aptarnavimo galimybės. Šių dviejų lojalumo formų analizė leidžia geriau suprasti vartotojų elgseną ir padeda gamintojams bei servisams formuoti efektyvesnes strategijas, siekiant išlaikyti esamus klientus ir skatinti ilgalaikius santykius su jais.

Pasak „S&P Global Mobility“ direktoriaus Tomo Libby (2021), pastaraisiais metais automobilių pramonėje pastebimas lojalumo mažėjimas (1 pav.). Automobilių trūkumas, kurį sukėlė pandemija ir puslaidininkių stygius, lėmė tai, kad pirkėjai dažniau atsisako savo mėgstamų prekės ženklų ir ieško alternatyvų. Ryšys tarp lojalumo ir automobilių pasiūlos dienų yra labai stiprus – mažėjant atsargoms, mažėja ir lojalumas. „Naujų transporto priemonių registracijos duomenys rodo, kad namų ūkių lojalumas keturiose kategorijose – gamintojo, prekės ženklo, segmento ir modelio lygmenyse – yra mažiausias bent jau nuo 2019 m. pradžios,“ – teigia Tom Libby. 2022 m. liepos mėn. transporto priemonių registracijos duomenys – naujausi tuo metu prieinami – pažymėjo trečią mėnesį iš eilės, kai į rinką grįžtantys vartotojai dažniau rinkosi kitą prekės ženklą, nei išliko lojalūs savo ankstesniam pasirinkimui.



1 pav. Skirtingi lojalumo lygmenys pagal pardavimų kategoriją

Šaltinis: Tom Libby (2021). Automotive brand loyalty rate dips below 50 percent for third straight month. S&P Global Mobility. Prieiga per internetą <https://www.spglobal.com/mobility/en/research-analysis/automotive-brand-loyalty-rate-dips-below-50-for-third-straight.html>

Visos automobilių pramonės prekės ženklo lojalumas liepą siekė vos 49,4 proc., tai buvo žemiausias rodiklis per pastaruosius trejus metus. Gamintojo lojalumas, siekęs 55,9 proc., taip pat buvo žemiausias bet kurio mėnesio rodiklis per šį laikotarpį. Segmento lojalumas liepą nukrito iki 32,2 proc., palyginti su 35,8 proc. prieš trejus metus, o modelio lojalumas sumažėjo daugiau nei trimis procentiniais punktais, siekdamas vos 24 proc. Abu šie rodikliai buvo žemiausi per bet kurį mėnesį šiuo laikotarpiu. Pasak Tom Libby (2021), lojalumo mažėjimas rodo, kad „vartotojai, kurie anksčiau buvo lojalūs tam tikriems prekės ženkams ir pasitikėjo pardavėjais, dabar dažniau renkasi konkurentų pasiūlymus nei grįžta prie ankstesnio modelio. Tai kelia grėsmę tiek prekės ženklo rinkos daliai, tiek pardavėjų pelningumui“.

Didėjantys vartotojų perėjimo rodikliai ne tik kelia iššūkių gamintojams, bet ir atveria naujas galimybes pritraukti naujus klientus. Automobilių gamintojai ir atstovybės gali pasinaudoti šia situacija, stiprindami savo pasiūlymus ir optimizuodami atsargas. Jei rinkoje pasirodo naujas arba atnaujintas modelis, kuris turi stipresnę vertę ir produkto pasiūlą nei konkurentai, bei yra gaminamas pakankamais kiekiais, tai suteikia puikią galimybę pervilioti klientus.

Remiantis empiriniais tyrimais, klientų elgseną ir jų norą grįžti į tą patį autoservisą lemia keletas pagrindinių veiksnių. Svarbiausi paslaugų kokybės aspektai yra:

- Patikimumas. Dažniausiai įvardijamas kaip svarbiausias veiksnys, apimantis gebėjimą teikti paslaugas tiksliai ir nuosekliai (Izogo & Ogba, 2014; Kadir, 2023; Halika & Kharisma, 2024; Setiono & Hidayat, 2022). Tyrimai rodo, kad patikimumo dimensija gali sudaryti net 86,8 proc. klientų pasitenkinimo (Kadir, 2023).

- Atsakingumas. Operatyvus klientų poreikių sprendimas ir užklausų valdymas yra esminiai. Efektyvus bendravimas ir savalaikis informacijos teikimas stiprina klientų pasitikėjimą ir paslaugų kokybę (Izogo & Ogba 2014; Kadir, 2023; Zygiaris et al., 2022).

- Pasitikėjimas. Tai profesionalumas ir darbuotojų gebėjimas įkvėpti pasitikėjimą, ypač atliekant sudėtingus remonto darbus (Izogo & Ogba, 2014; Kadir, 2023). Darbuotojų kompetencija, mandagumas, teigiamas požiūris ir efektyvus bendravimas yra svarbūs veiksniai, užtikrinantys klientų pasitikėjimą (Zygiaris et al., 2022).

- Fizinė aplinka. Švarus, modernus ir estetiškai patrauklus servisas sukuria geresnį klientų įspūdį ir skatina pasitikėjimą teikiamomis paslaugomis (Emeka & Ogba, 2014; Fathulloh & Purnama, 2024).

- Empatija. Asmeninis dėmesys ir klientų poreikių supratimas padeda kurti ilgalaikius santykius ir stiprina lojalumą (Emeka & Ogbra, 2014; Zygiaris et al., 2022; Taylor, 2024). Svarbu suprasti kliento poreikius, suteikti individualizuotą dėmesį ir paaiškinti remonto procesus (Zygiaris et al., 2022).

Patikimumas, kaip gebėjimas tiksliai ir laiku suteikti paslaugą, yra stipriausiai susijęs su lojalumu, o empatiškas aptarnavimas gali kompensuoti kitus trūkumus ir pagerinti klientų patirtį (Zygiaris et al., 2022). „Aukštas pasitenkinimo lygis didina tikimybę, jog klientai sugrįš į tą patį autoservisą“ (Emeka & Ogbra, 2014). Be to, tyrimai pabrėžia, kad vizualiniai ir aplinkos veiksniai daro reikšmingą įtaką klientų pasitikėjimui, o tai rodo, kad autoservisai, siekdami išlaikyti lojalius klientus, turėtų ne tik užtikrinti aukštą techninį aptarnavimo lygį, bet ir investuoti į klientų aptarnavimo kultūrą bei fizinės aplinkos gerinimą. Šie aspektai kartu gerina klientų patirtį ir didina jų pasitenkinimą. Nors jie yra esminiai, svarbu nepamiršti, kad klientų lojalumą gali lemti ir išoriniai veiksniai, tokie kaip rinkos konkurencija ir ekonominės sąlygos, kurios tam tikrais atvejais gali lemti paslaugų kokybę.

2. KLIENTŲ LOJALUMO VERTINIMAS REMIANTIS GRĮŽTAMUMO RODIKLIAIS PER DU SKIRTINGUS LAIKOTARPIUS

Šis tyrimas buvo atliktas siekiant įvertinti klientų lojalumo tendencijas, remiantis automobilių aptarnavimo duomenimis dviejuose laikotarpiuose: 2020–2022 m. ir 2022–2024 m. Pagrindinis analizės tikslas buvo nustatyti, kiek klientų sugrįžo į servisą antruoju laikotarpiu ir įvertinti pakartotinių apsilankymų dažnumą.

Pirmajame laikotarpyje (2020–2022 m.) buvo aptarnauti 3726 unikalūs automobiliai, o iš viso užfiksuoti 5737 apsilankymai. Antrajame laikotarpyje (2022–2024 m.) unikalių automobilių skaičius sumažėjo iki 2011, o bendras apsilankymų skaičius – iki 4423. Tarp šių duomenų nustatyta, kad 1120 įrašų yra sutampantys, reiškiantys pakartotinius apsilankymus antruoju laikotarpiu. Be to, 594 automobiliai buvo identifikuoti kaip unikalūs sugrįžę klientai, sudarantys 15,94 proc. grįžtamumo rodiklį, lyginant su 3726 automobiliais iš pirmojo laikotarpio. Kita vertus, šie 594 automobiliai sudaro 29,54 proc. visų 2011 antrajame laikotarpyje aptarnautų unikalių automobilių, kas rodo, kad beveik trečdalis klientų yra lojalūs ir grįžta į servisą – tai galima laikyti teigiamu rezultatu. Gauti rezultatai leidžia daryti prielaidą, kad didžioji dalis klientų po pirmojo aptarnavimo nebegrįžta. Tai gali reikšti jų perėjimą į kitus autoservisus arba sumažėjusį poreikį papildomam remontui. Pastebėtas bendras apsilankymų skaičiaus sumažėjimas gali būti siejamas su ekonominiais veiksniais, konkurencijos padidėjimu ar paslaugų pasirinkimo pokyčiais klientų tarpe.

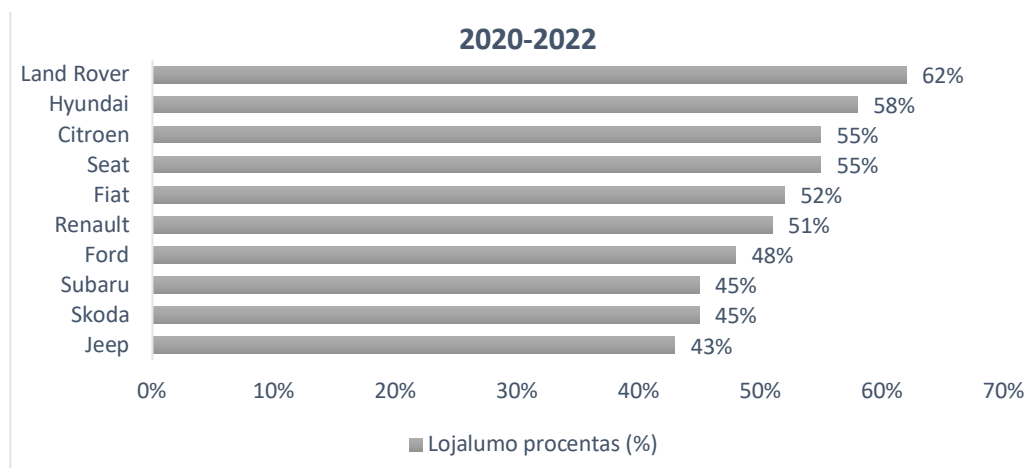
Dažniausiai aptarnautos automobilių markės buvo Audi, BMW, Volkswagen, Toyota, Mercedes-Benz, Ford, Opel, Nissan, Peugeot, Renault ir Volvo. Šie duomenys gali rodyti, kad šių gamintojų automobiliai dažniau reikalauja techninės priežiūros arba jų savininkai yra labiau linkę reguliariai lankytis servisuose. Verta pastebėti, kad dalis įrašų buvo netikslūs, todėl gali būti, kad dėl šios priežasties dalis duomenų nesutampa. Rekomenduojama atlikti duomenų patikrinimą ir atnaujinimą, kad būtų galima tiksliau stebėti klientų grįžimo tendencijas.

Siekiant padidinti klientų grįžtamumą, autoservisams rekomenduojama diegti lojalumo programas, siūlyti specialias nuolaidas ar paslaugų paketus nuolatiniam klientams. Be to, verta atlikti rinkodaros analizę ir klientų apklausas, siekiant išsiaiškinti galimas priežastis, dėl kurių mažėja paslaugų paklausa, ir pasiūlyti atitinkamus sprendimus. Tikslus klientų duomenų atnaujinimas bei lojalumo strategijų pritaikymas gali padėti pagerinti servisų konkurencingumą ir išlaikyti didesnę klientų ratą ateityje. Norint geriau suprasti, kaip pagerinti lojalumą ir pritraukti daugiau grįžtančių klientų, reikėtų toliau tirti sezoniskumo įtaką, klientų pasitenkinimo lygį bei automobilių aptarnavimo efektyvumą. Taip pat būtų naudinga įvertinti klientų elgseną ir jų grįžimo motyvus, kad būtų galima pasiūlyti tikslias paslaugas.

3. AUTOMOBILIŲ PREKĖS ŽENKLO LOJALUMO ANALIZĖ: DVIEJŲ LAIKOTARPIŲ DUOMENŲ PALYGINIMAS

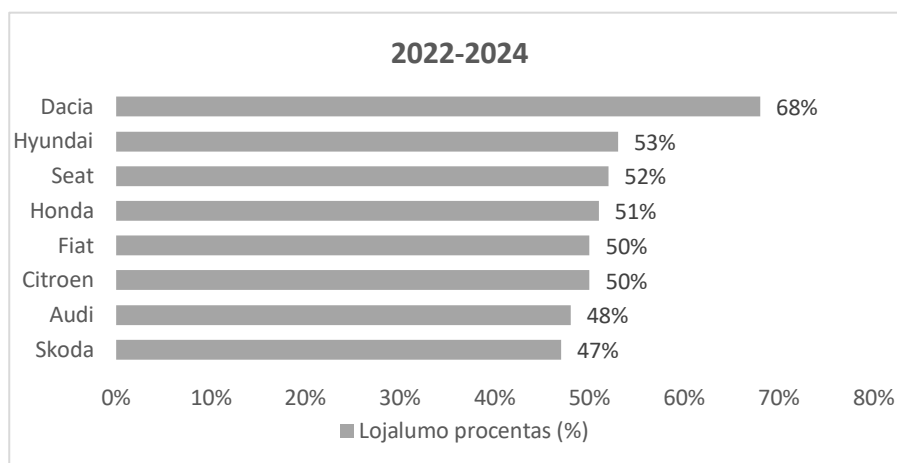
Analizuojant vieno autoserviso klientų lojalumo rodiklius per du skirtingus laikotarpius (2020–2022 m. ir 2022–2024 m.), galima pastebėti reikšmingus pokyčius, atskleidžiančius tiek klientų elgsenos tendencijas bei galimus paslaugų kokybės ar rinkodaros strategijų pokyčius.

Pirmajame laikotarpyje didžiausią lojalumo rodiklį demonstravo „Land Rover“ (62 proc.), „Hyundai“ (58 proc.) ir „Citroen“ (55 proc.), tai reiškia, kad daugiau nei pusė šių gamintojų klientų sugrįžo į tą patį autoservisą pakartotiniams vizitams. Vidutinis lojalumo rodiklis tarp visų gamintojų buvo 42 proc. – tai dalis klientų, kurie sugrįžo į servisą po pirminio apsilankymo pirmojo laikotarpio metu. Tačiau lyginant su antruoju laikotarpiu, kurio bendras lojalumo rodiklis siekė 29,54 proc., matomas ryškus kritimas, kuris signalizuoja apie galimas problemas. Šį rodiklį būtų galima pagerinti, taikant klientų išlaikymo strategijas, nagrinėtas ankstesniame skyriuje.



2 pav. 2020–2022 laikotarpio lojalumo statistika pagal automobilio prekės ženklą
Šaltinis: sudaryta autorių.

Antruoju laikotarpiu lojalumo lyderių trejetukas pasikeitė – aukščiausi rodikliai užfiksuoti „Dacia“ (68 proc.), „Lexus“ (56 proc.) ir „Honda“ (53 proc.). Šie pokyčiai gali būti susiję su tam tikrų gamintojų automobilių techninės priežiūros poreikiu, autoserviso specializacija ar paslaugų kokybės pokyčiais. Pavyzdžiui, „Dacia“ lojalumo augimas gali reikšti, kad servisas pritraukė ir išlaikė didelę šios markės vairuotojų dalį, galbūt dėl konkurencingų kainų ar geresnio suderinamumo su šio gamintojo automobiliais.



3 pav. 2022–2024 laikotarpio lojalumo statistika pagal automobilio prekės ženklą
Šaltinis: sudaryta autorių.

Be to, kai kurių gamintojų lojalumo rodikliai sumažėjo, nors bendras klientų skaičius galėjo išaugti. Tai gali reikšti, kad didesnė dalis naujų klientų pasirinko servisą tik vienkartiniam apsilankymui ir vėliau negrįžo. Šią tendenciją gali lemti paslaugų kainodara, klientų aptarnavimo pokyčiai ar konkurentų pasiūlymai. Pavyzdžiui, „Hyundai“ ir „Citroen“, kurie pirmuoju laikotarpiu buvo tarp lojalumo lyderių, antrajame laikotarpyje prarado aukštas pozicijas. Tai gali reikšti didesnę šių markių automobilių paslaugų skaidymąsi tarp skirtingų servisų arba pasikeitusią techninės priežiūros paklausą. Dar viena pastebima tendencija – kai kurių gamintojų lojalumo rodiklių stabilumas arba nuoseklus augimas. „Lexus“ išlaikė gana aukštą lojalumo procentą abiejuose laikotarpuose, kas gali rodyti tam tikrą klientų pasitikėjimą šio autoserviso teikiamomis paslaugomis. Tuo tarpu „Honda“ ir „Dacia“ fiksuoja lojalių klientų skaičiaus augimą, kas gali būti susiję su šių markių automobilių priežiūros poreikiu ir teigiamomis klientų patirtimis.

Šių duomenų analizė rodo, kad klientų lojalumas autoservisui nėra pastovus rodiklis – jį gali lemti ne tik autoserviso veiklos strategija ir paslaugų kokybė, bet ir platesni rinkos veiksniai, tokie kaip automobilių senėjimo tendencijos, gamintojų rekomendacijos dėl techninės priežiūros ar konkurentų paslaugų prieinamumas. Tokie duomenys leidžia geriau suprasti, kokių markių automobilių savininkai labiausiai linkę sugrįžti į servisą, o kurių lojalumas yra mažesnis, ir tai gali būti svarbi įžvalga formuojant klientų pritraukimo bei išlaikymo strategijas.

IŠVADOS

1. Automobilių pramonėje lojalumas reiškiasi dviem formomis: prekės ženklo lojalumu ir autoserviso lojalumu. Prekės ženklo lojalumą daugiausia formuoja automobilio kokybė, technologiniai sprendimai, dizainas, aplinkosaugos aspektai ir emocinis vartotojo ryšys su gamintoju. Automobilių gamintojų prekės ženklo lojalumas per pastaruosius metus mažėjo, daugiausia dėl rinkos sutrikimų ir tiekimo grandinės problemų. 2022 m. liepą gamintojo lojalumas siekė vos 55,9 proc., o tai buvo žemiausias rodiklis per trejus metus. Tuo tarpu autoserviso lojalumui didžiausią įtaką daro paslaugų kokybė, kainodara, klientų aptarnavimo lygis bei pasitikėjimas meistras ir naudojamomis detalėmis. Nors vartotojai gali būti lojalūs konkrečiam automobilių gamintojui, tai nebūtinai reiškia, kad jie visada renkasi oficialius serviso centrus – lojalumas autoservisams dažniausiai priklauso nuo jų teikiamos vertės ir aptarnavimo kokybės.

2. Empirinio tyrimo rezultatai atskleidė, kad klientų grįžtamumo rodiklis per antrąją analizę (2022–2024 m.) siekė 29,54 proc., o tai rodo, kad didesnė dalis klientų po pirmojo apsilankymo negrįžo. Tai gali reikšti, kad klientai renkasi kitus serviso centrus, jų transporto priemonės reikalauja retesnės priežiūros arba keičiasi klientų įpročiai dėl ekonominių ir rinkos veiksnių. Pastebima, kad dažniausiai aptarnaujamos markės – „Audi“, „BMW“, „Volkswagen“, „Toyota“ ir „Mercedes-Benz“ – gali turėti didesnę lojalumą, nes šių automobilių savininkai dažniau sugrįžta į servisą. Tai gali būti siejama su tam tikrų modelių priežiūros poreikiu arba didesniu pasitikėjimu autoserviso paslaugomis. Tačiau nesugrįžusių klientų skaičiai gali signalizuoti duomenų valdymo problemas arba natūralų klientų migravimą tarp skirtingų paslaugų teikėjų. Šie duomenys pabrėžia, kad norint didinti klientų grįžtamumą, autoservisai turėtų apsvarstyti lojalumo programas, specialius pasiūlymus nuolatiniais klientams ir tikslines rinkodaros kampanijas, skirtas populiariausiems automobilių gamintojams. Taip pat svarbu išanalizuoti klientų pasitenkinimą bei jų elgsenos pokyčius, kad būtų galima geriau suprasti jų lūkesčius ir pasiūlyti patrauklesnes paslaugas.

3. Pirmojo laikotarpio lojalumo analizė atskleidė, kad vidutinis lojalumo rodiklis tarp visų gamintojų buvo 42 proc. 2020–2022 m. laikotarpiu aukščiausią lojalumo rodiklį demonstravo tokie gamintojai kaip „Land Rover“, „Hyundai“ ir „Citroen“, tačiau 2022–2024 m. šias pozicijas užėmė „Dacia“, „Lexus“ ir „Honda“. Tai gali būti siejama su serviso specializacija, paslaugų kokybe ar klientų elgsenos pokyčiais. Pastebėtas ir kai kurių gamintojų lojalumo mažėjimas, rodantis, kad dalis klientų po pirmojo apsilankymo negrįžta, galbūt dėl konkurencijos ar skirtingų techninės priežiūros poreikių. Stabiliai lojalių markių, tokių kaip „Lexus“ ar „Dacia“, atvejai rodo, kad tam tikri klientai linkę sugrįžti dėl geros aptarnavimo patirties ar serviso pritaikymo jų poreikiams. Klientų lojalumas nėra pastovus – jį lemia tiek paslaugų kokybė, tiek rinkos veiksniai. Siekiant išlaikyti sugrįžtančius klientus, svarbu nuolat analizuoti jų poreikius ir tobulinti serviso strategijas.

Literatūra

1. Fathulloh, M. A., & Purnama, N. (2024). Assessing Customer Satisfaction in Automotive After-sales Service: A SERVQUAL Analysis. *Asian Journal of Economics, Business and Accounting*, 24(9), 98–110. <https://doi.org/10.9734/ajeba/2024/v24i91479>
2. Halika, N., & Kharisma, K. (2024). Study of the Effects of Service Quality Variables on Customer Satisfaction and Loyalty. *Journal of Social Science and Business Studies*, 2(2), 186–190. <https://doi.org/10.61487/jssbs.v2i2.57>
3. Izogo, E.E. & Ogba, I. (2014). Service quality, customer satisfaction and loyalty in automobile repair services sector. *International Journal of Quality & Reliability Management*, 32(3):250-269 DOI:10.1108/IJQRM-05-2013-0075
4. Kadir, A. (2023). THE INFLUENCE OF SERVICE QUALITY DIMENSIONS ON CUSTOMER SATISFACTION IN LIMITED COMPANIES (PT). ADIRA DINAMIKA MULTI FINANCE SATELLITE SIDENRENG RAPPANG DISTRICT. *Journal Management And Business*, 1(2), 122-131.
5. Libby, T.. (2021). *Automotive brand loyalty rate dips below 50% for third straight month*. S&P Global Mobility. Prieiga per internetą <https://www.spglobal.com/mobility/en/research-analysis/automotive-brand-loyalty-rate-dips-below-50-for-third-straight.html>
6. Setiono, B. A., & Hidayat, S. (2022). Influence of Service Quality with the Dimensions of Reliability, Responsiveness, Assurance, Empathy and Tangibles on Customer Satisfaction. *International Journal of Economics, Business and Management Research*, 06(09), 330–341. <https://doi.org/10.51505/ijebmr.2022.6924>
7. Shefska, Z. (2021). Automakers With the Most & Least Loyal Customers. Auto advocate. Prieiga per internetą <https://caredge.com/guides/automaker-loyalty>.
8. Taylor, R. (2024). UNVEILING CUSTOMERS' PERCEPTIONS: A COMPREHENSIVE ANALYSIS OF SERVICE QUALITY DIMENSIONS. *The American Journal of Management and Economics Innovations*, 6(04), 01-06.
9. Zygiaris, S., Hameed, Z., Alsubaie, M. A., & Rehman, S. (2022). Service Quality and Customer Satisfaction in the Post Pandemic World: A Study of Saudi Auto Care Industry. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.842141>

DETERMINANTS OF AUTOMOBILE MANUFACTURERS' BRAND LOYALTY: AN EMPIRICAL STUDY

Summary

This study analyses the factors influencing brand loyalty of automobile manufacturers and their impact on consumer behaviour. The focus is on changes in loyalty over two different periods (2020–2022 and 2022–2024), assessing both brand and service centre loyalty indicators. The empirical study involved 39 owners of vehicles from different automobile manufacturers. The research is based on service centre customer visit data, with applied methods including a scientific literature review and statistical data collection and analysis.

Several criteria were established in the study: the total number of unique customers who visited the service centre during the entire research period and the number of returning customers, i.e., how many customers revisited the service centre with the same vehicle within two years. The study results revealed that the customer return rate in the second analysed period was only 10,35 percent. This change could be attributed to increasing competition, customer migration to other service centres, changing vehicle maintenance needs, and factors related to service quality or pricing strategies. Significant differences in loyalty between different automobile manufacturers were observed when comparing the two periods. In the first period, the highest loyalty indicators were „Land Rover”, “Hyundai and Citroen”, and in the second period, “Dacia”, “Lexus” and “Honda” brands. The study showed that maintaining loyal customers requires not only quality services but also the implementation of loyalty programs and marketing strategies that encourage repeat visits to service centres. These findings provide valuable insights for both the academic community and the business sector, helping to understand consumer behaviour trends and optimize customer loyalty strategies.

Key words: loyalty, car service, brand, empirical, research, analysis.

A JOURNEY TOWARD THE 21ST-CENTURY BUSINESS SCHOOL: THE CASE OF ROTTERDAM BUSINESS SCHOOL

Ron Ainsbury

Finance and Banking University, Hanoi, Vietnam

Saulius Buivys

Rotterdam Business School, The Netherlands

Assoc. Prof. Dr. Gintautė Žibėnienė

Mykolas Romeris University, Lithuania

Anotacija

The rapidly evolving global business environment demands significant changes in business education, as traditional models often fail to provide students with the practical skills and adaptability needed for today's complex market. Scholars such as Beamond, Farndale & Härtel (2024) and Zsolnai (2024) argue that conventional business curricula overemphasize financial performance and theoretical models while neglecting essential social and environmental considerations. A key issue is the gap between academic knowledge and industry needs, where graduates frequently lack hands-on problem-solving skills and real-world experience (Smith & Brown, 2024). This study examines the Rotterdam Business School (RBS) experience, showcasing how business schools can integrate innovative, sustainability-driven practices and experiential learning to remain relevant. Using literature review and document analysis, the study evaluates the limitations of traditional business education and highlights emerging methodologies that bridge the gap between academia and industry. Findings indicate that close collaboration with industry, hands-on learning, and sustainability integration are crucial in preparing business graduates for future challenges.

Key words: 21st-Century Business School, experiential learning, industry collaboration.

INTRODUCTION

The rapidly evolving business landscape demands a fundamental shift in how business schools prepare students for their careers. As the global economy becomes increasingly volatile, uncertain, complex, and ambiguous (VUCA)¹, traditional business education models struggle to remain relevant. While business schools continue to provide foundational knowledge in finance, marketing, and management, they often fail to equip students with the agility, problem-solving abilities, and holistic thinking required to navigate modern challenges.

At the same time, industry expectations for business graduates are shifting. A decade ago, the most sought-after skills included critical thinking, creativity, and problem-solving, as highlighted in the World Economic Forum's *The Future of Jobs Report* (2016). Similarly, the *New Vision for Education: Fostering Social and Emotional Learning Through Technology* (2016) underscored the growing importance of social and emotional competencies, emphasising that business education must move beyond technical expertise to cultivate skills such as collaboration, adaptability, and leadership. These competencies are increasingly recognised as essential for thriving in dynamic and innovation-driven work environments. However, as we approach 2025, the global business environment continues to evolve at an accelerating pace. The World Economic Forum's *Future of Jobs Report* (2025) highlights that technological advancements—particularly in artificial intelligence (AI)—are converging with geopolitical realignments, economic volatility, and environmental challenges, redefining the core competencies needed in the workforce.

¹ First mentioned at Bennis, W., & Nanus, B. (1985), *Leaders: The Strategies for Taking Charge*.

The question of what the modern and future school should look like is becoming increasingly relevant in the context of rapid technological, economic, and social change. To address this question, the OECD (2020) outlines four possible future scenarios for schooling by 2040. „Schooling Extended“ envisions an intensified version of traditional education, making existing structures more comprehensive. „Education Outsourced“ shifts learning to external providers and digital platforms. „Schools as Learning Hubs“ reimagines schools as community-based, experiential learning spaces. Finally, „Learn-as-you-go“ suggests the decline of formal schooling, replaced by self-directed, lifelong learning integrated with work and personal growth.

These scenarios highlight the evolving role of education in an unpredictable world. Business schools, in particular, must embrace innovation, adaptability, and interdisciplinary approaches to remain relevant. The challenge is to balance traditional academic structures with the flexibility and real-world applicability needed to equip students with the skills required for the dynamic global business environment.

The main issue explored in this article is the gap between traditional business education and actual market needs. Critics argue that many business schools focus too heavily on profit maximization, often neglecting social and environmental considerations (Beamond et al., 2024; Zsolnai, 2024). Additionally, an overemphasis on theoretical models frequently results in graduates lacking practical skills necessary for the workforce (Smith & Brown, 2024).

The aim of this article is to present the experience of Rotterdam Business School (RBS) and illustrate why and how business schools should integrate innovative, sustainability-driven practices and methodologies to remain modern and relevant in today's business landscape.

A literature and document analysis was conducted to assess the shortcomings of business education programs and explore the potential impact of innovative methodologies, such as the Sustainability Pressure Cooker, on students' ability to solve real-world business challenges.

1. RETHINKING BUSINESS EDUCATION: CHALLENGES AND CHANGING EXPECTATIONS

Despite their central role in shaping future business leaders, many business schools have been criticized for their inability to adapt to changing market demands. Scholars and industry leaders have highlighted several key weaknesses in conventional business education. One of the most prominent critiques concerns the narrow focus on profit maximization, whereby traditional business curricula often prioritize financial performance and shareholder value, neglecting broader social, ethical, and environmental considerations (Beamond et al., 2024; Zsolnai, 2024). Additionally, many business schools fail to update their programs in response to technological advancements, sustainability concerns, and new business models, leading to curricula that do not reflect the realities of today's economy (Adewale, Thompson, 2020; Beamond, et al., 2024).

A further issue lies in the overreliance on theoretical frameworks, which prevents graduates from acquiring the practical experience necessary to succeed in real-world business environments (Smith & Brown, 2024). The absence of experiential learning components weakens students' ability to apply their knowledge in professional settings. Furthermore, the significant tuition fees associated with business degrees raise concerns regarding their return on investment, particularly in an era where alternative forms of education, such as online courses and certifications, offer competitive and cost-effective learning opportunities (Maldonado & De Wit, 2021, Hanson, 2024). Another commonly noted shortcoming is the lack of diversity and inclusion in business education, both in terms of student demographics and curriculum content. Many institutions fail to provide a truly global perspective, limiting students' exposure to diverse business cultures and practices (Shaikh, Katkar, Koli, Gupta & Krishnamoorthi, 2024; Karwowska & Tomczak, 2025).

These shortcomings contribute to a growing perception that business schools remain disconnected from industry realities, resulting in graduates who are ill-equipped to meet the needs of a

rapidly evolving corporate world. The increasing complexity of global business requires a workforce that possesses not only technical expertise but also adaptability, interdisciplinary thinking, and problem-solving skills. A recent study by the Graduate Management Admission Council (GMAC) in 2024 provides updated insights into the skills employers seek in business graduates. The GMAC Corporate Recruiters Survey found that employers consistently value problem-solving and strategic thinking as the top skills for graduates, both currently and in the future. Additionally, while there is an anticipated increase in the importance of artificial intelligence (AI) skills, employers continue to prioritize leadership and interpersonal abilities developed through traditional graduate business education.

At the same time, student preferences are evolving, particularly among Generation Z learners who have grown up in a digital environment. Unlike previous generations, contemporary students are surrounded by a wealth of online resources and no longer rely solely on classroom instruction for knowledge acquisition. Instead, they seek interactive, hands-on learning experiences that emphasise problem-solving in real-world contexts. Many students express a desire for business education to be more directly linked to industry, with greater opportunities for practical engagement through projects, case studies, and mentorship from practitioners rather than traditional academics. The demand for a more applied and flexible approach to learning suggests that business schools must shift from passive, lecture-based instruction to more dynamic, experiential methods of education.

Another critical factor influencing business education is the extended career lifespan of modern professionals. Historically, individuals would complete their education in their early twenties and pursue a single career path spanning approximately thirty-five to forty years. However, advancements in healthcare, shifting workforce expectations, and economic trends now suggest that individuals entering the workforce today will likely experience careers lasting between sixty-five and seventy years, often transitioning between multiple industries. This significant change necessitates a reevaluation of traditional business education structures, which have been largely designed to provide a single, static qualification rather than continuous learning opportunities.

Despite the criticisms directed at business education, attending a business school continues to offer several key benefits that extend beyond the formal curriculum. Access to high-quality resources, such as books, case studies, and academic research, remains a significant advantage. Moreover, the opportunity to engage with experienced faculty members and industry professionals provides students with valuable mentorship and insights into contemporary business practices. Another critical component of business school education is peer learning and collaboration. Interaction with fellow students exposes individuals to new skills. Additionally, business schools create an environment conducive to experiential learning moments, often referred to as “AHA moments,” where students can connect academic concepts to real-world experiences. Furthermore, one of the most enduring benefits of attending a business school is the opportunity to build a strong professional network. Relationships formed with peers, faculty, and industry contacts can provide long-term career benefits, facilitating job placements, business partnerships, and entrepreneurial ventures.

Given these advantages, business schools must prioritize enhancing these non-academic aspects of their programs, ensuring that students gain not only technical knowledge but also the interpersonal and strategic skills necessary for success in today’s business world.

2. JOURNEY OF MASTER IN CONSULTANCY AND ENTREPRENEURSHIP PROGRAMME AT ROTTERDAM BUSINESS SCHOOL

The Master in Consultancy and Entrepreneurship (MCE) at Rotterdam Business School (RBS) has continuously evolved to remain aligned with the ever-changing demands of the global business landscape. Since its establishment in 1998, the programme has been refined to integrate sustainability, real-world business challenges, and innovative learning methodologies, ensuring that graduates are well-prepared to tackle contemporary corporate and societal challenges. Designed to cultivate

practical, proactive, and hands-on problem solvers, the MCE programme blends consultancy and entrepreneurship, equipping students with the necessary skills to develop business solutions that address both economic and social needs.

Over the years, RBS has strengthened its collaboration with various companies, organizations, and industry leaders, transitioning from a “working for companies” to a “working with companies” model. Rather than merely presenting students with case studies or theoretical problems, the programme actively engages them with real-world business challenges provided by corporate partners. Through continuous feedback loops with industry representatives, students gain practical insights into sustainability, innovation, and complex problem-solving. This participatory approach embodies the experiential learning philosophy, ensuring that students develop critical business skills in a dynamic and applied setting.

At the core of the MCE programme (Figure) lies the Business Solution Design subject, which serves as a structured learning journey where students navigate three milestones before delivering a final comprehensive solution to a real-world business problem. This process is designed to help students master context analysis, rigorous problem-solving, and innovative planning essential competencies in today’s business world.

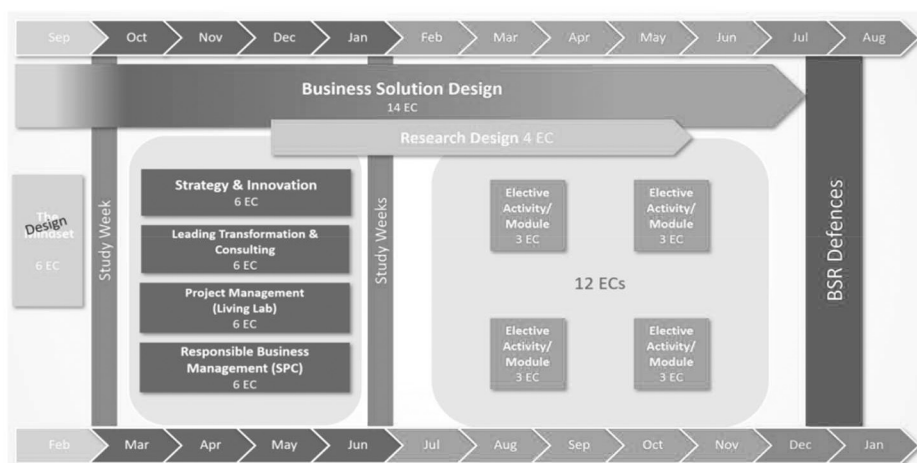


Figure. Overall Structure of the MCE programme

The programme is built around four thematic areas: The Mindset, Understanding Business and The Business Solution. Each of these themes is reinforced through live projects, interactive assignments, and close industry collaboration, allowing students to gain both technical business acumen and essential interpersonal skills. Among the innovative learning methods incorporated into the programme, the Sustainability Pressure Cooker (SPC) stands out as a high-intensity, time-constrained business challenge, encouraging students to apply sustainability principles and develop actionable solutions within a short time frame.

To ensure the MCE programme remains relevant to market needs and employer expectations, in 2022 RBS commissioned Lexnova Market Research to conduct a comprehensive study) which involved 11 in-depth interviews with industry professionals (Lexnova Marktonderzoek, 2021). These interviews provided us critical insights into the evolving expectations of business graduates, highlighting the demand for professionals who are innovative, cross-disciplinary thinkers, and capable of navigating complex sustainability and digital transformation challenges.

Several interviewees emphasized that modern businesses require graduates who possess both consultancy and entrepreneurial mindsets, as companies increasingly seek employees who can not only provide strategic advice but also implement and lead transformative initiatives. The research further underscored the growing importance of sustainability-driven business models, data analytics, and digital transformation, reinforcing the necessity for the MCE curriculum to integrate cutting-edge industry trends and real-world applications.

The transition of sustainability education at MCE also can be traced back to 2008, when a Corporate Social Responsibility (CSR) course was introduced as part of the curriculum. Initially, this course followed the Seven-Step Model developed by Grayson & Hodges (2004), emphasizing ethical business practices and corporate responsibility. However, feedback from students and industry partners highlighted the need for a more practical and integrated approach to sustainability, one that moved beyond theoretical discussions into hands-on, applied learning. The shift from CSR to Responsible Business Management was further influenced by the Responsible Business Management of SMEs (REBUSME) project, an Erasmus+ initiative launched in 2014. This project engaged students and faculty from four European countries in collaboration with SMEs in the food industry, examining how small businesses could implement sustainability strategies while remaining competitive. The project provided a living laboratory for sustainability education, with students working in teams - reinforcing the value of experiential, cross-cultural, and interdisciplinary learning. Recognizing the need for a more structured approach to experiential sustainability education, RBS launched the Sustainability Pressure Cooker (SPC) in 2016, scaling down the REBUSME model into an intensive, week-long format. The SPC model has since become an integral part of the MCE curriculum, helping students not only understand sustainability but also apply it in practice. Each year, the SPC tackles new sustainability challenges across different sectors, including renewable energy, circular economy, sustainable mobility, and responsible consumption.

One of the defining aspects of the MCE programme's sustainability transition has been its deep collaboration with industry. Instead of merely teaching sustainability concepts, the programme now co-creates sustainability solutions with businesses and public organizations. This aligns with experiential learning principles, where students learn best by engaging in real-world problem-solving.

By incorporating first-hand industry insights, practical business challenges, and an interdisciplinary approach, the MCE programme at RBS continues to adapt to the dynamic realities of the business world. Its strong emphasis on experiential learning, sustainability, and hands-on problem-solving ensures that graduates not only meet but exceed industry expectations, positioning them as future-ready professionals capable of making meaningful contributions to businesses and society.

CONCLUSIONS

1. As the business landscape continues to evolve rapidly, business schools must rethink their role in preparing students for the challenges and opportunities of the 21st-century economy. The traditional structures of business education, with their rigid academic silos and research-focused faculty, are proving insufficient in equipping graduates with the adaptability, interdisciplinary thinking, and problem-solving skills required in today's dynamic corporate world.

2. The findings from industry interviews and market research highlight the urgent need for business education reform, focusing on technology integration, sustainability, and practical learning. Employers are increasingly looking for graduates who can innovate, manage complex transitions, and bridge the gap between strategy and execution. This shift calls for business schools to move away from outdated theoretical approaches and towards a more applied, competency-based learning model.

3. A reimagined business school model should move away from the rigid structures of traditional academia and embrace a competency-driven, industry-integrated approach. Instead of focusing solely on academic credentials and theoretical frameworks, future business education should emphasize:

- Foundational Business Training – A three-month intensive introduction to business covering essential topics such as accounting, logistics, production, marketing, and problem-solving.
- Modular Specialization – Short, flexible courses that professionals can take on demand,

either full-time or part-time, catering to specific industry needs.

- Real-World Business Integration – Strong partnerships with local businesses, incubators, and innovation hubs that provide students with paid internships, consulting projects, and co-working opportunities.
- Hybrid Learning Models – A combination of online lectures, interactive case studies, and in-person workshops, ensuring that students focus on practical applications rather than passive content consumption
- Dynamic Faculty Composition – Instead of hiring professors based solely on academic publications, business schools should employ faculty members with real-world business experience, ensuring that students learn from practitioners who understand contemporary industry challenges.

4. A successful business school of the future must prioritize industry engagement, competency-based learning, and lifelong adaptability over traditional academic prestige. Degrees and diplomas should be secondary to demonstrated skills and applied expertise. While some may see this vision as ambitious, historical precedents—such as apprenticeship models in law and accounting, corporate-driven management education, and hybrid business-academic institutions like the Oxford Centre for Management Studies—demonstrate that such a transformation is not only feasible but necessary.

5. Business schools that fail to innovate and continue to prioritize outdated teaching models will struggle to attract students, as alternative educational providers, corporate training programs, and online learning platforms increasingly fill the gap. On the other hand, institutions that embrace change, integrate real-world learning, and align with the needs of industry will remain central to shaping the next generation of business leaders.

6. The Master in Consultancy and Entrepreneurship (MCE) programme at Rotterdam Business School provides a strong example of how business education can evolve. By embedding sustainability, innovation, and practical business problem-solving at its core, the programme serves as a blueprint for the business school of the future. Looking ahead, business education must continue to evolve towards flexibility, relevance, and real-world impact, ensuring that graduates are not just prepared for today's job market, but for the unpredictable challenges of the future.

List of references

1. Adewale, K., & Thompson, R. (2020). Challenges of teaching and learning business education with new technologies in university settings. *International Journal of Business and Educational Research*, 28(3), 88-102.
2. Beamond, M. T., Farndale, E., & Härtel, C. E. J. (2024). Sustainability in business education: A systematic review and future research agenda. *Critical Perspectives on International Business*, 20(2), 256-278.
3. Bennis, W., & Nanus, B. (1985). *Leaders: The Strategies for Taking Charge*. New York: Harper & Row
4. Graduate Management Admission Council (GMAC). (2024). 2024 corporate recruiters survey report. GMAC. Access via the Internet https://www.gmac.com/-/media/files/gmac/research/employment-outlook/2024-corporate-recruiters-survey/2024_gmac_crs_report.pdf
5. Grayson, D., & Hodges, A., (2004). *Corporate Social Opportunity!: Seven Steps to Make Corporate Social Responsibility Work for your Business*. Sheffield: Greenleaf Publishing
6. Hanson, M. (2024). College degree return on investment. *Education Data org*. Access via the Internet <https://educationdata.org/college-degree-roi>
7. Karwowska, E., & Tomczak, M.T. (2025). Diversity, equality and inclusion maturity model: setting new standards in responsible business education – evidence from PRME reports. *Social Responsibility Journal*, 21 (2), 337-350. <https://doi.org/10.1108/SRJ-08-2024-0558>
8. Lexnova Marktonderzoek. (2021). *Marktpotentieel Master Consultancy & Entrepreneurship: Deelrapportage interviews met het werkveld*. Lexnova. Access via the Internet <https://www.lexnova-marktonderzoek.nl/over-ons/nieuws>
9. Maldonado, A., & De Wit, H. (2021). The cost of business degrees versus their financial pay off: Is an MBA still worth it? *International Journal of Educational Development*, 81.

10. *New Vision for Education: Fostering Social and Emotional Learning Through Technology*. (2016). Access via the Internet http://www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf
11. OECD (2020). *Back to the Future of Education: Four OECD Scenarios for Schooling, Educational Research and Innovation*, OECD Publishing, Paris, <https://doi.org/10.1787/178ef527-en>.
12. Shaikh, A., Katkar, N., Koli, L., Gupta, S., & Krishnamoorthi, M. (2024). Incorporating Diversity, Equity, and Inclusion in Business School Education: Alumni Perspectives on Comprehensive Workplace Readiness. In: El Khoury, R. (eds) *Anticipating Future Business Trends: Navigating Artificial Intelligence Innovations. Studies in Systems, Decision and Control*, vol 535. Springer, Cham.
13. Smith, J., & Brown, L., (2024). The gap between theory and practice in business education: A critical review. *Journal of Management Education*, 48(2), 123-145.
14. Zsolnai, L. (2024). How to Renew Business Ethics Education? *Journal of Human Values*, 30(2), 123-134.
15. World Economic Forum. (2016). *The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Access via the Internet http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
16. World Economic Forum. (2025). *The Future of Jobs*. Access via the Internet https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf

XXI A. VERSLO MOKYKLA: ROTTERDAM BUSINESS SCHOOL TRANSFORMACIJOS PAVYZDYS

Santrauka

Šiuolaikinės verslo mokyklos susiduria su būtinybe prisitaikyti prie sparčiai besikeičiančios globalios verslo aplinkos. Tradicinės mokymo/studijų programos dažnai nepakankamai orientuotos į tai, kad paruošti studentus realiems darbo rinkos iššūkiams, kurie reikalauja ne tik dalykinių, metodinių/techninių žinių, bet ir strateginio mąstymo, lankstumo bei gebėjimo spręsti kompleksines problemas.

Šio straipsnio tikslas – pristatyti Rotterdam Business School (RBS) patirtį kodėl ir kaip verslo mokyklos turi integruoti inovatyvias, tvarumo principus atitinkančias praktikas, metodikas, siekiant būti modernia, atitinkančia laikmečio aktualijas, mokykla.

Pagrindinė problema, kuri nagrinėjama straipsnyje, yra atotrūkis tarp tradicinio verslo išsilavinimo ir realių rinkos poreikių. Kritikai teigia, kad daugelis verslo mokyklų per daug orientuojasi į pelno siekį ir nepakankamai atsižvelgia į socialinius bei aplinkosauginius aspektus (Beamond, Farndale & Härtel, 2024; Zsolnai, 2024). Be to, per didelis dėmesys teoriniams modeliams dažnai lemia praktinių įgūdžių stoką absolventų tarpe (Smith & Brown, 2024).

Taikyta literatūros šaltinių ir dokumentų analizė, kuri padėjo analizuoti, vertinti verslo mokymo/studijų programų trūkumus ir naujoviškų metodikų, tokių kaip „Sustainability Pressure Cooker“, taikymo galimybes, poveikį studentų gebėjimams spręsti realias verslo problemas. Rotterdam Business School atvejis rodo, kad glaudus bendradarbiavimas su verslo įmonėmis, pramonės atstovais, praktinis mokymasis ir tvarumo integracija leidžia paruošti konkurencingus ir ateities iššūkiams pasiruošusius verslo profesionalus.

Išvados siejamos su pastebėjimu, kad verslo studijose turėtų būti akcentuojama: pagrindiniai verslo dalykai (įvadas į verslą, apimantis tokias esmines temas kaip apskaita, logistika, gamyba, rinkodara ir problemų sprendimas); modulinė specializacija; realaus pasaulio verslo integracija (stažuotes, konsultacinius projektus ir bendro darbo įmonėje galimybes; hibridiniai studijų modeliai (interaktyvių atvejų tyrimų ir asmeninių seminarų derinys, užtikrinantis, kad studentai sutelktų dėmesį į praktines programas); dinamiška aukštosios mokyklos akademinės bendruomenės sudėtis.

Pagrindiniai žodžiai: šiuolaikinė verslo mokykla, patirtinis mokymasis, bendradarbiavimas su pramone.

STUDENTŲ NUOMONĖS APIE KONTAKTINĮ IR NUOTOLINĮ MOKYMĄSI TYRIMAS

*Rasa Bražulienė, Daiva Aktas, Roma Aleknienė
Vilniaus kolegija*

Anotacija

Tyrimo tikslas – išsiaiškinti Vilniaus kolegijos (VK) Elektros ir automatikos inžinerijos (EA), Elektros energetikos (EN), Mechaninių technologijų inžinerijos (MT), Automobilių elektronikos sistemų (AE) bei Automobilių techninio eksploatavimo (AT) studijų programų studentų nuomonę apie kontaktinį ir nuotolinį mokymąsi. Straipsnis susideda iš dviejų dalių: teorinės ir praktinės. Teorinėje dalyje atlikta mokslinės literatūros apžvalga apie kontaktinį ir nuotolinį mokymąsi. Praktiniam tyrimui buvo apklausti Vilniaus kolegijos Technikos fakulteto penkių studijų programų 2024–2025 mokslo metų nuolatinių ir iššestinių studijų I, II, III, IV kursų studentai.

Pagrindiniai žodžiai: studentų nuomonė, nuotolinis mokymasis, kontaktinis mokymasis.

ĮVADAS

Pandemijos protrūkis pasauliniu mastu neabejotinai paveikė visos žmonijos kasdienį gyvenimą. Dėl visuotinio karantino, kuris buvo įvestas daugumoje pasaulio šalių, iš esmės keitėsi tiek profesinis, t. y., darbo, tiek akademinis studijų pobūdis, o tai ženkliai paveikė visuomenės socialinį ir asmeninį gyvenimą. Keitėsi studijų kokybė, socialinė aplinka, mokymosi ir gyvenimo sąlygos, praktikų organizavimas, kito studentų mobilumo sąlygos, techninės galimybės.

Dėl pandemijos paskelbus karantiną, per trumpą laiką reikėjo persiorientuoti ir persiorganizuoti. Pasikeitė gyvenimo ritmas, kuris turi įtakos psichologinei savijautai, o ypač smarkiai atsiliepiama nuotoliniu būdu besimokantiems studentams. Nemažiau diskusijų kilo dėl nuotolinio ugdymo kokybės bei jo organizavimo, nes tai daro tiesioginį poveikį mokymosi dalyvių įsitraukimo į procesą kokybei, padeda pedagogams permąstyti mokymosi dizaino principus ir toliau tobulinti parengtas programas (Stevanovič, Božic, Radovič, 2021). Šios sistemos su patogiomis sąsajomis ir funkcijomis (vaizdo skambučiais, ekrano bendrinimu ir pan.) leido mokymosi dalyviams susisiekti, užtikrinant mokymosi tęstinumą. Tačiau nepaisant „Microsoft Teams“, „Zoom“, „Google Meet“, Moodle ir kitų vaizdo konferencijų platformų naudingumo, šios platformos nesugeba atkartoti fizinės klasės esančios socialinės sąveikos gylį, todėl susidaro vadinamasis „socialinio buvimo atotrūkis“ (Daigle ir Stuvland, 2021)

Problemos aktualumas. Visa švietimo sistemos forma buvo pakeista iš tiesioginės į nuotolinio ugdymo formą. Nuotolinis mokymasis, dar vadinamas distanciniu mokymusi (Targamadzė, 1999). Šis nenumatytų sąlygų sukeltas staigus pokytis paveikė mokslo proceso dalyvių sąveiką, įsitraukimą ir vaidmenis ugdymo procese ir nuotolinis mokymasis Vilniaus kolegijoje tapo mokymosi forma. Studijuojant nuotoliniu būdu studentai turi būti apsirūpinę tinkamomis technologinėmis priemonėmis – kompiuteriu su vaizdo kamera, mikrofonu ar išmaniuoju įrenginiu bei turėti interneto ryšį, taip pat turi dalyvauti nuotolinėse paskaitose ir būti aktyviais studijų proceso dalyviais, tačiau tuo pat metu išvengti socialinės atskirties.

Tyrimo objektas. Vilniaus kolegijos penkių studijų programų: Elektros ir automatikos inžinerijos (EA), Elektros energetikos (EN), Mechaninių technologijų inžinerijos (MT), Automobilių elektronikos sistemų (AE) bei Automobilių techninio eksploatavimo (AT) 2024-2025 mokslo metų nuolatinių ir iššestinių studijų I, II, III, IV kursų studentai.

Tikslas. Išsiaiškinti Vilniaus kolegijos EA, EN, MT, AE, AT studijų programų studentų nuomonę apie kontaktinį ir nuotolinį mokymąsi.

Uždaviniai:

1. Apibūdinti kontaktinį ir nuotolinį mokymąsi teoriniu aspektu.
 2. Išanalizuoti kiekybinio studentų nuomonės tyrimo apie kontaktinį ir nuolatinį mokymąsi duomenis.
 3. Numatyti prielaidas mokymosi gerinimui studijuojant kontaktiniu ir nuotoliniu būdu.
- Metodai:** mokslinės literatūros analizė, kiekybinis tyrimo metodas – apklausa.

1. LITERATŪROS SAMPRATA TEORINIU ASPEKTU

Švietimo institucijoje mokymas, kaip ir mokymasis, yra kryptinga, nuosekli bei aktuali pažintinė ir praktinė veikla, kuri vyksta ir turi vykti bendravimo pagrindu (Jovaiša, 1993). Bendravimas mus vienija ir atveria galimybes pasidalyti informacija, dalyvaujame nuolatiniame vaidmenų atlikimo procese. Kaupiame teorinę bei praktinę patirtį, išreiškiame save per įvairias veiklas. Paskaitose, bei kitomis formomis vykstančiame auditoriniame darbe, dėstytojas gali stebėti, kaip studentams sekasi, aptaria ir sprendžia įvairias problemas. Kontaktinis mokymosi būdas suteikia galimybę jaustis reikiamoje darbo aplinkoje ir labiau susikonsoliduoti į mokslus. Šis mokymo stilius yra labiau pritaikytas tiek studentams, tiek dėstytojams, esame labiau įsisavinę, įgudę, pripratę taip dirbti. Kai nėra tiesioginio bendravimo ir galimybių teorines žinias įtvirtinti praktikoje, atsiranda sąlygos, kurios gali neigiamai paveikti būsimos darbo jėgos motyvaciją, įgūdžius bei galimybes. Per pastaruosius kelis dešimtmečius vis svarbesnis tapo nuotolinis mokymasis. Iš pradžių nuotolinis mokymasis buvo vykdomas perduodant mokymo turinį telefonu, vėliau garso ir vaizdo įrašai buvo naudojami ir platinami kartu su spausdinta medžiaga (Hannay & Newvine, 2006). Tobulėjant technologijoms, internetas įgijo pagrindinį vaidmenį nuotolinio mokymosi srityje. Dėl to dažniausia nuotolinio mokymosi forma, kuri tampa vis svarbesnė, yra internetinis ir mišrus mokymasis (Hannay & Newvine, 2006; Vanslambrouck ir kt., 2018). Nuotolinis mokymasis – santykinai naujas mokymasis, pastaruoju metu išpopuliarėjęs dėl informacinių technologijų tobulėjimo. Informacinės ir komunikacinės technologijos sparčiai vystosi, jos tampa lengviau prieinamos, atsiranda naujų nuotolinio mokymosi formų bei organizavimo būdų. Visi gyvenimo pokyčiai skatina ugdyti idėjų kaitą, vyksta naujų, vis efektyvesnių mokymo ir mokymosi teorijų bei metodų paieškos. Nuotolinis mokymasis į mokymosi procesą įnešė dimensijas: nuotolį, laiką, erdvę (Targamadžė, 2020). Nuotolinis mokymasis – tai nuoseklus savarankiškas ar grupinis mokymasis, kai besimokančiuosius ir dėstytoją skiria atstumas ir laikas, o bendravimas ir bendradarbiavimas, mokymosi medžiaga pateikiama informacinėmis ir komunikacinėmis technologijomis. Vieno priimto nuotolinio mokymosi apibrėžimo nėra. Nuotolinis mokymasis pasaulinėje praktikoje turi ne vieną pavadinimą ir daug skirtingų apibrėžimų. Nuolatinės studijos kaip tradicinio mokymo alternatyva Vakarų šalyse sėkmingai plėtojamos jau nuo XIX amžiaus vidurio (Keegan, 1990). Atsiradus nuotolinio mokymosi koncepcijai, atsiranda ir virtualumo sąvoka, kai studentas ir dėstytojas bendrauja internetu jiems patogiu laiku, patogioje vietoje. Lietuvoje šiuolaikinė nuotolinio mokymosi sistema pradėjo formuotis apie 1995 metus, tuo metu vadintą distanciniu mokymu. Studijos nuotoliniu būdu, tapo pandemijos kasdienybe. Nuotolinio mokymosi metodai plėtojami ir diegiami labai sparčiai. Kai kuriais atvejais nuotolinis mokymasis efektyvesnis už įprastą auditorinį mokymąsi, nes kompiuterinės technologijos leidžia tobuliau vizualizuoti informaciją ir aktyvinti besimokančius asmenis, suderinti norą tobulėti su patogumu, galima studijuoti savarankiškai, paties pasirinktu laiku ir intensyvumu. Informacinės ir komunikacinės technologijos išplečia galimybes tobulėti. Nuotolinis mokymasis naudingiausias asmenims, kurie:

- negali atvykti į mokymo įstaigą;
- dirba ir nori įgyti kvalifikaciją, laipsnį;
- turi mokymosi sunkumų;
- turi specialiųjų ugdymosi poreikių;
- gydomsi ligoninėje;
- turi psichologinių bendravimo problemų ir kt.

Nuotolinis mokymasis ypač patogus dirbantiesiems. Sugebėjimas susirasti informaciją, manipuluoti faktais juos vertinant ir apibendrinant tapo svarbesnis nei paprastas faktų žinojimas. Nuotolinio mokymosi bruožas – dėstytojo ir studento fizinė atskirtis erdvėje. Mokymosi medžiaga pateikiama elektroniniais dokumentais, kompiuterinėse laikmenose, naudojamos interaktyvios programos, dalyvaujama nuotoliniuose seminaruose, konferencijose, kuriami specialūs tinklalapiai, užduotys atliekamos virtualioje aplinkoje ir kt.

Vienareikšmiškai nėra vieno atsakymo, kuris mokymo modelis yra pats tinkamiausias ar labiausiai siektinas, tačiau tam tikrais momentais nuotolinio arba mišraus mokymosi alternatyva vertinama daugelio sričių specialistų (Nacionalinė švietimo agentūra [NŠA], 2021). Oficialiame Europos Sąjungos leidinyje (2020) mišrusis mokymasis apibūdinamas kaip tiesioginio ir nuotolinio pedagoginio mokymosi derinimo metodas, kai besimokančiojo vieta, laikas ir tempas nėra apibrėžti, o nuotolinis mokymasis derinamas su tradiciniu mokymusi pagal poreikį.

Mišraus mokymosi metodo naudingumą jau spėjo pastebėti tiek dėstytojai, tiek studentai, nes didinamas darbo našumas, skatinamas įsitraukimas į studijas ir studijuojamą dalyką, gerina bendradarbiavimo ir bendravimo įgūdžius.

Tyrimo problema. Vis dažniau iškylantis klausimas koks mokymosi būdas: kontaktinis ar nuotolinis mokymasis tinkamesnis studijuojant nuolatiniuose ir ištęstinuose studijose. Kontaktinis mokymosi būdas sudaro sąlygas tiesiogiai įsitraukti į procesą, klausti bei diskutuoti aiškinantis, kai tuo tarpu nuotolinis mokymasis nėra apribotas vieta, laiku ir leidžia pačiam priimti sprendimus, bei save motyvuoti gilintis į dėstomą medžiagą.

Tyrimo tikslas. Išsiaiškinti Vilniaus kolegijos Technikos fakulteto studentų nuomonę apie kontaktinį ir nuotolinį mokymąsi.

Tyrimo uždaviniai:

1. Išsiaiškinti respondentų prioritetus renkant kontaktinį ir nuotolinį mokymąsi;
2. Įvertinti nuotolinio mokymosi įtaką asmens savijautai;
3. Apžvelgti nuotolinio mokymosi teigiamus ir neigiamus aspektus;
4. Pateikti tyrimo rezultatus ir apibendrinančias išvadas.

Tyrimo metodas. Empiriniam tyrimui atlikti pasitelktas kiekybinio tyrimo – apklausos metodas.

2. TYRIMO PAGRINDIMAS

Pasirinkus kiekybinį duomenų rinkimo metodą – apklausą, buvo nustatyta respondentų generalinė visuma. Pagal turinį, tai studentai, kurie studijuoja nuolatine studijų forma 2–3 kursuose ir ištęstine studijų forma 2–4 kursuose. Pagal vietą, tai Vilniaus kolegijos Technikos fakulteto studentai. Pagal laiką, tai 2024–2025 mokslo metais Technikos fakultete studijuojantys asmenys.

Tyrimo generalinė visuma skaičiuota visose VK Technikos fakulteto studijų programose, iš visų šiuo metu studijuojančių – 439 studentai. Respondentams buvo taikomas tikimybinis atrankos metodas, numatant 7 proc. paklaidą ir 95 proc. patikimumą. Paskaičiuota galima tyrimo imtis – 124 studentai. 124 respondentai dalyvavo tyrime pateikdami atsakymus į klausimus.

Tyrimas buvo vykdomas nuo 2024-09-09 iki 2024-11-08.

Klausimyną sudarė 8 klausimai, siekiant išsiaiškinti studentų nuomonę apie kontaktinio ir nuotolinio mokymosi motyvus, išskiriant studijų formą, informaciją apie nuotolinį ir kontaktinį mokymąsi bei asmeninius su mokymu susijusius pastebėjimus. Klausimynas buvo patalpintas <https://apklausa.lt> ir elektroniniais grupių paštais nuoroda išsiųsta į visas 2–3 kurso grupes, studijuojančių nuolatine studijų forma ir į 2–4 kurso grupes, studijuojančių ištęstine studijų forma.

Atliktas tyrimas leido išsigryninti esminius momentus kontaktiniame ir nuotoliniame mokyme.

Ši informacija bus naudinga dėstytojams, kurie dirbdami su studentais taiko kontaktinį ir nuotolinį mokymą. Tyrimo duomenys taip pat gali būti reikšmingi administracijos darbuotojams priimanant sprendimą dėl kontaktinio, nuotolinio, o gal būt ir hibridinio mokymo.

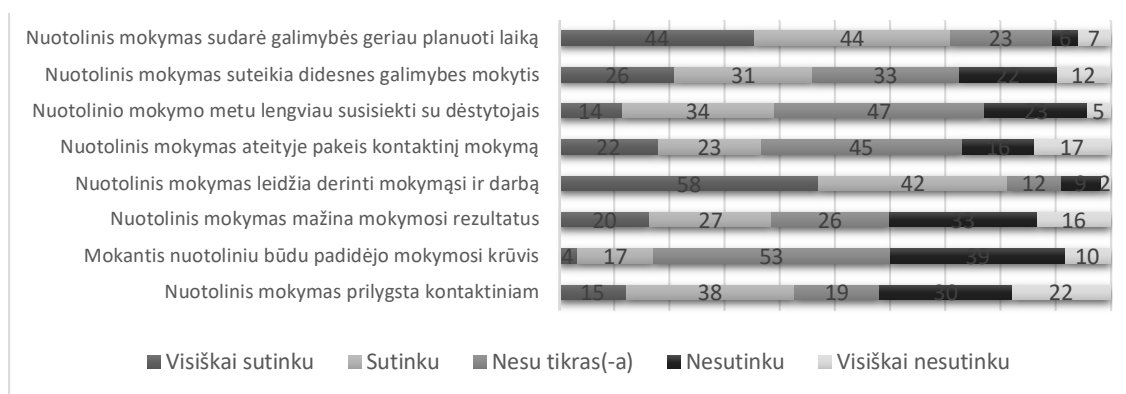
Tyrimo etika. Tyrimas buvo organizuojamas laikantis tyrimo etikos principų (Žydzžiūnaitė, 2011):

1. Geranoriškumo principas – anketos pradžioje dalyviai buvo informuoti apie tyrimo tikslą, anketa pildyta laisvanoriškai.
2. Pagarbos asmens orumui principas užtikrintas objektyviai pateiktais klausimais, kurie neimplikavo specialių, pageidaujamų, iškraipyti galimų atsakymų. Klausimuose, kuriuose buvo siūlomi atsakymo variantai buvo pridėtas ir „kita“ pasirinkimo variantas.
3. Anonimiškumo principas – anketos aprašyme minima, kad respondentų dalyvavimas apklausoje – anoniminis.
4. Teisės gauti tikslią informaciją principas įgyvendintas iki klausimyno pildymo respondentams pateikus tyrimo tikslą ir aktualumą.

3. GAUTŲ REZULTATŲ ANALIZĖ IR INTERPRETAVIMAS

Anketos pradžioje buvo norima išsiaiškinti respondentų pasiskirstymą pagal studijų formą – iš 124 apklaustųjų 84 studentai (67,7 proc.) buvo nuolatinio studijų studentai, o 40 (32,3 proc.) išėstinių studijų studentai. Nuolatinio studijų studentai buvo aktyvesni ir studijų forma jiems labiau svarbi nei studijuojantiems išėstine studijų forma.

Siekiant nustatyti/įvertinti/apibendrinti skirtingas mokymosi formas/galimybes, studentai buvo paprašyti pasirinkti tinkamą atsakymą apie nuotolinį mokymąsi (1 paveikslas).



1 pav. Respondentų nuomonė apie nuotolinį mokymąsi, skaičiais/vnt., (N=124)

44 studentai (35,5 proc.) visiškai sutiko ir tiek pat sutiko su teiginiu, kad nuotolinis mokymasis padeda geriau planuoti laiką. 23 (18,5 proc.) neturėjo nuomonės šiuo klausimu, nesutiko 6 (4,8 proc.), o visiškai nesutiko 7 (5,6 proc.).

Kad nuotolinis mokymasis suteikia didesnes galimybes mokytis, visiškai sutiko 26 (21 proc.), sutiko 31 (25 proc.) respondentų, 33 (18,5 proc.) nebuvo tikri, 22 (17,7 proc.) nesutiko, o nesutiko 12 (9,7 proc.) apklaustųjų.

Mokymosi procese dalyvauja kelios pusės/dalyviai – administracija, kurios dėka vyksta mokslo procesas, jo aprūpinimas reikalingais ištekiais – personalu, techninėmis priemonėmis ir kt., dėstytojai ir studentai. Kitas teiginys buvo dėl dėstytojų pasiekiamumo nuotolinio mokymosi procese. Kad lengviau susisiekti su atskiro dalyko dėstytoju nurodė 14 (11,4 proc.), sutiko su teiginiu 34 (25 proc.), nebuvo tikri 47 (38,2 proc.), nesutiko su teiginiu 23 (18,7), o priešingai, kad su dėstytoju kontaktuoti nuotolinio mokymosi metu yra sudėtingiau manė 5 (4,1 proc.) studentų.

Į pateiktą teiginį apie nuotolinio mokymosi perspektyvas kontaktinio mokymosi būdą keičiant nuotoliniu ateityje, su tuo visiškai sutiko 22 (17,9), sutiko 23 (18,7 proc.), neturėjo nuomonės 45 (36,6 proc.) apklaustųjų. Atitinkamai 16 (13 proc.) ir 17 (13,8 proc.) nesutiko ir visiškai nesutiko su pateiktu teiginiu.

Pasirinkta tikslinė grupė – 2 ir 3 kurso dieninių studijų studentai bei 2–4 kurso tęstinių studijų studentai jau yra atlikę praktikas, iš dalies ar pilnai dirbantys, todėl studijų derinimas su darbu

jiems yra aktualus klausimas. Kad nuotolinis mokymasis įgalina suderinti šias aplinkas/sritis, visiškai sutiko 58 (47,2 proc.) ir sutiko 42 (34,1 proc.) apklaustųjų, 12 (9,8 proc.) neturėjo nuomonės, nesutiko 9 (7,3 proc.) ir visiškai nepritarė teiginiui 2 (1,6 proc.).

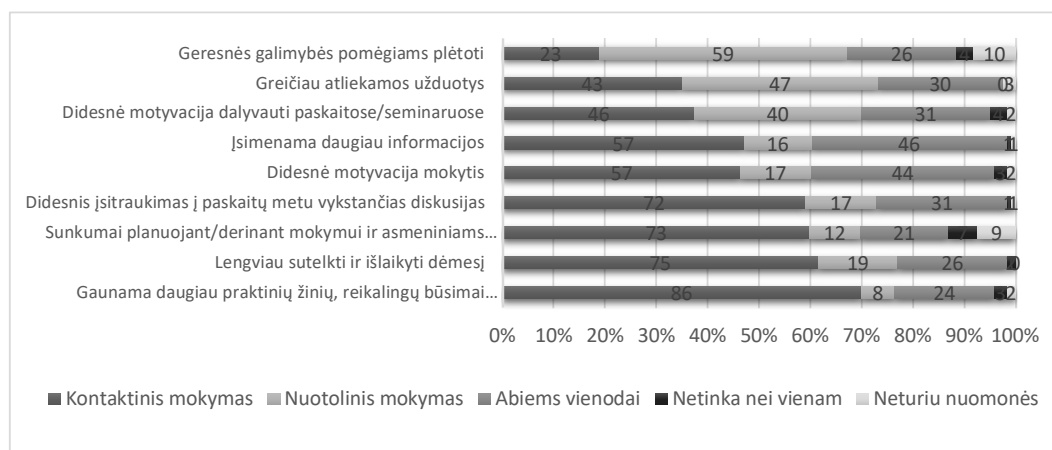
Kad nuotolinis mokymasis mažina mokymosi rezultatus, visiškai sutiko 20 (16,4 proc.), sutiko 27 (2,1 proc.), 26 (21,3 proc.) studentų nebuvo tikri, nesutiko 33 (27 proc.), o visiškai nesutiko 16 (13,1 proc.) apklaustųjų.

Mokantis nuotolinio mokymosi forma padidėjo mokymosi krūvis, visiškai sutiko 4 (3,3 proc.), sutiko 17 (13,8 proc.), šiuo klausimu buvo neapsprendę 53 (43,1 proc.), nesutiko 39 (31,7 proc.), o visiškai nesutiko 10 (8,1 proc.).

Respondentų buvo paprašyta išsakyti savo nuomonę ar nuotolinis mokymasis prilygsta kontaktiniam. Su teiginiu visiškai sutiko 15 (12,1 proc.), sutiko 38 (30,6 proc.), nebuvo tikri 19 (16,3 proc.). Priešingą nuomonę turėjo ir su pateiktu teiginiu nesutiko 30 (24,2 proc.), o visiškai nesutiko 22 (17,7 proc.) apklaustųjų.

Apibendrinant galima daryti prielaidą, kad nuotolinis mokymasis suteikia didesnes galimybes laiko ir mokymosi atžvilgiu ir yra palankesnis dirbantiems, nes leidžia derinti mokymąsi ir darbą.

Reikšminga palyginti nuotolinį ir kontaktinį mokymąsi skirtingais pjūviais (2 paveikslas).



2 pav. Respondentų nuomonė apie nuotolinį ir kontaktinį mokymąsi, skaičiais/vnt., (N=124)

Kaip geresnes galimybes pomėgiams plėtoti, 59 (48,4 proc.) studentai nurodė nuotolinį mokymąsi, kad abi mokymosi formos atliepia laisvalaikio poreikius, išskyrė 26 (21,3 proc.), 23 (18,9 proc.) nurodė priešingai – kad būtent kontaktinis mokymasis suteikia geresnes galimybes popaskaitinėms veikloms. Kad nei viena mokymosi forma netinka išskyrė 4 (3,3 proc.), o nuomonės šiuo klausimu neturėjo 10 (8,2 proc. apklaustųjų).

Į teiginį, kuris iš pateikiamų studijų formų suteikia galimybę greičiau atlikti užduotis, paaiškėjo, kad tiek nuotolinė (atsakiusiųjų 47 (38,2 proc.), tiek kontaktinė (atsakiusiųjų 43 (35 proc.)) suteikia praktiškai vienodai. 30 (24,4 proc.) studentų nurodė vienodas galimybes ir 3 (2,4 proc.) neturėjo nuomonės.

Studijų rengimo ir organizavimo tvarkose yra nurodomas pilnas arba dalinis privalomas studentų dalyvavimas paskaitose. Į klausimą, kokioje mokymo formoje didesnė motyvacija dalyvauti paskaitose, įskaitant jų metu organizuojamus seminarus, studentų atsakymai pasiskirstė atitinkamai – kaip kontaktinio mokymosi privalumą išskyrė 46 (37,4 proc.), o nuotolinį 40 (32,5 proc.) apklaustųjų, 31 (25,2 proc.) pažymėjo kad nėra skirtumo, 4 (3,3 proc.) studentai nurodė, kad netinka nei vienam mokymosi būdai, o nuomonės neturėjo 2 (1,6 proc.) respondentų.

Informacijos, kuri pateikiama mokymosi procese svarba yra neginčijama, didžia dalimi atliepanti mokymosi rezultatus, paskatinimą už rezultatus, todėl kitu klausimu buvo siekiama išsiaiškinti, koku būdu studentai labiau ją įsimena. Kaip kontaktinio mokymosi privalumą šiuo aspektu išskyrė 57 (47,1 proc.) besimokančių, kaip nuotolinį – tik 16 (13,2 proc.), abiem studijų formoms pritarė 46 (38 proc.).

57 (46,3 proc.) studentų sutinka, kad būtent kontaktinis mokymasis suteikia didesnę motyvaciją besimokant, apie nuotolinio mokymosi motyvacijos buvimą pažymėjo 17 (13,8 proc.). Kad motyvaciją vienodai skatina abi mokymosi formos, pažymėjo 44 (35,8 proc.), 3 (2,4 proc.) studentai motyvacijos neturi, o šiuo klausimu nuomonės neturėjo 2 (1,6 proc.).

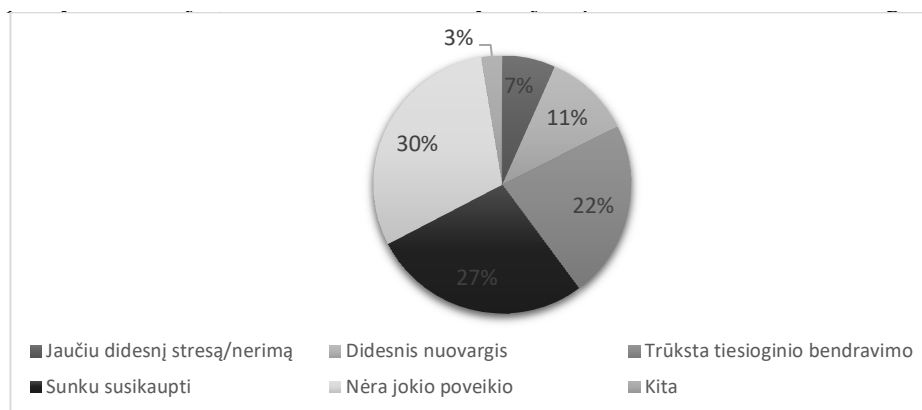
Siekiant didinti studentų įsitraukimą į paskaitas, taikomi skirtingi mokymosi metodai, vienas iš jų – diskusijos. 72 (59 proc.) studentai sutiko, kad būtent kontaktinių paskaitų metu galimas didesnis įsitraukimas į paskaitą, kai tuo tarpu apie įsitraukimą/dalyvavimą nuotolinių paskaitų diskusijose pažymėjo 17 (13,9 proc.). Abiejų mokymosi formų tinkamumą diskutuoti atsakė 32 (25,4 proc.).

Derinti asmeniniams poreikiams ir mokymuisi skirtą laiką yra sudėtinga, todėl kitu teiginiu buvo siekiama pasiaiškinti, kokia studijų forma įgalina labiau suderinti minimas veiklas. 73 (59,8 proc.) respondentų pažymėjo, kad kontaktinių studijų metu susiduriama su sunkumais, 12 (9,8 proc.) kaip mažesnius sunkumus planuojant/derinant laiką pažymėjo nuotolines studijas. Kad įmanoma susiderinti tiek kontaktinio, tiek nuotolinio mokymosi metu nurodė 21 (17,2 proc.), planavimas neįmanomas nei viena forma nurodė 7 (5,7 proc.), o nuomonės apklausos metu neturėjo 9 (7,4 proc.) respondentai.

Lyginant nuotolinį ir kontaktinį mokymąsi buvo siekiama pasiaiškinti, kurio metodo metu lengviau išlaikyti ir sutelkti dėmesį. 75 (61,5 proc.) studentų pripažino, kad dalyvaujant studijų procese tiesiogiai, dėmesį sutelkti paprasčiau, 19 (15,6 proc.) išskyrė nuotolinio mokymo pranašumą šiuo klausimu. 26 (21,3 proc.) studentai nurodė, kad abi studijų formos įgalina susikaupti, o 2 (1,6 proc.) studentams netiko nei viena paskaitų organizavimo forma.

Mokymosi procese svarbu įgytos praktinės žinios ir kompetencijos, reikalingos būsiesiems specialistams darbo rinkoje. Net 86 (69,9 proc.) studentų pažymėjo, kad būtent kontaktinio mokymosi metu jie įgyja daugiau žinių, kaip nuotolinio mokymosi privalumą šiuo atveju išskyrė tik 8 (6,5 proc.). Kad įmanoma įgyti praktinių žinių abejomis mokymosi formomis atsakė 24 (19,5 proc.) respondentų, 3 (2,4 proc.) nurodė kad žinių neįmanoma gauti nei viena mokymosi forma, o nuomonės neturėjo 2 (1,6 proc.). Apibendrinant respondentų nuomonę, kad kontaktinis mokymasis šiuo metu yra labiau vertinamas nei nuotolinis. Tačiau respondentai pritaria, kad studijų procese tikslinga įtraukti nuotolinį mokymąsi arba taikyti hibridinį mokymąsi (kontaktinį + nuotolinį).

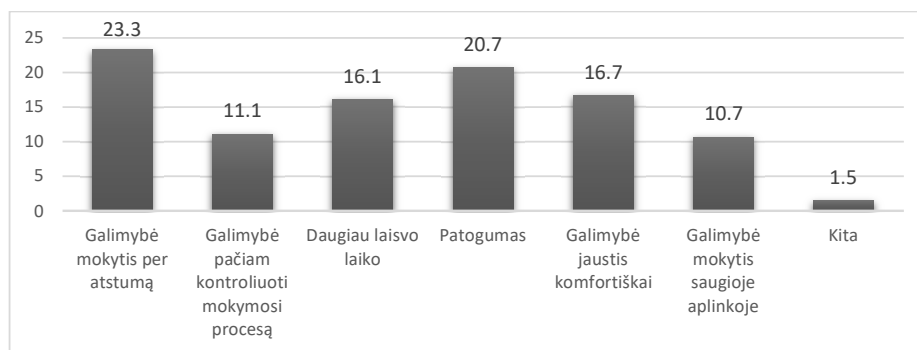
Darbo autoriams buvo svarbu vertinti/išsiaiškinti kaip nuotolinis mokymasis veikia respondentų emocinę būklę. Į pateiktą teiginį/klausimą buvo keli atsakymų variantai ir laisvas atsakymas, todėl gauti rezultatai tiksliau atspindi pateikiamą nuomonę, neapsiribojant tik vienu atsakymų variantu. Kad nuotolinio mokymosi metu sunku susikaupti, pažymėjo 58 (27,5 proc.) apklaustųjų, 43 (22,3 proc.) išskyrė tiesioginio bendravimo trūkumą, 21 (10,9 proc.) patyrė didesnę nuovargį, 13 (6,7 proc.) nuotolinio mokymosi metu jautė didesnę stresą/nerimą (3 paveikslas). 58 (30,1 proc.) respondentų teigė, kad nuotolinis mokymasis neturi jokio poveikio emocinei asmeninei būklei. Analizuojant išreikštas mintis galima teigti, kad respondentų atsakymai pasiskirstė lygiomis dalimis: vieniems tai puiki galimybė suteikianti pozityvias emocijas, o kitiems krintanti motyvacija ir patiriamas nuolatinis nuovargis.



3 pav. Respondentų nuomonė apie nuotolinio mokymosi įtaką emocinei būklei, proc. (N=124)

Respondentai studijuodami nuotoliniu būdu vis tik jaučia skirtingą poveikį emocinei būklei ir tai nurodė daugiau nei 50 proc. dalyvavusiųjų tyrime.

Kiekviena taikoma studijų forma turi savo pranašumų ir skirtumų, todėl buvo siekiama išsiaiškinti respondentų nuomonę apie nuotolinio mokymosi privalumus. Studentai galėjo pasirinkti kelis atsakymų variantus (4 paveikslas).



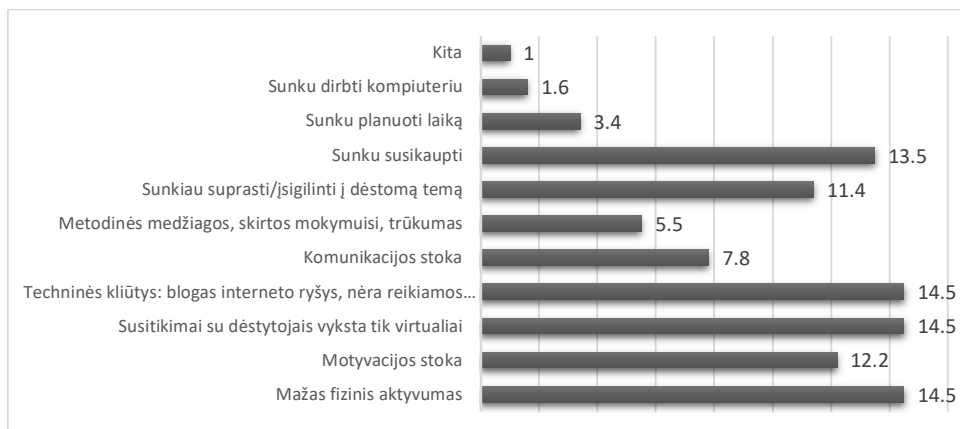
4 pav. Respondentų nuomonė apie nuotolinio mokymosi privalumus, proc. (N=124)

Kaip patį didžiausią nuotolinio mokymosi privalumą net 107 (23,3 proc.) pažymėjo galimybę mokytis per atstumą, 95 (20,7 proc.) išskyrė patogumą, 77 (16,7 proc.) galimybę mokytis iš sau komfortiškos vietos ir netrukdant aplinkiniams, 51 (11,1 proc.) pažymėjo, kad tokia studijų forma įgalina pačiam kontroliuoti mokymosi procesą, 74 (16,1 proc.) nurodė, kad taupomas laikas, pvz., kelionei į ugdymo įstaigą, 49 (10,7 proc.) nuotolinio mokymosi metu jaučiasi saugiau pažįstamoje aplinkoje. Nenurodė jokių išskirtinumų 7 (1,5 proc.) atsakiusiųjų.

Gilinantį ir atvirai išreikštas mintis pastebėta, kad didžiausią privalumą respondentai susiejo ne su studijų procesu, bet su laiko ir degalų sutaupymu reikalingo pasiekti mokymo instituciją. Sekantis išskirtas privalumas tai mokymosi ir darbo dermė.

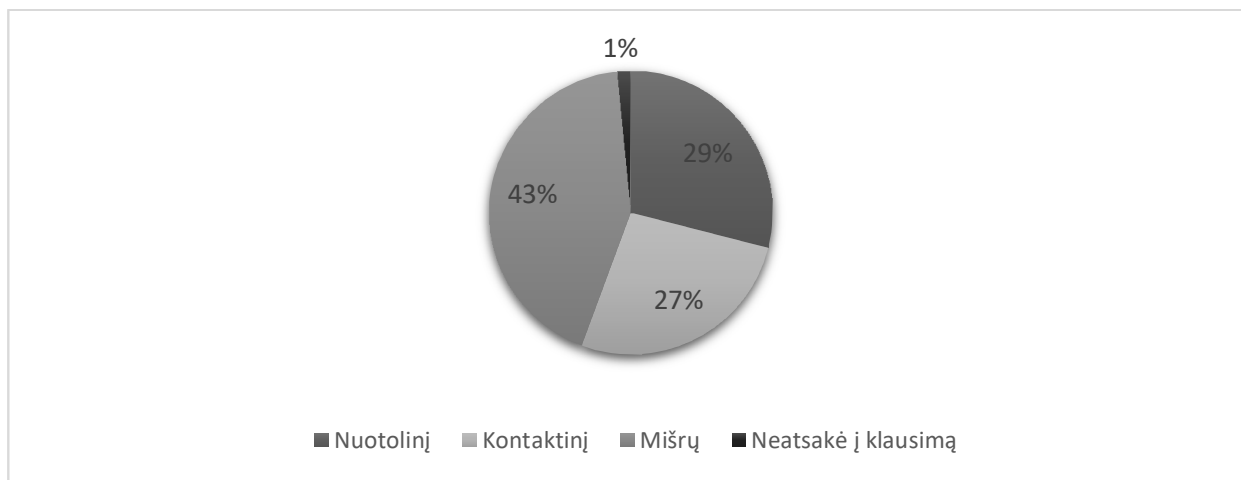
Siekiant tinkamai užtikrinti nuotolinio mokymosi sąlygas, reikalingi tam tikri ištekliai, be kurių tokia mokymo forma negalima. Be šių sąlygų, buvo paprašyta respondentų išskirti ir kitus nuotolinio mokymosi trūkumus (5 paveikslas).

Kaip svarbiausius nuotolinio mokymosi trūkumus, studentai (56 arba 14,5 proc.) išskyrė mažą fizinį aktyvumą, tik nuotolinius (virtualius) susitikimus su dėstytojais bei technines kliūtis. Mokslo institucijos privalo užtikrinti nenutrūkstamą mokymo procesą, todėl administracijos darbuotojai operatyviai šalina techninius nesklandumus, ko taip greitai nepavyksta mokantis, pvz., iš namų. Kad nuotolinio mokymosi metu sunku susikaupti, nurodo 52 (13,5 proc.), kad sunkiau įsigilinti į dėstomą dalyką pastebėjo 44 (11,4 proc.), motyvacijos stoką išskyrė 47 (12,2 proc.) respondentų. Kaip mažesnius trūkumus apklausiamieji nurodė komunikavimo stoką (30 studentų arba 7,8 proc.), sunkumus planuojant laiką (13 studentų arba 3,4 proc.) bei sunkumus dirbant kompiuteriu (6 studentai arba 1,6 proc.). Galima teigti, kad nuotolinis mokymasis respondentams kelia nemažai trikdžių, kurie gali daryti poveikį studijų kokybei.



5 pav. Respondentų nuomonė apie nuotolinio mokymosi trūkumus, proc. (N=124)

Daugelis mokymo įstaigų iš dalies taiko nuotolinio mokymosi formą tam tikrais atvejais, pvz., prieš šventines, esant nepilnai mokymosi savaitei, tiesiog 1 dieną savaitėje ir kt. Buvo pateiktas klausimas siekiant sužinoti mokymosi būdo pasirinkimą studentų požiūriu. Atsakymai pasiskirstė: 36 studentai (29 proc.) studijų procese rinkęsi tik nuotolinę mokymosi formą, 33 (26,6 proc.) – tik kontaktinį mokymą, neatsakė į pateiktą klausimą 2 (1,6 proc.), o 53 (42,7 proc.) pasisakė už mišrų mokymo būdą (6 paveikslas).



6 pav. Respondentų nuomonė apie mokymosi būdo pasirinkimą, proc. (N=124)

Vienos nuomonės nėra ir jei vieniems labiau tinka kontaktinis mokymasis, tai kitiems nuotolinis, kas ir leidžia daryti prielaidą, kad tikėtina geriausia mokymosi forma yra mišrus/hibridinis mokymosi būdas.

Tyrime respondentams buvo sudaryta galimybė atvirai išsakyti su kontaktiniu ir nuotoliniu mokymusi susijusius pastebėjimus. Iš pateiktų komentarų stebima tendencija prioritetą teikti kontaktiniam darbui, nuotolinį taikant daugiausiai teoriniams dalykams, bei paliekant galimybę juos apjungti. Keletas respondentų pastebėjimų: „kontaktinėse paskaitose lengviau susikaupti“, „auditorijoje bet kada paskaitos metu galima paklausti“, „yra poreikis dėstytojo konsultacijai gyvai“, „nuotolinis mokymasis tinka teorijai, kai visa informacija skaidrėse“, „nuotoliu galima daugiau sutaupyti laiko, derinti darbą ir studijas“, „mišrus/hibridinis su nemažai nuotolinio paskaitų skatintų rinktis studijas“.

IŠVADOS

1. Apibendrinus mokslinėje literatūroje (Targamadzė 1999, 2020); Jovaiša (1993); Keegan (1990); NŠA (2021) pateiktas mintis galima teigti, kad sinergija tarp nuotolinio/kontaktinio ir nuotolinio mokymosi leidžia kiekvienam iš jų išskirti tai, kas studentui geriausiai padeda įgyti žinių ir kompetencijų bei ugdyti įgūdžius. Bendravimas studentams atveria galimybes pasidalyti informacija ir jausmais, pažinti vieniems kitus ir užmegzti ryšius, leidžia tiesiogiai įsitraukti į mokymosi procesą, čia ir dabar, klausiant, aiškinantis, diskutuojant. Tuo tarpu nuotolinis būdas leidžia pačiam prisiimti atsakomybę ir sprendimus įsitraukti į mokymąsi. Kartu pastebima būtinybė šiuos abu mokymosi būdus apjungti taikant hibridinį/mišrų mokymosi būdą, leidžiantį tiek jausti motyvaciją, tiek ir motyvavimą mokymosi rezultatams/kompetencijoms pasiekti.

2. Atlikus tyrimą ir apibendrinus gautus duomenis pastebėta:

- ✓ kontaktinis mokymasis akcentuoja dėmesio sutelktumą mokymosi procese (61,5 proc.), bei geresnį praktinių žinių ir kompetencijų įgijimą (69,9 proc.); Nuotolinis mokymasis sudaro galimybes geriau planuoti laiką (35,5 proc.), bei suteikia didesnes galimybes mokytis (46,0 proc.).

- ✓ nuotolinio mokymosi įtaka asmens savijautai priklauso nuo paties asmens ir tai patvirtino apie 50 proc. tyrime dalyvavusių respondentų, teigdami pajutę vienokį ar kitokį poveikį;
- ✓ nuotolinio mokymosi pagrindinis privalumas nesusietas su mokymosi rezultatais/kompetencijomis, bet daugiau su procesais (atstumas; patogumas; komfortiškumas; laisvas laikas) bei galimybė derinti darbą su mokslais;
- ✓ nuotolinio mokymosi pagrindinis trūkumas, tai: mažas fizinis aktyvumas; techninės kliūtyš, motyvacijos stoka įsitraukti į dėstomą dalyką, kas atsiliepia studijų kokybei.

3. Tyrimo duomenys tik patvirtino, kad tiek kontaktinis, tiek ir nuotolinis mokymasis turi ir teigiamos ir neigiamos įtakos mokymui. Siekiant optimaliausio rezultato šiuos abu metodus reikėtų apjungti taikant hibridinį/mišrų mokymosi būdą. Apibendrinus surinktus duomenis, išryškėjo studentų charakteristikos, kurios apima jų mokymosi laiko veiksnius, pasitikėjimo savimi, motyvacijos, mokymosi tikslus bei jų lūkesčius.

Literatūra

1. Daigle, T. D., & Stuvland, A. (2021). Social Presence as Best Practice: The Online Classroom Needs to Feel Real. *Political science & Politics*, Volume 54, Issue 1, January 2021, p. 182-183. <https://doi.org/10.1017/S1049096520001614>
2. Jovaiša, L. (1993). *Pedagogikos terminai*. Šviesa.
3. Hannay, M., & Newvine, T. (2006) Perceptions of Distance Learning: A Comparison of Online and Traditional Learning. *MERLOT Journal of Online Learning and Teaching*, 2, 1-11. <https://jolt.merlot.org/documents/MS05011.pdf>
4. Kraujutaitytė, L. ir Pečkaitis, J. S. (2003). *Nuotolinių studijų organizavimas: strategijos ir technologijos*. Lietuvos teisės universitetas.
5. Keegan, D. (1990). *Foundations of Distance Education*. Routledge.
6. Stevanović A., Božić R., & Radović (2021). Higher education students' experiences and opinion about distance learning during the Covid-19 pandemic. *Journal of Computer Assisted Learning*. Volume 37, Issue 6. <https://doi.org/10.1111/jcal.12613>
7. Targamadzė, V. (1999). *Bendrojo lavinimo mokykla: mokinių edukacinio stimuliavimo aspektas*. Technologija.
8. Targamadzė, A. (2020). *Virtualusis mokymas. Teorija ir praktika*. Vitae litera.
9. Vaičiūnaitė, D. (2012). *Nuotolinis mokymasis: mokymosi galimybių išplėtimas. Švietimo problemos analizė*. Lietuvos Respublikos švietimo ir mokslo ministerijos Švietimo aprūpinimo centras
10. Žydzūnaitė, V. (2011). *Baigiamojo darbo rengimo metodologija/Klaipėdos valstybinė kolegija*. Vitae litera.
11. Europos Sąjungos oficialus leidinys. (2020) *Tarybos išvados dėl skaitmeninio švietimo Europos žinių visuomenėje* (2020/C 415/10). [https://eur-lex.europa.eu/legal-content/LT/TXT/%20PDF/?uri=CELEX:52020XG1201\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/LT/TXT/%20PDF/?uri=CELEX:52020XG1201(02)&from=EN)
12. Nacionalinė švietimo agentūra [NŠA]. (2021). *Projektas „Profesinio mokymo ir mokymosi visą gyvenimą informacinių sistemų ir registrų plėtra“ Nr. 09.4.1-ESFA-V-713-02-0001. Hibridinio mokymo(si) / ugdymo(si) patirties analizė*. https://sena.emokykla.lt/upload/EMOKYKLA/Nuotolinis/nuotolinio_vadovas/Hibridinis%20ugdymas_2021%2009%2008_FINAL_NSA.pdf
13. Vanslambrouck and all. (2018). Students' motivation and subjective task value of participating in online and blended learning environments. *The Internet and Higher Education*, Volume 36, January 2018, Pages 33-40. <https://www.sciencedirect.com/science/article/abs/pii/S1096751616301907>

STUDY OF STUDENTS' OPINIONS ABOUT CONTACT AND DISTANCE LEARNING

Summary

The global outbreak of the pandemic has undoubtedly affected the daily lives of all humanity. The whole form of the education system has been changed from face-to-face to distance education. This sudden change caused by unforeseen conditions affected the interaction, involvement and roles of the participants in the educational process, and distance learning became a form of learning at Vilniaus Kolegija / Higher Education Institution.

The aim of the study was to find out the opinions of the students of Vilniaus Kolegija/Higher Education Institution on contact and distance learning in the following study programmes: Electrical and Automation Engineering (EA), Electrical Power Engineering (EN), Mechanical Technology Engineering (MT), Automotive Electronics Systems (AE) and Automotive Technical Operation (AT).

The theoretical part of the paper reviews the scientific literature and sources related to contact and distance learning. The practical part includes research conducted with full-time and part-time students in the first, second, third and fourth years of five study programmes at the faculty of Engineering in the academic year 2024 -2025.

The findings confirmed that both contact and distance learning have both positive and negative effects on learning. For optimal results, these two approaches should be combined in a hybrid/blended learning approach.

Key words: students' opinions, distance learning, contact learning.

PERSONAL INCOME CONTROL AS A STRATEGY AGAINST THE SHADOW ECONOMY: THE LATVIAN CASE

Angelina Tjurina

Riga College of Accountancy and Finance, Latvia

Annotation

The largest portion of lost tax revenue in Latvia is due to the labor force. Salaries are still being paid „under the table.“ The purpose of this article is to analyze and evaluate the role of personal income control as a strategic instrument in combating the shadow economy, with a particular focus on Latvia's experience. The tasks of the article are identify the main components of the shadow economy in Latvia, analyze the existing methods of controlling the cash flow of individuals, determine possible measures to reduce the size of the shadow economy. The analytical method was used to study the regulatory framework governing the control of individuals' financial transactions. Additionally, the statistical analysis method was applied to examine data on the scale of the shadow economy, the amount of informal wages, and the volume of cash transactions. Limiting the shadow economy is one of the priorities of the Latvian government. Monitoring the cash flow of individuals becomes an important tool in combating informal economic practices.

Key words: shadow economy, undeclared wages, cash payments, personal income.

INTRODUCTION

The shadow economy leads to lost tax revenues, undermines trust in financial institutions, and creates unequal conditions for honest market participants. Monitoring the cash flow of individuals becomes an important tool in combating informal economic practices.

Despite the efforts of government authorities to implement control over cash flow, questions regarding the effectiveness of these measures remain unresolved. There is a need to assess to what extent these measures genuinely contribute to reducing the size of the shadow economy without placing excessive pressure on law-abiding citizens.

The purpose of this study is to analyze and evaluate the role of personal income control as a strategic instrument in combating the shadow economy, with a particular focus on Latvia's experience.

The tasks of the article:

1. Identify the main components of the shadow economy in Latvia.
2. Analyze the existing methods of controlling the cash flow of individuals.
3. Determine possible measures to reduce the size of the shadow economy.

The research object is the control of personal income as a strategic instrument for combating the shadow economy in Latvia.

Research methodology:

1. Analytical method: Studying the regulatory framework governing the control of cash flow for individuals.
2. Statistical analysis: Using data on the scale of the shadow economy, the size of undeclared wages, and the volume of cash transactions.

1. THE SIZE AND COMPONENTS OF THE SHADOW ECONOMY IN LATVIA

The shadow economy is a term used by various scholars and organizations to describe the part of the informal economy where taxes are not paid according to national tax regulations.

There is controversy about how to define and measure the shadow economy. The shadow economy

is also referred to as the “hidden” economy, “grey” economy, “black” or “lack” economy, “cash” or “informal” economy. All these synonyms refer to some type of shadow economy activities and have been used frequently and often inconsistently. [3,10]. Just as there are various definitions of the shadow economy, there are also different methods of calculating it, leading to varying results.

This article analyzes the Shadow Economy Index calculated by Arnis Sauka and Tālis Putniņš. In their publication, the researchers provided the index values for the period from 2009 to 2023.

Table. *Shadow Economy Index for Latvia (percent of GDP), 2019–2023, [8,9]*

	2019	2020	2021	2022	2023	2023–2022
LV	23.9 (21.4 26.3)	25.5 (23.6 27.4)	26.6 (24.9 28.3)	26.5 (24.5 28.5)	22.9 (20.2 25.5)	-3.6 (-5.6 -1.6)

Source: Adapted by the author from: Sauka, A., & Putniņš, T. (2024). Shadow Economy Index for the Baltic Countries 2009–2023. <https://www.sseriga.edu/shadow-economy-index-baltic-countries>

The shadow economy in Latvia is estimated as relatively large. In 2023, the index significantly decreased in Latvia. A decrease in this index may indicate that measures to reduce the share of the shadow economy are effective. Such a decrease in the shadow economy index has been observed for the first time since 2019.

In 2020, the worldwide coronavirus-pandemic (also referred to as the COVID-19 pandemic) occurred and triggered a severe recession in almost all countries as repeated lockdowns were imposed in almost all countries of the EU and worldwide. One consequence of this ‘great lockdown recession’ was a strong rise in the average size of the shadow economy to 17.9 percent (of the official GDP) of the 28 EU countries. Compared to 2019 this average increase is remarkably high with 1.69 percentage points or with 9.8 percent increase from the previous year, and it is the highest in the last 20 Years! In such a recession, a shrinking GDP and a strong increase in the unemployment rate are the key drivers of such a significant rise in the shadow economy. During an economic crisis or a recession, people try to compensate for their income loss with increased shadow economic activities. [3,11]

Arnis Sauka & Tālis Putniņš in their study “Shadow Economy Index for the Baltic Countries 2009–2023”, indicate the key components of the shadow economy.

Key components of the shadow economy:

- Underreporting of business income (profits)
- Underreporting of the number of employees
- Envelope wages
- Percent of revenue spent on payments ‘to get things done’: bribery
- Percent of the contract value paid to secure a contract with the government: corruption

The results of the Shadow Economy Index survey show that in Latvia the most significant component of the shadow economy was “envelope wages”. It is wages and salaries that are the main source of income for most individuals. Research by Arnis Sauka & Tālis Putniņš has revealed that underreporting of salaries amount to 48.2 percent underreporting of employees - 26.0 percent and underreporting of income - 25.8 percent. In 2023, the State Revenue Service of Latvia conducted a study on the scale of possible undeclared work. In 2022, the share of undeclared wages in the commercial sector was 17.5 percent. Compared to 2021, it decreased by 0.5 percentage points. [10,10]. The proportion of undeclared wages remains high.

Latvia, like many countries, faces challenges related to the shadow economy, which includes activities such as underreported or unreported employment, tax evasion, and informal economic transactions. Labor taxes play a significant role in shaping the dynamics of the shadow economy in Latvia. Restriction of the shadow economy is one of the government’s priorities, for the implementation of which measures are being taken to improve the business environment and promote

voluntary compliance with tax obligations, improving the legal framework, creating a stable and predictable tax policy, reducing the administrative burden, corruption, while improving the efficiency of the work of the state administration.

2. CONTROL OVER THE CASH FLOW OF INDIVIDUALS

Since 2018, the State Revenue Service of Latvia has strengthened supervision over the flow of funds in individuals' bank accounts. This supervision is intended to simplify the fight against the shadow economy.

Article 22 of the Law on Taxes and Duties states - In order to promote voluntary tax compliance of taxpayers, the credit institution and payment service provider shall, until 1 February of each year, submit to the State Revenue Service information regarding clients - natural persons who are residents of the Republic of Latvia - the total debit or credit turnover of whose sight-deposit accounts and payment accounts (including closed sight-deposit accounts and payment accounts) in the previous year has been EUR 15 000 or more within the scope of a single credit institution or payment service provider. [7]

It is important to note that, starting in 2025, credit institutions and payment organizations must report to the State Revenue Service (SRS) about private clients who, in the previous year, deposited a total of 7 000 euros or more in cash into an account at a single credit institution or payment service provider. This will allow the State Revenue Service to more effectively monitor cash flows and reduce opportunities for tax evasion.

It is assumed that this control could help eliminate the payment of salaries in envelopes.

The State Revenue Service conducts an analysis of the gap between income and expenses—if household expenses exceed official income, this may indicate hidden earnings. It is important to note that an individual's income is not limited to wages, and there are types of income that are not subject to personal income tax. Individuals are required to declare tax-exempt income if it exceeds 10 000 euros per year.

The decrease in the volume of envelope wages is also evidenced by the increase in cashless payments.

According to the Bank of Latvia, compared to August 2023, the use of cashless payments increased in August 2024. A year ago, the ratio of cashless to cash payments was 73 percent to 27 percent (in February 2024, it was 77 percent to 23 percent; two years ago, in August 2022, it was 71 percent to 29 percent). [4]

In August 2024, the prevalence of non-cash payments grew compared to August 2023. The ratio of non-cash to cash payments was 73 percent to 27 percent a year ago (77 percent to 23 percent six months ago, in February 2024, and 71 percent to 29 percent two years ago, in August 2022). [5]

It should be noted that, despite the continuous increase in the proportion of cashless payments, many people still use cash as a convenient payment method. At the same time, it is no secret that cash is often used as a tool for activities in the shadow economy.

Article 70 of the Labour Law states - Remuneration shall be calculated and disbursed in cash. An employer has the right to disburse remuneration as non-cash payments only where the employee and the employer have specifically so agreed. [6]

Employers are not required to transfer salaries exclusively via bank transactions. To reduce the circulation of cash, it is necessary to amend the Labour Law and prohibit cash salary payments.

This policy aims to:

- Increase transparency in financial transactions,
- Reduce the shadow economy,
- Simplify tax reporting and compliance.

As long as Latvian legislation allows salary payments in cash, the circulation of cash will persist. To identify undeclared income of individuals, the State Revenue Service of Latvia conducts an analysis of income and expense matching.

Labour taxes (PIT and SSRIs) account for 77 percent of lost tax revenues. The study shows that there is considerable potential for increasing tax revenues through political actions that reduce lost labour taxes. Notes at the same time that these could be any measures to reduce envelope salaries, in particular any policies aimed at eliminating schemes designed to avoid tax for large income earners, at the expense of which the largest share of uncollected taxes is generated overall, compared to how much tax revenue from such persons should be. [8]

Payroll taxes in Latvia consist of two taxes - personal income tax and mandatory social insurance contributions. In addition to personal income tax, both employees and employers are required to make contributions to social security programs. These contributions fund pensions, healthcare, and other social benefits.

The standard Mandatory State Social Insurance Contributions for employees is 34.09 percent – 23.59 percent paid by the employer and 10.50 percent paid by the employee. It is important to note that taxes are paid not by the individual, but by the employer. High taxes on labor costs do not stimulate transition of entrepreneurs from “grey” to “white” area.

The Foreign Investors’ Council in Latvia recommends simplifying tax calculations of personal income tax and payment of taxes for small companies and private entrepreneurs. [2,4].

The task of the State Revenue Service of Latvia is to motivate the individual, the employee, to put pressure on their employer to ensure that the salary is not paid „under the table.“

The reasons for income concealment may be different for different social groups. In May 2024, the results of a tax morale study were published. The study was conducted on behalf of the State Chancellery. A study of tax morality shows that most residents agree that Latvia’s tax system is both too complicated and unfair.

The majority (70.5 percent) of residents agree that Latvia’s tax system is overly complicated (36.0 percent – completely agree; 34.5 percent – rather agree), while 6.5 percent of residents disagree (5.1 percent – rather disagree, 1.4 percent – completely disagree). Another 13.6 percent neither agree nor disagree with this statement. This statement is more frequently agreed upon by residents with medium-low personal incomes (€601–€1000) and those living in households of two people. In contrast, students, pupils, and individuals living alone are relatively less likely to agree. [9,7].

A comprehensive package of reforms is needed to successfully combat the shadow economy, carefully designed based on the determinants most relevant in that specific case. Measures can range from regulatory and institutional reforms, to tax policies and administration. In addition, a well-designed policy set should address incentives for informal workers to transition to the formal sector, especially in countries reliant on remittances and where the shadow economy provides a social safety net. Furthermore, policy actions focused on encouraging private-sector job creation and fostering human capital development would help to bring firms and workers out of the shadows and promote growth that is more inclusive. [3,47].

CONCLUSIONS

1. The study has shown that one of the key elements of the shadow economy is envelope wages. In recent years, the volume of cashless transactions has increased, alongside a decrease in envelope wages. Monitoring the flow of funds of individuals helps reduce envelope wages and decrease the volumes of the shadow economy.

2. Starting in 2025, the State Revenue Service will strengthen control over the cash flow of individuals. To reduce illegal employment and payment of wages in envelopes, for many years it has been proposed to change the proportion of social payments of the employee and employer. To reduce the circulation of cash, it is necessary to amend the Labour Law and prohibit cash salary payments. Further research may focus on examining the impact of tax policy and the level of tax burden on the scale of the shadow economy.

List of references

1. Foreign investors council in latvia position paper on the shadow economy https://www.ficil.lv/wp-content/uploads/2022/09/FICIL_PP_Shadow_Economy_EN_2022.pdf, 4.
2. Latvijas Banka. <https://www.bank.lv/en/news-and-events/news-and-articles/news/16569-value-of-non-cash-payments-executed-in-latvia-grew-notably-during-the-first-half-of-2023>
3. Latvijas Banka. <https://www.bank.lv/en/news-and-events/news-and-articles/news/17049-the-ratio-of-non-cash-payments-to-cash-payments-in-latvia-is-77-to-23>
4. LR likums "Darba likums", 01.06.2022.
5. LR likums "Par nodokļiem un nodevām", 02.02.1995.
6. Ministru kabineta rīkojums Nr. 72 Rīgā 2024. gada 25. janvārī (prot. Nr. 3 36. §) Ēnu ekonomikas ierobežošanas plāns 2024.–2027. gadam
7. *Pētījums par nodokļu morāli.* (2024). https://ppdb.mk.gov.lv/petijuma_istenotajs/sia-tns-latvia-kantar/
8. Sauka, A., & Putniņš, T. (2024). *Shadow Economy Index for the Baltic Countries 2009–2023*. <https://www.sseriga.edu/shadow-economy-index-baltic-countries>
9. Schneider, F., & Asllani, A. (2022). Taxation of the Informal Economy in the EU [https://www.europarl.europa.eu/RegData/etudes/STUD/2022/734007/IPOL_STU\(2022\)734007_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2022/734007/IPOL_STU(2022)734007_EN.pdf)
10. Valsts ieņēmumu dienests. (2023). *Nedeklarētā darba samaksa ("aplokšņu alga") vispārējā nodokļu režīmā strādājošiem un tās radītā nodokļu plaša 2022.gadā*. <https://www.vid.gov.lv/lv/media/18936/download?attachment>

GYVENTOJŲ PAJAMŲ KONTROLĒ KAIP KOVOS SU ŠEŠĒLINE EKONOMIKA STRATEGIJA: LATVIJOS ATVEJIS

Santrauka

Straipsnī nagrinājamas Latvijas šešēlinės ekonomikos dydis ir pagrindiniai komponentai. 2022 metais nedeklaruoto darbo užmokesčio dalis komerciniame sektoriuje sudarė 17,5 proc. Palyginti su 2021 metais, ji sumažėjo 0,5 procentinio punkto. Šešėlinės ekonomikos indekso tyrimo rezultatai rodo, kad Latvijoje 2023 metais svarbiausia šešėlinės ekonomikos sudedamoji dalis buvo neoficialūs atlyginimai. Atlyginimai yra pagrindinis daugumos asmenų pajamų šaltinis. Nuo 2018 metų Latvijos Valstybinė mokesčių inspekcija sustiprino priežiūrą dėl lėšų srauto asmenų banko sąskaitose. Ši priežiūra skirta palengvinti kovą su šešėline ekonomika. Valsybinė mokesčių inspekcija atlieka pajamų ir išlaidų skirtumo analizę – jei namų ūkių išlaidos viršija oficialias pajamas, tai gali rodyti nedeklaruotą darbo užmokestį. Latvijos Valsybinės mokesčių inspekcijos užduotis yra motyvuoti darbuotoją daryti spaudimą savo darbdaviui, kad užmokestis būtų mokamas tik oficialiai.

Pagrindiniai žodžiai: šešėlinė ekonomika, nedeklaruotas darbo užmokestis, mokėjimai grynaisiais pinigais, asmens pajamos.

APPLICATION OF THE PRINCIPLE OF PROPORTIONALITY IN THE CONTEXT OF TAX LAW

Assoc. Prof. Dr. Sigita Šimbelytė

Kazimieras Simonavičius University

Panevėžio kolegija / State Higher Education Institution, Lithuania

Annotation

In Lithuanian law and the case law of administrative courts, even the application of such universally recognized principles as the proportionality criterion is still more random than systematic. Therefore, a reasonable question arises – how this principle should be understood and applied in administrative law in general, starting from different administrative legal acts adopted by the legislator, ending with the evaluation of the legality of decisions made by public administration entities in individual areas of public administration. In the absence of a comprehensive study of the principle of proportionality, the legislator, the practitioner of administrative law and the explainer are not aware of their duties. The relevance of the topic is determined by the fact that the application of the principle of proportionality and its interpretation are increasingly seen in the practice of administrative courts, however, the application of the principle of proportionality, when imposing administrative sanctions and in the context of tax law, has been studied very little in Lithuania.

Key words: administrative law, principle of proportionality, tax law, administration subjects.

INTRODUCTION

It should be noted that the principle of proportionality in administrative jurisprudence can be considered a special principle of administrative law, i.e. characteristic of the relevant institutes of the branch of administrative law and established in special laws. Regardless of the fact that the special principles of administrative law coincide with the general principles of law, the special principles of administrative law are classified as legal principles of public administration or administrative proceedings. They differ from the general principles of law in that the special principles of administrative law are established in a specific norm of administrative law, while the general principles are derived from the Constitution. It should also be noted that the special principles of administrative law specify and develop the general principles of administrative law. Thus, the special principles of administrative law differ from the general ones in that they do not operate in all administrative law, but in its separate branches or institutes.

In summary, it can be stated that the principle of proportionality is a general legal principle based on the need for fairness and justice. This is the idea that the legal impact measure should not be more severe than necessary and that in this respect a proper balance should be struck between the competing interests, and the principle of proportionality in administrative law is already considered a special principle of administrative law characteristic of the relevant institutes of the branch of administrative law and established in special laws, since it is attributed to the legal principles of public administration or administrative proceedings.

Research object – the principle of proportionality in administrative law in a practical aspect.

The purpose of the research – to analyse the principle of proportionality in administrative law from a practical aspect.

Research tasks: 1) to examine the application of the principle of proportionality in the context of tax law; 2) to analyse the significance of the principle of proportionality when assigning an administrative sanction.

Research methodology: taking into account the topic, goals and objectives of the scientific article, the following research methods are applied: methods of document analysis, systematic analysis, comparative analysis and generalization.

Abbreviations used in the work: 1. ECtHR - European Court of Human Rights; 2. CAO - Code of Administrative Offenses of the Republic of Lithuania; 3. CC - Constitutional Court of the Republic of Lithuania; 4. SACL - Supreme Administrative Court of Lithuania; 5. TAL – Tax Administration Law of the Republic of Lithuania; 6. Commission - Tax Disputes Commission under the Government of the Republic of Lithuania; 7. STI - State Tax Inspectorate under the Ministry of Finance of the Republic of Lithuania; 8. EL - Employment Law of the Republic of Lithuania; 9. Department - Migration Department under the Ministry of Internal Affairs of the Republic of Lithuania.

1. APPLICATION OF THE PRINCIPLE OF PROPORTIONALITY IN THE CONTEXT OF TAX LAW

First of all, when determining taxes and their amount, the legislator must be guided by the Constitution, its norms and principles, *inter alia*, the principles of proportionality, legal clarity, legal certainty, justice, reasonableness and the protection of the legitimate expectations of individuals. Article 6 of TAL also distinguishes the main principles that must be followed when creating a tax system - basic principles of legal regulation and application of taxation - principles of equality of taxpayers, justice, universal obligation, clarity of taxation, primacy of content over form. The constitutional doctrine notes that tax legal relations are related to public law and are also a matter of its regulation. In their implementation, first of all, the method of administrative legal regulation is applied, which aims to ensure that the taxes established by law are paid quickly and on time. CC has noted that „taxes are not negotiated, the rights and obligations of taxpayers are directly specified in the norms of tax laws“¹, however, at the same time noted that „[...] the relationship between tax payers and tax administration officials must be based not only on the effective implementation of authoritative instructions, but also on the real possibility of tax payers to defend their legitimate interests“². Taking into account the practice of the CC and its interpretations, it can be stated that when the legislator regulates tax legal relations, priority must be given to public interests. Therefore, to conclude in advance that the principle of proportionality does not apply in tax law would be illogical and incompatible with the concept of law itself. Consequently, in the event of a dispute related to the determination of taxes in the legal regulation or (and) applied sanctions for violations of the aforementioned law, etc., it can be assumed that compliance with the principle of proportionality must also become part of the court's assessment, despite the fact that such a principle is not established in the aforementioned TAL. Therefore, the question arises, is there a balance of interests between taxpayers' rights and executive authorities and the latter's instructions and decisions that are binding on taxpayers, or is the state's word absolute and final? This question will be answered by analysing the abundant case law of administrative courts and the disputes that arise in it, related to the application of the principle of proportionality both in the creation of tax legal regulation and in its application and evaluation of decisions made by tax administrators in a specific situation.

For example, in one administrative case, eleven owners of one forest (natural and legal persons) believe that the legal regulation established in Section 2 of Article 7 of the Law on Forests of the Republic of Lithuania contradicts the Constitution, the law of the European Union and is illegal. As a result of this established legal regulation, they had costs, as they paid mandatory 5 percent settlements to the state budget from the income for sold wood and uncut forest, which they would not have had if such a new version of regulation had not been established. One of the arguments of the applicants is that this measure chosen by the state - to obligatorily set 5 percent deductions to the state budget from income for sold wood and uncut forest for private forest owners - obviously

¹ Order of the Constitutional Court of the Republic of Lithuania of 10 July 1997 „On the Compatibility of Article 44(2) (1), Article 56(4)(1), (2) and Article 58(3) of the Tax Administration Law of the Republic of Lithuania with the Constitution of the Republic of Lithuania“. Valstybės žinios, 1997-07-16, No. 67-1696, 2 p.

² Ibid., 2 p.

does not comply with the principle of proportionality, whereas even before that, the valid version of the Law on Forests already provided for measures to ensure the maintenance and repair of forest land drainage systems and forest roads, during which the owners already paid excise duty for fuel, taxes for freight vehicles, personal income tax and etc. Therefore, such a legal regulation, according to which forest owners must not only repair forest roads themselves, but also pay taxes, is incompatible with the constitutional principles of justice, reasonableness, and proportionality, according to the applicants. Legal regulation of mandatory 5% deductions to the state budget, not only for state forest managers but also for private forest owners who have not received free forest from the state, in the applicants' view, it is manifestly disproportionate to the objective pursued, has become manifestly distorted, is detrimental to the national economy, and is leading to a loss of jobs in the forestry sector as a result of the rising costs of private forestry. Both the Vilnius Regional Administrative Court of first instance and the panel of judges of the SACL dismissed the applicants' complaint on the ground that „The provision of the Law on Forests, contrary to what the applicants are trying to claim, is clear, the terms used in it are fully and properly defined in the same law, and there is no doubt and no ambiguity as to the content and scope of the duty of the forest managers. The applicants themselves stated that they had calculated, declared and paid the mandatory deductions to the State budget during the period at issue“³. Finally, having assessed the evidence/documents submitted by the parties to the proceedings, the panel of judges does not consider that there has been a violation of the constitutional requirements for legislative procedure. In the context of the applicants' arguments, in the case under consideration, attention was drawn to the fact that the right of interested persons to submit comments and suggestions on the draft law was ensured, which, among other things, was used by entities acting in the interests of forest managers; no objective circumstances have been identified (not specified) that would allow us to reasonably assume that in the event of a dispute, the constitutional principles of the rule of law, responsible governance, and the duties of the legislator to ensure the publicity and transparency of the legislative process have been disregarded; (ii) the entry into force of the provision of the disputed law was delayed for almost a year, that is, the short period of time between the submission of the draft law and the adoption and promulgation of the law did not, in principle, have any negative impact on the participants (applicants) of the relevant legal relations. Thus, the applicants did not prove and the court did not establish any provisions of the Constitution or other laws that limit the possibility of financing the maintenance and repair of forest infrastructure objects from several different sources, therefore, the applicants' arguments that the Road Fund and other funds are used for these purposes were not significant in the event of a dispute. In addition, the panel of judges emphasized the fact that „the general duty imposed on forest users, not only managers - to protect forest roads and drainage systems, is not directly related to the maintenance and repair of these forest infrastructure objects, this does not create grounds for doubting the proportionality of legal regulation“⁴. And regarding the applicants' arguments related to the proportionality of the legal regulation, the panel of judges noted that „when assessing the amount of mandatory deductions (5%) together with the personal income tax applied to natural persons, it does not in any way lead to an obviously unreasonable tax burden, which may unreasonably restrict or negate the right to property protected by Article 23 of the Constitution, or the freedom of economic activity guaranteed by Article 46 of the Constitution. Therefore, such an assessment is in no way negated by the circumstance emphasized by the applicants that forest managers, like other taxpayers, pay other taxes and mandatory payments, such as excise duty on purchased fuel“⁵.

³ Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 14 December 2022 in administrative case No. eA-200-822/2022, 42 p.

⁴ Ibid., 43 p

⁵ Ibid., 46 p.

Attention should also be drawn to the fact that in the field of tax legal relations, administrative courts apply the principle of proportionality when evaluating the decisions made by the tax administrator, and not only when evaluating the sanction measures applied by the tax administrator. For example, in this aspect, another SACL administrative case No. eA-407-602/2022⁶ should be mentioned, in which a dispute arose regarding the proportionality of the tax calculated for the applicant at the higher rate for the Linkuva agricultural company of the Pakruojis district, which was calculated by the officials of the Panevėžys Accounting and Tax Control Department of the Department of Environmental Protection after the planned tax calculation and declaration check for extracted state natural resources. According to the Law on State Resource Tax of the Republic of Lithuania, the applicant was obliged to declare the amount of water consumed and to pay a fixed amount of tax to the State budget, but did not pay and declare the tax. The applicant did not contest the substance of his infringements before the Court, but disagreed with the amount of the penalty imposed, which was EUR 88 820, because it was unfair and disproportionately high, and argued that it should be maximally reduced. It was found that after the inspection report was drawn up, the applicant paid a fee of EUR 8,882 to the state and, as the latter claimed, he fulfilled the obligation specified by the Department to pay the basic tax for the resources used (for groundwater). By its decision of May 18th, 2021, the Vilnius Regional Administrative Court partially upheld the applicant's complaint - amended the amount of the tax for undeclared natural resources approved by the defendant's Decision, reducing it from EUR 88 820 to EUR 8 882. The panel of judges, based on the principles of proportionality and justice, concluded that the sanction applied to the applicant at a tax rate of 10 times higher is too severe. The panel of judges of the Supreme Administrative Court, having also examined the appellant Department's complaint, stated that the court of first instance, having correctly applied the explanations of the CC in its jurisprudence that „the court shall ensure the control of the reasonableness and legality of the decisions adopted by the authorities to impose a specific sanction on a person. Taking into account the nature of the offence, its scale, mitigating and other relevant circumstances, and in accordance with the criteria of fairness and reasonableness, the court has the right to decide that such a sanction should not be imposed on a person if, due to certain extremely important circumstances, it is manifestly disproportionate (inadequate) to the offence committed and is therefore unjust⁷„, correctly concluded that the sanction imposed on the applicant for the period 2017 - 2019, at a rate of 10 times the tax rate for unauthorized and undeclared groundwater extraction for the period under review, is excessive and disproportionate. Modified the decision of the Court of First Instance and reduced the amount of the tax for undeclared and unauthorized extraction of natural resources from EUR 88 820 to EUR 13 323.

When analysing the case law, it is observed that in tax legal relations disputes arise regarding the methods of securing the tax liability, established in Article 95 of the TAL, and the compliance of these economic sanctions with the criteria of proportionality, justice and fairness in the case of a specific violation. For example, in administrative case No. eA-2807-602/2021⁸ of December 8th, 2021, the applicant applied for annulment of the decisions of the Commission and the STI imposing a fine of EUR 214 848 on the applicant and a default interest of EUR 555 188,01. The applicant indicated that he should have been exempted from the payment of interest and fines. Pursuant to Point 2 of Section 1 of Article 141 of the TAL, the applicant unequivocally assessed that he committed the violation of the Income Tax Law exclusively due to circumstances that did not depend on his will, but depended on the actions of third parties - investors in the financial markets and their decisions.

⁶ Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 19 October 2022 in administrative case No. eA-407-602/2022.

⁷ Order of the Extended Panel of Judges of the Constitutional Court of 17 September 2008 in case No. 71/06-12/07.

⁸ Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 8 December 2021 in administrative case No. eA-2807-602/2021.

He claimed that the Commission in its decision relied on the practice of SACL, according to which the basis for exemption from interest on late payment is associated with the impact of force majeure and fortuitous circumstances, which the taxpayer did not anticipate and could not foresee in his activities, as a result of which the consequences could not be influenced by the will of the taxpayer. These circumstances include natural forces, unlawful acts by public authorities and human will (absolute violence used which the payer cannot avoid, resist or defend against). Such an interpretation of the aforementioned article, in the applicant's opinion, unreasonably and unfairly narrows the opportunity given to him by the legislator, in the presence of the conditions provided for in the law, to be exempted from the fine and late interest, which according to the decisions of STI and the Commission, make up almost a quarter - as much as 23 percent of the additional income tax paid by the applicant. He believed that such an interpretation of the legal norm is too far removed from the goals of the legislator and the context of the legal norm. In addition, the applicant stated that the imposed fine and interest on late payment are of an unreasonable amount, fundamentally do not comply with the principles of justice, reasonableness, as well as proportionality and adequacy of the fine. The Court of First Instance, having established the validity and legality of part of the STI and of the Commission's decision, dismissed the applicant's appeal on the ground that the circumstances alleged in the appeal did not meet the conditions for exemption from the payment of the fine and late payment interest. Furthermore, the Court agreed with the assessment of both the STI and the Commission that the amount of the economic sanctions imposed complies with the criteria of proportionality, justice and fairness. The panel of judges of the SACL, after examining the applicant's appeal, partially upheld it. The Court agreed with the reasoning of the Court of First Instance that the fact that the applicant paid the income tax after the control action, following the drawing up of the Inspection Act, does not constitute a ground for exempting him from the payment of economic sanctions, since the tax infringements were detected and the tax was paid late. Moreover, he did not take steps to improve his situation before the tax authorities started their control activities. On the other hand, in deciding on the amount of the default interest, the Court stated that „[...] the applicant rightly points out that the defendant has treated situations analogous to those of different businesses differently in terms of the factual/tax circumstances, and in particular has treated the applicant in a less favourable manner than another entity in a similar position. Such a decision of the tax administration is incompatible with the principle of equality of taxpayers enshrined in Article 7 of the TAL“⁹. Thus, the panel of judges of the SACL disagreed with the amount of default interest calculated in the decisions of the STI and the Commission, and, therefore, by amending the decision of the court of first instance, taking into account both the principles of proportionality and equality of taxpayers, exempted the applicant from payment of 90% of the calculated default interest on late payment of income tax.

Thus, regardless of the fact that we will not find a principle of proportionality established in the TAL, but it can be considered as part of the principles of reasonableness and fairness enshrined *expressis verbis* in this law. Among other things, tax collection is closely linked to the protection of the public interest, as it raises funds to meet the needs of society as a whole. Failure to pay taxes is a violation of the public interest. As regards the public administration entities and the decisions they take, it can be seen that they are also public administration entities, and therefore the decisions they take are subject to the principles of public administration laid down in Article 3 of the TAL, *inter alia*, the principle of proportionality.

In conclusion, the applicability of the principle of proportionality in tax law is evident in the case law of both the administrative courts and the CC. Despite the fact that the principle of proportionality is not directly enshrined in the legal acts regulating the tax law, this principle, according to the jurisprudence of the Constitutional Court of Lithuania, is a general constitutional principle, and

⁹ Ibid., 43 p.

is therefore the basis for the entire Lithuanian legal system. According to the national legal framework and the case law of the CC and the SACL, the principle of proportionality is recognized and applied in a wide range of areas of national tax law: assessing the legislator's regulatory legal acts establishing taxes and the administrative acts adopted to implement them, assessing the economic sanctions (fines) imposed on businesses and the general public, assessing the decisions of the tax administrations themselves, their legality and compliance with the proportionality principle.

2. THE IMPORTANCE OF THE PRINCIPLE OF PROPORTIONALITY IN IMPOSING ADMINISTRATIVE SANCTIONS

Administrative sanctions in administrative legal relations have for a long enough time been most widely manifested through the relationship of administrative liability. In its rulings, the CC has repeatedly emphasized that “the principle of proportionality must be respected when imposing legal restrictions and liability for infringements of the law, according to which the legal measures adopted must be necessary in a democratic society and appropriate to the legitimate aims pursued and must not restrict the rights of the individual more than is necessary to attain those aims (Orders of CC of December 29th, 2004, September 29th, 2005, January 16th, 2006).¹⁰” It should also be noted that Section 2 of Article 32 of the CAO also directly enshrines the principle of proportionality, which must be followed when imposing administrative penalties and/or other administrative measures. Thus, the administrative liability should be proportionate to the offender, taking into account the nature of the offence, the aggravating and mitigating circumstances and to the extent necessary to achieve the objective. By analysing the case law, we will try to highlight the peculiarities of the application of administrative sanctions.

The legislator must comply with the requirement of proportionality when introducing administrative sanctions into the legal framework. Moreover, according to case-law, the proportionality of an administrative penalty depends on a variety of circumstances, which determine the need for both the authorities and the courts to depart from the basic rules. The assessment of the circumstances is also governed by specific provisions of the law.

In the case-law of administrative courts, the issue of the legality of sanctions imposed by public administration entities on managers of legal entities is often addressed. For example, in one administrative case, the applicant Rosteka UAB, in a complaint filed with the court, requested to annul the decision of the State Labour Inspectorate of the Republic of Lithuania (hereinafter - Inspectorate) in the case of violation of the Law on Employment of the Republic of Lithuania by a legal entity and to terminate the administrative misconduct proceedings against the applicant Rosteka UAB. The applicant indicated that the order establishes that the director of Rosteka UAB employed three third-country nationals who held temporary residence permits issued on the basis of intermediation by another company. The applicant is an employer who is liable under Point 5 of Section 1 of Article 57 of the EL for violation of the procedure for employment of foreigners and information on foreigners employed or sent to Lithuania for temporary work, and is subject to an economic sanction - a fine. A fine of EUR 600 was imposed on the applicant for infringement of Point 5 of Section 1 of Article 57 of the EL, taking into account mitigating and aggravating circumstances. The applicant did not dispute the fact that by employing foreigners who had been granted a residence permit in the Republic of Lithuania to work in another company, it had violated Article 62 of the EL, but it immediately took steps to remedy this violation by applying to the Migration Department to issue residence permits for the aforementioned foreigners in Lithuania and to link them to the work in Rosteka UAB. In the light of these circumstances, the applicant considered that the negative consequences suffered by her disproportionately outweighed the infringement committed and

¹⁰ Ruling of the Panel of Judges of the Criminal Cases Division of the Supreme Court of Lithuania of 12 February 2019 in Criminal Case No. 2K-13-719/2019, 26 p.

the consequences caused. Pointed out that there is a huge disproportion between the committed violation and the sanction, therefore, in the current situation, the administrative prosecution of the applicant violated both the principle of proportionality and the principle of the rule of law. Despite the applicant's efforts, both by the decision of the Kaunas Chamber of the Regional Administrative Court of first instance of May 23rd, 2022 and by the ruling of the Panel of Judges of the SACL of February 8th, 2023, the complaint of the applicant Rosteka UAB was dismissed as unfounded. The panel of judges of the SACL stated that "there is no evidence that the minimum fine imposed on the applicant, who claims in the procedural documents to have recruited 315 foreigners, by the contested Order (EUR 200 per infringement) is disproportionate and thus manifestly unjust."¹¹ Therefore dismissed the appeal brought by the applicant Rosteka UAB.

Violations of the Competition Law - economic operators entered into a prohibited agreement restricting competition in the cities of Vilnius and Kaunas regarding the setting of prices for driving training services. By entering into the price fixing agreement, the defendants restricted one of the essential elements of competition between economic operators in the conduct of their business, namely price competition"¹². The panel of judges also referred to the case-law of the Court of Justice of the European Union and the SACL, which has clarified that "[...] price-fixing agreements between competitors are among the most serious and harmful infringements of competition law, the mere conclusion of such agreements harms the competitive process and restricts it, and their negative consequences are presumed (Judgment of the Court of Justice of the European Union of September 11th, 2014 in case No. C 67/13)"¹³. Taking into account the above-mentioned national and international case-law, legal regulation and the totality of the relevant circumstances, the panel of judges of the SACL partly upheld the applicant's appeal and amended the part of the decision of the court of the first instance concerning the imposition of sanctions on the defendants, and additionally, along with the restrictions on the right to hold the office of a manager of a public or a private legal person, to be a member of the collegiate supervisory or executive body of a public or a private legal person, imposed financial penalties on the defendants.

In the case-law, there are also cases where disputes arise regarding the legality and reasonableness of the Department's refusal to issue a temporary residence permit to an applicant of Belarusian nationality and the prohibition to enter the Republic of Lithuania. In one administrative case, the applicant claimed that the Department's decision to refuse to issue a temporary residence permit to a citizen of the Republic of Belarus and to prohibit his entry into the Republic of Lithuania was taken in a biased, incomplete and formalistic manner, formally assessing all the factual circumstances. The applicant noted that the defendant had failed to prove that the measures taken were proportionate to the objective pursued, had failed to take into account the fact that he has close family ties, friends and property in Lithuania, and that his social ties are close only to Lithuania. By decision of January 5th, 2021, the Vilnius Regional Administrative Court dismissed the applicant's complaint. Established that the applicant has been sanctioned for 35 administrative offences between 2018 and 2020, of which 19 are serious administrative offences, and on March 28th, 2019, he was also subjected to an administrative measure of deprivation of the right to drive vehicles for 1 month for serious administrative offences, which he has not complied with (he crossed the border of the Republic of Lithuania 8 times during the period of the ban on driving vehicles), he has failed to pay the fines imposed on him, which amount to EUR 3,930, and he has received a report from the Police Department, which states that he is a threat to the public order and to the public. The Court noted that "[...] public order and public security is a value of fundamental importance, of importance to

¹¹ Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 8 February 2023 in administrative case No. A-682-624/2023.

¹² Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 25 January 2023 in administrative case No. eA-60-502/2023, 141 p.

¹³ Ibid., 142 p.

all members of society, and therefore the restrictions imposed on the applicant are to be regarded as proportionate and necessary in the interests of the State”¹⁴. In the light of the foregoing, the Court of First Instance held that the threat posed by the applicant to public order and society is real and manifest, based on established facts which give rise to a reasonable expectation that the applicant will continue to commit offences. Therefore, the Court concluded that the decision taken by the Department to refuse to issue the applicant with a temporary residence permit in Lithuania was justified. The applicant appealed. The panel of judges of the SACL noted that “[...] in the event of a conflict between the applicant’s right to protection of his family and private life and the protection of public security and public order, it is necessary to assess whether the refusal to issue a temporary residence permit for the applicant, the application of the entry ban and the introduction of an alert in the central second-generation Schengen Information System regarding the entry and residence ban were proportionate.”¹⁵ The Court also referred to the case-law of the ECtHR, which explains that „the case-law of the ECtHR has formulated principled provisions on the protection of the right to private and family life, which recognise the broad discretion of the State in choosing the means of protection in cases where an alien residing in the State has committed serious crimes. However, when applying protective measures, the State must take into account the foreign links with the host country and assess whether the measures are proportionate to the objectives pursued (Judgment of the ECtHR of July 15th, 2003 in *Mokrani v France*)¹⁶. It should also be pointed out that the ECtHR has taken the view that the mere fact that a child’s parents have separated does not, in itself, mean that the child’s family ties with the parent with whom the child no longer lives are broken. [...] in such a case, the restriction of the right to private and family life guaranteed by Section 1 of Article 8 of the Convention may only be made in cases provided for by law, in order to achieve legitimate aims which are necessary in a democratic society (Decision of the ECtHR of July 3rd, 2006 in the case of *Rodrigues da Silva and Hoogkamer v. the Netherlands*, Application No. 50435/99)¹⁷. In the assessment of the panel of judges, when making the decision, the Department was not guided by the above-mentioned case-law interpretations, and did not check the aspect of proportionality of the measures applied (the decision did not state anything about the applicant’s real relationship with a minor child). In the light of the above, the panel of judges of the SACL decided that the decision adopted by the Department should be annulled, as it did not comply with the requirements for an individual administrative act, and the applicant’s application for a temporary residence permit in Lithuania should be re-examined, with a thorough assessment of the applicant’s real, factually-based relationship with his child, the child’s mother and the Republic of Lithuania. Thus, proportionality must be assessed in the light of all relevant circumstances, and in the present case the competent authorities were obliged to examine the situation of the foreign national and his/her family, to assess all the relevant aspects, and only then to adopt a reasoned and motivated individual administrative act either refusing or granting the applicant’s application for a temporary residence permit in the Republic of Lithuania.

An examination of the case-law on the imposition of sanctions for certain administrative offences reveals that it is the applicants who most often complain about the lack of proportionality of the sanction imposed by the public administration body. The court, having assessed such statements of the applicant and the facts of the case, determines whether the offence committed is serious, seriously damaging to the public interest and public order, and whether the imposition of a lesser penalty would manifestly fail to meet the objectives of the administrative penalty, etc. The vast majority of

¹⁴ Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 16 June 2021 in administrative case No. eA-2700-756/2021, 21 p.

¹⁵ Ibid., 22 p.

¹⁶ Ibid., 25 p.

¹⁷ Ibid., 28 p.

case-law shows that, when imposing an administrative penalty and/or an administrative measure for an administrative offence, the level of the penalty must be proportionate to the seriousness of the offence, the mitigating and aggravating circumstances, and the restriction of a person's rights and freedoms must be in the public interest, which is achieved by means of the objectives of the sanction. Moreover, today's Lithuanian case-law shows that the relations of administrative liability, when the question of the application of the liability imposed for an act qualified under the norms of the CAO is being decided, are also strongly influenced by the case-law of international courts. The application of international case-law in the context of the principle of proportionality has had a significant impact on the emerging practice of national courts, particularly where the courts need to assess whether public administrations have imposed an appropriate level of sanction, taking into account the principle of proportionality.

CONCLUSIONS

1. There are two areas of implementation of this principle: 1) the implementation of the principle of proportionality in the decision-making process of a public administration body in relation to a natural or legal person; 2) an assessment of the legality and reasonableness of the decision taken, in accordance with the principle of proportionality in judicial proceedings. According to the national legal regulation, the case-law of the CC and the SACL, the principle of proportionality is recognised and applied in a wide range of areas of national tax law: in the assessment of the normative legal acts adopted by the legislator establishing taxes and the administrative acts adopted implementing them, in the assessment of the economic sanctions (fines) imposed on business entities, and in the assessment of the decisions taken by the tax authorities themselves and their legitimacy and compliance with the principle of proportionality.

2. The application of international case-law in the context of the principle of proportionality has had a significant impact on the emerging practice of national courts, in particular where the courts need to assess whether the public administration has imposed an appropriate level of administrative penalty and/or measure in accordance with the principle of proportionality. Accordingly, the compliance of an administrative penalty and/or measure with the proportionality criterion is determined by means of a proportionality test: 1) assessing the appropriateness of the measure to achieve the objectives set for it; 2) the necessity of the administrative measure is assessed (a measure may be considered necessary if there are no lesser but equally effective means of achieving the same objectives); 3) the proportionality of the administrative measure in the strict sense, i.e. whether the chosen measure is not disproportionate to the constraints it imposes, whether the benefits (the objective) sought in a given case will outweigh the potential losses, and whether the scale of the administrative sanction is proportionate to the objectives pursued.

List of references

Legal acts:

1. Constitution of the Republic of Lithuania, *Lietuvos Aidas*, No. 220; 1992, No. 33-1014.
2. Code of Administrative Offences of the Republic of Lithuania, *TAR*, 2015-07-10, No. 2015-11216.
3. Tax Administration Law of the Republic of Lithuania, *Žin.*, 2004, No. 63-2243.
4. Law on Forests of the Republic of Lithuania, *Žin.*, 1994, No. 96-1872; 2001, No. 35-1161.
5. Law of the Republic of Lithuania on Tax on State Natural Resources, *Lietuvos Aidas*, No. 67; 1991, No. 11-274; *Žin.*, 2006, No. 65-2382.
6. Employment Law of the Republic of Lithuania, *TAR*, 2016-07-05, No. 2016-18825.

Case law:

7. Order of the Constitutional Court of the Republic of Lithuania of 10 July 1997 „On the Compatibility of Article 44(2)(1), Article 56(4)(1), (2) and Article 58(3) of the Tax Administration Law of the Republic of Lithuania with the Constitution of the Republic of Lithuania“. *Valstybės žinios*, 1997-07-16, No. 67-1696.

8. Order of the Extended Panel of Judges of the Constitutional Court of 17 September 2008 in Case No. 71/06-12/07.
9. Order of the Panel of Judges of the Criminal Cases Division of the Supreme Court of Lithuania of 12 February 2019 in Criminal Case No. 2K-13-719/2019.
10. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 16 June 2021 in administrative case No. eA-2700-756/2021.
11. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 8 December 2021 in administrative case No. eA-2807-602/2021.
12. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 19 October 2022 in administrative case No. eA-407-602/2022.
13. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 14 December 2022 in administrative case No. eA-200-822/2022.
14. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 25 January 2023 in administrative case No. eA-60-502/2023.
15. Ruling of the Panel of Judges of the Supreme Administrative Court of Lithuania of 8 February 2023 in administrative case No. A-682-624/2023.

PROPORCINGUMO PRINCIPO TAIKYMAS MOKESČIŲ TEISĖS KONTEKSTE

Santrauka

Lietuvos teisėje ir administracinių teismų praktikoje net tokių visuotinai pripažintų principų kaip proporcingumo kriterijaus taikymas vis dar yra labiau atsitiktinis nei sisteminis. Todėl kyla pagrįstas klausimas – kaip šis principas turėtų būti suvokiamas ir taikomas apskritai administracinėje teisėje, pradedant nuo įstatymų leidėjo priimtų skirtingų administracinių teisės aktų, baigiant viešojo administravimo subjektų priimamų sprendimų teisėtumo vertinimo atskirose viešojo administravimo srityse. Nesant kompleksinio proporcingumo principo tyrimo, įstatymų leidėjui, administracinės teisės taikytojui ir aiškintojui nėra žinomos jiems tenkančios pareigos. Temos aktualumą lemia ir tai, jog proporcingumo principo taikymas ir jo aiškinimas vis dažniau matomas administracinių teismų praktikoje, tačiau proporcingumo principo taikymas, skiriant administracines sankcijas bei mokesčių teisės kontekste, Lietuvoje itin mažai nagrinėtas.

Pagrindiniai žodžiai: administracinė teisė, proporcingumo principas, mokesčių teisė, administravimo subjektai.

DARBO UŽMOKESČIO APSKAITOS METODIKA

Lina Kušleikienė, dr. Renata Šivickienė
Šiaulių valstybinė kolegija

Anotacija

Straipsnyje analizuojamos darbo užmokesčio sąvokos ir apskaitos metodikos procesas. Nagrinėjami pagrindiniai apskaitos klausimai: darbo užmokesčio priskaitymo, išskaitymų iš darbo užmokesčio aspektai. Straipsnyje pateikiami įmonės apskaitoje atlikti darbo užmokesčio priskaitymo, mokesčių išskaičiavimo pavyzdžiai, pateiktos pagrindinės tipinės korespondencijos. Analizės rezultatai atskleidė, kad darbo užmokesčio apskaita įmonėje atitinka 31-ojo Lietuvos Verslo apskaitos standarto ir teisės aktų, reglamentuojančių su darbo užmokesčiu susijusius mokesčius, pagrindines nuostatas.

Pagrindiniai žodžiai: darbo užmokesčio samprata, korespondencija, verslo apskaitos standartai, apskaitos metodika.

ĮVADAS

Temos aktualumas - verslo įmonių vadovai turėtų suvokti, kad darbuotojai yra vienas esminių veiksnų, darančių įtaką įmonės sėkmei ir plėtros perspektyvoms. Organizacijos veikla neįmanoma be dviejų pagrindinių komponentų – finansinių išteklių ir žmogiškojo kapitalo. Daugeliui žmonių darbo užmokestis yra pagrindinis pajamų šaltinis ir gyvenimo kokybės rodiklis, todėl jie siekia kuo didesnio atlygio. Tuo tarpu darbdaviui darbo užmokestis reiškia gamybos kaštus, kuriuos jis stengiasi optimizuoti. Nepasitenkinimas atlyginimu gali sukelti darbuotojų kaitą, neigiamai paveikti organizacijos reputaciją ir sumažinti jos patikimumą. Kadangi dauguma verslo įmonių remiasi samdomų darbuotojų darbu, atlygio nustatymo, skaičiavimo ir su juo susijusių išlaidų valdymo klausimai tampa itin reikšmingi.

Tyrimo problema - Lietuvos Respublikos Vyriausybė kasmet atlieka su darbo užmokesčio apmokestinimu susijusias pertvarkas. Labai svarbu, kad įmonės gebėtų laiku prisitaikyti prie Vyriausybės patvirtintų įstatymų pakeitimų ir tinkamai juos taikytų. Dėl to kiekviena organizacija turėtų įsivertinti, ar teisingai apskaičiuoja ir apmokestina darbuotojų darbo užmokestį, ar tinkamai atliekami su darbuotojų darbo užmokesčiu susiję išskaitymai ir priskaitymai.

Tyrimo objektas – darbo užmokesčio apskaita.

Tyrimo tikslas – įmonės pavyzdžių pagrindu išnagrinėti darbuotojų darbo užmokesčio apskaitą.

Tyrimo uždaviniai:

1. Išnagrinėti darbo užmokestį ir darbo užmokesčio apskaitą teoriniu aspektu.
2. Įvertinti verslo įmonės darbuotojų darbo užmokesčio skaičiavimą, apmokestinimą ir registravimą apskaitoje.

Tyrimo metodai. Bendrieji tyrimo metodai – detalizavimas, sisteminimas, grupavimas, integravimas, lyginimas, analogijų ieškojimas, loginės analizės metodas, grafinis modeliavimas, apibendrinimas ir kt.

1. DARBO UŽMOKESČIO SAMPRATA, REGLAMENTAVIMAS IR APSKAITA

Skirtinguose šaltiniuose galima rasti įvairių sąvokų, tokių kaip „atlyginimas“, „atlygis“, „išmoka“, „uždarbis“, „darbo apmokėjimas“, „kompensacija“ ir kiti, tačiau dažniausiai naudojama sąvoka „darbo užmokestis“. Pasak Stankevičienės, Gerikienės ir Jurgaitytės (2016), darbo užmokestis daugelyje organizacijų Lietuvoje yra svarbiausias atlygio už darbą elementas, daugelyje jų – net

vienintelis, todėl svarbu, prieš pradėdant toliau kalbėti apie darbo užmokesčio skaičiavimo tvarką, apmokestinimą, išskaitymus ir kitus aspektus, išsiaiškinti, kaip skirtingi autoriai ne tik Lietuvoje, bet ir užsienyje supranta ir apibrėžia darbo užmokesčio sąvoką. Sąvokos pateiktos 1 lentelėje.

1 lentelė. *Darbo užmokesčio sąvokos*

Šaltinis	Sąvoka
Lietuvos Respublikos darbo kodekso 139 str., 1 d. (aktuali redakcija)	Darbo užmokestis – atlyginimas už darbą, darbuotojo atliekamą pagal darbo sutartį.
31 Verslo apskaitos standartas „Atlygis darbuotojui“	Atlygis darbuotojui – bet koks atlygis įmonės darbuotojui už atliktą darbą.
Balčytienė (2024)	Darbo proceso metu eikvojama protinė ir fizinė samdomo darbuotojo energija, kuri turi būti apmokama darbdavio ir darbuotojo sutartu darbo užmokesčiu. Darbo užmokestis darbuotojui – tai tam tikra nauda, kompensuojanti jo darbo jėgos sąnaudas.
Smith, Johnson (2024)	Darbo užmokestis – svarbiausias veiksnys, lemiantis darbuotojų pasitenkinimą, motyvaciją ir organizacijos efektyvumą.
Ali, Anwar (2021)	Darbo užmokestis yra dalis atlygio už darbuotojo darbą. Tai taip pat vienas iš pagrindinių motyvuojančių ir stimuliuojančių veiksnių.
Bruzdeilynaitė, Subačienė (2022)	Darbo užmokestis – apima ne tik kompensaciją už atliktą darbą, bet ir turi reikšmingą motyvacinę funkciją, skatinančią darbuotojo įsitraukimą, veiklos efektyvumą ir lojalumą darbdaviui.
Černius (2022)	Darbo užmokestis – esminis veiksnys, lemiantis darbuotojų motyvaciją ir įmonės veiklos efektyvumą. Be to, teigiama, jog tinkamai suformuota atlygio sistema gali padidinti darbuotojų produktyvumą ir prisidėti prie įmonės finansinių rodiklių gerinimo/
Martinkus, Žilinskas (2022)	Darbo apmokėjimas – atlyginimas darbuotojams už dirbtą laiką ar atliktą darbą.
Morosan - Danila, Fercal (2022)	Darbo užmokestis – atlyginimas už darbuotojo atliktą darbą pagal individualią darbo sutartį, į kurią įeina bazinis atlyginimas, premijos ir kiti priedai.

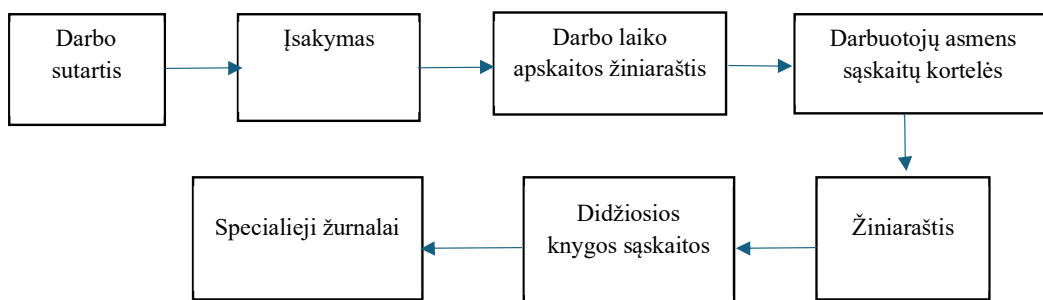
Šaltinis: sudaryta autorių, remiantis lentelėje nurodytais autoriais

Iš 1 lentelėje pateiktų darbo užmokesčio sąvokos apibrėžimų matyti, kad visi autoriai šią sąvoką apibūdina panašiai, tačiau vieni labiau akcentuoja pačią sąvoką, kiti gilina šiek tiek plačiau. Apibendrinant pateiktas „darbo užmokesčio“ sąvokas galima teigti, kad darbo užmokestis – tai piniginės formos atlygis darbuotojui už atliktą darbą, įskaitant gaunamus priedus, premijas bei kitas išmokas. Pagrindiniai su darbo užmokesčiu susiję aspektai, tokie kaip darbo užmokesčio dydis ir darbo laiko norma, privalo būti aptarti darbdavio su darbuotoju, raštiškai išdėstyti ir patvirtinti abiejų pusių parašais darbo sutartyje.

Ivanauskienės (2016) teigimu, darbo užmokestis yra reglamentuojamas dviem lygiais: valstybiniu ir vietiniu (įmonės vidaus). Darbo apmokėjimo politika vykdoma remiantis Lietuvos Respublikos Konstitucija, Darbo apmokėjimo įstatymu, Darbo kodeksu, mokesčių įstatymais ir kitais darbo santykius reguliuojančiais įstatymais, nutarimais, įsakymais. Lietuvos Respublikos Vyriausybė, siekdama apsaugoti samdomų darbuotojų interesus, vadovaudamasi Darbo kodekso (2020) 141 straipsnio 3 dalimi ir atsižvelgdama į Lietuvos Respublikos trišalės tarybos rekomendacijas bei į šalies ūkio vystymosi rezultatus bei tendencijas patvirtina tik minimalųjį valandinį atlygį ir minimaliąją mėnesinę algą ir bazinę mėnesinę algą. Šie darbo užmokesčio dydžiai numato minimalias apmokėjimo ribas viešajame ir privačiame sektoriuje. Pasak Вишневецкая (2018) darbo užmokesčio dydis ir dinamika lemia dirbančiųjų gyvenimo lygį ir darbo sąlygas. Į šį rodiklį atsižvelgiama formuojant valstybės biudžeto ir pinigų politiką, nustatant minimalaus atlygimo dydį.

Privačiame sektoriuje pagrindiniai darbo užmokesčio priskyrimo ir apmokėjimo principai reglamentuojami Darbo kodekse (2020), tačiau įmonė vidiniais teisės aktais gali nusistatyti tik jai būdingą darbo apskaitos politiką, tiek kiek tai neprieštarauja normatyvinių teisės aktų nuostatomis. Pasak Česnauskės (2018), darbo užmokesčio apskaičiavimą daugiausiai reglamentuoja Darbo kodeksas (2020), o darbo užmokesčio apskaitą – 31-asis verslo apskaitos standartas „Atlygis darbuotojui“ (2012).

Kalčinsko, Kalčinskaitės - Klimaitienės (2017) teigimu, labai svarbu laikytis tvarkos visose buhalterinės apskaitos duomenų formavimo stadijose. Kiekvienoje įmonėje turi būti nustatytas įvairių buhalterinės apskaitos procedūrų eiliškumas, tiksliai reglamentuojant, kokie darbuotojai kokius darbus privalo atlikti. 1 paveiksle pateikiamas informacijos judėjimo eiliškumas darbo užmokesčio apskaitoje.



1 pav. Informacijos judėjimo eiliškumas darbo užmokesčio apskaitoje

Šaltinis: sudaryta autorių, remiantis Ivanauskiene (2016)

Darbai apmokėti naudojamos dvi darbo užmokesčio formos: laikinė ir vienetinė. Taikant laikinę darbo apmokėjimo formą, darbo užmokestis apskaičiuojamas atsižvelgiant į išdirbtą laiką. Taikant vienetinę darbo užmokesčio formą, darbo rezultatai nustatomi pagal pagamintos produkcijos kiekį ar atliktų darbų bei paslaugų apimtį. Abi šios formos turi sistemas, kurios skiriasi viena nuo kitos darbo apmokėjimo apskaičiavimo būdais. Subačienės, Radziūnienės, Savicko, Senkaus, Tamulevičienės (2015) teigimu, tarifiniai atlygiai nustatomi darbuotojo ir darbdavio susitarimu ir nurodomi darbo sutartyse. Jeigu yra nukrypimų nuo normalių darbo sąlygų, už darbą tokiomis sąlygomis turi būti mokamas padidintas palyginti su normaliomis sąlygomis, tarifinis atlygis (žr. 2 lentelę).

2 lentelė. Mokėjimas už darbą poilsio ir švenčių dienomis, viršvalandinį darbą

Darbas	Apmokėjimas
Už darbą poilsio dieną, kuri nenustatyta pagal darbo (pamainos) grafiką	Mokamas ne mažesnis kaip dvigubas darbuotojo darbo užmokestis
Už darbą švenčių dieną	
Už darbą naktį	Ne mažesnis kaip pusantro darbuotojo darbo užmokesčio dydžio užmokestis
Už viršvalandinį darbą	
Už viršvalandinį darbą poilsio dieną, kuri nenustatyta pagal darbo (pamainos) grafiką	Ne mažesnis kaip dvigubas darbuotojo darbo užmokestis
Už viršvalandinį darbą naktį	
Už viršvalandinį darbą švenčių dieną	Ne mažesnis kaip du su puse darbuotojo darbo užmokesčio dydžio užmokestis
Darbuotojo prašymu darbo poilsio ar švenčių dienomis laikas ar viršvalandinio darbo laikas, padauginti iš nustatyto atitinkamo dydžio, gali būti pridedami prie kasmetinių atostogų laiko.	

Šaltinis: sudaryta autorių, remiantis Darbo kodeksu (2020) 144 str.

Darbo laiko apskaitos žiniaraščiuose privaloma žymėti tikslų kiekvieno darbuotojo dirbtų viršvalandžių, darbo poilsio ir švenčių dienomis apskaitą. Žiniaraščio duomenys yra pagrindas apskaičiuoti priemokas prie darbuotojo darbo užmokesčio.

2. TYRIMO METODIKA

Tyrime pasirinkta nagrinėti įmonės, kurios pagrindinė veikla – augalų auginimas ir didmeninė prekyba. Medelynas savo veiklą pradėjo maždaug prieš 40 metų ir dabar yra vienas didžiausių Baltijos šalyse.

Žaptorius (2015) teigia, kad „darbo užmokesčio apskaičiavimas, taip pat su tuo susijusių įmonės sąnaudų ir įsiskolinimų darbuotojams apskaita – viena iš sudėtingiausių buhalterinės apskaitos dalių“.

Atlygio darbuotojui už atliktą darbą, sąnaudas įmonė pripažįsta tą ataskaitinį laikotarpį, kada buvo atliktas darbuotojo darbas, nepaisant to, kada priskaičiuota suma bus išmokama darbuotojui.

Darbo užmokesčio apskaita privalo būti vykdoma remiantis pagrindiniais apskaitos principais:

Kaupimo principu, kuris užtikrina, kad sąnaudos registruojamos tuo metu, kai jos patiriamos, nepriklausomai nuo jų apmokėjimo laiko;

Teisingumo principu, kuris reikalauja tiksliai ir išsamiai atspindėti visas su darbo užmokesčiu susijusias operacijas.

Darbo užmokesčio registravimą apskaitoje reglamentuoja šie teisės aktai ir standartai:

- 31-asis Verslo apskaitos standartas „Atlygis darbuotojui“ – nustato principus, kaip apskaitoje turi būti registruojamas darbo užmokestis, kitos išmokos darbuotojams bei su tuo susiję įsipareigojimai.
- Darbo kodeksas – reglamentuoja darbo santykių sąlygas, darbo užmokesčio apskaičiavimą, išmokėjimo tvarką ir terminus.
- Gyventojų pajamų mokesčio įstatymas – apibrėžia gyventojų pajamų mokesčio apskaičiavimo ir išskaitymo tvarką iš darbo užmokesčio.
- Valstybinio socialinio draudimo įstatymas – reglamentuoja socialinio draudimo įmokų apskaičiavimą ir mokėjimą.
- Sveikatos draudimo įstatymas – nustato privalomojo sveikatos draudimo įmokų apskaičiavimo ir pervedimo taisykles.
- Finansinės apskaitos įstatymas – reglamentuoja apskaitos vedimo principus, dokumentų ir įrašų tvarkymą bei finansinių ataskaitų sudarymą.
- Kiti teisės aktai – susiję su darbuotojų socialinėmis garantijomis ir kitais mokestiniais įsipareigojimais.

Visi šie teisės aktai ir standartai užtikrina, kad darbo užmokesčio apskaičiavimas ir registravimas būtų vykdomas tinkamai.

Darbo užmokesčio apskaičiavimas grindžiamas kiekvieną mėnesį sudaromu darbo laiko apskaitos žiniaraščiu ir darbo užmokesčio skaičiavimo bei išskaitymo žiniaraščiu. Remiantis šiais žiniaraščiais, apskaičiuojamas konkretus darbuotojo darbo užmokestis.

Lietuvos Respublikos darbo kodeksas 146 straipsnyje numato, kad atlyginimas darbuotojams turi būti apskaičiuojamas ir išmokamas ne rečiau nei du kartus per mėnesį, išskyrus atvejus, kai darbuotojas pateikia raštišką prašymą, kad atlyginimas būtų išmokėtas tik kartą per mėnesį. Bet kuriuo atveju už darbą per kalendorinį mėnesį negali būti atsiskaitoma vėliau negu per dešimt darbo dienų nuo jo pabaigos, jeigu darbo teisės normos ar darbo sutartis nenustato kitaip.

Atlikdami buhalterinius įrašus, susijusius su darbo užmokesčiu, dažniausiai naudojamos ketvirtos ir šeštos klasės sąskaitos.

4480 Mokėtinas darbo užmokestis
 4481 Mokėtinas gyventojų pajamų mokestis
 4482 Mokėtinos socialinio draudimo įmokos
 4483 Mokėtinos garantinio fondo įmokos
 4484 Kitos išmokos darbuotojams
 4485 Atostoginių kaupiniai
 4486 Mokėtinos privalomojo sveikatos draudimo įmokos

6003 Tiesioginės gamybos išlaidos
 6004 Netiesioginės gamybos išlaidos
 6203 Darbuotojų darbo užmokestis ir su juo susijusios sąnaudos
 6304 Administracijos darbuotojų darbo užmokestis ir su juo susijusios sąnaudos

2 pav. Buhalterinės sąskaitos, susijusios su darbo užmokesčiu

Šaltinis: sudaryta autorių remiantis Audito ir apskaitos patvirtintu Pavyzdiniu sąskaitų planu (2015)

Darbo užmokesčio apskaitai naudojamų sąskaitų tvarkymą reglamentuoja Audito ir apskaitos tarnybos parengtas 31-asis Verslo apskaitos standartas. Pagal šį standartą, mokėtinos sumos ir įsipareigojimai registruojami ketvirtosios klasės sąskaitose, o darbo užmokesčio sąnaudos šeštosios klasės sąskaitose.

Darbuotojams apskaičiuotas darbo užmokestis skirstomas į bruto ir neto darbo užmokestį:

Bruto darbo užmokestis – tai visas darbuotojo priskaičiuotas darbo užmokestis. Jį sudaro pagrindinis ir papildomas darbo užmokestis kartu su užmokesčiu už viršvalandinį darbą ir premijomis, neatskaičius socialinio draudimo, gyventojų pajamų ir kitų mokestinių išskaitymų. Tai suma, kuri „kainuoja“ įmonei priskaitant bruto darbo užmokestį.

Neto darbo užmokestis – tai atlyginimo už darbą suma, kurią darbuotojas gauna „į rankas“, t. y. iš priskaičiuoto darbo užmokesčio išskaičiuavus visus mokėtinus mokesčius ir kitus išskaitymus (Žaptorius, 2015).

Kai darbo užmokestis apskaičiuojamas ir išskaičiuojami visi su juo susiję mokesčiai, apskaitoje atliekami atitinkami įrašai (žr. 3 lentelę).

3 lentelė. Darbo užmokesčio ir įmokų registravimas

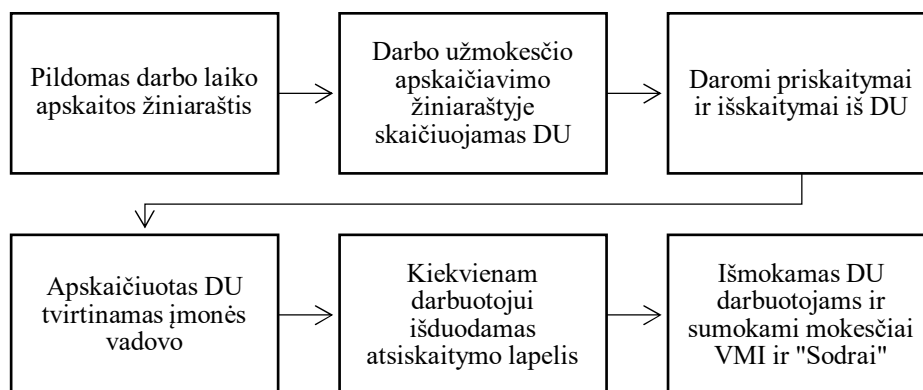
Eil. Nr.	Ūkinės operacijos	Sąskaitų korespondencija
1.	Apskaičiuotas darbo užmokestis	D 6203 / D 6304 Darbuotojų darbo užmokestis ir su juo susijusios sąnaudos (pardavimo arba bendrosios ir administracinės sąnaudos) K 4480 Mokėtinas darbo užmokestis
2.	Išskaityta socialinio draudimo įmoka	D 4480 Mokėtinas darbo užmokestis K 4482 Mokėtinos socialinio draudimo įmokos
3.	Išskaitytas privalomasis sveikatos draudimas	D 4480 Mokėtinas darbo užmokestis K 4486 Mokėtinas privalomasis sveikatos draudimas
4.	Išskaitytas gyventojų pajamų mokestis	D 4480 Mokėtinas darbo užmokestis K 4481 Mokėtinas gyventojų pajamų mokestis
5.	Apskaičiuotos ir priskaičiuotos socialinio draudimo įmokos darbdavio lėšomis	D 6203 / D 6304 Darbuotojų darbo užmokestis ir su juo susijusios sąnaudos (pardavimo arba bendrosios ir administracinės sąnaudos) K 4482 Mokėtinos socialinio draudimo įmokos

Šaltinis: sudaryta autorių, remiantis 31-ju verslo apskaitos standarto „Atlygis darbuotojui“ metodinėmis rekomendacijomis (2024)

3 lentelėje pateikiamos pagrindinės ūkinės operacijos, susijusios su darbo užmokesčio apskaita, remiantis 31-uju Verslo apskaitos standartu „Atlygis darbuotojui“. Jame nurodoma, kaip registruojamas apskaičiuotas darbo užmokestis, atliekami išskaitymai (socialinio draudimo, sveikatos draudimo ir gyventojų pajamų mokestis) bei darbdavio mokami mokesčiai. Apskaitoje naudojamos sąskaitų korespondencijos leidžia tinkamai atvaizduoti tiek įmonės sąnaudas, tiek įsipareigojimus, susijusius su darbuotojų darbo užmokesčiu.

3. TYRIMO REZULTATAI

Skaičiuojant darbo užmokestį, pirmiausia užpildomas darbo laiko apskaitos žiniaraštis. Pagal nekintantį darbo laiką dirbantiems darbuotojams darbo laiko apskaitos žiniaraštis pildomas įprastai: dirbama 5 darbo dienas per savaitę, 8 valandas per dieną. Pagal individualų darbo laiko režimą dirbančių darbuotojų darbo laiko apskaitos žiniaraštis pildomas remiantis atliktų darbų ir darbo užmokesčio apskaitos lapuose pateikta informacija. Juose nurodytas faktiškai dirbtas darbuotojų laikas konkrečią mėnesio dieną, įskaitant ir dirbtus viršvalandžius ar darbą poilsio dieną. Pildant darbo laiko apskaitos žiniaraštį, duomenys apie darbuotojų nedraudiminiuosius laikotarpius ir išduotus nedarbingumo pažymėjimus tikrinami „Sodros“ internetiniame puslapyje. Užpildžius darbo laiko apskaitos žiniaraštį, toliau darbo užmokestis skaičiuojamas, naudojant darbo užmokesčio apskaitos žiniaraštį, jame atliekami *priskaitymai* – vadovo įsakymu skaičiuojami priedai, ligos pašalpa iš darbdavio lėšų už pirmas 2 darbo dienas, atostoginių skaičiavimas, nepanaudotų atostogų kompensacija atleidžiant darbuotoją ir *išskaitymai* – mokesčiai, susiję su darbo užmokesčiu, išskaitymai pagal vykdomuosius dokumentus. Įmonės darbo užmokesčio skaičiavimo tvarka aprašyta įmonės apskaitos politikoje (žr. 3 pav.).



3 pav. Darbo užmokesčio skaičiavimo tvarka įmonėje

Žemiau pateikiami analizuojamos įmonės dviejų darbuotojų darbo užmokesčio skaičiavimo ir registravimo apskaitoje pavyzdžiai. Vienas iš darbuotojų dirba pagal neterminuotą darbo sutartį, kitas darbuotojas – pagal terminuotą darbo sutartį.

1 pavyzdys. Darbuotojo darbo sutartyje nurodytas 2025 metais galiojęs pareiginis atlyginimas – 1500 Eur. Įmonės vadovo įsakymu darbuotojui skiriamas priedas už 2025 m. sausio mėn. darbų apimtį – 387,00 Eur. Darbuotojas dirba pagal nekintantį darbo laiką. Prašymas taikyti NPD yra pasirašytas. Darbuotojas papildomai kaupia pensijai – 3 proc. Darbo sutartis – neterminuota.

2 pavyzdys. Gautas darbuotojo 2025 m. sausio mėn. atliktų darbų ir darbo užmokesčio apskaitos lapas, kuriame nurodomas priskaičiuotas atlyginimas 2712 Eur. Darbuotojui NPD taikomas. Informacija apie papildomą kaupimą pensijai: nekaupia. Darbo sutartis – terminuota.

Darbuotojo, aprašyto 1 ir 2 pavyzdyje, darbo užmokestis už 2025 m. sausio mėn. pateikiamas 4 lentelėje.

4 lentelė. 1 ir 2 pavyzdyje pateikto darbuotojo darbo užmokesčio skaičiavimas

1 pavyzdys		2 pavyzdys	
2025 metai (Eurais)			
Papildomas pensijos kaupimas – 3 %		Papildomas pensijos kaupimas – 0%	
NPD taikomas		NPD taikomas	
DU – 1500 Eur		DU – 2712 Eur	
Priedas – 387 Eur		Priedas – 0 Eur	
Iš viso priskaičiuota bruto DU – 1887 Eur		Iš viso priskaičiuota bruto DU – 2712,00 Eur	
NPD			
747– 0,49 × (1887 – 1038) = 330,99		400- 0,18× (2712 – 642) =27,40	
GPM (20 %)			
1887 – 330,99= 1556,01 × 0,20 = 311,20		(2712 –27,40) × 0,20 = 536,92	
Darbuotojo VSD įmokos			
PSD 6,98%	1887 × 0,0698 = 131,71	PSD 6,98%	2712× 0,0698 = 189,30
VSD 12,52%	1887 × 0,1252 = 236,25	VSD 12,52%	2712 × 0,1252 = 339,54
PPK 3%*	1887 × 0,03 = 56,61	PPK 0%*	
Darbdavio VSD įmokos			
1,77%	1887 × 0,0177 = 33,40	2,49%	2712 × 0,0249 = 67,53
1,77%	1887 × 0,0177 = 33,40	2,49%	2712 × 0,0249 = 67,53
Visa darbo vietos kaina	1920,40	Visa darbo vietos kaina	2779,53
Išmokamas DU	1151,23	Išmokamas DU	1646,24
GPM	311,20	GPM	536,92
VSD įmokos 22,5 %	424,57	VSD įmokos 19,50%	528,84
VSD įmokos 1,77 %	33,40	VSD įmokos 2,49 %	67,53

*PPK - papildomas pensijų kaupimas

Darbo užmokesčio ir su juo susijusių mokesčių registravimas apskaitoje nuo praėjusių ataskaitinių metų nepasikeitė. Dėl šios priežasties registracijos įmonės apskaitoje pavyzdys bus pateikiamas naudojant 2025 metų sausio mėnesio apskaičiuotus abiejų darbuotojų darbo užmokesčio suminius duomenis (žr. 4 pav.).

Duomenys keliami į bendrąjį žurnalą (Eurais)	Priskaičiuota darbo užmokesčio (bruto)	4599,00
	Gyventojų pajamų mokestis	848,12
	VSD įmokos, kurias moka darbuotojas	575,79
	PSD	321,01
	Papildomas kaupimas pensijai	56,61
	VSD įmokos, kurias moka darbdavys	100,93
	Priskaičiuota išmokėti darbuotojams (neto)	2797,47

4 pav. Suminiai 1 pavyzdžio ir 2 pavyzdžio duomenys

Suminiai duomenys 2025 m. sausio 31 d. registruojami bendrajame žurnale (BŽ).

5 lentelė. Įmonės apskaičiuoto DU ir mokesčių registravimas

Turinys	Korespondencijos	
Priskaičiuotas DU ir darbuotojo mokami mokesčiai	D6304 Darbuotojų darbo užmokestis ir su juo susijusios išlaidos	4599,00 Eur
	K4480 Mokėtinas darbo užmokestis	2797,47 Eur
	K4481 Mokėtinas gyventojų pajamų mokestis	848,12 Eur
	K4482 Mokėtinis socialinio draudimo įmokos	953,41 Eur
Darbdavio VSD įmokos	D6304 Darbuotojų darbo užmokestis ir su juo susijusios išlaidos	100,93 Eur
	K4482 Mokėtinis socialinio draudimo įmokos	100,93 Eur

Apskaičiavus darbo užmokestį, kiekvienam darbuotojui individualiai iki atlyginimo išmokėjimo dienos išduodamas atsiskaitymo lapelis, kuriame nurodomas faktiškas darbuotojo dirbtas laikas dienomis ir valandomis, darbuotojui pritaikytas NPD dydis (Eurais), darbo užmokesčio priskaitymai, iš darbuotojo darbo užmokesčio išskaitytos sumos ir mokėtinas darbo užmokestis.

Įmonė 2025 m. vasario 3 d. 1 ir 2 pavyzdžiuose pateiktiems darbuotojams išmokėjo darbo užmokestį ir sumokėjo GPM mokestį VMI, VSD įmokas „Sodrai“. 6 lentelėje pateikiama darbo užmokesčio ir su juo susijusių mokesčių išmokėjimo registracija bendrajame žurnale.

6 lentelė. Sumokėtų įsipareigojimų registracija

Turinys	Korespondencijos	
DU išmokėjimas darbuotojams	D4480 Mokėtinas darbo užmokestis	2797,47 Eur
	K271 Bankas	2797,47 Eur
Su DU susijusių mokesčių sumokėjimas	D4481 Mokėtinas gyventojų pajamų mokestis	848,12 Eur
	D4482 Mokėtinis socialinio draudimo įmokos	1054,34 Eur
	K271 Bankas	1902,46 Eur

Apibendrinant darbo užmokesčio ir su juo susijusių mokesčių skaičiavimą ir registravimą apskaitoje, galima daryti išvadą, kad darbo užmokestis dirbantiems pagal neterminuotas ir terminuotas darbo sutartis skaičiuojamas panašiai. Skiriasi darbdavio mokamų VSD įmokų procentas – pagal neterminuotas sutartis dirbančių 1,77 proc., pagal terminuotas – 2,49 proc. Registravimas apskaitoje abiem atvejais toks pat, kadangi visų darbuotojų apskaičiuotas darbo užmokestis ir su juo susiję mokesčiai sumuojami ir bendrai keliami į bendrąjį žurnalą. Įmonėje darbo užmokestis darbuotojams ir su darbo užmokesčiu susiję mokesčiai už 2025 m. sausio mėn. buvo sumokėti vasario 3 d., todėl daroma išvada, kad įmonė laiku įvykdo įsipareigojimus darbuotojams ir Valstybės biudžetui.

IŠVADOS

1. Darbo užmokestis – tai piniginės formos atlygis darbuotojui už padarytą darbą, įskaitant visas kitas papildomas gautas išmokas. Darbo užmokestis skirstomas į pagrindinį ir papildomą, taip pat išskiriamos vienetinė ir laikinė darbo užmokesčio formos. Nuo priskaičiuoto darbo užmokesčio privaloma išskaičiuoti ir į Valstybės biudžetą pervesti gyventojų pajamų mokestį ir Valstybinio socialinio draudimo įmokas. Atliekant išskaitymus iš darbo užmokesčio, privalu vadovautis realiu laiku galiojančiais teisės aktais ir kitais dokumentais, įrodančiais atliekamų išskaitų teisėtumą. Vidutinis darbo užmokestis skaičiuojamas apmokant darbuotojui už nedirbtą laiką taip pat skaičiuojant kompensaciją už nepanaudotas atostogas.

2. Atliktas tyrimas parodė, kad analizuojamos įmonės darbo užmokesčio apskaita atitinka 31-ojo verslo apskaitos standarto „Atlygis darbuotojui“ nuostatas. Analizuojama įmonė apskaičiuodama ir apskaitoje registruodama darbo užmokestį vadovaujasi kaupimo principu.

Literatūra

1. 31-asis verslo apskaitos standartas „Atlygis darbuotojui“ (2012). Prieiga per internetą <https://www.infolex.lt/ta/27480>
2. Ali, B. J., Anwar, G. (2021). An Empirical Study of Employees' Motivation and its Influence Job Satisfaction. *International journal of Engineering, Business and Management*. 5(2), 21–30. doi:10.22161/ijebm.5.2.3.
3. Audito ir apskaitos tarnyba. Įsakymas „Dėl pavyzdinio sąskaitų plano patvirtinimo“. (2015 m. balandžio 13 d., Nr. VAS-15). Prieiga 2025-01-13 per internetą <https://www.e-tar.lt/portal/lt/legalAct/edddfdc-0082c11e588da8908dfa91cac>.
4. Audito, apskaitos, turto vertinimo ir nemokumo valdymo tarnyba. (2016). 31-asis VAS „Atlygis darbuotojui“ metodinės rekomendacijos (2024). Prieiga 2025-01-15 per internetą https://avnt.lrv.lt/public/canonical/1734603895/650/_31_VAS_MR_4_redakcija_nuo_2024_m_2024_12_19_final_skelbimui.pdf
5. Balčytienė, B. (2024). Darbo užmokesčio dinamikos viešojoje švietimo įstaigoje analizė. *Taikomieji moksliniai tyrimai*. 3(1), 98–112. Prieiga per internetą <https://ojs.svako.lt/TMT/article/view/229>.
6. Bruzdeilynaitė, G. ir Subačienė, R. (2022). Darbo užmokesčio ir jam įtaką darančių veiksnių vertinimas Lietuvoje. *Buhalterinės apskaitos teorija ir praktika*. doi:10.15388/batp.2022.44.
7. Černius, G. (2022). Finansų valdymas II. *Verslo finansų ir analizės pagrindai*. Vilnius: Mykolo Romerio Universitetas.
8. Česnauskė J., (2018) *Apskaitos pagrindai: teorija ir praktika*. Kaunas: Kauno kolegijos leidykla.
9. Ivanauskienė, A. (2016). *Buhalterinė apskaita*. Vilnius: Tyto alba.
10. Kalčinskas, G., Kalčinskaitė - Klimaitienė, R. (2017). *Buhalterinė apskaita*. Vilnius: Pačiolis.
11. Lietuvos Respublikos Seimas. (1991) *Lietuvos Respublikos valstybinio socialinio draudimo įstatymas*. (1991 gegužės 21 d. Nr. I-1336) Prieiga 2025-01-13 per internetą <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.1327/asr>
12. Lietuvos Respublikos Seimas. (1996) *Lietuvos Respublikos sveikatos draudimo įstatymas* (1996 m. gegužės 21 d. Nr. I-1343). Prieiga 2025-01-19 per internetą <https://www.e-tar.lt/portal/lt/legalAct/TAR.94F-6B680E8B8/asr>
13. Lietuvos Respublikos Seimas. (2001) *Lietuvos Respublikos finansinės apskaitos įstatymas* (2001 m. lapkričio 6 d. Nr. IX-574). Prieiga 2025-01-17 per internetą <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.154657/asr>
14. Lietuvos Respublikos Seimas. (2016). *Lietuvos Respublikos darbo kodeksas* (Nr. XII-2603, 2016-09-19). Prieiga 2025-01-03 per internetą <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/10c6bfd07bd511e-6a0f68fd135e6f40c/asr>
15. Martinkus, B., Žilinskas, J. V. Darbo apmokėjimas. (2022). Iš *Visuotinė lietuvių enciklopedija*. Prieiga per internetą <https://www.vle.lt/straipsnis/darbo-apmokejimas/>
16. Morosan - Danila L., Fercal, E - M. (2022). *Company personnel – From the salary to accounting*, 8-16.
17. Smith, J., Johnson L. (2024). *Employee Satisfaction and Organizational Performance. The Role of Compensation. Journal of Business Research*.112, 45-58.
18. Stankevičienė, A., Gerikienė, V., ir Jurgaitytė, N. (2016). Y ir Z kartų darbuotojų atlygio lūkesčiai informacinės visuomenės kontekste. *Information & Media*, 74, 7-24.
19. Subačienė, R., Budrionytė, R., Kamarauskienė, I., Lakis, V., Radziūnienė, D., Savickas, V., Senkus, K., Tamulevičienė, D. (2015). *Apskaitos ir audito pagrindai*. Vilnius: Vilniaus universiteto leidykla.
20. Žapatorius, J. (2015). *Finansinė apskaita*. Vilnius: Technika.
21. Вишневская, Н.Т. (2018). *Международные стандарты статистики заработной платы и практика их использования в развитых странах*. Prieiga per internetą <https://cyberleninka.ru/article/n/mezhdunarodnye-standarty-statistiki-zarabotnoy-platy-i-praktika-ih-ispolzovaniya-v-razvityh-stranah/viewer>

PAYROLL ACCOUNTING METHODOLOGY

Summary

The paper analyses the concepts of payroll accounting and the accounting methodology process. It examines the main accounting issues: aspects of payroll accounting, payroll deductions. The paper presents examples of payroll accounting, tax deductions and the main typical correspondences. The results of the analysis showed that the company's payroll accounting complies with the main provisions of the 31st Lithuanian Standard of Business Accounting and the legal acts regulating payroll taxes.

Key words: concept of payroll, correspondence, business accounting standards, accounting methodology.

MARKETING RESEARCH IN GLOBAL MARKETS

Chyzhevskaya Maryna, Dobrianska Viktoria, Chichulina Kseniia
National University «Yuri Kondratyuk Poltava Polytechnic», Ukraine

Annotation

The article examines the process of conducting marketing research in foreign markets. The relevance of the topic of the article is due to the trend of Ukrainian enterprises entering global markets. The role of marketing research is to assess market conditions, provide information that makes it possible to make informed marketing decisions. The main problem of international marketing research is the difficulty of accessing information, due to geographical remoteness and the lack of awareness of the customer of the research in the socio-cultural characteristics of consumers in foreign markets. Added to this is the organizational problem associated with the difficulties of establishing interaction with local agencies for collecting marketing information, due to the language and cultural differences of the customer and the researcher. The article proposes to overcome obstacles to conducting marketing research in foreign markets by using the capabilities of the Internet. The main advantages of marketing research using the Internet are that Internet surveys provide the widest geographical coverage of respondents compared to all other methods, open access to hard-to-reach respondents, are convenient for forming „target“ samples based on the use of social networks. In Internet surveys, the search for respondents occurs automatically. Modern Internet users are united by social networks, can easily exchange content with each other, which makes it possible to analyze the content of online reviews and conversations, participate in online conversations with buyers, which, in addition to questionnaires, allows you to organize joint online discussions or expert surveys.

Key words: marketing research, Internet, social networks, international markets.

INTRODUCTION

Modern markets are characterized by a tendency towards globalization. Nowadays, the problem of entering the markets of other countries is relevant not only for large, but also for medium-sized enterprises. The effective functioning of enterprises in marketing conditions requires obtaining the necessary objective information about the external and internal environment of activity. Free access to economic and social information is considered one of the basic conditions for the effective functioning of a market economy. The role of marketing research is to assess marketing situations, provide information that makes it possible to develop effective marketing programs for the enterprise. The conclusions of international marketing research are understood as systematized information about the state and possible options for the development of the object of research. [1]. There is a need for marketing information about consumers, competitors, sales markets, etc. Any company planning to enter foreign markets must have information about other manufacturers, about possible consumers of its goods, about potential intermediaries who will participate in logistics or sales of products in a new market, about prices, about the state of commodity and capital markets, about the situation in the business sphere, about concluded contracts, the functioning of companies and firms, the relations between them, about the general economic and political situation in the country and the world, about long-term trends in economic development, prospects for the development of science and technology, about the legal conditions of economic activity, etc.

Problem statement. The main problem of marketing research in foreign markets is the problem of their information support. And depending on what type of information, what are the sources of information, what are the means of collection, transmission, research and interpretation of results, the issues of its use by company managers are resolved. The main obstacle to obtaining information is the geographical remoteness of foreign markets, as well as the inability to disseminate the com-

pany's experience in conducting marketing research in the domestic market due to the legal and socio-cultural characteristics of other countries.

The purpose and objectives of the article are to determine the features of the process of collecting marketing information in foreign markets and develop recommendations for the successful conduct of marketing research.

Object of research: the main problems and obstacles associated with conducting marketing research in foreign markets and their information support.

Research methodology. The goal of any international marketing research is to reduce the risk of decisions regarding the international activity of the company. Risk minimization is achieved on the basis of using the conclusions of international marketing research in decision-making. The research methodology is an analysis of possible methods and tools for obtaining marketing information in order to propose solutions to the problem and justify the feasibility of the proposals.

Theoretical substantiation of the study. Issues of information support for marketing research in foreign markets were studied by such scientists as Bushken J. and Allenby G. [2], Olenski S. [11], Roubo J. [13] and others. Marketing research, methods of conducting it and analysis of results were studied in the works of Wang H. and Bendl N. [16], Evgeniu T, Cho Y. and Fu J. [4] and others. The works of scientists are devoted to such problems as the study of the features of information systems, the study of consumer behavior, the analysis of the results of marketing research. However, the issues of accessibility of marketing information, the process of its collection have not been studied enough.

Summarizing the opinions of various authors, it can be stated that the value of marketing information about foreign markets is that it [16]:

- creates the prerequisites for obtaining competitive advantages;
- helps reduce the level of risk;
- identifies and warns about the features and changes in the international market environment;
- contributes to the formation and coordination of strategies for entering foreign markets;
- supports and justifies decisions;
- contributes to the formation of the company's image in the foreign market;
- makes it possible to analyze the company's activities in the foreign market in order to increase its efficiency.

1. METHODOLOGY FOR CONDUCTING MARKETING RESEARCH

Information is essentially one of the most valuable market products. To study foreign markets, a company can use the services of local agencies, which is expensive, organizationally difficult and almost does not allow the customer to control the activities of the performer. Internet surveys conducted by its own forces can replace traditional methods of organizing marketing research in foreign markets. If the research is conducted by its own forces, it is advisable to test the questionnaire questions with the involvement of a native speaker of the country in which the marketing research is conducted to avoid misunderstandings.

The place for conducting public opinion measurements in foreign markets is megacities and large cities, where the number of network users, especially in Europe, is extremely large, and the spread of their socio-demographic, status and professional characteristics allows for the construction of representative samples. Computerization in developed countries is moving towards full coverage of the socially active population, which will make provincial markets accessible for Internet surveys. This area is developing rapidly, and Internet survey technologies are constantly being improved. Despite all the obstacles, inconveniences, and limitations, the number of such studies is growing rapidly. [9; 13].

The sample size has very little effect on the cost of the study, and surveys within and outside the country can be conducted with the same speed and cost. If the questionnaires are written in English,

people in many countries of the world can be surveyed with the same speed and low cost as within the country. Internet surveys provide the widest geographic reach of respondents compared to all other methods. Internet surveys can be used for such inaccessible respondents as, for example, very wealthy and highly educated foreign consumers. [7].

Convenient for implementation is the possibility of forming “targeted” samples. Over the past century, technological progress has significantly changed consumers, markets and marketing. Since the early 2000s, information technology has penetrated major markets and has developed into what is now called new wave technology. It makes it possible for individuals and groups of people to unite and interact. New wave technology consists of four main forces: cheap computers, mobile phones, inexpensive Internet and open source software. This technology allows individuals to express themselves and collaborate with others, online means of information exchange (or “social media”). [5; 6]. These means are divided into two broad categories. The first is representative means of information exchange: blogs (online journals), Twitter, YouTube, Facebook, photo sharing sites like Flickr, and other social networks. Another category is the common means of information exchange, which include websites like Wikipedia, Rotten Tomatoes, and Craigslist.

Our contemporaries seek communication with their peers, form various homogeneous associations and societies. This saves time and makes it easier to find the right respondents. The Internet makes it quite easy to form highly specialized, „targeted“ samples for conducting marketing research. To do this, it is necessary to place invitations to participate in the survey on special thematic forums and sites. [8; 14].

With Internet surveys, there are no costs for postal transfers, telephone conversations, replication of questionnaires and payment of labor for „field“ researchers, which is very expensive for research on foreign markets. Also, there is no need to spend a lot of time searching for respondents, since everything happens automatically. The main costs are associated with ensuring the technical conditions for conducting the survey: maintenance and operation of the server, payment for provider services, programmers' labor, etc. Almost all of these costs are one-time, and the costs of attracting additional respondents are practically zero, so the advantages of Internet surveys in terms of cost are best manifested with large samples and/or research in foreign markets.

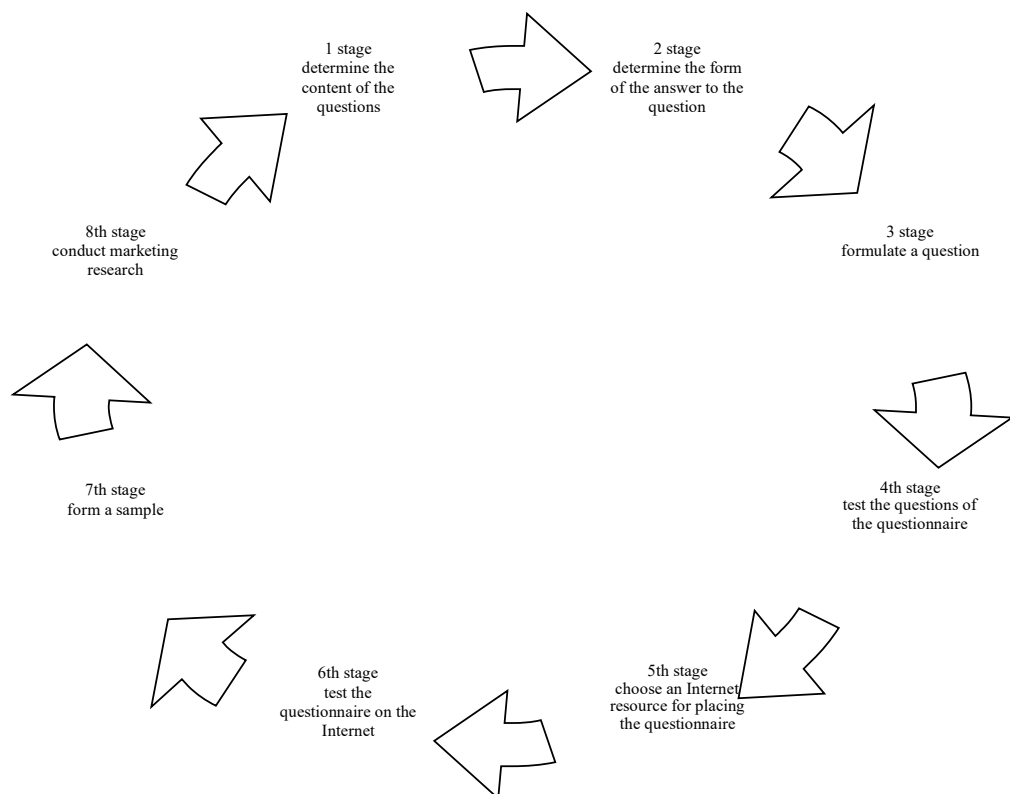


Figure. 1. Methodology for conducting marketing research in markets external to the enterprise

Internet surveys are also characterized by high efficiency. Information is transmitted over computer networks almost at the speed of light (theoretically, this should be the case, but in reality, information is delayed in the nodes of the Network). Here, there is no need to wait long for the delivery of questionnaires, as when using traditional mail, or to look for respondents, as when conducting a survey on the street or at the place of residence. Compared to conventional surveys, the duration of the survey is reduced several times.

In addition, during Internet surveys, answers are automatically recorded in writing and questionnaires are automatically processed. Since it usually takes quite a lot of time to enter completed questionnaires into a computer, this also reduces the duration of the survey.

The Internet is also very convenient to use for quick and effective piloting of questionnaires. This is all the more important if the questionnaires are drawn up in a foreign language. You can also effectively conduct operational control over the progress of filling out the questionnaire. At the same time, if serious errors are found in the questionnaire, it is possible to change the questions directly during the study.

The ability to provide individual feedback. This occurs immediately after the test and the respondent receives data on the distribution of responses across the entire panel. This can serve as an additional factor in expanding the audience of survey participants and increasing their attractiveness.

2. PROBLEMS OF INTERNET RESEARCH

Additional capabilities of programmatic control of task execution using CGI or Java scripts, which allow to solve the problem of incomplete responses that occurs when conducting traditional surveys [2].

Broadband Internet access was introduced in 2000 and gradually replaced the former dial-up connection, social networks and smartphones reached 50% penetration by 2009. Broadband and Wi-Fi have accelerated online communication and made it possible to transfer much larger files. Users can easily share content with each other, and sellers must provide more detailed information and ensure faster transactions on the Internet [1]. Sellers can also analyze the content of online reviews and conversations on social networks and participate in online conversations with buyers, which in addition to questionnaires allows you to organize joint online discussions or expert surveys. [15].

The problem with Internet research is the lack of contact with the respondent (the inability to identify him). As with postal surveys, the “field” researcher does not see or know the respondent. In the event of deliberate distortion of the answers, their veracity cannot be verified. However, access to the Internet via telephone ensures that the location of respondents is no longer secret, and companies have the opportunity to track their whereabouts, which to some extent simplifies control over the reliability of the study.

CONCLUSIONS

1. The main problem of marketing research in foreign markets is the geographical inaccessibility of respondents and the lack of knowledge of the customer of the research in the socio-cultural characteristics of the local audience. Added to this is the organizational problem associated with the difficulties of establishing interaction with potential local intermediaries (marketing information collection agencies), due to both geographical remoteness and existing language and cultural differences between the customer and the research performer. The listed problems have become particularly acute during the period of quarantine restrictions.

2. A possible way out of overcoming obstacles to collecting information in foreign markets is to conduct marketing research on the Internet. The main advantages of marketing research using the

Internet are that Internet surveys provide the widest geographical coverage of respondents compared to all other methods, provide access to hard-to-reach respondents, are convenient for forming „target“ samples based on the use of social networks, Internet surveys do not require the costs of postal transfers, telephone conversations, replication of questionnaires and payment of labor for „field“ researchers, which would be very expensive for researching external markets, and the search for respondents is automatic.

List of references

1. Ameri, M., Honka, E., & Xie, Y. (2019). Word of mouth, observed adoptions, and anime-watching decisions: the role of the personal vs. the community network, *Marketing Science*, Vol. 38 No. 4, pp. 567-583.
2. Buschken, J., & Allenby, G.M. (2016). Sentence-based text analysis for customer reviews, *Marketing Science*, Vol. 35 No. 6, pp. 953-975.
3. Chen, X., van der Lans, R., & Phan, T.Q. (2017). Uncovering the importance of relationship characteristics in social networks: implications for seeding strategies, *Journal of Marketing Research*, Vol. 54 No. 2, pp. 187-201.
4. Cho, Y.J., Fu, P.W., & Wu, C.C. (2017). Popular research topics in marketing journals, 1995-2014, *Journal of Interactive Marketing*, Vol. 40, pp. 52-72.
5. Grewal, L., & Stephen, A.T. (2019). In mobile we trust: the effects of mobile versus nonmobile reviews on consumer purchase intentions, *Journal of Marketing Research*, Vol. 56 No. 5, pp. 791-808.
6. Grewal, D., Bart, Y., Spann, M., & Zubcsek, P.P. (2016). Mobile advertising: a framework and research agenda, *Journal of Interactive Marketing*, Vol. 34, pp. 3-14.
7. Hoffman, D.L., & Novak, T.P. (2018). Consumer and object experience in the internet of things: an assemblage theory approach, *Journal of Consumer Research*, Vol. 44 No. 6, pp. 1178-1204.
8. Kannan, P.K., & Li, H.S. (2017). Digital marketing: a framework, review and research agenda, *International Journal of Research in Marketing*, Vol. 34 No. 1, pp. 22-45.
9. Li, H.S., Kannan, P.K., Viswanathan, S., & Pani, A. (2016). Attribution strategies and return on keyword investment in paid search advertising, *Marketing Science*, Vol. 35 No. 6, pp. 831-848.
10. Novak, T.P., & Hoffman, D.L. (2019). Relationship journeys in the internet of things: a new framework for understanding interactions between consumers and smart objects, *Journal of the Academy of Marketing Science*, Vol. 47 No. 2, pp. 216-237.
11. Olenski, S. (2018). Data science is the key to marketing roi – here's how to nail it, *Forbes*, available at: <https://www.forbes.com/sites/steveolenski/2018/03/06/data-science-is-the-key-to-marketing-roi-heres-how-to-nail-it> (accessed 20 August 2019).
12. Ramsoy, T.Z. (2019). Building a foundation for neuromarketing and consumer neuroscience research: how researchers can apply academic rigor to the neuroscientific study of advertising effects, *Journal of Advertising Research*, Vol. 59 No. 3.
13. Roubaud, J. (2018). Will data teams replace marketing teams in the near future?, *Adweek*, available at: <https://www.adweek.com/performance-marketing/will-data-teams-replace-marketing-teams-in-the-near-future/>.
14. Timoshenko, A., & Hauser, J.R. (2019). Identifying customer needs from user-generated content, *Marketing Science*, Vol. 38 No. 1, pp. 1-20.
15. Tirunillai, S., & Tellis, G.J. (2014). Mining marketing meaning from online chatter: strategic brand analysis of big data using latent Dirichlet allocation, *Journal of Marketing Research*, Vol. 51 No. 4, pp. 463-479.
16. Wang, X., Bendle, N.T., Mai, F., & Cotte, J. (2015). The journal of consumer research at 40: a historical analysis, *Journal of Consumer Research*, Vol. 42 No. 1, pp. 5-18.

RINKODAROS TYRIMAI PASAULIO RINKOSE

Santrauka

Straipsnyje nagrinėjamas rinkodaros tyrimų atlikimo užsienio rinkose procesas. Straipsnio temos aktualumą lemia Ukrainos įmonių ėjimo į pasaulines rinkas tendencija. Rinkodaros tyrimų vaidmuo – įvertinti rinkos sąlygas, pateikti informaciją, kuri leidžia priimti pagrįstus rinkodaros sprendimus. Pagrindinė tarptautinės rinkodaros tyrimų problema yra informacijos prieinamumo sunkumai, atsirandantys dėl geografinio nuotolio ir nepakankamo tyrimo užsakovo informuotumo apie vartotojų socialines ir kultūrines charakteristikas užsienio rinkose. Taip pat dėl kliento ir tyrėjo kalbos ir kultūrinių skirtumų kita organizacinė problema yra susijusi su sunkumais užmezgant ryšius su vietos rinkodaros informacijos rinkimo agentūromis. Straipsnyje siūloma įveikti kliūtis, trukdančias atlikti rinkodaros tyrimus užsienio rinkose, pasinaudojant interneto galimybėmis. Pagrindiniai rinkodaros tyrimų naudojant internetą privalumai yra tai, kad internetinės apklausos užtikrina plačiausią geografinę respondentų aprėptį palyginti su visais kitais metodais, atveria prieigą prie sunkiai pasiekiamų respondentų, yra patogios formuojant „tikslines“ imtis, paremtas socialinių tinklų naudojimu. Atliekant apklausas internetu, respondentų paieška vyksta automatiškai. Šiuolaikinius interneto vartotojus vienija socialiniai tinklai, jie gali lengvai tarpusavyje keistis turiniu, o tai leidžia analizuoti internetinių atsiliepimų ir pokalbių turinį, dalyvauti pokalbiuose su pirkėjais internetu, o tai kartu su ankertinėmis apklausomis leidžia organizuoti bendras internetines diskusijas ar ekspertų apklausas.

Pagrindiniai žodžiai: rinkodaros tyrimai, internetas, socialiniai tinklai, tarptautinės rinkos.

STUDIJOS KINTANČIOJE VERSLO APLINKOJE
STUDIES IN A CHANGING BUSINESS ENVIRONMENT

Straipsnių rinkinys

Parengė Romantė Bučienė
Straipsniai recenzuoti

LIETUVOS EKONOMIKOS DĖSTYTOJŲ ASOCIACIJA
Naugarduko g. 5, LT-03231 Vilnius, Lietuva
el. paštas info@leda.lt
<http://www.leda.lt>

Išleido Lietuvos ekonomikos dėstytojų asociacija,
Naugarduko g. 5, LT-03231 Vilnius

Maketavo ir spausdino UAB CIKLONAS,
Žirmūnų g. 68, LT-09124 Vilnius
Internete: <http://www.skaityk.lt>, el. paštas: info@skaityk.lt

ISSN 2029-2805



9 772029 1280015

LIETUVOS EKONOMIKOS DĖSTYTOJŲ ASOCIACIJA

Naugarduko g. 5
LT-03231 Vilnius, Lietuva
El. paštas info@leda.lt
<http://www.leda.lt>