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Faculty of Economics & Business



EDITORS

Kosjenka Dumančić

University of Zagreb, Faculty of Economics & Business
kdumancic@efzg.hr

Ivana Marić

University of Zagreb, Faculty of Economics & Business
imaric@efzg.hr

Ana Rep

University of Zagreb, Faculty of Economics & Business
arep@efzg.hr

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FOREWORD

Dear researchers,

We are pleased to present the Proceedings of the International Scientific Jean Monnet Conference: Building Sustainable EU Society for the Future, held in Zagreb, Croatia, at the House of Europe on December 12th and 13th, 2024. Organized by the Faculty of Economics & Business, University of Zagreb, in collaboration with the Representation of the European Commission in Croatia, this conference served as the closing event of the Jean Monnet EUsolis project.

The conference brought together academics, professionals, and practitioners, as well as secondary school teachers and librarians, to exchange knowledge and insights on actual topics related to, in a broad manner, economics, business, law, and education. More specifically, by bringing together a diverse group of participants, the conference aimed to inspire new ideas, foster collaborations, and contribute to building a more solidary, inclusive, and educated European society. The conference served as a platform to:

- Promote Solidarity and Inclusiveness
- Enhance Educational Capabilities
- Discuss Contemporary Challenges
- Facilitate Interdisciplinary Dialogue
- Support Lifelong Learning
- Advance Research and Practice

Over two days, nearly 40 academic papers by domestic and international authors were presented in a hybrid format, engaging around 150 participants onsite and online.

We were honored to host two distinguished keynote speakers:

- Professor Siniša Rodin, PhD, Judge at the Court of Justice of the European Union, who delivered a thought-provoking keynote on judicial independence in liberal democracies, and
- Mr Lawrence Chong, Group CEO of Consulus and Two Time TEDx Speaker, spoke on the transformative role of educators in shaping future generations.

The program continued with three thematic panels:

- Towards a Sustainable EU Society through EU Enlargement, moderated by Professor Robert Mikac, PhD, explored the challenges and opportunities of EU expansion and featured panellists from Croatia, Moldova, and Georgia.

- Education as a Changemaker in the EU Society, moderated by Professor Ivana Marić, PhD, focused on the transformative potential of education, with speakers from Croatia and Poland.
- Empowering Minds: The Pivotal Role of Academic Libraries in Student and Researcher Development, moderated by librarian Marija Šimunović, emphasized the role of libraries in advancing research and education, with contributions from Croatia and the United States.

This volume contains 50 full papers that have undergone a double-blind peer-review process. They represent relevant research and innovative perspectives across a variety of disciplines, including economics and business, education, and public policy. Topics covered range from sustainability and digitalization to EU enlargement and the critical role of education and libraries in fostering European values.

The Proceedings reflect the core objectives of the EUsolis Jean Monnet project: fostering knowledge exchange, supporting educational innovation, and promoting EU themes in academic and professional contexts. We are proud of the diverse backgrounds of the authors and contributors, whose work demonstrates a commitment to advancing a sustainable European society.

We deeply thank all contributors, including authors, reviewers, keynote speakers, panellists, and conference participants (listeners only). Your engagement and dedication have made this conference a resounding success. As the Dean noted in her opening address, this conference marks a milestone and is also a stepping stone for future collaborations and projects within the Jean Monnet framework.

We hope these Proceedings will serve as a valuable resource for researchers and practitioners, sparking further discussion and innovation on the path to a sustainable European society.

Editors

PUBLIC FINANCIAL DEBT MANAGEMENT TAKING INTO ACCOUNT THE ENERGY SECTOR: EXPERIENCE OF UKRAINE AND AZERBAIJAN

Ganna LIKHONOSOVA
National Aerospace University Kharkiv Aviation Institute
g.likhonosova@khai.edu

Elmira GOJAEVA
Azerbaijan State Economic University, Azerbaijan
elmira_qocayeva@unec.edu.az

Abstract

Background: Financial debt management in the context of the energy crisis is an urgent problem that requires a strategic approach in countries with an unstable energy system. The imbalance between the supply and demand of energy resources generation creates a trap in which the growth of energy shortages leads to increased import costs, higher prices for end consumers and increased financial burden on the state. This, in turn, can provoke inflationary pressure, a decrease in the competitiveness of the national economy, an increase in public debt and social tension due to an increase in the cost of living and a decrease in the level of energy security.

Objectives: The purpose of the article is to analyse the impact of energy crises on the state of state financial support, to determine ways to minimize risks and ensure financial stability.

Methodology: The research used the methods of scenario analysis, descriptive statistics, econometric, monographic and comparative analysis.

Findings: The paradigm of an integrated approach to the management of public debt in the context of energy crises is characterized, which is based on an integrated, multidimensional analysis and management of interrelationships between various economic, financial, social and political factors. Consideration of the energy sector should take place in the context of its interaction with the financial capabilities of other sectors of the economy. Practical recommendations include risk assessment models related to energy crises and methods of stabilizing public finances, which can be used in the operational management of the state's financial debt. The method of integration and coordination of energy, economic, fiscal and social indicators is proposed for determining effective financial instruments and mechanisms for optimizing budget expenditures. In the conditions of imbalance of energy demand and supply, management of financial debt requires a strategic approach based on investments in clean energy, improvement of energy efficiency and accurate forecasting.

Keywords: Public Debt, Financial Recession, Risk Management, Level of State Indebtedness, Level of Energy Generation

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Introduction

Financial debt management in the context of the energy crisis is an urgent problem that requires a strategic approach in Ukraine with an unstable energy system. The change in supply and demand for energy resources affects the financial condition of enterprises, their ability to provide a stable tax base and income to the revenue part of the state budget, which requires the development of effective debt management mechanisms. In recent years, a number of studies have been conducted that analyze the impact of the energy crisis on the economy and financial stability of the country. For example, the International Energy Agency (IEA) notes in its reports that the energy crisis is causing significant changes in energy demand and supply, forcing governments and companies to adapt to new conditions through investments in clean energy and energy efficiency improvements (Outlook for energy demand, 2020).

Ukraine faces additional challenges due to its dependence on energy imports and the imbalance between existing consumer demand and the ability to ensure energy supply as a result of military operations on its territory. According to a study conducted by the CSIR, countries with low energy efficiency are particularly sensitive to fluctuations in energy prices, which can lead to an increase in public debt (Roro, 2023).

The authors of the article (Biondi, 2017). discuss the various aspects of public debt management, including fiscal policies and their implications on economic stability, which can be linked to the challenges posed by energy consumption imbalances.

This study by the Cato Institute (Salmon, 2021) analyzes the relationship between public debt and economic growth, highlighting how debt management strategies can influence economic outcomes, particularly in contexts of unbalanced energy markets. This article explains how studies were identified for the survey sample, provides an overview of the theories of how public debt impacts economic growth, reviews the findings of the 40 studies in the survey sample, and concludes with some recommendations for future research.

The report by the International Energy Agency provides insights into the financial challenges and opportunities within the energy sector, discussing how energy investments and market dynamics affect public debt and fiscal policies (World Energy Investment 2022).

The authors of the study provide current data on the sustainability of the state debt and dependence on energy carriers (Katsikas, et al., 2023). The focus is on the feedback loop between the dynamic stability of public debt and interest rates, discounted by economic growth, in conjunction with budget deficits during tranquil and turbulent periods. Using the GMM panel dynamic model, the results show that dynamic stability was the case before the global financial crisis (GFC), while from GFC to the pandemic, dynamic instability prevailed and persisted in the evolution of public debt

Current research is mostly focused on the role of gross public debt in financial stability. Two contrasting views of economic sustainability have emerged in academia: strong

sustainability, which requires the separate preservation of all environmental assets, and weak sustainability, which allows for a high degree of interchangeability between produced capital, human capital, and natural capital. The authors of the study (Ouedraogo, 2022), which focuses on weak stability, offer an alternative point of view. While debt accumulation can finance capital spending, debt service can increase pressure on natural resources needed for a sustainable economy, affecting all components of adjusted net savings or the inclusive welfare index, both of which measure economic sustainability.

In the conditions of the imbalance of the existing demand for energy resources and the possibilities of their generation, the urgent issue of ensuring energy stability and financial stability is the improvement of supply and demand forecasting. The use of modern methods of forecasting energy needs and financial capabilities of the state is given in the study (Eksoz, 2020). The author characterizes the methods of modern forecasting, which allows for more accurate planning of purchases and production of energy resources, which reduces financial risks.

Therefore, the issue of managing the state financial debt in the conditions of unbalanced supply and demand of energy resources is becoming urgent for Ukraine. The world economy is experiencing significant fluctuations caused by objective factors, among which the imbalance of supply and demand for energy resources plays a significant role. In recent years, there have been significant shifts in the global structure of demand for energy resources. Growing demand for energy from developing countries, along with reduced supply due to political and economic crises in producing countries, creates instability in energy markets (Ushenko, et al., 2023; Likhonosova, 2024). Geopolitical conflicts, sanctions, as well as changes in international relations also significantly affect the availability of energy resources. For example, sanctions against key energy suppliers can lead to shortages that affect prices and, as a result, public debt. The global transition to clean energy sources also brings its share of uncertainty. States are forced to invest in new technologies and infrastructure, which can affect their financial stability.

In these conditions, effective management of public financial debt becomes a key task. It is necessary to develop strategies that will reduce the negative impact of energy crises on public finances. An important aspect is the optimization of budget expenditures and the improvement of the efficiency of the use of public funds. Governments must consider energy risks when formulating budgets and planning expenditures. The use of various financial instruments (government bonds, loans from international financial organizations) can help stabilize the financial situation. It is also important to develop protection mechanisms against currency and price fluctuations in energy markets.

The energy sector plays an important role in the economy of Azerbaijan on the current agenda. Thus, at present, in order to develop an energy concept and promote the General Plan of the "green energy zone", one of which is an agreement with the Japanese company TEPCO, specializing in this area.

The program provides for the implementation of measures aimed at increasing the efficiency of the Azerbaijani model of economic development, a significant area of which is the creation of environmentally friendly production methods, the introduction of energy-saving technologies, and it is extremely important that these technologies are available to ordinary citizens. This program is aimed precisely at the person, his needs and ensuring a productive, state-protected life. This includes improving the quality of social services provided by the state, such as medicine, education, utilities, and preventing social exclusion.

Azerbaijan aims to consolidate the image of a reliable strategic partner on the world stage. Undoubtedly, this fact is important for the country's authority in terms of ensuring energy security. International financial and credit institutions of the West are joining the implementation of mega-projects, both in the field of energy efficiency and in the field of alternative energy. For example, the oil company BP (British Petroleum) in August 2020 announced a development strategy for the next 10 years, which will help a rapid transition to "green energy".

Taking into account the above, research in the field of public financial debt management in the conditions of unbalanced supply and demand of energy resources is extremely relevant. This will make it possible to find effective solutions to ensure the financial stability of states and minimize the negative consequences of energy crises for national economies.

The purpose of this scientific article is to develop theoretical and practical recommendations for the effective management of public financial debt in conditions of unbalanced supply and demand of energy resources, namely: analysis of the impact of energy crises on the state of public financial support, determination of ways to minimize risks and ensure financial stability.

Based on this, the tasks of the research are:

- Determining the influence of the imbalance of demand and supply of energy resources on the state financial debt;
- Assess the influence of factors affecting the imbalance of supply and demand of energy resources on the financial stability of the state;
- Develop a comprehensive approach to public debt management in the context of energy crises;
- Identify effective financial instruments and mechanisms for optimizing budget expenditures and strategic planning in conditions of instability in the energy markets.

The proposed methodology for integrating energy factors into the public debt management model can be considered a scientific novelty of the study, which allows more accurate risk assessment and the development of effective strategies. A comprehensive approach is proposed, including both financial instruments and strategic planning for public debt management in the context of energy crises.

Practical recommendations include risk assessment models related to energy crises and methods of stabilizing public finances, which can be used in the operational

management of the state's financial debt.

Therefore, in the conditions of imbalance of energy demand and supply, the management of financial debt requires a strategic approach based on investments in clean energy, improvement of energy efficiency and accurate forecasting. These measures will help to stabilize the financial condition of enterprises and ensure the economic stability of Ukraine in the long term.

Thus, the current state of financial debt management in conditions of critical energy consumption includes a complex relationship between financial development, energy security and environmental sustainability.

Literature Review

The main trends in the dependence of the state's financial sector on its energy balance are given in the publication (Energy Industry in Ukraine and the World..., 2024). The study contains the determination of the impact of stabilization of electricity supply on the economic growth of Ukraine in 2023-2024. In particular, it is noted that one of the key factors influencing the growth of the economy is the stability of the energy sector, which contributes to improving the financial stability of the state.

The authors of the article (Konechenkov, 2022) analyze the development of renewable energy in Ukraine, including the impact of military operations on this sector. It is noted that Europe's political will to reduce dependence on imported energy resources has a positive effect on the Ukrainian renewable energy market, which contributes to the overall economic and financial stability of the state.

The main directions of the development of the financial sector of Ukraine in conditions of macro-financial instability and challenges related to energy dependence are considered in the Strategy for the Development of the Financial Sector of Ukraine until 2025 (Strategy of the Financial Sector ..., 2024). The article emphasizes the importance of integrating renewable energy sources to ensure a stable financial environment in the country.

A study by the National Institute for Strategic Studies (Review of Support Tools..., 2023) provides an overview of financial stability support tools under martial law conditions in Ukraine. The authors examine measures taken by the regulator to strengthen the financial stability of Ukraine's banking system during martial law, including public debt management and macro-financial stability.

Ukrainian authors confirm that Ukraine faces complex challenges in the field of financial debt and energy security. The financial debt reality of the country is characterized by significant foreign debt and the instability of the currency market (Odylivana, 2019).

The analysed sources can become the basis for a deeper understanding of the

problem and the development of new approaches to the management of financial debt in the conditions of unbalanced supply and demand of energy resources.

At the same time, energy instability caused by geopolitical risks and dependence on imported energy sources creates permanent threats to the economic stability and financial stability of the country. In such conditions, the management of the country's financial debt becomes a key element of ensuring national security and further economic development.

Research Objectives and Methodology

Methods of analysis and synthesis were used to study the literature on risk management, financial debt and energy instability. Descriptive statistics methods were used to analyse the dynamics of Ukraine's financial debt, debt structure, exchange rates, economic growth and energy imports. The data were obtained from official sources such as the State Statistics Service of Ukraine, the Ministry of Finance of Ukraine, the National Bank of Ukraine and the International Energy Agency.

The method of scenario analysis was used to model possible scenarios of the development of the situation with financial debt and energy security of Ukraine. Various scenarios of economic growth, energy price fluctuations, political changes and introduction of energy-saving technologies were taken into account. Scientific articles, monographs, research reports and reviews on the topics of risk management, financial stability and energy security were analysed. The experience of other countries that had similar problems, as well as the recommendations of international organizations, were taken into account.

In order to assess the impact of the imbalance of demand and supply of energy resources on the state financial debt and to study the experience of other countries in the management of state debt in the conditions of energy crises, econometric and comparative analysis was used, namely, the collection of statistical data on the state debt, energy resources, macroeconomic indicators, analysis strategies and policies implemented in various countries to stabilize public debt. Based on the received data, a synthesis of best practices and recommendations for implementation in Ukraine was carried out. Using these methods will allow you to get a comprehensive view of the problem and develop effective strategies for managing public financial debt in the context of energy challenges.

The application of a comprehensive approach, which includes quantitative and qualitative methods, made it possible to comprehensively investigate the problems of financial debt and energy instability of Ukraine and to develop effective directions of risk management.

Research Results

Dynamics of the total state debt of Ukraine

At the end of 2021, the national debt of Ukraine was only 48.9% of GDP (Dynamics of the total national debt, 2024), that is, the country was in a fairly stable debt situation. The average debt service rate was about 9% per year for domestic debt and 4% for external debt (Medium-term strategy for public debt management, 2024). The total cost of servicing the debt was 2.9% of GDP. But the decline of the Ukrainian economy due to the military conflict, as well as a significant increase in public spending, which increased from 40% to 75% of GDP from 2021 to 2023, significantly increased both internal and external debt. As a result, according to the results of 2023, the state debt amounted to 84.4% of GDP (Table 1) (Dynamics of the aggregate state debt, 2024).

Table 1: Dynamics of the Aggregate State Debt and GDP of Ukraine from 2009 to 2024 (Million Hryvnias)

State debt (total)				Gross domestic product (GDP)				State debt / GDP
December 2009	316,885	-	-	for 2009	913,345	-	-	34.7%
December 2010	432,235	115,351	36.4%	for 2010	1,082,569	169,224	18.5%	39.9%
December 2011	473,122	40,886	9.5%	for 2011	1,316,600	234,031	21.6%	35.9%
December 2012	515,511	42,389	9.0%	for 2012	1,408,889	92,289	7.0%	36.6%
December 2013	584,114	68,604	13.3%	for 2013	1,454,931	46,042	3.3%	40.1%
December 2014	1,100,564	516,450	88.4%	for 2014	1,566,728	111,797	7.7%	70.2%
December 2015	1,572,180	471,616	42.9%	for 2015	1,979,458	412,730	26.3%	79.4%
December 2016	1,929,759	357,579	22.7%	for 2016	2,383,182	403,724	20.4%	81.0%
December 2017	2,141,674	211,916	11.0%	for 2017	2,982,920	599,738	25.2%	71.8%
December 2018	2,168,627	26,953	1.3%	for 2018	3,558,706	575,786	19.3%	60.9%
December 2019	1,998,275	-170,352	-7.9%	for 2019	3,974,564	415,858	11.7%	50.3%
December 2020	2,551,936	553,660	27.7%	for 2020	4,194,102	219,538	5.5%	60.8%
December 2021	2,671,828	119,892	4.7%	for 2021	5,459,574	1,265,472	30.2%	48.9%
December 2022	4,071,683	1,399,856	52.4%	for 2022	5,191,028	-268,546	-4.9%	78.4%
December 2023	5,519,484	1,447,801	35.6%	for 2023	6,537,825	1,346,797	25.9%	84.4%
May 2024	6,115,264	595,780	10.8%	for 2024	-	-	-	-

Source: developed by authors based on Dynamics of aggregate public debt, 2024

This indicator would have been even worse if the US had not filled Ukraine's budget with \$22.85 billion in the form of grants, not loans, in 2022-2023. (Grant funds provided on non-refundable terms, 2023). In 2022, the government of Ukraine agreed with creditors to postpone the payment of principal and interest on Eurobonds for 2022–2023 (Kharlamov, 2023). However, the situation will be different in 2024. This year, Ukraine does not have Western grant support, and it is time to pay interest on Eurobonds immediately in three years (2022-2024).

This situation has led to an unprecedented increase in public debt servicing costs to 6.3% of GDP, or almost \$12 billion in 2024 (Medium-Term Strategy for Public Debt Management, 2024). And by the end of the year, the state debt will reach almost 100% of GDP (Chupak, 2024). At the same time, the policy of high interest rates of the National Bank of Ukraine led to an increase in the average domestic debt service rate

from 9% to 13% in two years (Medium-term strategy of public debt management, 2024).

Deferred servicing of public debt

Debt service to the IMF and other creditors Ukraine, having signed a four-year program with the IMF, is now replacing \$10 billion of debt to the IMF (debt received until 2022 at rates of 2% and 3% per year) with another IMF loan in the amount of \$15.6 billion (The interest rate is already 8.5% per annum). As a result, already in 2024, in addition to repaying the principal amount of the loan under the old IMF programs, Ukraine will have to pay about \$900 million in interest for IMF debt service. According to calculations, having received \$5.4 billion in IMF loans in 2024, Ukraine will need to increase payments only for debt service (without reducing the amount of the debt) in 2025 to \$1.1–1.2 billion.

In addition, there are securities of Ukraine tied to the GDP of 2015, which are valid until 2041. In 2015, Prime Minister and Finance Minister signed an agreement with creditors, which slightly reduced the amount of debt in exchange for securities, the payments of which are mandatory (Vygovska, 2015), if Ukraine's economic growth exceeds 3% of GDP starting in 2019. Moreover, the conditions contain obligations: the greater the GDP growth, the greater the payment. The motive behind the signing of such an agreement by the government of Ukraine remains a mystery. However, in the conditions of post-war recovery, payments on these obligations can reach \$1-2 billion per year and more for the nominal amount of securities of \$3.2 billion.

In 2023, the Ukrainian economy grew by 5.3%, which means that already in 2025, Ukraine will have to pay about \$700-\$800 million "tax on the growth of the Ukrainian economy" for the benefit of creditors, to which the Ukrainian government signed a corresponding agreement.

Thus, approximately half of the US and EU aid to Ukraine in 2024 will go to service the debt of creditors inside and outside of Ukraine.

In order to reduce the burden on the state budget, in May-June 2024, the Ministry of Finance of Ukraine and its creditors held negotiations on the restructuring of the \$20 billion debt (Eurobond) and the modification of securities tied to GDP (Parashchiiy, 2024). So far, the negotiations have not led to any joint decision. If debt restructuring fails by August 1, 2024, Ukraine will have to pay about \$3.75 billion in interest on Eurobonds by the end of 2024.

The GDP of Ukraine in 2023 was UAH 6.5 trillion in nominal terms (Dynamics of the aggregate state debt, 2024). The amount of international aid is 1.5 trillion. UAH or 23% (Medium-term strategy for public debt management, 2024). This money goes mainly to cover the budget's social expenses: pensions, salaries of budget employees, benefits, scholarships, etc. In dollar equivalent, the situation is approximately similar: the GDP of 2023 amounted to 160 billion dollars. in the equivalent, aid - 40 billion

dollars. or 25% (Medium-term strategy for public debt management, 2024).

However, if you look at the actual data, the effect of foreign aid is broader. This money is used to pay social transfers, which, in turn, are used to purchase social goods and services, mainly of national production. That is, solvent demand is formed (Likhonosova, 2024). Therefore, the multiplier effect of budget and consumer spending is included.

It can be assumed that up to 30% of GDP is directly or indirectly formed at the expense of external international aid, and without it, the gross product of Ukraine last year would hardly have exceeded 100 billion dollars.

But, in addition to the state budget, there is also a balance of payments factor. Thus, the deficit of the trade balance last year approached the mark of 40 billion dollars, although the balance of payments itself remained in surplus, including due to the positive balance of the financial account (by almost +20 billion dollars) and current transfers (+24 billion dollars) (Balance of payments in 2023, 2024).

That is, if it were not for the grants that go to transfers and credits that go to the assets of the financial account, the balance of payments of Ukraine would have a "hole" of 40 billion dollars. and a deficit of 25-30 billion dollars. And this would lead to a deep devaluation of the hryvnia at least at the level of 2022. Which, in turn, would lead to a revaluation of the currency equivalent of nominal GDP and a reduction of currency GDP to 70-80 billion dollars. In addition, there is nothing unusual about this for the Ukrainian economy: in 2015, the GDP of Ukraine was already falling from 183 billion dollars. in 2013 to 90 billion dollars (Dynamics of the aggregate state debt, 2024).

In 2022, real GDP in hryvnia decreased by 28.8%, and in 2023 it increased by 5.3%. The currency equivalent in 2023 was 160 billion dollars. – this is 80% of the level of 2021 (then a historical maximum of \$200 billion was recorded). But in such a method of determining the ratio of GDP and public debt there are certain destructive factors in the form of a huge influence that forms external financial assistance.

Modern trends of state financial support of Azerbaijan based on adjustments of oil industry indicators

Over the past 10-15 years, Azerbaijan has been in the process of forming a more effective and multifaceted model of economic development associated with the development of the national economy. Of course, the role of foreign exchange reserves is crucial in the implementation of economic development priorities. Large foreign exchange reserves are valuable economic and financial assets for each country (Gojaeva, 2021). Many countries in the world have been able to increase the intensity of economic development processes, improve the standard of living in the country and ensure a sustainable and socio-economic solution to problems at a high level by strengthening their foreign exchange reserves. In recent years, some foreign exchange reserves in Azerbaijan have been lost due to urgent need. The fact is that most of the

foreign exchange reserves of the Central Bank of the Republic of Azerbaijan were directed to measures to stabilize the national currency. However, the downward trend in the exchange rate of foreign exchange reserves has already been stopped (Gojaeva, 2018) The dynamics of foreign exchange reserves in our country during 2003-2016 attracts attention with instability. For example, if in 2010 the total volume of foreign exchange reserves in Azerbaijan amounted to 29.8 billion dollars, then in 2011 this figure reached 40.28 billion dollars, in 2012 - 41.82 billion US dollars, in 2013 - 50.03 billion US dollars, in 2014 - 50.86 billion dollars (a record volume). However, since 2015, foreign exchange reserves have decreased, and by the end of 2016 they reached 37.16 billion dollars. Currently, the growth rate of foreign exchange reserves has already been restored.

Azerbaijan's external debt for 2023 was estimated at \$6 billion 576.9 million, which is 1.7% less than the figure at the end of 2022. External debt for 2023 was equal to 10% of GDP. 11,180.7 million manats or \$6,576.9 million of the debt is external, and 4,970.3 million manats is domestic public debt. These are 10% and 4.5% of the expected GDP, respectively.

The bulk of the domestic public debt is made up of government bonds issued to finance the state budget deficit and support the development of the government securities market. 28.5% of government bonds in circulation during the reporting period are one-year, 54% are two- and three-year, and 17.5% are five- and seven-year government bonds.

Azerbaijan's public debt increased by 6.8% in 2023 amid active borrowing in the domestic market. At the end of 2022, Azerbaijan's public debt amounted to 16 billion 476 million manats. Thus, in 2023, the country's public debt increased by 6.8%. In 2023, the volume of external public borrowing amounted to 1 billion 405 million manats against 600 million manats in 2022.

The growth of public debt in 2023 was associated with more active borrowing in the domestic market. In particular, by the end of 2022, the size of the domestic public debt amounted to 3 billion 841.1 million manats, while by the end of 2023, the domestic debt reached 5 billion 64.1 million manats. The external debt at the end of 2022 was at the level of 12 billion 634.9 million manats, by the end of 2023 it decreased to 12 billion 529.4 million manats.

Public debt to GDP in Azerbaijan fell to 11.7% in 2022. The maximum level was 25.4%, and the minimum was 3.2%. Thus, Azerbaijan's external debt in 2023 was \$6.7 billion, or about 10 percent of GDP. Several years ago, the goal was set to ensure that the volume of external public debt was below 10 percent of the gross domestic product. The volume of international currency reserves in Azerbaijan fell to USD 9,044 million (USD 9.044 billion) in 2023. The maximum volume was USD 15,193 million, and the minimum was USD 3,974 million.

Of these, \$43,223.3 million or 87% falls to the State Oil Fund of Azerbaijan (SOFAZ), \$6,436.3 million or 13%. Azerbaijan's foreign exchange reserves amounted to about

\$66 billion. Azerbaijan's strategic foreign exchange reserves are estimated at a record \$65.9 billion, the Chairman of the Central Bank (CBA) said. Thus, the size of Azerbaijan's strategic foreign exchange reserves for the first 6 months of 2023 increased by 12.7%, reaching \$65.9 billion. Azerbaijan's strategic foreign exchange reserves are formed from the CBA reserves, the assets of the State Oil Fund and the treasury funds of the Ministry of Finance. As of July 1, 2021, the public debt of the Republic of Azerbaijan was estimated at 17 billion 352 million manats (10 billion 207 million dollars) or 21.6% of GDP. According to the Ministry of Finance, 84.3% of the public debt for 2021 was external debt (8 billion 603.4 million dollars or 14 billion 625.7 million manats or 18.2% of GDP), 15.7% was domestic (2 billion 726.3 million manats or 3.4% of GDP).

According to the estimates of the Azerbaijani government, in 2025, the volume of Azerbaijan's public debt should decrease to 7.7 billion dollars or 14.1% of GDP. The state budget of Azerbaijan for 2024 was approved with a deficit of 2.2% of GDP. The state budget revenues for 2024 were approved at 34 billion 173 million manats, expenses - 36 billion 763 million manats. The state budget revenues for 2024 are calculated based on an average oil price of \$60 per barrel. In the structure of state budget revenues in 2024, transfers from the State Oil Fund (SOFAZ) for 2024 are planned at the level of 12 billion 781 million manats (+8.9% of the forecast for 2023).

In addition, in 2024, VAT revenues are projected by the end of the year at the level of 7 billion 591 million manats, income tax - 5 billion 675.6 million manats, personal income tax - 1 billion 895 million manats, excise taxes - 1 billion 531 million manats, customs duties - 1 billion 475 million manats. In the structure of expenditures, in 2024, 6 billion 421 million manats were allocated for defense and national security; 4 billion 549.9 million manats for education; 4 billion 542.2 million manats for social protection and social security; 4 billion 814.9 million manats for general state purposes; 1 billion 109.9 million manats for the agro-industrial complex; 7 billion 878 million manats for economic activity, the rest for other purposes. Expenditures on servicing the public debt for 2024 are envisaged at the level of 1 billion 972.6 million manats.

One of the most complex and demanded tasks is the process of digitalization of the economy of Azerbaijan, which the government of the republic will have to implement in the coming years. Based on the basic network infrastructure in the country, it is necessary to accelerate the development of the digital economy, expand innovative production and the service sector, create prerequisites for accelerating the development of human capital, including in business. Azerbaijan is taking a course on the introduction of a new socio-economic development model.

The strategic goal of today for Azerbaijan is to increase its own renewable capacities, which will ensure energy security. Modern energy production, which is based on renewable and environmentally friendly sources, allows for more efficient use of hydrocarbons.

Based on the above, it should be noted that alternative energy sources in Azerbaijan are hydropower, wind, solar energy and biomass. Therefore, the potential of the

country's wind, sun and water resources allows for an increase in the value of solar, hydro and wind energy. As the statistical data in Table 2 show, electricity production is increasing every year, which is a priority for energy security. Thermal power plants have proven their potential, but it would still be worth noting that solar power plants have begun to develop at a rapid pace. Waste incineration, which allows saving natural resources, cannot be ignored.

Table 2: Electricity Production in Azerbaijan, Million kW

Years	Electricity production	Including					
		thermal power plants	hydro-electric power	plants wind power	plants solar power	plants electricity from waste	incineration electricity from biomass combustion
2016	24,952.9	20,699.0	1,959.3	22.8	35.3	174.5	0.0
2017	24,320.9	20,445.4	1,746.4	22.1	37.2	170.3	0.0
2018	25,229.2	21,242.9	1,768.0	82.7	39.3	162.2	0.0
2019	26,072.9	22,289.7	1,564.8	105.4	44.2	195.9	0.0
2020	25,839.1	22,471.3	1,069.5	96.1	47.0	200.6	0.0
2021	27,887.8	24,308.8	1,277.3	91.4	55.2	193.2	-
2022	29,039.8	25,137.4	1,595.7	83.3	60.9	205.3	-

Source: Gojaeva, et al, 2022

There are many indicators, such as the competitiveness of the country's economy and the indicator of its influence in the international arena. Among them, external public debt is of great importance. The withdrawal and use of external public debt is actually one of the indicators of economic development. However, the debt must have some limit and must also correspond to the financial capabilities of the country. Part of the country's foreign exchange reserves in the near future will be directed to finance the implementation of strategic roadmaps, primarily in the field of real sector development. All this will not only ensure the sustainable development of the national economy, but will also create new sources of economic growth, increase the production of export-oriented products and, ultimately, create favourable conditions for the formation of new sources of foreign exchange reserves of the country (Gojaeva, 2022). In addition, against the backdrop of global events, an increase in the export of non-oil goods and services, as well as the volume of remittances and the dynamics of investments in the non-oil sector are expected. Among strategic minerals, gold remains one of the most priority and highly liquid types of raw materials for Azerbaijan along with fuel and energy resources. Thus, without gold, an innovation-oriented economy is impossible, which is the main trend for the future of Azerbaijan.

Measuring energy consumption indicators as a method of determining GDP growth rates

To determine GDP growth rates, we use the so-called "electrical method", that is, the method of determining GDP growth rates based on the dynamics of electricity production and consumption.

One of the modern indicators of GDP sustainability is the indicator of its energy

intensity. At the same time, its growth is not always a positive dynamic for the state, because the energy intensity indicator of GDP is a peculiar sign of high energy costs for production using outdated technologies.

The indicator of energy availability of the country's economy and population has a different connotation. Its growth indicates positive development trends. Because the more available and cheap energy, the more opportunities and incentives for development, although the energy factor alone is necessary but not sufficient.

Nikola Tesla determined the development of civilization by the level of energy consumed (Kresoja, 2024). In the natural sciences, there is the Kardashev Scale, which defines three types of space civilizations (Holdren, 2003):

The first type uses all available energy resources on the home planet;

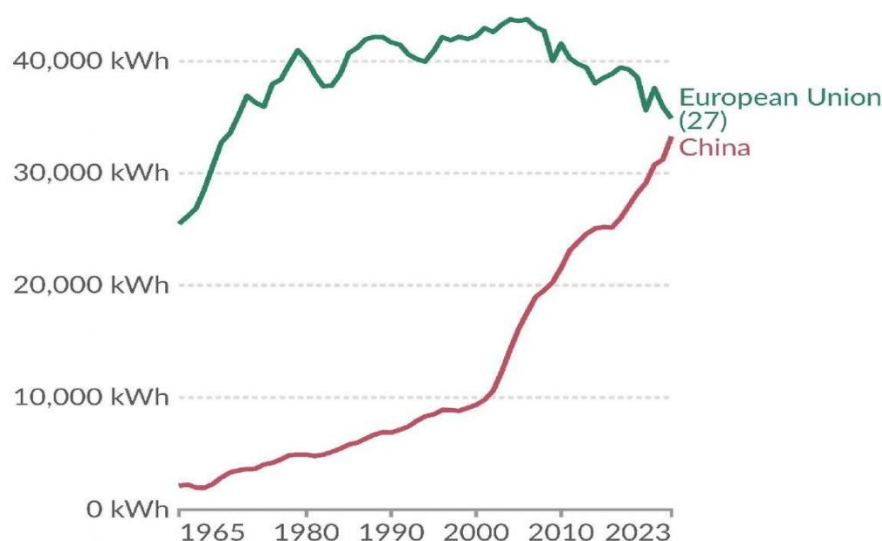
The second type is a civilization that uses all the energy of its star, in our case, the Sun.

The third type is a civilization that uses the energy of its galaxy.

So, let's track, based on actual data, how energy consumption reflects the level of strategic development of the country. On a per capita basis, China compared the indicators of the level of primary energy production with the volume of the entire EU.

In turn, the EU level decreased significantly: from approximately 45,000 kWh per year to 35,000 kWh per year per capita (Primary and final energy consumption in Europe, 2024). And in China, the same indicator, on the contrary, grew significantly: starting from significant energy poverty of the population to more than 30,000 kWh per year (Statistical Review of World Energy, 2024) (Figure 1).

Figure 1: Levels of Primary Energy Production per Capita in the EU and China



Source: *Statistical Review of World Energy, 2024*

Discussion

Energy generation per capita

The indicator of energy production per capita shows the level of complexity of the economy, how many machines and equipment can be used in everyday life and production for the strategic development of the country and the quality of life of its population.

As for Ukraine's indicators of primary energy production, there are no statistical data to date. In 2023, electricity production amounted to 96.8 billion kWh per year (Ukraine Electricity Generation 2023 vs 2022, 2024) with a population of about 30 million people (Population Reduction Forecasts, 2023). It is worth noting that this is not consumption, it is production per capita of purely electricity, without taking into account other energy resources.

That is, the indicator of energy generation per capita in Ukraine is about 3,200 thousand kWh per year. In 2024, it is safe to say that electricity production may drop to 90 billion kWh per year, and the per capita production rate may fall to 3,000,000 kWh or lower. And if its citizens who left at a constant electricity generation start returning to Ukraine, this figure will drop to 2,500 kWh per year.

This level indicates total energy poverty. After all, even with a complete shutdown of industry from energy supply, taking into account critical infrastructure, one person will be able to consume about 100 kWh per month. This is sufficient for minimum needs, but it will be an economy with commercial consumption completely disconnected (industry, service sector, trade, etc.). In order to ensure the stable life of the country, such obstacles are impassable rather than realistic.

According to Ember and Energy Institute (Per capita electricity generation, 2023), electricity production per capita in 2023 in the USA is 16,600, in Germany - 6,000, in the Russian Federation - 8,000, in China - 6,600, in Japan - 8,200 kWh per year. In Ukraine by 2023, there was 2,800 kWh per year (Per capita electricity generation, 2023).

Based on these indicators, to ensure an above-average level of development, taking into account the population of about 30 million, Ukraine needs to generate at least 180 billion kWh per year. In other words, taking into account the current level, Ukraine needs to at least double its electricity generation.

At the same time, it is necessary to understand that no decentralized generation will fulfill the task. Only the increase of basic, stable generation, and what is important for Ukraine - on an available energy resource. And today, for Ukraine, it is no longer coal or gas. Alternative sources of generation, or rather their level of development in Ukraine today, are also unable to cover the necessary indicators. The only source available so far is uranium, i.e. energy generation by nuclear plants.

Structural restructuring of the economy of Ukraine

It can be assumed that the root of the problem lies in the deep structural degradation of Ukraine's economy. Virtually complete deindustrialization and dependence of GDP on the raw material sector (agriculture), banking and services sector, where there is no direct relationship between production growth and electricity consumption. Plus, an increase in the contribution to GDP of tax revenues.

All these segments of the economy (except agriculture) are directly dependent on the amount of foreign aid: taxes, finance, and the service sector (including trade) function thanks to foreign financial aid.

Among the positive effects of such a structural transformation, only the narrowing of the gap between production and consumption can be mentioned: if in 2021 consumption was 77% of production, then in 2023 it will be 81%. (Okhrimenko, 2024).

That is, up to 4% of electricity production, which previously "disappeared" in the form of losses in networks, is now officially consumed. This effect can be explained by the decrease in the "shadow electricity" market, which involved large enterprises that have simply been sent to function today.

In other words, the Ukrainian economy is becoming less energy-rich. Not energy-intensive (which would be a completely positive phenomenon), but less energy-rich. In this format, the economy and security of Ukraine in the horizons of post-war structural transformations (if they will occur at all) become more and more hazy.

Conclusion

So, to get a chance for recovery, the economy of Ukraine should be directed, first of all, to social programs. Something like the repatriation of the population following the example of Israel. But for this, it is necessary to completely remove the existing repressive tools in the relations between society and the state, restart the social contract, form a relationship to the country's resources as a general potential and opportunity for growth, guarantee the impossibility of dismantling basic human rights and freedoms, launch well-known models of dynamic economic growth based on knowledge economy and the formation of own added value, not only raw materials and agricultural products, create jobs and ensure entrepreneurial freedoms. This task is extremely difficult, but it cannot be said that it is impossible, of course, under the conditions of its formation.

The leading role of oil production in the economy of Azerbaijan is due to the fact that over the past few years, revenues from the sale of oil and oil products have provided a significant portion of budget revenues, which made it possible to direct them to solving important economic and social problems. However, the dominance of the oil industry may lead in the long term to unbalanced development of the economy, make it dependent on the situation on world energy markets, the international political situation and the emergence of other negative phenomena. In this regard, research aimed at finding the most effective directions for the strategic development of the oil and gas industry of Azerbaijan, ensuring sustainable and balanced growth for the country's economy, is of particular relevance.

Thus, the research makes it possible to determine the degree of influence of the imbalance of demand and supply of energy resources on the state financial debt through the use of such tools as: analysis of market conditions, assessment of demand and supply for energy resources: current and forecasted volumes of consumption, main consumers of energy resources (industry, transport, households); analysis of price changes for energy resources on the domestic and world markets; regulatory initiatives to support stability in the energy resource market; the impact of international sanctions or trade agreements on the availability of energy resources; the use of statistical data to assess historical trends and their impact on public financial debt.

The developed paradigm of an integrated approach to public debt management in the context of energy crises is based on an integrated, multidimensional analysis and management of interrelationships between various economic, financial, social and political factors. Consideration of the energy sector should not take place in isolation, but in the context of its interaction with other sectors of the economy (industry, transport, agriculture).

The integration and coordination of energy, economic, fiscal, and social policies to achieve agreed goals and create integrated strategies, including financial plans, political measures, and regulatory initiatives, is very important for determining effective financial instruments and mechanisms for optimizing budget expenditures.

Appropriate long-term planning may include: developing long-term debt management plans that take into account possible energy crises; creation of reserve funds and mechanisms for rapid response to crisis situations; the use of econometric and mathematical models for forecasting possible scenarios of the development of energy crises and their impact on public debt; creation of "what if" scenarios to assess the risks and consequences of various political decisions; assessment and management of financial risks related to energy crises, including currency risks, interest rate risks and liquidity risks; using insurance instruments and hedging to protect against possible losses.

The energy sector plays a key role in the formation of macroeconomic stability, which directly affects the management of public financial debt. In countries rich in energy resources, such as Azerbaijan, revenues from the export of energy resources make it possible to reduce the debt burden. At the same time, in Ukraine, with its dependence on energy imports, the debt is largely due to the lack of funding in the energy sector.

The main challenges for Ukraine are significant energy dependence, a high level of public debt and the need to modernize the energy infrastructure. The introduction of renewable energy sources and improved energy efficiency can be key factors in reducing debt pressure.

The use of the sovereign fund of Azerbaijan (SOFAZ) is an example of effective management of revenues from energy resources, which contributes to the stabilization of public debt. At the same time, diversification of the economy remains an urgent task to ensure stability in the conditions of falling energy prices.

Both countries need to integrate debt policy with energy strategy. This includes:

- 1) For Ukraine: reducing dependence on imports by developing domestic energy resources and attracting international financial assistance for energy modernization.
- 2) For Azerbaijan: increasing investments in "green" energy and reducing dependence on oil and gas exports.

Azerbaijan's practice of accumulating surplus income in a sovereign fund can be adapted by Ukraine to create a reserve fund focused on debt stabilization and financing of strategic energy projects.

Strategic recommendations for Ukraine include a focus on long-term energy security policies, including the use of renewable energy sources and energy efficiency. Expanding access to international financial markets at low interest rates for financing infrastructure projects.

For Azerbaijan, the strategic policy will be deepening the diversification of the economy, increasing institutional transparency in the field of debt management and ensuring stable investment in the development of non-traditional energy sources.

Public debt management cannot be effective without taking into account the specifics of the energy sector. Both countries need close coordination between energy, financial and foreign economic policies to ensure sustainable economic development.

The experience of Ukraine and Azerbaijan demonstrates the importance of taking into account the energy context when managing public debt. Successful implementation of comprehensive strategies in this area can not only reduce the debt burden, but also contribute to sustainable economic growth of both countries.

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ESTIMATING THE IMPACT OF CO₂ EMISSION ON INTRA-EU TRADE: A GRAVITY MODEL ASSESSMENT

Elena MAKREVSKA DISOSKA

Faculty of Economics-Skopje, Ss. Cyril and Methodius University in Skopje
elenam@eccf.ukim.edu.mk

Katerina TOSHEVSKA-TRPCHEVSKA

Faculty of Economics-Skopje Ss. Cyril and Methodius University in Skopje
katerina@eccf.ukim.edu.mk

Abstract

Background: The European Union (EU) is characterized by high level of intra-regional trade due to the existence of the Internal market. Goods and services flow freely across borders, which can result in varying levels of CO₂ emissions depending on the energy mix and industrial practices of each country. When production shifts to countries with less stringent environmental regulations, CO₂ emissions can increase even if the EU's total production emissions decrease. The EU has mechanisms like the Emissions Trading System (ETS) to counteract this by making emissions costly for industries. Since the adoption of the Kyoto Protocol in 1997, the EU has implemented a range of policies aimed at reducing greenhouse gas (GHG) emissions. The European Green Deal, launched in December 2019 is the EU's comprehensive strategy to make Europe the first climate-neutral continent by 2050.

Objectives: This paper identifies the factors that influence bilateral trade flows among EU countries. The focus is given to the CO₂ emissions of the countries (kg per PPP of GDP) and its influence on the trade flows among EU countries.

Methodology: Panel gravity model used in this paper considers economic and geographical factors, including GDP, distance, population, CO₂ emissions and commonalities like language and border. We consider the period 1999-2022 using annual data. The study employs OLS and PPML models with fixed effects. By including the indicator for the CO₂ emissions, the model can reveal the extent to which environmental factors impact trade dynamics between countries.

Findings: The results of the analysis point out that larger CO₂ emissions between EU member countries (natural logarithm of product of the CO₂ emissions) have negative influence on their mutual trade. This indicator makes it possible to see how changes in the CO₂ emissions affect mutual trade among EU countries.

Keywords: CO₂ Emissions, Intra-EU Trade, Gravity Model, Climate-Smart Trade, Sustainable Development

JEL classification: F15, F18, C33

Introduction

Most international institutions have urged that implementing sustainable trade and investment supplementary policies is necessary to ensure that trade and investments directly contribute to sustainable development. If countries apply strategically targeted trade and investment policies that adversely support sustainable development, they can help mitigating the climate change in the world. Although there are many drivers, impact and ways that the climate could be tackled and sustainable development supported, lowering greenhouse gas emissions (GHGs) such as water vapor, carbon dioxide, methane, nitrous oxide and ozone which are the main driving force for fighting climate change (US Environmental Protection Agency, 2020).

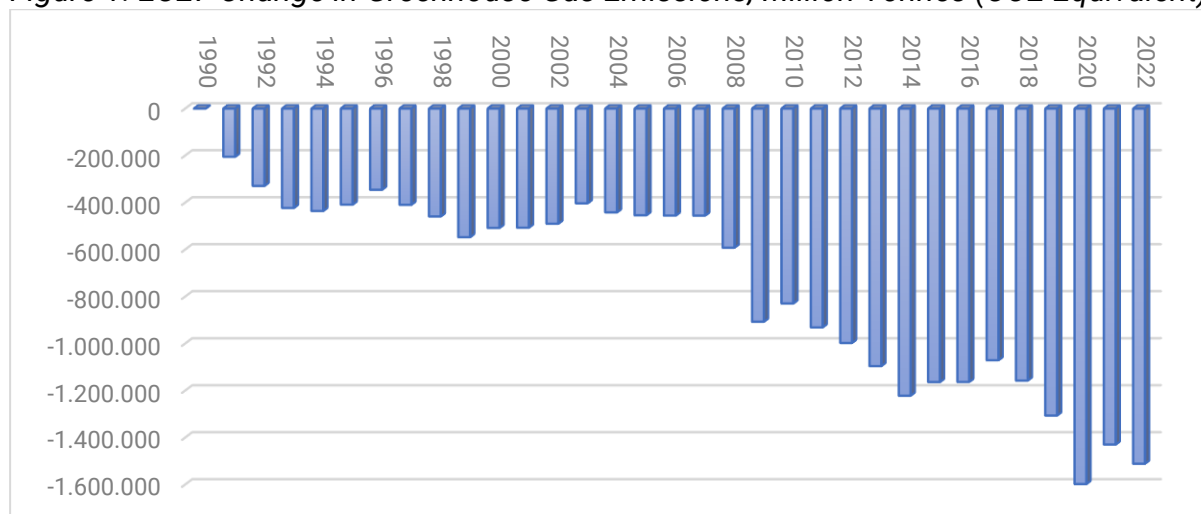
CO₂ emissions have been mainly attributed to enabling sustainable trade and investment (United Nations ESCAP, 2023). Latest report by the Intergovernmental Panel on Climate Change (IPCC, 2021) indicates that to reach the goals of the Paris Agreement on climate change countries need to halve the CO₂ emissions by 2030, reach zero by 2050, or enable 5 to 7 percent CO₂ reductions annually.

The European Union's goal of achieving climate neutrality by 2050 is central to the European Green Deal. This ambitious objective is pursued through a combination of emission reductions, investments in green technologies, and the protection of natural ecosystems. The European Climate Law makes this target legally binding for all EU countries and sets an intermediate milestone of reducing net greenhouse gas emissions by at least 55% by 2030, relative to 1990 levels and long-term objective of zero emission by 2050 (Regulation (EU) 2021/1119). Much of the legislation proposals to reach the objective is presented by the European Commission under the "Fit for 55" package.

The EU Emission Trading System (EU ETS) is the main policy tool for reducing emissions in the energy, industry and air transport sectors. Other sectors such as road transport, building, small industry, agriculture and waste management are covered by the Effort Sharing Regulation. The EU Emission Trading System (ETS), which initially regulated roughly 50% of EU carbon emissions from mainly energy production and large industrial polluters, saved more than 1 billion tons of CO₂ between 2008 and 2016. This translates to reductions of 3.8% of total EU-wide emissions compared to a world without the EU ETS (Bayer & Aklin, 2020). ETS regulates carbon emissions of approximately 12,000 installations across Europe, is estimated to have increased average material costs (including fuel) for regulated companies in the power, cement, and iron and steel sectors by 5 percent to 8 percent (Chan & Zhang, 2013).

According to the EU Climate Action Progress Report, The EU has steadily decreased its greenhouse gas emissions since 1990, reaching a total -32.5% in 2022 (European Commission, 2023). Based on Member States' projections, the EU is currently not on track to reach its 2030 objective of removing 310 million tonnes of CO₂ from the atmosphere per year. However, Figure 1 shows significant progress in reduction of the greenhouse gas emissions especially after 2009.

Figure 1: EU27 Change in Greenhouse Gas Emissions, Million Tonnes (CO₂ Equivalent)



Source: European Environmental Agency, 2024

While each EU country has a mandatory target in terms of emission reduction according to a country's GDP (so called "bubble system"), renewable energy and energy efficiency targets are only set at the EU level. Study the convergence in emissions for the period 1971–2012 and the 28 EU core European countries shows that France, the Netherlands, Germany and the UK are included in the best performing clubs, no matter the sector or subsector, whereas among Central and Eastern European Countries, a few diverge from the average towards higher emissions. Still, the authors prove that there is convergence among EU countries, although weak.

Differences in environmental regulations can thus alter the competition between companies by changing their relative production costs and therefore cause so called carbon leakage i.e. transfer of polluting production to countries that are not committed to strong environment regulations. This can result in an overall increase in global CO₂ emissions, even if the original country's emissions decrease.

The carbon leakage can be also considered in the context of whether a country is a territorial emitter or consumption emitter of harmful CO₂ emissions. This means that although CO₂ emissions are typically done at the point of production (territorial emissions) with international trade the produced goods are moved into other jurisdictions/countries where their consumption happens. In this way the production of emission intensive goods happens in jurisdictions with lower environmental standards, but products find their way through international trade to jurisdictions with higher environmental standards. That's how the European Union on a global level is below the GHG emissions in the world counted as territorial emissions. But, at the same time it has higher consumption emissions than territorial emissions meaning that EU ETS has been able to reduce overall emissions despite the carbon leakage (Wang & Kuusi, 2024).

Leitão & Balogh (2020) examine the relationship between intra-industry trade in agriculture and CO₂ emissions during the period from 2000 to 2014. Their findings indicate that intra-industry trade was linked to lower CO₂ emissions, aligning with the

principles of the EU's sustainable agricultural policy. Therefore, EU success to reduce carbon emissions and to achieved emission convergence among EU countries, suggest effectiveness of EU abatement policies, although with considerable challenges in its implementation (Morales-Lage et al., 2019).

This paper identifies the factors that influence bilateral trade flows among European Union countries using panel gravity model of international trade. The analysis considers both geographical and economic factors such as GDP, geographical distance, population, as well as dummy variables for common language, border, and use of Euro currency. The focus is given to the CO₂ emissions of the countries (metric ton per capita) and its influence on the trade flows among EU countries. The data is comprised of 24 years, from 1999 to 2022, covering 756 country-pairs among 28 EU member countries, including Great Britain. To assess the drivers of trade from each EU country, we employ standard OLS and PPML model with fixed effects.

The paper is structured as follows. Section 2 provides short overview of the interplay between environmental stringency and international trade. In section 3 we present the model and provide explanations on the different variables. Section 4 presents the main results and section 5 concludes, providing policy options along the way.

Interplay between environmental stringency and international trade

The relationship between CO₂ emissions and trade is complex and multifaceted, involving several economic, environmental, and policy factors. Trade can lead to both increases and decreases in CO₂ emissions, depending on factors such as the composition of trade, the adoption of cleaner technologies, and the regulatory environment. Higher trade flows often indicate a higher level of economic activity, especially the export of energy-intensive goods such as: steel, cement, chemical etc. As economies grow and engage more in international trade, their industrial output generally increases, which can lead to higher CO₂ emissions. The Environmental Kuznets Curve suggests that at the early stages of economic growth, including increased trade intensity, CO₂ emissions tend to rise (Bilan et al., 2019; Hasnisah et al., 2019; Jebli et al., 2019). However, after reaching a certain level of income per capita, the structure of the economy shifts towards cleaner industries and technologies, leading to a reduction in emissions.

Conversely, economies focused on services or less energy-intensive industries may experience lower emissions. However, some impacts are less clear-cut. Bigger effect on the CO₂ emissions of the countries could have the nature of the product the country specializes in. If a country with a greener energy system produces energy-intensive products it could be net beneficial to the climate change. But if a country tries to produce similar products in a less environmentally friendly manner than there is negative effect over climate change and sustainable development (United Nations ESCAP, 2023). In this context, trade can either help reduce CO₂ emissions by allowing countries to specialize in less carbon-intensive industries or introduce innovation of more energy-efficient technologies and mitigate the effect of carbon leakage.

On 1 October 2023 the EU introduced the Carbon Border Adjustment Mechanism (CBAM) aiming to put a fair price on the carbon emitted during the production of carbon-intensive goods that are entering the EU and to encourage cleaner industrial production in non-EU countries (European Commission official web page). Initially, it will apply to imports of certain goods whose production is carbon intensive such as cement, iron and steel, aluminium, fertilizers, electricity, and hydrogen. The CBAM aims to ensure the carbon price of imports is equivalent to the carbon price of domestic production, and that the EU's climate objectives are not undermined. This mechanism contributes to a reduction of 360 tons of CO₂, but at the same time result with a carbon leakage of 12 percent of the amount of the CO₂ reductions (United Nations ESCAP, 2023). In the longer term, however, we assume that introducing a carbon tariff in the EU will contribute to reducing global emissions by changing the composition of production within and between countries.

The existence of a relationship between CO₂ emissions and EU trade is important for the expected effects of the CBAM to materialise. This mechanism is expected to support environmental goods production in the EU, decrease unit costs of such production, and increase its affordability and its wider use in other countries leading to growing EU exports of environmental goods. CBAM is also expected to limit CO₂-intensive imports to the EU and thus promote the introduction of climate policies aimed at reducing CO₂ emissions in partner countries.

Trade agreements can include environmental provisions that encourage countries to adopt greener practices, potentially reducing CO₂ emissions. Conversely, trade liberalization without strong environmental safeguards can lead to increased emissions. Policymakers need to consider these factors when designing trade and environmental policies to ensure that trade contributes to sustainable development and emissions reductions (Baghdadi et al., 2013; Yang & Usman, 2021). According to Porter's hypothesis stringent environmental policies result in an improvement in productivity or profits and improvements in organizational or product/process innovations towards energy-sparing technologies (Porter, 1991). Many papers have proven the accuracy of this hypothesis (Makrevska Disoska et al., 2023; Hojnik et al., 2017). Richter & Schiersch, 2017 based on the evidence from firm-level data for Germany, found a negative relationship between the export intensity of a company and its emission intensity indicating that exporting firms are less CO₂ emission-intensive than non-exporting ones. Developing a system that will apply globally, on all countries would be the best solution. However, this requires climate policy synergies of the world's strongest economies (EU, US, China) and help from developed countries to developing countries.

Econometric Model

To estimate the impact of various determinants on bilateral export flows among EU countries, we applied panel gravity model. It is one of the oldest and most extensive literatures in empirical economics that concerns the estimation of demand and supply of goods, services, and factors across national or subnational borders (Leamer &

Levinsohn, 1995). These empirical models, often referred to as gravity models due to their functional similarity to Newton's law of gravity in physics, involve a country of origin and a country of destination. This analysis encompasses panel data of bilateral trade flows among the 28 EU member countries (including Great Britain) over a 24-year period from 1999 to 2022 using annual data. We measure the export flow of each EU member country to its trading partners within the EU. Gravity models have long been a cornerstone in international trade for analysing bilateral trade flows and are widely used to examine country-specific trade characteristics. In addition to the standard variables used in the model by Yotov et al., 2016 (GDP, distance, population, language, border, currency used ...) additional variables such as CO2 emissions are included in the equation.

For the purposes of this paper different models are used by constructing panel data with fixed ($\alpha_{ij,s}$) and time effects (λ_t), where Y represents the dependent variable and X individual regressors (Yotov, et al., 2016; Frohm, 2023).

$$Y_{ij,s,t} = \alpha_i + \alpha_j + \alpha_s + \lambda_t + \beta_1 X1_{ij,s,t} + \beta_2 X2_{ij,s,t} + \beta_{n-1} X_{n-1,ij,s,t} + \beta_n Xn_{ij,s,t} + u_{ij,s,t}.$$

The influence of certain independent variables on EU members' export is investigated by using the statistical software STATA. The dependent variable trade (*EXPORT*) is export of each individual EU country to its trading partners from the EU in absolute values, in million US dollars. The data is extracted from Direction of Trade Statistics, IMF. Independent variables included in the regressions are GDP difference, geographical distance, remoteness indexes, population, CO2 emissions and three dummy variables: common language, common border, membership in the Eurozone.

The variable *GROSS DOMESTIC PRODUCT DIFFERENCE (GDP difference)* is calculated as the difference between the maximum and minimum value of the GDP per capita between trading partners (the data are in constant 2015 U.S. dollars). GDP per capita is the most common indicator for measuring the level of economic development. In this model, the data for the variable GDP per capita is expressed in American dollars in prices from 2015, and the data is extracted from the World Bank Development Indicators. The expectation is that the coefficient should be statistically significant and positive, thus meaning that an increase in the GDP difference should increase the intensity of mutual trade.

The variable *DISTANCE* is a standard variable applied in gravity models measuring the geographical distance between trading partners. The geographical distance is constant through time. The coefficient measuring distance should be significant and negative since the expectation is that when the distance between two countries is higher it should likely have negative impact on their bilateral trade. Data on geographical distance between the economic centres of two countries are extracted from the website <http://www.worldatlas>.

REMOTENESS INDEX is a variable introduced for controlling multilateral resistance terms. The variable measures a country's average weighted distance from its trading partners, where weights are the partner countries' shares of world GDP (Mayer &

Zignago, 2012; Yotov et al., 2016). Because of fixed effects, remoteness should be interpreted as a change in the partner's share of global GDP over time.

The variable SCALE is calculated as logarithm of the product of the population in both trading partners. In the context of the gravity model, the logarithm of the product of the total populations is often used to linearize the relationship between populations and their interaction to trade flows i.e. to makes the interpretation of results more straightforward in terms of elasticity and relative changes (Tinbergen, 1963; Helpman, Melitz & Rubinstein, 2008; Baldwin & Taglioni, 2006)

The focus in the model is put on the CO2 emission (kg per 2021 PPP \$ of GDP) as a metric used to measure the carbon dioxide emissions produced by a country's economy relative to its economic output. The variable measures how many kilograms of CO2 are emitted for each dollar of GDP, adjusted for purchasing power parity and based on 2021 dollars. This indicator helps to understand the carbon intensity of a country's economy: how much CO2 is being emitted to produce a unit of economic output. Lower values indicate a more carbon-efficient economy.

The variable used in the model is constructed as a logarithm of the product of CO2 emission for both trading partners. If the coefficient is positive, it will suggest that a larger CO2 emission between the two countries is associated with an increase in the export volume. This could also imply that countries with larger differences in CO2 emissions tend to trade more, possibly due to comparative advantages or differing environmental regulations and vice versa. Differences in CO2 emissions often correlate with differences in levels of industrialization and economic development. If the coefficient is close to zero or statistically insignificant, it would imply that the disparity in CO2 emissions between the two countries does not have a meaningful impact on the dependent variable being studied.

The model uses three dummy variables: EURO, BORDER and LANGUAGE. The variable EURO is a dummy variable, meaning that if both EU countries are members of the Eurozone in a specific year, the variable has the value of 1. The variable BORDER denotes a dummy variable for the existence of a common official border between trading partners *i* and *j*. The variable LANG denotes a dummy variable for the existence of a common official language between trading partners *i* and *j*.

The panel data gravity model is estimated using five different equations. The first three equations are estimated with OLS regression: by using simple OLS regression, OLS regression with multilateral resistance and OLS with fixed effects. The other two equations utilize PPML estimators without and with fixed effects. Multilateral resistance terms were covered in the second equation which improved the results of the first equation (without remoteness indexes). The third equation is calculated by adding fixed effects to our specifications, including exporter-time and importer-time (Adam & Cobham, 2007; Yotov et al., 2016; König, 2021). The statistical technique applied in equations (4) and (5) is PPML model without and with fixed effects.

Interpretation of the Results

The results from the regressions are presented in Table 1. There are five regressions run. Although, at first sight the results presented in the table with five regressions may look a little bit confusing they enable the robustness of our analysis and investigation. It is visible throughout all the results in the table that all independent variables are significant and stable in all regressions. To enable clear presentation of the findings we will interpret the results presented with OLS estimate controlling for multilateral resistance terms with remoteness indexes since they take into account the remoteness and the coefficients of the analysed independent variables are with the highest values.

Table 1: Results from the Econometric Models

	OLS	OLS, remoteness	OLS fixed effects	PPML	PPML fixed effects
	(1)	(2)	(3)	(4)	(5)
Sample	1999-2022	1999-2022	1999-2022	1999-2022	199-2022
Cross-Section	756	756	756	756	756
Log (distance)	-1.299***	-1.300***	-1.341***	-0.789***	-0.846***
Log (scale)	0.248***				
Log (GDP difference)	0.0368***	0.037***			
Log (remoteness exporter)		0.382***			
Log (remoteness_importer)		0.349***			
Log (CO2 emissions)	-0.688***	-0.693***	-0.365***	-0.664***	-0.627***
Eurozone	0.532***	0.510***	0.186***	0.364***	0.663***
Common language	0.230***	0.234***	0.262***	0.091***	0.047***
Common border	0.625***	0.632***	0.394***	0.728***	0.373***
Constant	12.017***	12.740***	14.059***	17.235***	16.002***
Observations	16624	16624	16624	16624	16624
R-square	0.829	0.833	0.931	0.672	0.955
Exporter-time fixed effects	No	No	Yes	No	Yes
Importer-time fixed effects	No	No	Yes	No	Yes
RESET test	0.000	0.000	0.000	0.000	0.000

Author's calculations

*Note: The p-values read as follows: *p<0,10; **p<0.05; ***p<0.01*

The values of the coefficients measuring the impact of GDP difference on the trade between the EU member countries are statistically significant and with positive signs. This means that countries which GDPs per capita have greater difference among themselves are more prone to trading between each other. The expected effect of GDP on trade is always positive as trade is expected to grow with the GDP growth of the countries or with the growth of the difference of the GDP per capita between the trading partners. The influence of this variable should expectedly be positive on trade. However, the impact of distance on trade in the opposite should always be negative. This is also very common feature and essence of the gravity model that the trade

between the countries should diminish with the increase of their mutual distance because of the rise of the transport and transaction costs. The results in our analysis confirm this, the coefficients are significant with negative signs. The impact of the population measured as the product of the population in both trading partners also shows significant and positive impact on the trade between the EU member countries.

The results of the impact of the dummy variables are also, as expected, significant and positive. This means that countries that share a common language, common border, or are part of the Eurozone have higher possibility to trade between themselves. All the coefficients are highly significant and positive for increasing trade among the partners.

The result on the CO₂ emissions and their effect on intra trade show that it is highly statistical variable, and the coefficient is negative. Statistically significant and negative results obtained with the regressions indicate that when the CO₂ emissions of the two trading partners is increasing the trade between those partners will decrease. Or in other words EU member countries tend to trade more with other members where the CO₂ emissions are with lower values. Presented with numbers we could say that if the CO₂ emissions between two countries increase by 1% it could lead to decrease of their mutual trade by 0.36% to 0.69%.

These results confirm the dedication of the European Union to the fight to decrease CO₂ emissions on a global level and by that support the fight against climate change. European Union member countries are more prone to trade with other members that have similar levels of CO₂ emissions or similar environmental regulations.

Conclusion

The European Union can be considered as a leader in promoting climate policy actions by introducing many aspects of how trade and investment policies can be created to be climate-smart and crafted to support sustainable development. That's why in this paper we tried to measure the impact of these policies on their intra-trade. To assess the impact of these actions we have used the values of the CO₂ emissions of the European Union member-countries and applied the gravity model to estimate its effect on intra-trade.

Our results indicate that disparities in CO₂ emissions among EU member states negatively affect trade between them. The greater the difference in CO₂ emissions, the lower the likelihood of trade occurring between these countries. EU member states tend to trade more frequently with other members that have similar levels of CO₂ emissions. To foster trade and combat climate change, the EU must continuously implement both domestic and international measures aimed at efficient production and coordinated decarbonization across all sectors in Europe. However, significant progress in addressing climate change can only be achieved through complex, climate-smart trade and investment policies on a multilateral level as well by supporting decarbonization through technology transfers to developing countries.

In drawing these conclusions, it is important to point out the limitations of the research arising from the fact that the CO₂ emission indicator used does not reflect the determinants of emissions such as sectoral composition of the economy, transport, energy efficiency, etc. We therefore recommend that future research should take these determinants into account.

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Annexes

Annex 1: Explanation and Source of the Variables

Variable name	Explanation	Expected sign	Source
EXPORT (dependent variable)	Export of each individual EU country to its trading partners from the EU in absolute values, in million US dollars.		Direction of Trade Statistics (DOC), IMF
Distance	Geographical distance is the distance between the biggest cities of countries <i>i</i> and <i>j</i> .	Negative (-)	http://www.worldatlas .
GDP difference	Captures the level of difference of economic development between the trading partners. It is calculated as a natural logarithm of the difference between the maximum value and the minimum value of the GDP per capita between the trading partners. GDP per capita is gross domestic product divided by midyear population. Data are in constant 2015 U.S. dollars.	Positive (+)	The variable GDP difference is calculated by the authors. Source (GDP per capita): World development indicators
Scale	Represents the relative size of the country by its population. It is calculated as a natural logarithm of the product of the populations of two countries. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.	Positive (+)	The variable Scale is calculated by the authors. Source (Population): (1) United Nations Population Division. (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: (4) U.S. Census Bureau: International Database, and (5) Secretariat of the Pacific Community: Statistics and Demography Programme.
GDP	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant 2015 prices, expressed in U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2015 official exchange rates.	Positive (+)	World Bank national accounts data, and OECD National Accounts data files. World Bank Development Indicators
Variable name	Explanation	Expected sign	Source

REMOTNESS	<i>lnREM_EXP_{i,t}</i> , and on the importer side, <i>lnREM_IMP_{j,t}</i> , are constructed, respectively, as the logarithms of GDP of domestic and partner country weighted averages of bilateral distance.	Positive (+)	Calculated by the authors with the use of the variable GDP of the home/partner and world GDP as well as the geographical distance.
CO2 intensity	Natural logarithm of the product of the CO2 emissions (kg per 2021 PPP \$ of GDP).	Negative (-)	Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute. Available at: climatewatchdata.org/ghg-emissions .
EURO	Variable that takes value of 1 if both countries use the Euro as official currency	Positive (+)	Dummy variable
BORDER	Variable that takes value of 1 if both countries have common official border, otherwise it takes value of 0	Positive (+)	Dummy variable
LANGUAGE	Variable that takes value of 1 if both countries have common official language, otherwise it takes value of 0.	Positive (+)	Dummy variable

MONTENEGRO: REGIONAL INEQUALITIES AND POPULATION DRAIN

Jelisaveta BLAGOJEVIĆ
Historical Institute of the University of Montenegro
jelisaveta@ucg.ac.me

Radenko ŠĆEKIĆ
Historical Institute of the University of Montenegro
scekicr@yahoo.com

Abstract

Background: Internal migration is a key demographic and economic phenomenon influencing regional development disparities, yet its economic determinants remain underexplored in the context of Montenegro's Northern region.

Objectives: The aim of this paper is to answer the research question: What factors contribute to the negative migration balance in Montenegro's Northern region? In contrast to most previous studies, this research focuses exclusively on the economic causes of internal migration within Montenegro, addressing a critical gap in the literature.

Methodology: A specific theoretical framework is developed to analyse the research topic, synthesizing both functionalist and historical-structural perspectives on migration. The study integrates the latest data from relevant institutions on regional economic development and vital statistics. In addition to demographic indicators such as population size, birth and death rates, and migration balance, the analysis includes socio-economic factors that reflect the impact of regional inequalities on internal migration. In other words, the following research methods are applied: content analysis of relevant literature, statistical reports, strategies, legal acts, and similar documents; case analysis of Montenegro as an example of significant disparities in regional development; and a comparative method to identify similarities and differences in regional development across different time periods.

Findings: Through this comparison and analysis of available statistical data, the study supports the hypothesis that the pursuit of better living conditions—specifically, freedom from unemployment and low wages—drives residents of Northern Montenegro to migrate to more developed regions of the country. In other words, migration occurs as individuals seek to transition from "negative freedom," characterized by poor living standards, to "positive freedom," defined by improved quality of life and better working conditions.

Key words: Internal Migration; Economic Disparities; Regional Development; Northern Montenegro; Freedom of Movement

JEL classification: J11, J17, J21, J6, I30

Introduction

Several authors have explored contemporary migration flows in Montenegro, with a focus on the integration of refugees (Vučković, 2021), external migrations (Golubović, 2021; Radulović & Brnović, 2016; Western Foundation for Democracy, 2021), and both external and internal migrations (Radojević & Koprivica, 2022). Only a few authors have analysed in detail the impact of economic factors on internal migrations across Montenegro's regions (Fabris, 2021; Mirković, 2018).

Radulović and Brnović (2016, pp. 13-14) examined the emigration of Montenegrin citizens to European Union countries in search of better living conditions, noting that most emigrants originated from the underdeveloped Northern region. Similarly, Golubović (2021) studied the push and pull factors of external migration, highlighting the uneven regional development in Montenegro, with the Northern region serving as the primary source of emigrants.

Certain aspects of migration in Montenegro have also been addressed by NGOs and international organizations. Radojević and Koprivica (2022, pp. 16–19), for example, looked at how the COVID-19 pandemic affected demographic, economic, and financial trends in Montenegro. They found that negative population growth and economically inactive populations were major reasons for migration, especially among 34-year-olds from the Northern region going to other parts of Montenegro or the EU.

The Western Foundation for Democracy (2021) identified key reasons for youth emigration, such as seeking better living standards, professional development, and stable social systems, correlating these with internal migration effects like depopulation and population aging. In contrast, Vučković (2021) focused on migration management, particularly the position of refugees and returnees under the Readmission Agreement.

Mirković (2018) analysed immigration to Montenegro and internal migrations, emphasizing the socio-economic factors that drove migration flows from the Northern to the Central and Coastal regions from 2004 to 2016. Fabris (2021, pp. 132-153) explored the developmental causes of internal migrations, within a broader discussion of Montenegro's macroeconomic development and strategies, to reduce regional economic disparities.

In contrast to these analyses, this study aims to focus exclusively on the economic causes of internal migrations in Montenegro. It includes a range of regions' demographic indicators, allowing for comparisons over recent time periods, including population numbers, birth and death rates, and migration balance. Official statistical data are presented and interpreted to answer the research question: What factors determine the negative migration balance of Montenegro's Northern region? In this context, the study reviews theoretical approaches to economic migration, such as Haas's view of migration as an individual decision to increase freedom or gain. Socio-economic indicators that measure the effects of regional inequalities on internal

migrations are also presented, followed by discussions, critiques, and conclusions on the study's implications for science, practice, and society.

Methods

Migration is a highly complex, dynamic, and multifaceted process that affects not only the demographic structure of the populations in both the areas people leave and those they migrate to, but also influences the economic, cultural, security, and overall social development, sustainability, and progress of a particular community, region, or country. As such, studying migration requires the attention of multiple scientific disciplines, each with its own theoretical and methodological approaches, depending on which aspects of population movement, its causes, or its consequences are being examined.

Mijalković and Petrović (2016, p. 2) define migration as "the temporary or permanent, voluntary or forced relocation of people, both within the borders of a country, from one socio-cultural or regional environment to another (internal migration), and from one country to another (international migration)." They identify the causes of migration as economic – the pursuit of better living and working conditions; political – the desire for a secure living environment free from armed conflict, repressive regimes, and violations of human rights and freedoms; and ecological – the search for a healthy living environment.

When it comes to migration theories, particularly economic migrations, de Haas (2021), synthesizing multiple theoretical perspectives and authors (Cohen, 1997; Frank, 1966; Harris & Todaro, 1970; Mabogunje, 1970; Massey, 1990; Massey, 2019; Massey et al., 1998; Piore, 1979; Sassen, 1991; Skeldon, 1990; Vertovec, 2009; Wallerstein, 1974; Wallerstein, 1980; Zhang et al., 2018), identifies two main theoretical paradigms: the "functionalist" approach, where migration is seen as an individual or family strategy to optimize decisions based on a cost-benefit analysis, and the "historical-structural" approach, which emphasizes structural economic inequalities and the role of migration in reinforcing those inequalities.

Neoclassical migration theory, rooted in the functionalist paradigm, views migration from rural to urban areas as a natural component of the development process. From this perspective, rural areas with surplus labour provide the workforce needed to support the industrial economies of cities (Lewis 1954, as cited in de Haas, 2008, p. 12). In this context, economic theory explains migration by geographical differences in labour supply and demand, with workers migrating from low-wage, labour-surplus regions to high-wage, labour-scarce regions. Additionally, human capital theory views migration as an investment decision, with the costs of migration being lower than those of staying in a particular location (de Haas, 2008, p. 13). The primary issue with this functionalist approach is its reductionist nature, which overlooks poverty, inequality, government restrictions, repression, and violence (de Haas, 2021, p. 6).

On the other hand, historical-structural theories argue that migration disrupts stable rural societies, undermines their economies, and displaces their populations. These theories challenge the neoclassical perspective on migration, arguing that structural forces fundamentally constrain individuals' freedom of choice (de Haas, 2008, p. 15). The main issue with this approach is its tendency to view migration as something caused by global macro forces, neglecting actual relationships and causes. By portraying migrants as passive victims of smugglers and traffickers, it overlooks the fact that most migrate voluntarily (de Haas, 2021, p. 8). Haas emphasizes that to achieve a comprehensive theoretical understanding of migration, it is necessary to view it as part of broader social transformations, development trends, and globalization. In this context, migrants are seen as active agents making their own decisions, navigating constraints and moving from "freedom from" towards "freedom to" (de Haas, 2008, p. 16).

Based on the given theoretical framework, the independent variable identified is the pursuit of better living conditions, while the dependent variable is the abandonment of rural areas and migration to urban centres. By recognizing these variables, the following hypothesis is defined: *The desire for better living conditions, or freedom from unemployment and low income, determines the decision to leave one's place of residence and move to more developed regions*. This hypothesis is tested, through the given theoretical framework, by analysing and comparing available statistical data that serve as indicators of the independent variable (living conditions) and the dependent variable (migration).

To clarify, the methodology of this research is based on the understanding that studying the impact of regional development disparities on migration requires a synthesis of knowledge and methods from two disciplines: demography and economics. Demography, the study of populations, and economics, which examines economic trends, both rely heavily on statistics as their primary method.

In this context, the research employs methods that facilitate the interpretation of statistical (economic and demographic) data, as well as the analysis of information, facts, and materials from various monographs and serial publications. Specifically, the analysis in this paper is based on three main methods: 1) content analysis of relevant literature, statistical reports, strategies, legal acts, and similar documents; 2) case analysis of Montenegro as an example of significant regional development disparities; and 3) a comparative method to identify similarities and differences in regional development across different time periods.

Results

To evaluate the development of Montenegro's Northern, Central, and Coastal regions and its correlation with migration flows, the following key indicators are analyzed:

- Development and Competitiveness Indices: The Local Self- Government Development Index for 2016–2018 and 2019–2021, and the Local Self- Government Competitiveness Index for 2015–2018 and 2019–2021;

- Labour Market Indicators: Labour force participation and employment rates for the Northern, Central, and Coastal regions (2021–2022);
- Income Levels: Gross earnings by local self-government units (2018–2022).

Additionally, demographic data are presented, including:

- Population figures by local self-government units from the 2011 and 2023 censuses;
- Vital statistics such as natural increase rates, birth and death rates by local self-government units for 2021 and 2022;
- Migration data: migration balance rate by local self-government units for 2021 and 2022, general migration trends over the past decade (2013–2022), and migration balance by regions between the two censuses (2011–2022).

Demographic trends

According to the definition provided in the Law on Regional Development of Montenegro, a region consists of multiple geographically connected local self-government units, aimed at planning development priorities and implementing and monitoring regional development policies. The legal provisions (Article 4) categorize Montenegro into three regions: the Coastal Region (municipalities of Bar, Budva, Herceg-Novi, Kotor, Tivat, and Ulcinj), the Central Region (the Capital City of Podgorica, the Old Royal Capital of Cetinje, and the municipalities of Danilovgrad, Tuzi, Nikšić, and Zeta¹), and the Northern Region (municipalities of Andrijevica, Berane, Bijelo Polje, Gusinje, Kolašin, Mojkovac, Petnjica, Plav, Plužine, Pljevlja, Rožaje, Šavnik, and Žabljak).

Comparing data from the two census periods, 2011 and 2023, a decline in population is observed in the following municipalities: Bijelo Polje (decrease of 6,341), Pljevlja (decrease of 6,244), Nikšić (decrease of 5,718), Berane (decrease of 3,326), Cetinje (decrease of 2,192), Mojkovac (decrease of 1,838), Kolašin (decrease of 1,615), Andrijevica (decrease of 1,093), Plužine (decrease of 1,014), Kotor (decrease of 685), Žabljak (decrease of 567), Šavnik (decrease of 482), and Zeta (decrease of 25). Conversely, there has been an increase in population in the following municipalities: Podgorica (increase of 21,859), Budva (increase of 7,449), Bar (increase of 4,123), Tivat (increase of 2,308), Rožaje (increase of 2,283), Tuzi (increase of 1,763), Ulcinj (increase of 1,474), Plav (increase of 1,297), Gusinje (increase of 635), Danilovgrad (increase of 360), Herceg Novi (increase of 307), and Petnjica (increase of 70).

¹ The Municipality of Zeta was added by the author because it was not stipulated by the Law, as it was part of the capital city of Podgorica (Golubovci Municipal Unit) until August 16, 2022.

Table 1: Population by Local Self-Government Units in Montenegro, 2011 and 2023

	Population 2011	Population 2023 ²
Montenegro	620,029	633,158
Andrijevica	5,071	3,978
Bar	42,048	46,171
Berane	28,488	25,162
Bijelo Polje	46,051	39,710
Budva	19,218	26,667
Cetinje	16,657	14,465
Danilovgrad	18,472	18,832
Gusinje	4,027	4,662
Herceg Novi	30,864	31,471
Kolašin	8,380	6,765
Kotor	22,601	21,916
Mojkovac	8,622	6,824
Nikšić	72,443	66,725
Petnjica	5,482	5,552
Plav	9,081	10,378
Pljevlja	30,786	24,542
Plužine	3,246	2,232
Podgorica	158,327	180,186
Rožaje	22,964	25,247
Šavnik	2,070	1,588
Tivat	14,031	16,340
Tuzi	11,379	13,142
Ulcinj	19,921	21,395
Žabljak	3,569	3,002
Zeta	16,231	16,206

Source: MONSTAT, 2024, p. 3

It is evident that the increase in population has occurred in two local self-government units in the Central Region: Podgorica and Danilovgrad, coastal municipalities such as Budva, Bar, Tivat, Ulcinj, and Herceg Novi, as well as in five out of 14 municipalities in the Northern Region. In Gusinje, Danilovgrad, Herceg Novi, and Petnjica, the increase is under 1,000 residents, while the Capital City experienced a population growth of 21,859, which is close to the total increase across all other local self-government units where population growth was recorded (22,069).

² The data for 2023 represents preliminary results from the census conducted by the Statistical Office of Montenegro - MONSTAT. For the municipalities of Gusinje, Petnjica, Tuzi, and Zeta, the figures are estimated based on the current territorial organization of Montenegro.

Table 2: Natural Increase Rate, Birth Rate, Death Rate, and Migration Balance by Local Self-Government Units, 2021/2022

Local Self-Government Units	Natural Increase Rate		Birth Rate		Death Rate		Migration Balance Rate	
	2022	2021	2022	2021	2022	2021	2022	2021
Andrijevisa	-10.3	-11.8	7.7	7.9	18.0	19.8	-16.6	-17.5
Bar	-1.3	-4.5	10.3	9.5	11.6	14.0	2.1	4.4
Berane	-3.2	-7.4	10.6	10.3	13.8	17.7	-6.5	-7.2
Bijelo Polje	-2.0	-4.9	10.3	9.8	12.3	14.7	-7.7	-10.4
Budva	6.2	4.2	14.6	16.4	8.4	12.2	11.1	7.8
Cetinje	-6.7	-9.7	10.1	9.5	16.9	19.2	-16.6	1.4
Danilovgrad	-1.0	-3.1	10.1	10.1	11.2	13.1	6.1	4
Gusinje	-2.0	-7.0	9.3	10.3	11.3	17.3	5.8	7.0
Herceg Novi	-1.7	-5.2	10.6	10.3	12.3	15.5	-0.2	1.1
Kolašin	-10.3	-14.4	7.7	8.6	18.0	23.0	-11.1	-12.8
Kotor	-3.1	-4.6	9.8	11.3	13.0	15.9	-1.4	1.1
Mojkovac	-13.1	-16.2	7.6	5.8	20.7	22.0	-22.1	-9.1
Nikšić	-2.3	-6.2	9.9	9.8	12.2	16.0	-9.3	-2.1
Petnjica	-3.3	-6.6	7.1	9.1	10.3	15.7	-2.7	12.3
Plav	2.2	-3.8	13.6	13.7	11.4	17.5	-3.6	-7.9
Pljevlja	-10.9	-16.1	6.8	6.0	17.8	22.1	-6.2	-8.6
Plužine	-14.3	-15.7	5.7	8.5	20.0	24.1	1.2	-10.9
Podgorica	4.0	1.4	13.3	13.5	9.3	12.1	6.1	4.5
Rožaje	5.2	2.5	12.6	11.6	7.4	9.1	-5.3	-5.0
Šavnik	-14.2	-21.8	5.9	9.8	20.1	31.6	177.0	-50.6
Tivat	4.5	-0.7	14.0	12.5	9.6	13.2	7.1	3.5
Tuzi	3.3	2.3	13.6	14.4	10.3	12.2	5.5	-5.9
Ulcinj	0.3	-9.1	11.6	11.1	11.3	20.2	2.6	2.2
Žabljak	-9.5	-18.1	6.1	10.0	15.6	28.1	0.7	-4.4

Source: MONSTAT, 2023c, pp. 4-5, MONSTAT, 2022a, pp. 4-5

Based on vital statistics from MONSTAT, it is evident that in both 2021 and 2022, the mortality rate exceeded the birth rate in most municipalities of the Northern region (except Rožaje), while in Podgorica, Budva, and Tuzi, the birth rate was higher. In 2022, the birth rate was also higher than the mortality rate in Ulcinj, Plav, and Tivat. Overall, the highest birth rate in 2021 and 2022 was recorded in Budva, at 14.6 and 16.4, respectively, while in 2022, the lowest birth rate was in Plužine (5.7), and in 2021, it was in Mojkovac (5.8). Regarding the mortality rate, the lowest was recorded in Rožaje in both 2021 (9.1) and 2022 (7.4), while the highest in 2022 was in Mojkovac (20.7) and in 2021 in Šavnik (31.6).

In terms of migration balance rates, higher rates were recorded in the Coastal and Central region municipalities of Budva, Podgorica, Danilovgrad, Ulcinj, Tivat, and Bar in both years. In 2021, Herceg Novi, Kotor, and Cetinje also had rates above one per mille. Among municipalities in the Northern region, Gusinje had a migration balance rate above five per mille in both years, while Žabljak and Plužine had positive rates in 2022, and Petnjica had a positive rate in 2021. All other municipalities in this region experienced a negative migration balance rate during the observed period. The lowest migration balance rate in 2021 was in Šavnik (-50.6), while in 2022 it was in Mojkovac

(-22.1). Conversely, the highest migration balance rate in 2022 was in Budva (11.1) and Šavnik (177.0)³, while in 2021, it was in Petnjica (12.3).

MONSTAT data (2023a, p. 3) indicates a rise in the number of individuals relocating within Montenegro over the last decade (2013-2022), with the exception of 2020, the first year of the COVID-19 pandemic, when health and safety restrictions restricted movement. Specifically, this number increased by 59% in 2022 compared to 2013.

Table 3: Migration Balance by Regions, 2011-2023

Year	Central Region	Coastal Region	Northern Region
2023	278	375	-653
2022	352	417	-769
2021	745	522	-1,267
2020	541	366	-907
2019	898	772	-1,670
2018	990	892	-1,882
2017	643	625	-1,268
2016	583	502	-1,085
2015	671	518	-1,189
2014	668	518	-1,186
2013	1,025	390	-1,415
2012	808	446	-1,254
2011	768	639	-1,407

Source: MONSTAT, 2011-2023

During the analysed period (2011-2023), the Northern region of Montenegro recorded a negative migration balance, meaning the number of people leaving the region exceeded those moving in. This contrasts with the Central and Coastal regions, where a positive migration balance was observed, indicating a higher number of incoming residents. The most pronounced negative balance in the Northern region was recorded in 2018, with 1,882 people emigrating. However, in the last two years, this figure has significantly declined (653 in 2023 and 769 in 2022).

In the Central region, the highest number of immigrants was recorded in 2013, with 1,025 individuals moving in, while the lowest number was seen in 2023 (278). As for the Coastal region, the peak of immigration occurred in 2018, with 892 new residents, coinciding with the highest negative migration balance in the Northern region. In 2023, the Coastal region recorded the lowest number of immigrants (375), marking the year with the least negative migration balance in the Northern region and the lowest positive balance in the Central region.

Regarding age demographics, according to data from MONSTAT, the majority of those emigrating or relocating to other cities are between the ages of 25 and 34, with women comprising the majority of this group (Skupština Crne Gore, 2021).

³ This data for Šavnik can be explained by the arrival of voters from other cities for the parliamentary elections. For further information, please refer to Doknić (2024).

Regional development indicators

This chapter presents indicators of the development of local self-government units in Montenegro, including the development index, competitiveness index, and unemployment rate. It is important to note that no data are provided for the Municipality of Zeta, as it was part of the capital city of Podgorica until August 16, 2022. Similarly, Tuzi, previously a municipal unit within Podgorica, was granted municipal status on September 1, 2018.

The development index of municipalities, or local self-government units, is an indicator of their development calculated based on the following data: unemployment rate, per capita income of the local self-government unit, per capita budget revenues of the unit, population growth rate, and education rate. The index is calculated every three years, with a central value of 100, where municipalities with an index above 100 are considered above-average in terms of development. According to the latest prepared Regional Development Index for the period 2019-2021, the least developed municipalities are in the Northern region of Montenegro. In contrast, five municipalities are above the development average, led by Budva (142.7), followed by Tivat (128.8), Podgorica, Herceg Novi, and Kotor. All other municipalities fall below the average, including the coastal municipality of Ulcinj, with Petnjica ranking at the bottom (28.3). Slightly below the average are Cetinje, Bar, Danilovgrad, Nikšić, and Žabljak.

Compared to the Local Self-Government Development Index for the 2016-2018 period, it is evident that the same five municipalities held the top five positions in that period as well, though Kotor ranked ahead of Herceg Novi. Notably, Podgorica's development index increased by 1.73, while Budva's and Tivat's decreased by 14.33 and 5.07, respectively. The development index also dropped for Bar while it increased for Cetinje, Nikšić, and Danilovgrad.

Table 4: Development Index of Local Self-Government Units (LSU) 2019-2021; 2016-2018

Development Index (DI) 2019-2021				Development Index 2016-2018			
LSU	Development Index	Development Level	Comparison to Average	LSU	Development Index	Development Level	Comparison to Average
	142.68	1	Above 125%	Budva	157.01	1	Above 125%
Tivat	128.76	2		Tivat	133.83	2	
Podgorica	122.85	3	100-125%	Podgorica	121.12	3	100-125%
Herceg Novi	117.27	4		Kotor	118.91	4	
Kotor	116.33	5		Herceg Novi	115.53	5	
Cetinje	99.29	6	75-100%	Bar	100.53	6	

Development Index (DI) 2019-2021				Development Index 2016-2018			
LSU	Develop ment Index	Develop ment Level	Comparis on to Average	LSU	Develop ment Index	Develop ment Level	Comparis on to Average
Bar	98.79	7		Danilov grad	94.97	7	75-100%
Danilov grad	98.69	8	75-100%	Nikšić	93.54	8	75-100%
Nikšić	96.14	9		Cetinje	91.19	9	
Žabljak	95.45	10		Žabljak	89.98	10	
Plužine	83.27	11		Ulcinj	83.47	11	
Pljevlja	81.47	12		Plužine	82.35	12	
Kolašin	80.47	13		Pljevlja	78.55	13	
Ulcinj	79.11	14		Kolašin	74.11	14	50-75%
Mojkov ac	77.48	15		Mojkov ac	73.48	15	
Bijelo Polje	71.15	16	50-75%	Šavnik	66.47	16	
Šavnik	70.81	17	50-75%	Bijelo Polje	64.78	17	
Tuzi	63.45	18	Below 50%	Berane	58.43	18	
Berane	62.86	19		Tuzi	56.35	19	
Andrijev ica	54.37	20		Rožaje	52.73	20	
Rožaje	48.70	21		Plav	47.24	21	Below 50%
Gusinje	48.10	22		Gusinje	43.96	22	
Plav	44.27	23		Andrijev ica	41.60	23	
Petnjica	28.32	24		Petnjica	28.13	24	

Source: Vlada Crne Gore, 2023, pp. 31-32

In addition to the Regional Development Index, a significant indicator of the development level and positioning of local self-government units, both individually and within a regional context, is the Competitiveness Index⁴. For the period from 2019 to 2021, the municipality of Budva has been identified as the most competitive, with a score of 154.8, making it four times more competitive compared to the least competitive municipality, Petnjica, which has a score of 38.8. During the previous measurement period of 2015-2017, these two municipalities held the same positions with different scores (Budva, 187.9; Petnjica, 31.5) on the competitiveness scale. Based on the Competitiveness Index, it is clear that the most competitive and developed municipalities are Budva, Tivat, Podgorica, and Kotor. In contrast, for Herceg Novi, there has been a decline in competitiveness by 10.2 compared to the 2015-2017 period, which has resulted in its position falling below that of Tuzi and Žabljak.

⁴ The Competitiveness Index represents an indicator of the developmental potential of local self-government units and consists of: (a) factors: business environment and business sector; (b) subfactors: demography, health, and culture; education; basic infrastructure and the public sector; business infrastructure; investments and entrepreneurial dynamics; the development of entrepreneurship; economic results - level; economic results - dynamics; (c) indicators - calculated based on quantitative (statistical) and qualitative (survey) data.

Table 5: Competitiveness Index of Local Self-Government Units (LSU), 2019-2021; 2015-2017

Competitiveness Index 2019-2021			Competitiveness Index 2015-2017		
LSU	Competitiveness Index	Competitiveness Level	LSU	Competitiveness Index	Competitiveness Level
Budva	154.8	1	Budva	187.9	1
Tivat	152.1	2	Tivat	157.3	2
Kotor	140.5	3	Podgorica	144.9	3
Podgorica	137.5	4	Kotor	140.2	4
Tuzi	134.9	5	Herceg Novi	126.0	5
Žabljak	121.9	6	Žabljak	120.9	6
Herceg Novi	115.8	7	Bar	120.3	7
Plav	114.2	8	Nikšić	112.4	8
Bar	112.8	9	Ulcinj	108.6	9
Ulcinj	104.8	10	Danilovgrad	104.3	10
Andrijevica	100.7	11	Cetinje	98	11
Cetinje	96.5	12	Pljevlja	93.2	12
Bijelo Polje	95.3	13	Plav	93.0	13
Šavnik	91.9	14	Mojkovac	90.3	14
Nikšić	89.4	15	Bijelo Polje	89.4	15
Rožaje	82.8	16	Kolašin	84	16
Danilovgrad	80.3	17	Rožaje	76.7	17
Gusinje	78.0	18	Plužine	76.2	18
Pljevlja	75.8	19	Gusinje	73.5	19
Plužine	73.7	20	Šavnik	65.4	20
Mojkovac	72.2	21	Berane	60.1	21
Kolašin	71.0	22	Andrijevica	42.0	22
Berane	66.6	23	Petnjica	31.5	23
Petnjica	38.8	24			

Source: Vlada Crne Gore, 2023, pp. 33-34

The labour force participation rate and employment rate in the Coastal and Central regions were higher in both 2021 and 2022 compared to the Northern region. Each region experienced an increase in these rates in 2022 relative to 2021, including the Northern region.

Table 6: Labour Force Participation Rate and Employment Rate in Montenegro by Regions in 2021/2022

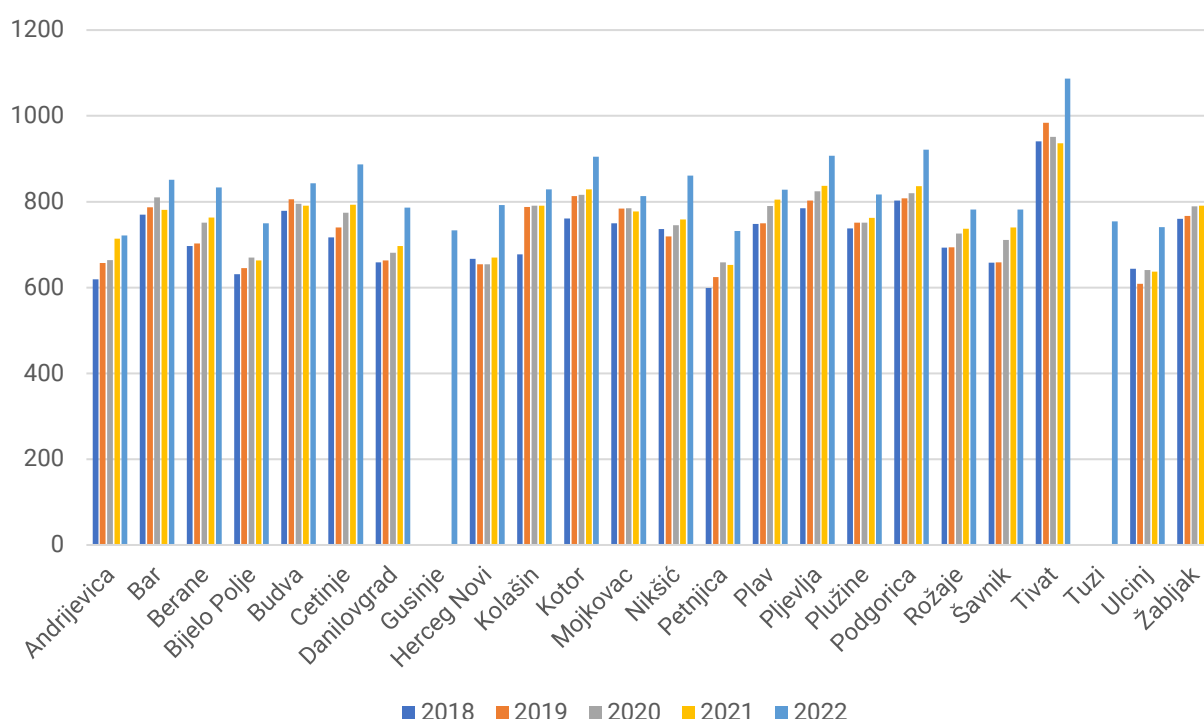
	Montenegro		Coastal Region		Central Region		Northern Region	
	2022	2021	2022	2021	2022	2021	2022	2021
Labour Force Participation Rate	58.9	50.9	62.4	49.2	64.9	55.1	46.4	45.3
Men	65.9	57.7	68.1	55.9	71.6	61.8	55.4	52.7
Women	52.1	44.4	57.1	43.0	58.5	48.8	37.3	37.9
Employment Rate	50.3	42.4	60.2	46.7	57.3	48.5	30.5	28.7
Men	55.2	47.8	66.9	53.0	61.8	54.1	35.5	33.5
Women	45.4	37.3	53.9	40.8	53.0	43.3	25.5	23.9

Source: MONSTAT, 2023d, p. 56, MONSTAT, 2022b, p. 15

In 2022, the highest labour force participation rate was recorded in the Central region, while the highest employment rate was in the Coastal region (60.2%). In 2021, both the highest labour force participation and employment rates were also in the Central region, at 55.1% and 48.5%, respectively.

Throughout the period from 2018 to 2022, the highest average gross salary in December was observed in Tivat in 2022 (€1087), whereas the lowest was in Petnjica in 2018 (€599). Apart from Tivat, higher earnings in 2022 (above €800) were noted in Podgorica, Pljevlja, Kotor, Kolašin, Nikšić, Cetinje, Berane, Budva, Bar, Mojkovac, Žabljak, Plužine, and Plav. In the other local self-government units, most of which are municipalities in the Northern region of Montenegro (excluding Ulcinj and Herceg Novi), the average salary during the period from 2018 to 2022 was below €800.

Graph 1: Average (Gross) Salary by Local-Self Government Units, 2018-2022



Source: MONSTAT, 2023b, p. 28; 2020, p. 28

Discussion and Critical Assessment

Analysis of the dependent variable's demographic indicators reveals that most municipalities in the Northern region exhibit negative vital statistics, indicating significant out-migration and limited in-migration. The independent variable highlights that municipalities in this region experience lower levels of development, competitiveness, employment, and active labour force participation. Additionally, these municipalities are characterized by lower average monthly gross earnings.

In other words, it is evident that Montenegro exhibits a pronounced development gap among its municipalities, particularly in a regional context. Nineteen out of twenty-four municipalities are below the average level of development, and thirteen out of twenty-four municipalities are below the average level of competitiveness based on the development and competitiveness indices. All municipalities in the Northern region fall into this lower category. Despite some degree of growth in development among most of these municipalities compared to previous measurement periods, none have reached or exceeded an index score of 100. Žabljak, with a score of 95.45 (2019-2021) compared to 89.98 (2016-2018), came closest to this benchmark. Similarly, the positions of local self-government units on the Development Index reflect that Northern region municipalities are predominantly at the centre and bottom of the Competitiveness Index. In the new index for the period 2019-2021 (compared to 2015-2017), municipalities such as Nikšić and Danilovgrad have also joined the lower ranks, with declines of 23 and 24 places, respectively.

There is a noticeable correlation between the decline in the negative migration balance in the municipalities of the Northern region (653 in 2023 and 769 in 2022) and the decline in the positive migration balance in the municipalities of the Central and Coastal regions, alongside the increase in earnings in 2022 compared to the previously observed period (2018-2021). This correlation also extends to employment rates and labour force participation rates in the Northern region. Moreover, it is evident that the migration balance in the Northern region was most negative in 2018 (-1882 residents), a period during which the municipalities in this region also experienced the lowest earnings compared to 2019-2022.

The Development Index for the period 2019-2021 shows growth for the Northern region municipalities compared to the index for 2016-2018, except for the municipalities of Plav and Petnjica, where there was a decline of 2.97 and 0.19, respectively. In other words, while there is a slight reduction in disparities among regions, the pace and dynamics of this reduction are unsatisfactory. The continued negative migration balance, along with lower employment rates and labour force participation rates compared to other regions, highlights the need for more effective interventions to address these challenges.

Through the given theoretical framework, it is clear that the causes of internal migration in Montenegro are not of a political or ecological nature, but are exclusively economic, rooted in the poorer living conditions in the Northern region of the country. Analysed through neoclassical migration theory, it is evident that lower earnings have driven people to move to urban centres. According to human capital theory, this migration can be seen as an investment decision where the costs of relocating and settling in new areas are outweighed by the benefits compared to remaining in the current location. This is particularly relevant when it comes to young people, as they make up the majority of migrants.

On the other hand, historical-structural theories suggest that a negative migration balance destroys agricultural communities and undermines the economy of the affected regions. Apart from that, de Haas (2021) emphasizes that migrations are not

random processes dictated by structural factors but rather individual decisions that consider various constraints. In other words, migrants move from a state of negative freedom—marked by poor living conditions—to positive freedom, characterized by better quality of life and working conditions.

This analysis, comparison, and correlation of available statistical data support the hypothesis that the desire for improved living conditions, or freedom from unemployment and low earnings, drives residents of Northern Montenegro to leave their homes and move to more developed regions of the country.

Conclusion

The validity and relevance of this research and analysis of collected data are recognized in the scientific sense through the enhancement and advancement of literature in this field, based on the most recent data. This is complemented by a specific theoretical framework for analysing and identifying influencing factors on both independent and dependent variables, as well as explaining the consequences of their correlation.

The comparison of selected indicators across different time periods allows for a deeper understanding of the issues, with a focus on recent years' dynamics between negative migration balance and low levels of development, competitiveness, earnings, and employment in the Northern region of Montenegro. Conversely, the Coastal and Central regions report positive vital statistics and a positive migration balance, indicating a greater influx of residents compared to those leaving. This corresponds with their higher development index, competitiveness, higher employment rates, labour force participation, and greater earnings. By applying Haas's model of migration understanding, the study enables comprehension of the role of individual and family choice in optimizing living conditions through changes in residence and finding jobs that match their "human capital."

In other words, the originality and authenticity of this work are reflected in the development of a specific theoretical framework for analysing the research subject, which represents a synthesis of functionalist and historical-structural theoretical understandings of migration. The next implication of the paper lies in consolidating the most recent data from relevant institutions related to the economic development of regions and their vital statistics. This is particularly significant as this study is among the first in this field, underscoring the need for a distinct theoretical framework to analyze the available empirical data.

In the social and practical context, the research provides valuable insights into the relationship between regional disparities in Montenegro and internal migration. It deepens the understanding of these issues and serves as a source of information for preparing plans, strategies, reports, various documents, and defining policies related to both migration trends and the economic and regional development of Montenegro.

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IOT FOR SUSTAINABLE MINING: EU-UA INSIGHTS ON RESEARCH, EDUCATION, AND BUSINESS

Nina KYRYLENKO

Zhytomyr Polytechnic State University, Ukraine
kgt_knp@ztu.edu.ua

Valentyn KOROBIICHUK

Zhytomyr Polytechnic State University, Ukraine
korobiichykv@gmail.com

Vasyl MAMRAI

Zhytomyr Polytechnic State University, Ukraine
mamrayv@ukr.net

Abstract

Background: Raw materials are essential to Europe's economy, forming a strong industrial base that supports the production of goods and technologies vital for modern life. The mining industry, on the other hand, faces multiple challenges, including the need to improve efficiency, reduce costs, enhance worker safety, and minimize environmental impacts. To meet these goals, companies are increasingly adopting innovative technologies, particularly industrial management systems based on the Internet of Things (IoT). IoT facilitates production automation, real-time equipment monitoring, and operational optimization, thereby leading to enhanced overall productivity.

Objectives: This paper examines the role of IoT technologies in automating and enhancing mining operations, focusing on key IoT components such as physical devices, network protocols, and cloud platforms. It examines how environmental technologies can be integrated for sustainable industry development, the role of AI in data processing, and the importance of cybersecurity.

Methodology: An analysis of scientific publications and relevant laws to establish a theoretical foundation for IoT was conducted, supported by empirical studies of successful IoT applications across industries. Key IoT elements, their role in process automation, and their impact on safety and efficiency are examined. The study also outlines the advantages and challenges of IoT in mining, relevant EU initiatives, and IoT-related educational opportunities.

Findings: Various digital transformation initiatives within the mining sector are supported by EU-funded projects, with a focus on IoT and Industry 4.0/5.0 principles. However, there is a gap in research and training specifically targeting IoT specific applications in open-pit mining.

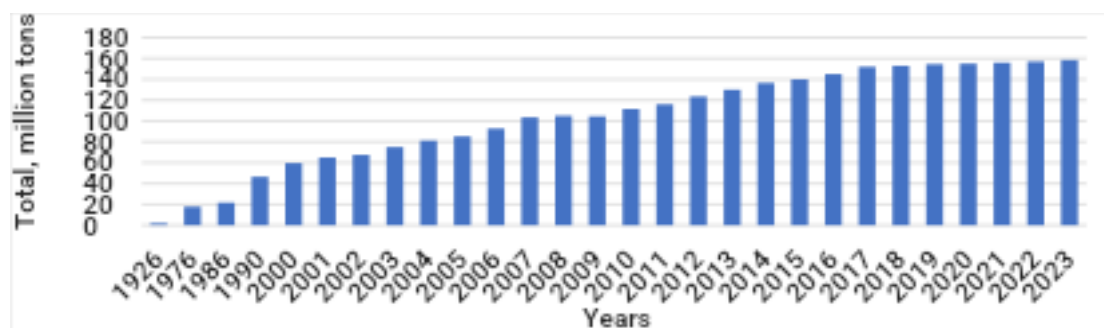
Keywords: Digital Transformation, Mining Industry, Mining Sustainability, IoT Implementation, Business Development

JEL classification: L72, O14, L86, O49, L60

Introduction

A secure supply of sustainable raw materials is vital for both the green and digital transitions within the EU and globally. These resources are crucial across sectors like construction and technology, positioning mining as an industry that must align with increasingly stringent environmental and operational standards. The dimension stone industry (DSI), essential for construction, has grown significantly over the past four decades. Global production of ornamental stones like granite has increased nearly eightfold, from 21 million tons in the 1980s to 158 million tons in 2023 (Montani, 2022) (Figure 1). The global market for natural stone also continues to expand, reaching USD 41.2 billion in 2023, with a forecast of USD 57.6 billion by 2032 (The Brainy Insights, 2023; Verified Market Research, 2024).

Figure 1: Dimension Stone Industry of the World: Historical Production



Source: Author's work based on data from Montani, 2022

The stone industry contributes around USD 100 to 120 billion annually to the global economy, encompassing direct trade, machinery, and services (Chiodi Filho, 2013). Stone quarrying primarily serves construction, consuming 80 % of stones, while the monumental industry uses 18 % (Ashmole & Motloun, 2008).

While the mining industry holds substantial economic potential, it faces complex environmental, technological, and economic challenges (Filipova & Rasputna, 2018). Ornamental stone excavation is relatively eco-friendly, with minimal land disturbance and potential for waste-free production. However, globally, mining activities have disrupted 15–20 million hectares of land, with 59 % used for operations and 38 % occupied by waste heaps covering 2,000 cubic kilometers often on fertile land. Although recycling techniques, such as ceramic granite production (which can sometimes yield higher prices than products made from natural stone), are available, a large portion of stone waste remains unprocessed. Additionally, technological barriers such as aging equipment and limited digital infrastructure, particularly in countries like Ukraine, impede the industry's modernization and hinder operational efficiency. As the EU and other regions advance toward digitalization and green policies, the role of technology in mining – especially the Internet of Things (IoT) – is increasingly recognized as essential for the industry's sustainable evolution. The increasing reliance on digital technologies further necessitates the development of specialized training programs to address the growing demand for skilled IT and data professionals.

The IoT refers to a network of interconnected physical objects embedded with sensors, software, and various technologies designed to collect and transmit data across the internet or other networks. In mining, IoT offers the potential to improve operational efficiency, worker safety, and environmental sustainability. By enabling seamless data exchange and remote monitoring, IoT supports predictive maintenance, optimizes resource consumption, and facilitates real-time adjustments in equipment and operations. Yet, challenges remain, as implementing IoT in mining requires robust infrastructure, cybersecurity measures, and skilled professionals to manage data and integrate digital solutions into existing workflows.

This paper examines the state of mining in the EU and Ukraine, focusing on how IoT can drive sustainability, efficiency, and safety. It also highlights potential pathways for digital transformation in mining and underscores the need for strategic collaboration between government, industry, and academia to develop innovative solutions that meet global sustainability goals.

Methods

This study employs a mixed-methods approach, combining qualitative and quantitative analysis to evaluate the role of IoT technologies in the mining industry, focusing on sustainability, efficiency, and safety. The methods include literature review, case study analysis, and evaluation of EU initiatives related to IoT integration. *Literature Review and Data Collection:* An extensive review of academic publications, industry reports, and regulatory documents was conducted to understand the mining sector's challenges and technological advancements. Key databases were utilized to identify peer-reviewed articles, while industry reports from GlobalData and market research firms provided insights into trends, IoT adoption rates, and projections. Additionally, government publications, EU policy papers, and Horizon Europe project reports were analyzed to contextualize regulatory support for digital transformation in mining.

Case Study Analysis: To assess real-world IoT implementations, the study includes case studies from major mining companies worldwide. These cases were selected based on their demonstrated use of IoT in improving mining operations, safety, and environmental sustainability. Each case study examines the type of IoT technology used, the primary goals (e.g., automation, monitoring, safety enhancement), and measurable outcomes such as productivity or safety improvements. Analysis of IoT adoption within Ukrainian quarries and small-scale ornamental stone producers highlights challenges faced by developing markets.

Policy and Initiative Evaluation: The study explores policies under the EU's Horizon Europe program, Industry 4.0/5.0 frameworks, and support programs like Germany's Plattform Industrie 4.0 and Ukraine's Digital Economy program. These were evaluated for their relevance to mining and impact on IoT integration. Key scientific projects were reviewed to assess their contribution to building digital skills and promoting IoT literacy within mining.

Analytical Framework: The study utilizes a comparative analysis framework to evaluate the advantages and challenges of IoT across different contexts (EU vs. Ukraine). Data on IoT benefits, such as productivity gains and cost reductions, were compared against challenges, including implementation costs, infrastructure limitations, and cybersecurity risks. This comparative approach allows for identifying critical gaps and opportunities specific to EU and Ukrainian contexts. Descriptive statistics and trend analysis were also applied to quantify market growth, IoT investment levels, and the projected economic impact of IoT-based digital transformation in the mining sector.

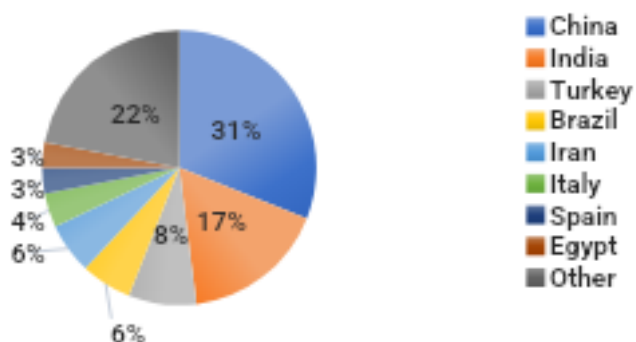
Results

Current state of the mining industry and IoT adoption

The analysis shows that the global mining industry is increasingly integrating IoT technologies to tackle challenges in operational efficiency, safety, and environmental impact. The DSI, vital for both construction and infrastructure, has experienced significant growth. However, many regions, particularly in Europe, have yet to fully adopt IoT solutions in their operations.

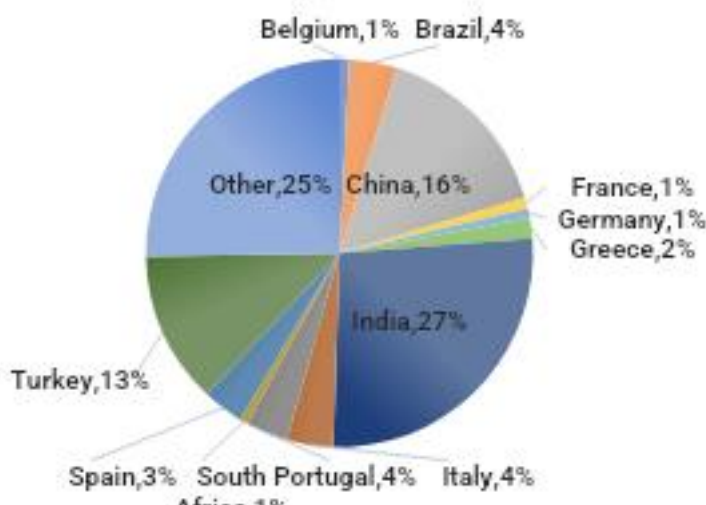
A significant disparity exists between regions: Asian countries like China and India lead in ornamental stone production (36% of global output) (Figure 2), while EU countries such as Italy, Greece, and Norway dominate stone products within Europe (Figure 3).

Figure 2: World Leaders in Ornamental Stone Production



Source: Author's work based on data from Montani, 2022

Figure 3: Leading Stone Exporters



Source: Author's work based on data from Montani, 2022

Ukraine, possessing 4 % of the world's ornamental stone reserves, contributes only 0.5 % to global output (Filipova & Rasputna, 2018). Despite leading in the EU, especially the Zhytomyr region with 45 % of reserves, less than 0.1 % is extracted annually. Finland, in contrast, produces ten times more. The lack of advanced equipment and marketing remains a key barrier, affecting countries with untapped reserves like Croatia and Romania.

Advantages of IoT integration in mining

Data from industry reports and case studies show that IoT adoption in mining offers multiple advantages, particularly in *process automation*, *operational efficiency*, and *safety standards*. By integrating various production processes into a unified system, IoT facilitates real-time data exchange, thereby enhancing transparency across the sector.

The use of IoT-based autonomous drills and excavators drives significant *automation*, reducing human intervention in hazardous environments and improving worker safety. Additionally, quarrying optimization benefits from IoT by collecting data on equipment performance, mine conditions, and resource consumption, enabling automated adjustments that enhance efficiency. For example, optimizing transport operations, which account for 40–65 % of total production costs (Aguirre-Jofré et al., 2021; Ahangaran et al., 2012; Alarie & Gamache, 2002; Moradi Afrapoli & Askari-Nasab, 2017; Umirzoqov, 2021), reduces fuel consumption (with an average quarry using around 400 liters daily or 100,000 liters annually) and lowers greenhouse gas emissions. The ornamental stone industry in Ukraine, for instance, emits about 66,750 tons of CO₂ annually, constituting 18.2 % of the sector's emissions. Such optimization reduces overall operating costs.

Moreover, IoT enables *predictive maintenance and forecasting* by generating large data volumes that support predictive analytics, allowing for timely equipment maintenance. This approach prevents costly failures and minimizes downtime.

Finally, IoT technologies *enhance labor safety* by continuously monitoring quarry site conditions, including gas emissions, temperature, and air quality. When dangerous indicators are detected, the system sends automatic notifications for prompt worker evacuation or other safety measures. Additionally, IoT supports employee location tracking within work areas, expediting emergency responses.

IoT in practice: case studies of implementation

According to GlobalData's report (GlobalData Plc, 2023), key adopters of IoT in the mining sector include major companies like Anglo American (UK), BHP (Australia, Chile), Fortescue Metals (Australia), Rio Tinto (UK, India, Australia), Vale (Brazil, Canada), Boliden (Sweden), Teck Resources (Canada), and Newcrest Mining (Australia). BHP implemented *autonomous trucks* in 2017 and introduced specialized wearable technology to monitor drivers' brain activity, helping prevent fatigue-related accidents. In 2022, BHP further advanced its operations by deploying an autonomous drill at the Spence mine. Rio Tinto uses a mine *automation* platform to integrate data from various autonomous equipment, helping predict and prevent engine breakdowns and other downtime events. Vale began its digital shift in 2016, utilizing IoT for *autonomous trucks*, drones for monitoring, and various *safety solutions*. Ferrexpo (Ukraine) and Vodafone Ukraine developed Private Networks e-LTE to automate production at the Poltava Mining and Processing Plant, reducing costs and enhancing safety by minimizing personnel in hazardous areas. Since 2017, the quarry has used semi-autonomous drill rigs and drone surveys to improve safety standards. Ferrexpo plans to automate all 12 CAT793D haul trucks and implement fully autonomous drills along with a trolley-assist network to *minimize diesel consumption*. Boliden (Sweden) employs IoT to *monitor quarry equipment*, including autonomous trucks and remote-controlled loaders, enabling timely detection of wear and malfunctions, which helps prevent accidents and boosts productivity by 80 %. Additionally, it uses an IoT solution for environmental and water management to model and analyze water flows. Nordkalk (Finland) uses a reporting solution for real-time *monitoring of production* in its plants and production lines, allowing observation of everything from overall statistics to individual line performance.

Ornamental stone quarries in Europe and Ukraine have fewer examples of IoT adoption, as the industry is traditional and resistant to change. However, innovation is crucial to remain competitive in the global market (da Silva & Almeida, 2020). With increasing environmental challenges, making the industry more sustainable is not just desirable but essential (Ghobakhloo et al., 2021).

The small-scale sector of open-pit ornamental stone quarries differs from larger mines, often lacking real-time task management systems and relying on manual dispatch via two-way radios, limiting flexibility. High costs of advanced systems, like Fleet Management, make them prohibitive for many owners. While Europe has seen a

push for digitization with technologies like Ground Penetrating Radar, proximity sensors, and drones, comprehensive management systems remain rare. In Ukraine, economic challenges and the war, including worker shortages and energy crises, have slowed technology-driven transformation, highlighting the need for affordable IoT solutions in both regions.

Challenges and limitations of IoT implementation

The application of IoT in mining offers distinct *advantages*, including productivity gains achieved through automation, real-time monitoring, and accelerated data analysis. This technology enables prompt responses to dynamic mining conditions and *improves overall efficiency*. IoT also *reduces costs* by optimizing resources like electricity, fuel, and consumables, and through preventive maintenance to minimize costly repairs and reduce downtime. Additionally, IoT *improves working conditions* by automating complex and hazardous tasks, enhancing labor safety, reducing physical strain, and lowering injury rates.

However, IoT implementation faces *challenges*. *Technical barriers* include limited infrastructure, insufficient network coverage, and difficulty integrating IoT with older equipment without major modifications or replacements. *Implementation costs* are high for small- and medium-sized companies, covering expenses for equipment, installation, staff training, and maintenance. *Cybersecurity* is also a concern, with IoT increasing risks to data protection and operational stability, requiring investment in systems to guard against cyber-attacks.

Research and education opportunities in IoT-based mining

Numerous digital initiatives have emerged globally for the mining sector, aiming to advance industrial efficiency and safety. Commercial companies like Softeq, Matellio, Intuz, Cygnatise and SPT have developed IoT products specifically tailored for industrial environments. For instance, WorldSensing commercial company offers 1-hour Webinar on “IoT Remote Monitoring of Open-pit mines” to showcase its IoT solutions. Additionally, the annual conference series “Digitalization in Mining” with participation fees ranging from €695 to €1,695, provides a platform for discussing advancements in mining digitization.

Despite the growing interest, limited research has focused specifically on digitalization in open-pit mining (Aguirre-Jofré et al., 2021; Molaei et al., 2020). However, various Horizon Europe (HE) projects and EU training initiatives address topics related to mining digitalization. The “MINE.THE.GAP” project (2020–2023), for instance, has developed four free online training courses for lifelong learning on IoT-based mining applications. Curtin University also offers a “Digital Transformation of Mining” course biannually, available for free without certification. The ongoing HE project “European Mining in the Green and Digital Era” (MASTERMINE, 2022–2026) is set to implement strategic changes within the EU mining sector, specifically in critical raw materials (CRMs), with a focus on digitalization and environmental sustainability. Similarly, the HE project “A Holistic Digital Mine 4.0 Ecosystem” (Mine.io, 2023–2026) aims to

create a sustainable digital ecosystem, covering the full mining value chain from exploration and extraction to waste management and post-mining activities, with particular attention to techniques distinct from open-pit operations.

Further, the Jean Monnet Module "GreeDI-EU" (2023–2026) aims to introduce a new industrial policy approach for young professionals, fostering EU values in creating a Green Digital Industry. This module emphasizes modern competencies for technical graduates and supports the digital transition of European industries. The "DigiRescueMe" project (2022–2024) aims to innovate rescue training in mining vocational schools through VR and AR simulations, including the development of a multisensory 'Rescue Cave' for immersive learning experiences. Projects like "ICARUS" (2019–2022) provide open digital training tools for higher education educators and stakeholders, focusing on AI, big data, and cloud technology to address Industry 4.0 skill gaps. Additional projects, such as "Innovative Open Education on IoT: improving higher education for European digital global competitiveness" (2016–2019) and its subsequent initiative "Education-based strengthening of the European universities, companies and labour force in the global IoT market" (2022–2025), bridge the gap between higher education and the European IoT job market by launching the IOTOPEN1x course, with content applicable for mining professionals. The "Competence Development in Collaborative Industrial Internet of Things" project (2020–2023) aims to enhance employability for BSc students in IoT/IIoT, supporting digitalization in SMEs, with modules like Advanced Machining Technologies and Cybersecurity in IIoT, which are also valuable for mining expert training.

Despite these projects aimed at digital competence in I4.0, IoT, and IIoT, there is a lack of initiatives for mining experts and students, as well as limited EU studies on Mining digitalization. In Ukraine, few initiatives are emerging, such as Open lecture «Digital transformation of the mining industry in Ukraine and in the world» organized by K-MINE in late 2023. Initial steps towards advancement in digital technologies in mining, particularly in geology, were discussed at the 1st Business Forum "EU – UA Strategic Partnership on Raw Materials" (2022), where a MoU for modernizing geodata management was signed between the UGS and EBRD.

European initiatives in IoT

The European Union has established several initiatives and policies to support the integration of IoT within the mining sector, aligning with broader goals for digital and green transitions. *Horizon Europe* serves as the EU's primary research and innovation program, promoting advancements across various industrial sectors, including mining. Under its second strategic plan for 2025–2027, Horizon Europe emphasizes "Green transition" and "Digital transition," allocating grants to projects focused on IoT-driven automation, energy efficiency, and enhanced security within mining operations. The EU's *Industry 4.0* initiative, along with the emerging *Industry 5.0* framework, promotes digital shift within industrial sectors such as mining. These initiatives encourage the adoption of IoT, automation, big data, and AI, aiming to align industrial operations with sustainable and technological advancements. To promote innovation, EU governments are creating cooperative platforms where industrial enterprises,

research institutions, and regulatory authorities can share best practices in IoT implementation. Notable examples include the U.S. National Network for Manufacturing Innovation, which encourages digital manufacturing research through public funding; the European Factories of the Future Research Association (EFFRA), which advances I5.0 concepts via its "Factories of the Future" program; and the Digital Europe Programme, which supports the digital economy within an Industry 5.0 context. Furthermore, the European Commission Web Portal outlines Industry 5.0's alignment with EU priorities, such as "An economy that works for people," the "European Green Deal," and a "Europe fit for the digital age."

The policy paper, I5.0: A Transformative Vision for Europe – Governing Systemic Transformations Towards a Sustainable Industry ((European Commission: Directorate-General for Research and Innovation et al., 2021), highlights that Industry 4.0 primarily emphasizes technology and growth. By contrast, Industry 5.0 is designed to place research and innovation at the heart of a sustainable, human-centric, and resilient European industry. This new approach builds on existing policies, including the Artificial Intelligence Act (2021) for human-centric digital technologies, the European Skills Agenda and Digital Education Action Plan (2022) for digital skills development, the European Green Deal for sustainable industry and circular economy initiatives, and the European Industrial Strategy, which accelerates investment in research and innovation to maintain global competitiveness.

National-level support further reinforces these initiatives. For example, Germany's Plattform Industrie 4.0 program funds IoT integration across various sectors. Ukraine's digital economy program similarly provides grants and support for IoT implementation within mining. However, Ukraine's transition to Industry 5.0 will require a coordinated decentralization strategy and alignment with environmental, social, and governance (ESG) principles to ensure sustainable growth.

Policy support in the AI, IoT/IIoT in the European Union and Ukraine

Modern advancements in IT, particularly AI, enhance various fields, making life more convenient. However, challenges remain, including safety and accountability issues that necessitate a comprehensive regulatory framework. The EU aims to establish regulations for AI under its digital strategy, promoting benefits like improved healthcare, safer transport, and sustainable energy. In April 2021, the European Commission proposed (The EU Artificial Intelligence Act, 2024) - the world's first comprehensive AI law which categorizes AI systems based on their risk to users. GDPR Regulation (General Data Protection Regulation, 2018) is the main regulatory act of the EU, which governs personal data processing in the EU, critical for IoT systems that handle significant data volumes. Mining companies must ensure compliance to protect employee and customer data.

The Network and Information Systems Directive (The NIS 2 Directive, 2022) enhances cybersecurity, requiring mining companies to safeguard their networks against threats, particularly in critical infrastructure. The European Electronic Communications Code

regulates IoT network operations, emphasizing the need for reliable internet access in remote areas.

The Directive (EU) 2018/1972 Establishing the European Electronic Communications Code (2023) regulates electronic communications services provision in the EU, establishes rules to ensure the stable and reliable operation of networks. Mining companies must take its requirements into account in terms of providing access to high-speed Internet in remote regions.

As for *Ukraine*, on December 2, 2020, the Cabinet of Ministers of Ukraine approved *the Concept for the AI Development in Ukraine* («On Approval of the Concept of Development of Artificial Intelligence in Ukraine», 2020). However, its alignment with EU regulations remains uncertain.

The Concept identifies AI as a priority but faces challenges, including low digital literacy, insufficient investment, and inadequate legal frameworks. These issues hinder education quality and data protection, necessitating robust regulatory measures to build trust in IoT technologies. Therefore, in order to ensure the protection of both the consumer and the industry, it is necessary to introduce regulatory regulation of safety and liability in order to provide them with more trust in the new IoT-based technologies (Bukhanets & Golovko, 2021).

To integrate with European standards, Ukraine should adopt the "Recommendations on Artificial Intelligence" (OECD/LEGAL/0449) and develop an AI Code of Ethics, leveraging its significant AI development sector. Since Ukraine has the largest number of companies developing AI in Eastern Europe, the development of an understandable strategy for the AI development for the state and the private sector is very important. Overall, supportive government policies in Europe and Ukraine favour IoT implementation in mining, but companies must navigate legal challenges and requirements effectively.

Emerging trends and prospects for IoT in mining

To identify real needs in the mining industry and top trends, 1,759 global startups and scaleups were analyzed through the StartUs Insights Discovery Platform, powered by Big Data and AI. The analysis identifies key innovations in autonomous and remotely controlled systems, with significant advancements in sensor technologies and the adoption of the Industrial Internet of Things (IIoT). These technologies enable precise tracking of processes and assets, leading to notable productivity improvements. Sustainability, AI, wearable devices, virtual modelling, and cloud computing are also driving efficiency and safety. Based on the 2024 Mining Innovation Map, the impact of the top 8 Mining Trends and innovations makes up of Process Automation – 22 %, IIoT – 20 %, Sustainability – 16 %, AI – 14 %, Wearable Technology – 14 %, Virtual Modelling – 9 %, Additive Manufacturing – 3 % and Cloud Computing – 2 %.

Table 1: Prospects for The IoT Implementation in The Mining Industry

Indicator	Forecast	Influence
Further integration of IoT and automation in the mining industry	The integration of IoT and automation is set to expand, featuring unmanned systems and automatic monitoring to reduce human error and enhance operational accuracy. VR and AR will aid in remote equipment control and staff training. Increased drone usage for surveying and smart sensors for detailed monitoring and data collection are anticipated. Blockchain technologies enhance transparency and reduce fraud in mineral supply chains	Improving efficiency, reducing labour costs and reducing risks for human
The growing use of AI, Big Data and analytics in mining	IoT systems will produce more data, making analysis crucial for decision-making. Increased use of analytical platforms and AI technologies for data processing is expected, aiding optimal decision-making	Huge volumes of data will allow better forecasting of maintenance, analysis of process efficiency and reduction of mining costs
Environmental sustainability and energy efficiency	Following global trends, mining companies will adopt IoT technologies for environmental parameters monitoring and energy-efficient practices application	Increased compliance with environmental standards, improved environmental situation in mining areas; increased energy efficiency; improved company image on the market
The development of 5G and its impact on IoT	The rollout of 5G will be crucial for IoT in mining, enabling high-speed, reliable communication in remote areas. This will enhance IoT system integration and ensure seamless data transfer	5G will increase the speed and reliability of communication, which will contribute to the development of new IoT applications and expand the possibilities of remote monitoring and management

Source: Author's work

Discussion and Conclusion

The mining and stone industries play crucial roles in Europe, with significant potential for sustainable development in Ukraine. By adopting EU standards, Ukraine can expand trade relations, enhance its economic standing, and contribute to sustainable practices in the industry. Training specialists in Digital Mining and fostering interdisciplinary EU-UA projects will be essential to achieving these goals.

This research contributes to the global discourse on sustainable mining practices by providing an EU-UA perspective, highlighting the potential for international cooperation in adopting IoT for environmental impact reduction. The integration of IoT technologies not only optimizes mining processes but also creates new avenues for business development and job creation. Emphasizing the role of IoT in modernizing mining operations can attract young professionals to the field, showcasing that mining today is not limited to traditional, labor-intensive activities but also involves cutting-edge digital technologies, automation, and remote management.

Training highly qualified specialists in Digital Mining is essential for both Ukraine and the EU, facilitating the exchange of expertise. Enhancing mining education and expanding academic exchanges will benefit the local economy, environment, and deepen EU-UA cooperation. This focus on digital skills can motivate graduates to view mining as a promising career path, offering high salaries, stability, and opportunities for growth while supporting sustainability.

To achieve these goals, joint interdisciplinary projects between the EU and Ukraine are needed in areas like mining, digital technologies, and business, aligning with EU principles (complementing INTEUAS – 101085202 and EUSERML – 101085715). These initiatives will advance EU approaches within Ukraine's mining sector, fostering eco-friendly growth and deeper integration into EU frameworks. Future projects should emphasize innovative technologies for raw material extraction and increased local sourcing to meet EU sustainability targets.

Key findings suggest that IoT-enabled predictive maintenance strategies, energy optimization, and advanced data analytics in mining can improve safety, lower operational costs, and reduce environmental impact. A significant reduction in greenhouse gas emissions from mining operations is essential to support EU climate objectives. Furthermore, promoting the application of frameworks such as the *United Nations Framework Classification for Resources* (2019) and the *United Nations Resource Management System* (2022) is recommended. Accelerating the adoption of advanced technologies, including IoT/IIoT and AI, will also be crucial for the efficient extraction and management of mining waste and abandoned sites. Moreover, aligning with the European Green Deal objectives and the 'do no significant harm' principle under EU Taxonomy Regulation will be crucial. This can include projects in circular economy practices, digital skills enhancement, and sustainable resource management.

The research and training initiatives should directly respond the Key Strategic Orientations (Horizon Europe Strategic Plan 2025-2027, 2024) such as KSO C (transformation of mobility, energy, construction and production systems in the EU), KSO A (development of key human-centred digital, enabling and emerging technologies, sectors and value chains) and KSO D (addressing inequalities and providing high-quality health care, empowering all citizens to act in the green and digital transitions). Achieving these objectives requires unprecedented investments in reskilling and upskilling, which are central to supporting green and digital transitions, boosting innovation and resilience, and promoting quality employment and social inclusion.

The findings lay the groundwork for future interdisciplinary and cross-border projects, particularly in the development of eco-innovative and IoT-based technologies in mining. Collectively, these initiatives are expected to drive transformative changes in EU and Ukrainian mining education and industry, strengthening EU-UA cooperation. Enhanced academic and scientific exchange, combined with market development in areas like stone quarrying, recycling, import/export distribution, and digital solutions for mining, will foster sustainable growth. Such collaborations will also support

European integration efforts in mining legislation, ecological standards, and economic progress, contributing to the global conversation on sustainable mining practices.

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COMPETITION DISTORTIONS ARISING FROM SELECTIVE SUBSIDIES: A CASE STUDY

Dubravko SABOLIĆ

Croatian Transmission System Operator, and the University of Zagreb
dubravko.sabolic@hops.hr

Goran SLIPAC

HEP-Distribution System Operator, and the University of Zagreb
goran.slipac@hep.hr

Tomislav GELO

The University of Zagreb, Faculty of Economics and Business
tomislav.gelo@efzg.net.hr

Abstract

Background: The article explores some of the consequences of the growing occurrence of negative electricity prices, driven by the increasing integration of renewable energy sources (RES), occasional overproduction, the highly inelastic nature of short-term electricity demand, and the opportunity costs tied to forced grid disconnections and subsequent ramping up. For RES, these opportunity costs can emerge if plants receive state subsidies that partially shield them from market risks. The paper assesses whether negative pricing by RES could be classified as a form of predatory pricing, enabling them to displace conventional power plants by distorting competition. This issue raises significant concerns about long-term investment, energy system stability, and long-term market distortion. Although negative bidding with subsidies is not currently considered legally problematic, companies affected by such practices may still pursue antitrust claims, arguing potential predatory behavior. The article concentrates on the EU's situation but also touches on the U.S. perspective.

Objectives: This paper aims to critically examine the practice of negative bidding by subsidized power plants from the competition law standpoint, a topic of increasing importance in the energy sector.

Methodology: Our research is based on a comprehensive review of relevant literature, legislation, and operational practices in the industry. We have identified and analyzed both short- and long-term effects on the industry as a whole.

Findings: Negative electricity bidding by subsidized plants resembles predatory pricing, where the financial security of state aid replaces market power and deserves a more thorough investigation.

Keywords: Negative Prices, Predatory Pricing, Competition Law, Power Sector

JEL classification: K21, L40, L94, Q41, Q48

Introduction

The rise of negative prices in electricity markets (details on power industry organization can be found in Kirschen and Strbac (2018); Stoft (2002)) is increasingly common with the growth of renewable energy sources (RES) in the energy mix (ACER, 2024). Two categories of power plants typically offer negative reservation prices. The first includes RES producers benefiting from state subsidies, allowing them to offer a negative price equivalent to the subsidy. A RES, without subsidies, has a marginal cost of nearly zero and thus can bid a reservation price close to zero.

The second category consists of fossil fuel or nuclear plants, which face significant opportunity costs when forced to disconnect and reconnect to the grid. These producers may also offer negative prices up to their anticipated opportunity cost. Negative prices usually occur when energy supply far exceeds consumption, typically driven by high output from non-dispatchable RES like wind and solar.

As zero marginal cost sources dominate, prices drop and can turn negative. This increasingly crowds out conventional energy plants, reducing their operational hours and leading to underinvestment (Hirth, 2013). Subsidized RES bidding negatively raises serious questions about whether this constitutes predatory pricing, as it displaces competitors by undermining their cost recovery. Though these RES companies may not dominate the market, state subsidies function as financial shields, mimicking market power. However, this behavior likely reflects a regulatory flaw rather than intentional market abuse. This paper provides a preliminary analysis of negative electricity prices' economic and legal implications, seen as a potential market distortion caused by inadequate regulation. While focusing on EU policy, U.S. competition law is also briefly considered.

Predatory Pricing Contextualized

In contemporary competition law, predatory pricing occurs when a dominant firm sets prices below cost for an extended period to weaken or eliminate competitors (Van Bael & Bellis, 2021; OECD, 2005). Once competitors are driven out, the firm raises prices to recoup losses, harming consumers in the long run. This practice is considered abusive under both EU competition law (Treaty on the Functioning of the European Union, TFEU, Art. 102, (EU, 2012)) and U.S. antitrust law (Sherman Act, Sec. 2, (U.S. Congress, 2004)). Predatory pricing typically requires evidence that prices were below an appropriate cost measure (e.g., average variable cost, AVC as a proxy for marginal cost, MC) and that the firm had a realistic prospect of recouping losses. Notably, in the case of subsidized RES, these criteria are met.

Predatory pricing distorts competition by foreclosing smaller competitors, harming consumers through eventual price increases, and creating barriers to entry. Subsidized RES can mimic predatory behavior due to state aid, functioning as a financial buffer that replaces traditional market power. At the industry level, this leads to inefficient production, generating energy when it is unnecessary.

Overproduction, a primary cause of negative prices, is inherent to variable RES due to their low capacity factors, e.g. (Horváth et al., 2022) and low capacity credit (Ensslin, C. et al., 2008). Because of this, in largely/fully decarbonized power systems, RES capacity must far exceed peak demand, leading to occasional large energy surpluses. This reality calls for a fundamental rethinking of market design and investment coordination, as RES's negative pricing strategies will persist even without subsidies.

Under Art. 102 of the TFEU (EU, 2012), predatory pricing is an abuse of dominance. In *Akzo Nobel* (Case C-62/86, (European Court, 1991)), the European Court of Justice (ECJ) ruled that pricing below AVC indicates predatory intent, and further evidence of intent is needed if prices are between AVC and ATC (average total cost). The ruling clarified that dominant firms could abuse their position even without monopoly power by leveraging pricing strategies to harm competition.

In the U.S., *Brooke Group Ltd. v. Brown & Williamson* (509 U.S. 209, 1993, (U.S. Supreme Court, 1993)) set a high burden of proof for predatory pricing under the Sherman Act. Plaintiffs must show that prices were below AVC and that the defendant had a reasonable prospect of recouping losses. The U.S. Supreme Court ultimately ruled in favor of *Brown Williamson*, as *Brooke Group* failed to prove recoupment was likely in the competitive tobacco market. This ruling has made predatory pricing claims more difficult to pursue in the U.S.

Economic Rationale for Testing Predatory Pricing

Despite its economic significance, MC is often challenging to measure directly, especially in complex markets. Marginal costs are not static, and in many industries, the complexity of production processes makes it challenging to use MC as a practical benchmark. Additionally, MC may not account for legitimate strategies like promotional pricing or discounts, which can result in prices temporarily below MC without anti-competitive intent.

Therefore, courts and regulators frequently use AVC as a proxy, as it can be calculated from a firm's accounting. The *Areeda-Turner* test (Areeda & Turner, 1975), widely used in U.S. antitrust law, assesses whether a firm's prices are predatory by focusing on whether prices are below short-run marginal cost (SRMC). Since MC is often elusive, the test substitutes AVC.

Under this framework, pricing below AVC is considered predatory unless the firm seeks to eliminate competition. At the same time, prices above AVC are generally deemed lawful as they likely reflect legitimate competition strategies.

A notable case where the *Areeda-Turner* test was applied is *Matsushita Electric Industrial Co. v. Zenith Radio Corp.* (1986) (U.S. Supreme Court, 1986), where the U.S. Supreme Court ruled in favor of *Matsushita*, finding that predatory pricing claims required proof not only of prices below cost but also a reasonable likelihood of

recoupment. Unlike the two-part test established by *Brooke Group Ltd. v. Brown & Williamson*, the Areeda-Turner test does not require proof of recoupment, leading some courts to favor more nuanced approaches. Critics argue that the test may oversimplify the dynamics of pricing strategies. Over time, the pure application of the Areeda-Turner test has given way to more refined methods while retaining its fundamental rationale.

Legal Grounds for RES Subsidies

In the EU, the legal framework for state subsidies, a form of state aid, is governed primarily by the TFEU (EU, 2012), with supplementary legislation and guidelines. The challenge lies in supporting renewable energy while maintaining competitive markets and avoiding distortions.

Articles 107 and 108 of the TFEU are the primary legal sources. Art. 107(1) prohibits state aid that distorts competition, while Art. 107(3) allows aid that serves common interest objectives, such as environmental protection, provided it supports EU climate goals. Art. 108 requires member states to notify the European Commission before implementing state aid.

Art. 194 of the TFEU addresses energy policy, promoting renewable energy in line with market rules. The General Block Exemption Regulation (GBER) (European Commission, 2014) permits state aid for renewables without prior notification, provided proportionality and limited distortion. The Guidelines on State Aid for Environmental Protection and Energy (EEAG) (European Commission, 2022) emphasize market integration, ensuring renewable producers face market signals through competitive bidding and that over-subsidization is avoided.

The Clean Energy for All Europeans Package (European Commission, 2020) encourages market integration for renewables and includes the Renewable Energy Directive (EP and EC, 2018), which sets binding targets. The European Green Deal (European Commission, 2019) also influences state aid policy, stressing alignment with climate goals and the phasing out fossil fuel subsidies.

In the U.S., renewable subsidies are less centralized and governed by federal and state programs like the Investment Tax Credit (ITC) and Production Tax Credit (PTC) (Thomson Reuters, 2024). The Public Utility Regulatory Policies Act (PURPA) (U.S. Congress, 1978) and state-level Renewable Portfolio Standards (RPS) (NCSL, 2024) also play roles. U.S. competition law focuses more on antitrust enforcement, with fewer direct subsidy regulations than the EU.

Is Negative Bidding by Subsidized RES a Form of Predatory Pricing?

While many renewable energy producers lack traditional market dominance, their ability to offer negative prices due to state subsidies raises questions of whether their behavior could be classified as predatory. State aid enables below-cost pricing, potentially driving unsubsidized competitors out of the market.

Although RES subsidies are legal under EU law, their competitive impact may resemble predatory pricing by crowding out competitors and distorting long-term investment incentives. This is especially concerning in capacity markets (Simoglou & Biskas, 2023), where conventional plants maintain grid stability. As renewables increase, negative pricing periods become more frequent, reducing profitability for conventional plants and leading to underinvestment in essential capacity during low renewable output.

The EEAG guidelines (European Commission, 2022) emphasize integrating renewables into the market through competitive bidding processes to avoid overcompensation. However, once subsidies are awarded, they become decoupled from electricity market signals, which may cause market distortions, as discussed in this paper.

Negative pricing, particularly by state-subsidized renewables, raises critical questions about market competition. Though not inherently anti-competitive, the long-term effects on market structure and investment incentives require further investigation. This paper suggests that negative pricing driven by state aid could be a subtle form of predatory pricing that mirrors typical predatory outcomes.

Subsidized companies offering negative bids may exploit regulatory gaps to maximize profits at the expense of conventional power generators using public funds. While the policy was meant to make RES more competitive, producing energy inefficiently due to oversupply is not in the public interest. Conventional plants face double penalties: carbon emission costs through the EU Emissions Trading System (European Commission, 2023) and market displacement by state aid.

Despite policies promoting RES, the system will only be able to function with conventional plants for decades from now. Flexible production plants, critical for balancing volatile RES output, are not easily replaced. Moreover, the growing share of RES demands the expansion of flexible capacities, not contraction.

In the U.S., subsidies for renewables are governed by different rules, primarily federal tax credits and state-level renewable portfolio standards. Market distortion concerns are addressed through antitrust law rather than state aid rules.

Conclusion and Further Research

Some renewable energy producers benefit from state subsidies, allowing them to offer negative prices, which raises concerns about the long-term effects on competition in electricity markets. These practices resemble predatory pricing, where the financial security of state aid replaces market power. This approach to state subsidies seems misdirected, potentially distorting fair market competition, which is fundamentally based on technology, contrary to the EU's policy of technological neutrality.

However, transitioning from fossil-fueled power plants to renewable energy is undeniably in the public interest. Given the extensive legal framework regulating renewable energy, the competition law landscape is complex and demands interdisciplinary research. The impact of negative pricing on investment incentives, market diversity, potential market concentration due to state-subsidized pricing, and possible long-term social welfare losses from inefficient production also merits further study.

While it is not new that subsidized RES, when bidding negative prices, actually misuse the subsidies they receive, putting the phenomenon in the context of predatory pricing as a form of market power abuse may make it easier to regulate and process such behavior. Additionally, this paper calls for a reassessment of state aid rules in the renewable energy sector to ensure that environmental goals are pursued without undermining market competition or the long-term sustainability of the power system as it moves toward full decarbonization.

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IMPLEMENTATION OF VEGETATION INDEXES IN THE ASSESSMENT OF THE SOIL EROSION IN ARMENIA: THE DEBED RIVER BASIN

Narek HARUTYUNYAN

Faculty of Geography and Geology, Yerevan State University, Armenia
n.harutyunyan@ysu.am

Arman KANDARYAN

World Wide Fund for Nature Armenian branch, Armenia
armankandaryan@gmail.com

Abstract

Background: The article discusses the issues of soil erosion assessment in mountainous terrain, the complexity of which requires conducting a spatio-temporal study and using modern approaches. The catchment basin of the Debed River, which is a typical mountainous area, was chosen as an example. There is a wide variety of interrelated factors causing soil erosion here, which together make the Debed River catchment basin a typical object of geoecological research. Such research is not only of scientific and methodological interest and is useful for the study of soil erosion in other mountainous areas, but it can also contribute to the scientific understanding and solution of the land use problem of the Debed River catchment basin. The article presents the results of the calculation and analysis of the spatial manifestation and temporal development of soil erosion in the catchment basin of the Debed River.

Objectives: The objectives of the study is to develop a methodology and methodological approaches for soil erosion assessment in the Debed River catchment basin based on the measurability and analysis of vegetation cover in the area using normalized vegetation indices.

Methodology: The study was carried out using systematic and spatio-temporal approaches, analysis, comparison, mathematical, space photo decoding and GIS methods were used.

Findings: The NDVI indicators of vegetation in the Debed river basin in different seasons of the year express the vegetation coverage of the area, which makes it possible to evaluate the spatiotemporal manifestations of the possible development of soil erosion. It also provides insight into land use patterns, especially agricultural land use, and thereby identifies eroded areas. The specific observations made in the study areas selected in the Debed river basin prove that NDVI indicators are important indicators for the assessment of vegetation cover.

Keywords Vegetation Index, soil erosion, land use, ortho imagery, catchment basin.

JEL classification Q 24, Q57

Introduction

Soil erosion is a process occurring on the earth's surface, in which a whole complex of factors participates, the energy source of which is the sun. The erosion of soils by water and wind causes linear or surface erosion of the area. There are many factors of soil erosion in the Debed River basin, each of which promotes or hinders the development of erosion, ultimately the intensity of erosion is determined by the whole complex of these factors. Among those factors, soil composition, atmospheric precipitation, slopes and orientations of mountain slopes, vegetation and the nature of land use play a significant role. Erosion first begins in those lands where there is no natural vegetation, which in this case performs at least two functions. First, plants anchor the soil with their roots, and second, the above-ground parts of the plant reduce the force and intensity of water and especially wind flow. Depending on the vegetation, soil erosion can be active or passive. Vegetation indices are widely used to study and evaluate the state of vegetation, which are calculated by differences in the brightness of pixels in images of the visible and near infrared parts of the spectrum. In our study, the main focus was on studying the distribution and dynamics of vegetation index NDVI. One of the important areas of application of this indicator is the identification of modern land use forms and the determination of the soil cover erosion of the area. The main goal of the study is to determine the scale of soil erosion in the Debed River basin and the spatio-temporal features of their development by calculating the NDVI. Calculations of the NDVI index by remote sensing for different seasons of the year provide a more accurate understanding of the state of vegetation and erosion processes, as well as the results of the study of different years determine the trends of expansion or reduction of soil erosion.

Methods

The study was carried out by the method of calculating and mapping the Normalized Difference Vegetation Index in GIS. Normalized Difference Vegetation Index (NDVI) quantifies vegetation by measuring the difference between near-infrared (NIR) and red light (Red). NDVI is calculated based on the following equation:

$$NDVI = (NIR - Red) / (NIR + Red),$$

where, NIR = the near infrared portion of the electromagnetic spectrum (0.75-1.5 μm) and RED = the red portion of the electromagnetic spectrum (0.6-0.7 μm) (Yengoh, Dent, & Tucker, 2015).

NDVI values lie between -1 and +1. The higher the value is (close to +1) reflects high Near Infrared (NIR) which means dense greenery and healthy vegetation cover. The produced result depicts the NDVI index on a colorized scale from -1 (purple) to +1 (green). Dense and healthy vegetation corresponds to positive values, while clouds and snow are characterized by negative values of the index. Typical vegetation values range from 0.2 to 1. Healthy plants, which are in very good condition, are reflected in values >0.6. When the values of the index are at zero or very close to it, they correspond to the absence of vegetation (Pettorelli, 2014).

The study was done with a systemic and spatiotemporal approach. Based on the main objective of the study, high-resolution satellite images of the Debed River basin in different years and seasons were used. Aerial photography of the target areas was also done using a drone.

Results

The catchment area of the Debed River is located in the north-eastern part of the Republic of Armenia (Figure 1). The Debed is one of the rivers of the Kuri basin and a right tributary of the Khram. The length is 178 km, 152 km within the borders of the Republic of Armenia, the catchment area is 3790 sq km. There are 1356 rivers and streams in the Debed system, 55 of which are more than 10 km long, including 6 rivers up to 50 km long and 2 rivers up to 100 km long (Mnacakanyan, 2005).

Figure 1: Maps of the Debed River basin



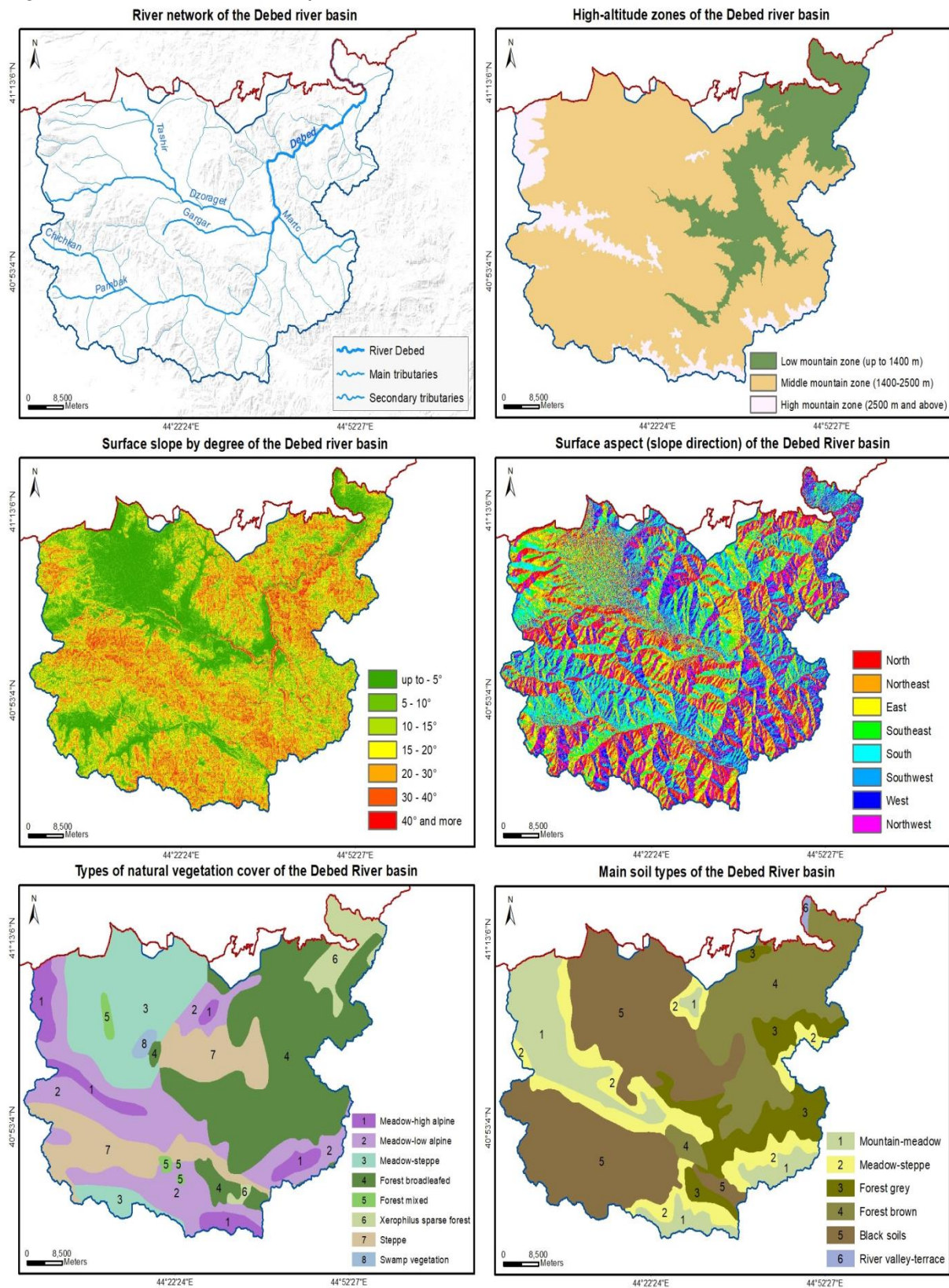
Source: Author's work

The major tributaries of Debed River are Dzoraget (71 km) and Pambak (36 km) (Figure 2). The average density factor of the river network is 0.92 km/km². Debed is fed by snowmelt and rainwater (55%), but underground feeding is also significant (45%). The water regime is characterized by a predominance of spring flow with occasional summer floods. The overflow lasts from April to June, reaching its maximum in May. Average annual discharge is 35.8 m³/s, flow modulus is 9.57 l/s km², flow layer is 305 mm, annual precipitation is 663 mm, flow coefficient is 0.46. Permanent freezing is absent, various ice phenomena are observed from 12 days (in the lower reaches) to 33 days from mid-December to early March (Harutyunyan et al., 2023).

The average annual atmospheric precipitation in the low mountain zone (up to 1400 m) of the Debed River basin is about 400-650 mm, of which 150-250 mm falls in spring. In the middle mountain zone (1400-2500 m), the annual average amount of atmospheric precipitation ranges from 650-900 mm, of which 250-350 mm falls in spring. In the high mountain zone (above 2500 meters), the annual amount of atmospheric precipitation is 900-1100 mm, of which 350-400 mm falls in spring (Mnacakanyan, 2005).

One of the factors contributing to the active development of the erosion process are the inclinations and slopes of the mountain slopes. The Debed basin has a great variety of slope slopes and a highly uneven distribution. Sites with a relatively flat (0-5°) surface make up 17.8% of the entire area. Slopes (5-10°) occupy 17.0% of the total area. Strongly sloping slopes (10-15°) occupy 15.9% of the area. Steep slopes (15-20°) occupy 14.6% of the entire area. Steep sites (20-30°) make up 23.4% of the entire area. Steep slopes (30-40°) cover 9.5% of the area. Stepped, directional rocky slopes (40° and more) are not widespread and occupy 1.8% of the entire area (Figure 2).

Figure 2: Characteristic Maps of the Debed River Basin



Source: Author's work

According to lighting and heating, the Debed area can be classified into the following groups of orientations: shady and relatively weakly heated mountain slopes (with northern, northeastern, northwestern orientations), illuminated and significantly heated mountain slopes (with southeastern, southeastern, southwestern orientations), sufficiently illuminated and heated mountain slopes (eastern and with western leanings). Shaded and relatively weakly heated mountain slopes dominate here, occupying 39.5% of the entire area - 149,733 ha. Illuminated and significantly heated mountain slopes occupy 35.6% of the entire area - 134,789 ha. Sufficiently lit and heated mountain slopes occupy 24.9% of the entire area - 94478 ha (Figure 2).

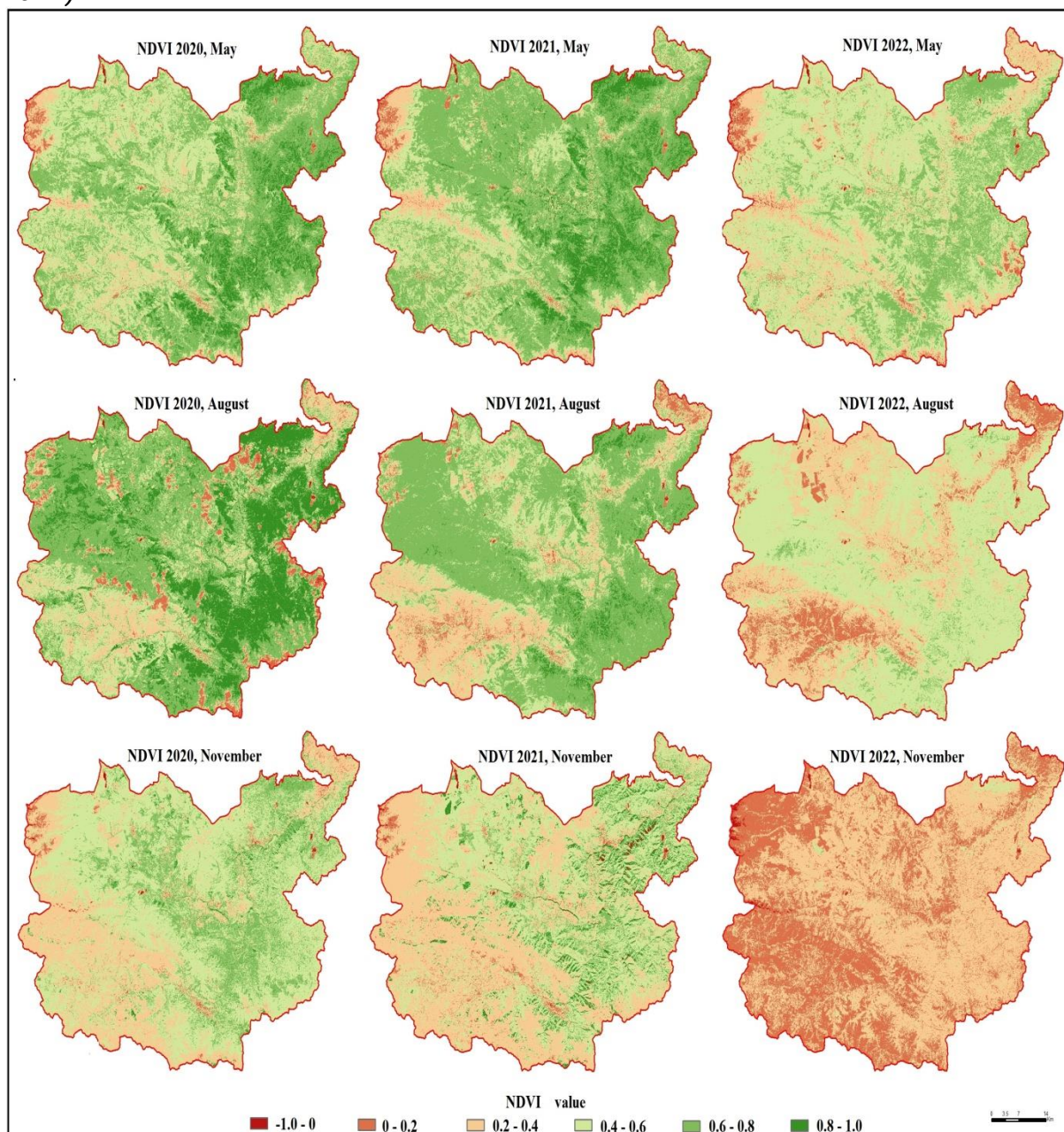
The natural and climatic conditions of the Debed River basin have contributed to the formation of various natural ecosystems with diverse vegetation. Here, the geographical distribution of the main types of vegetation is due to upward zoning (Figure 2). The highest zones of the mountains are occupied by meadow vegetation. In the Debed river basin, meadow vegetation begins at an altitude of 2700-2800 m. At 2200-2800 m altitude, the zone of meadow-steppe vegetation extends. Forest vegetation is spread in the altitude zone of 900-1900 m. Xerophilus sparse forests occupy an intermediate position between xerophilic grass and forest vegetation. Steppe vegetation is found in the middle mountain zone at 1400-2200 m, and on the southern mountain slopes, it reaches 2600-2700 m. Swamp vegetation is not widespread in the Debed river basin, but it is found in small areas in the concave parts of the relief and on the shores of water basins.

The severe fragmentation of the relief of the Debed River catchment basin, large differences in altitude, different orientations and slopes of the mountainsides, variegated parent rocks, diverse climatic conditions and different vegetation groups have had their impact on soil formation, which is responsible for the heterogeneity and characteristics of the soil cover of the study area. Here, the distribution of soil types is closely related to landforms (Figure 2). Mountain-meadow lands lie above 1800 m above sea level. Meadow-steppe lands are spread at an altitude of 1300-2700 m above the sea level, which were formed in the conditions of the washing water regime on the wind-blown materials of volcanic rocks, their sedimentary accumulations. Forest gray soils are spread at an altitude of 800-2400 m above sea level and were formed mainly on the northern slopes of the mountains, under broad-leaved trees, in hot and humid conditions. Brown forest soils are spread at an altitude of 400-2500 m above sea level, formed in moderately warm forest climate, under oak and beech forests, porphyrites, marls, tufabreccias, granitadiorites, limestones, sandstones, weathered materials, as well as on loamy sand and clay accumulations. Mountain black soils are located at an altitude of 800-2500 m above sea level, formed on weathered materials of limestones, porphyrites, tuffobreccia, as well as alluvial sediments with different mechanical composition. River valley-terrace soils are spread over 375-500 m altitude, usually have a simple layered structure and high capacity (Gabrielyan, 2000). In the input part of the soil water balance of the catchment basin of the Debed River, the share of the condensation of underground water and water vapor is insignificant. Therefore, atmospheric precipitation plays a major role in the input components of the soil water balance of the study area.

Satellite images covering different time periods were downloaded to detect erosion-prone areas, acquired at the close dates in the months, in which vegetation cover is less developed. Less than 5% of cloud cover was, among others, one of the important image quality criteria. The vegetation NDVI index of the Debed River basin was calculated for different vegetation phases of the years 2020, 2021 and 2022: spring, summer and autumn. NDVI indices were calculated using Sentinel-2 satellite images for May, August and November (<https://scihub.copernicus.eu/dhus/#/home>, <https://asterweb.jpl.nasa.gov/gdem.asp>).

The selected scenes were processed in ArcGIS. Thus, nine scenes were used three in each year. The next step was to produce the indices (NDVI). The vegetation indices were classified into six groups: -1 to 0 (no vegetation), 0 to 0.2 (Unhealthy vegetation), 0.2 to 0.4 (Poor healthy vegetation), 0.4 to 0.6 (Moderately healthy vegetation), 0.6 to 0.8 (Healthy vegetation), 0.8 to 1 (Very healthy vegetation) (Figure 3).

Figure 3: NDVI Indices of the Debed River Basin (May, August, November, 2020, 2021, 2022)



Source: Author's work

The vegetation cover but also the road network and vehicles are clearly identified in the figure while even more categories and calibration techniques could also separate the water surface. This index can be used also for soil erosion and drought monitoring (Pettorelli, 2014). Calculations of NDVI studies for separate periods of different years are given in table (Table 1).

In order to obtain the most accurate data, observations were made by us at four different sites in the Debed River basin: Kurtan, Marts, Shirakamut and Archis (Figures 4, 5, 6, 7). The study determined the NDVI index of each precinct for the month of August 2021. The choice of the date depends on the purposeful use of

the land in the area. This applies especially to agricultural lands. Accurate depictions of land use were obtained through drone photographs taken during that same period.

Table 1: Surfaces of NDVI Indicators (May, August, November, 2020, 2021, 2022)

NDVI	Description	km ²	%	km ²	%	km ²	%
<i>May</i>		<i>2020</i>		<i>2021</i>		<i>2022</i>	
-1 to 0	No vegetation	3,032	0,080	4,434	0,117	10,536	0,278
0 to 0.2	Unhealthy vegetation	47,110	1,243	59,541	1,571	116,543	3,075
0.2 to 0.4	Poor healthy vegetation	277,314	7,317	293,081	7,733	651,122	17,180
0.4 to 0.6	Moderately healthy vegetation	1421,477	37,506	904,863	23,875	2130,283	56,208
0.6 to 0.8	Healthy vegetation	1683,063	44,408	2097,727	55,349	881,516	23,259
0.8 to 1.0	Very healthy vegetation	358,003	9,446	430,355	11,355	-	-
<i>August</i>		<i>2020</i>		<i>2021</i>		<i>2022</i>	
-1 to 0	No vegetation	4,700	0,124	1,857	0,049	2,388	0,063
0 to 0.2	Unhealthy vegetation	155,125	4,093	111,350	2,938	353,266	9,321
0.2 to 0.4	Poor healthy vegetation	389,574	10,279	676,363	17,846	1176,833	31,051
0.4 to 0.6	Moderately healthy vegetation	736,018	19,420	839,03	22,138	2138,015	56,412
0.6 to 0.8	Healthy vegetation	1585,660	41,838	2030,265	53,569	119,498	3,153
0.8 to 1.0	Very healthy vegetation	918,923	24,246	131,134	3,460	-	-
<i>November</i>		<i>2020</i>		<i>2021</i>		<i>2022</i>	
-1 to 0	No vegetation	5,950	0,157	17,130	0,452	15,585	0,4112
0 to 0.2	Unhealthy vegetation	62,687	1,654	87,360	2,305	1435,804	37,884
0.2 to 0.4	Poor healthy vegetation	934,425	24,655	1572,888	41,501	2233,288	58,9258
0.4 to 0.6	Moderately healthy vegetation	2001,005	52,797	1551,058	40,925	104,413	2,755
0.6 to 0.8	Healthy vegetation	743,333	19,613	373,353	9,851	0,910	0,024
0.8 to 1.0	Very healthy vegetation	42,600	1,124	188,211	4,966	-	-
<i>Total area</i>		<i>3790</i>	<i>100</i>	<i>3790</i>	<i>100</i>	<i>3790</i>	<i>100</i>

Source: Author's work

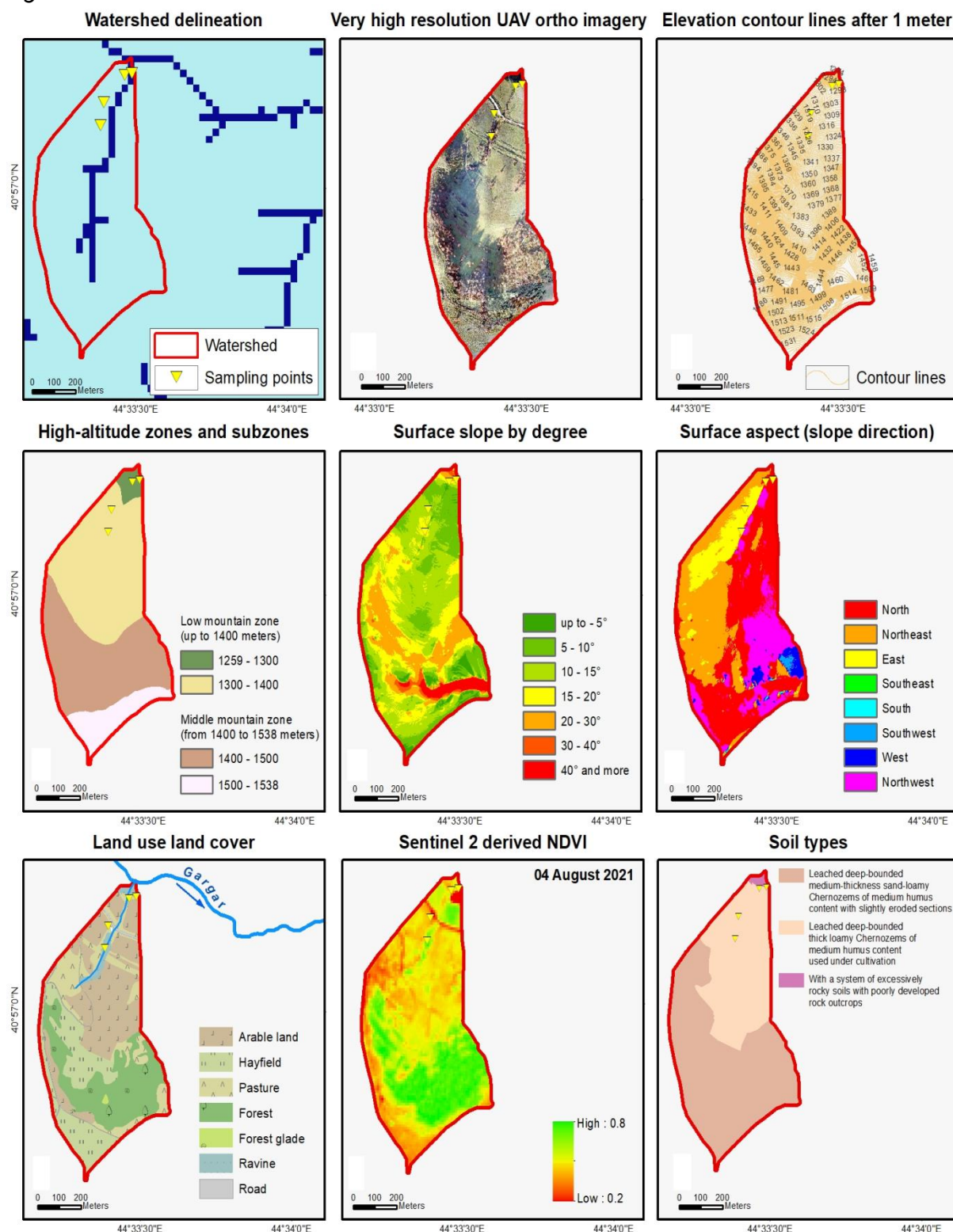
Characterization of the Kurtan catchment area

The basin lies at absolute altitudes of 1259 to 1538 meters (Table 2). The average height of the area is almost 1399 meters, and the difference in elevations of the terrain is 279 meters. The depth fragmentation is 0.003 m/m². The area has a moderately cold mountain climate, the average annual air temperature is 4-8°C, and the average annual precipitation is 450-550 mm. Due to the regime and processes

of soil formation, the type of mountain black soils with its subtypes was formed in the area (Figure 4).

The thickness of mountain black soils reaches up to one meter. 126 c/ha of plant mass accumulates annually in black soils, the main part of which is root, 64-67%. The amount of humus is 8-10%, the composition of which is dominated by humic acids. The reaction of the soil solution is mainly neutral (pH ranges from 7). The absorption complex is saturated mainly with Ca and Mg. Mountain black soils are rich in total nitrogen (0.15-0.35%), phosphoric acid (0.15-0.26%) and potassium (1-2%). The high content of humus and rather heavy mechanical composition determine the property of high absorbability of mountain black soils, up to 45-55 milligrams equivalent in 100 g of soil. The catchment area of Kurtan area is dominated by sandy loam and slightly eroded black soils, which occupy 61% of the entire area, 38.3% are occupied by strong clay cultivated black soils and sites with a complex of poorly developed hard rock soils with outcrops of root rock - 0.7%. Disruption of landscapes here is 71.7% (Table 6).

Figure 4: Characteristics of the Kurtan Catchment Area



Source: Author's work

Table 2: Geomorphological Characteristics of Kurtan Site

Geomorphological characteristics		Soil type			Total
		Black soils leached deep bound medium humus medium strength sandy loam some places slightly eroded	Black soils leached deep connected medium humus strong clay cultivated	Bedrock outcrops with an incompletely developed complex of highly rocky	
Spreading zone of the soil (m)		1345-1538	1285-1402	1259-1291	1259-1538
Area (ha)		26.9	16.9	0.3	44.1
Surface areas of different slopes (ha)	0-5°	1.3	0.1	-	1.4
	5-10°	3.9	5.1	-	9.0
	10-15°	6.3	9.3	-	15.6
	15-20°	6.9	2.3	0.04	9.24
	20-30°	5.4	0.1	0.18	5.68
	30-40°	1.0	-	0.08	1.08
	40° <	2.1	-	-	2.1
Surface areas of different orientations (ha)	N	8.5	8.4	0.1	17.0
	NE	8.9	4.2	0.2	13.3
	NW	5.9	1.9	-	7.8
	S	0.04	-	-	0.04
	SE	0.06	-	-	0.06
	SW	0.3	-	-	0.3
	E	1.9	2.4	-	4.3
	W	1.3	-	-	1.3
NDVI 04.08.2021		0.341-0.801	0.196-0.764	0.475-0.647	-

Source: Author's work

Characteristics of the Marts catchment area

The basin lies at absolute altitudes of 1075 to 1093 meters. The average height of the area is almost 1084 meters, and the difference in elevations of the terrain is 18 meters (Table 3).

Table 3: Geomorphological Characteristics of Marts Site

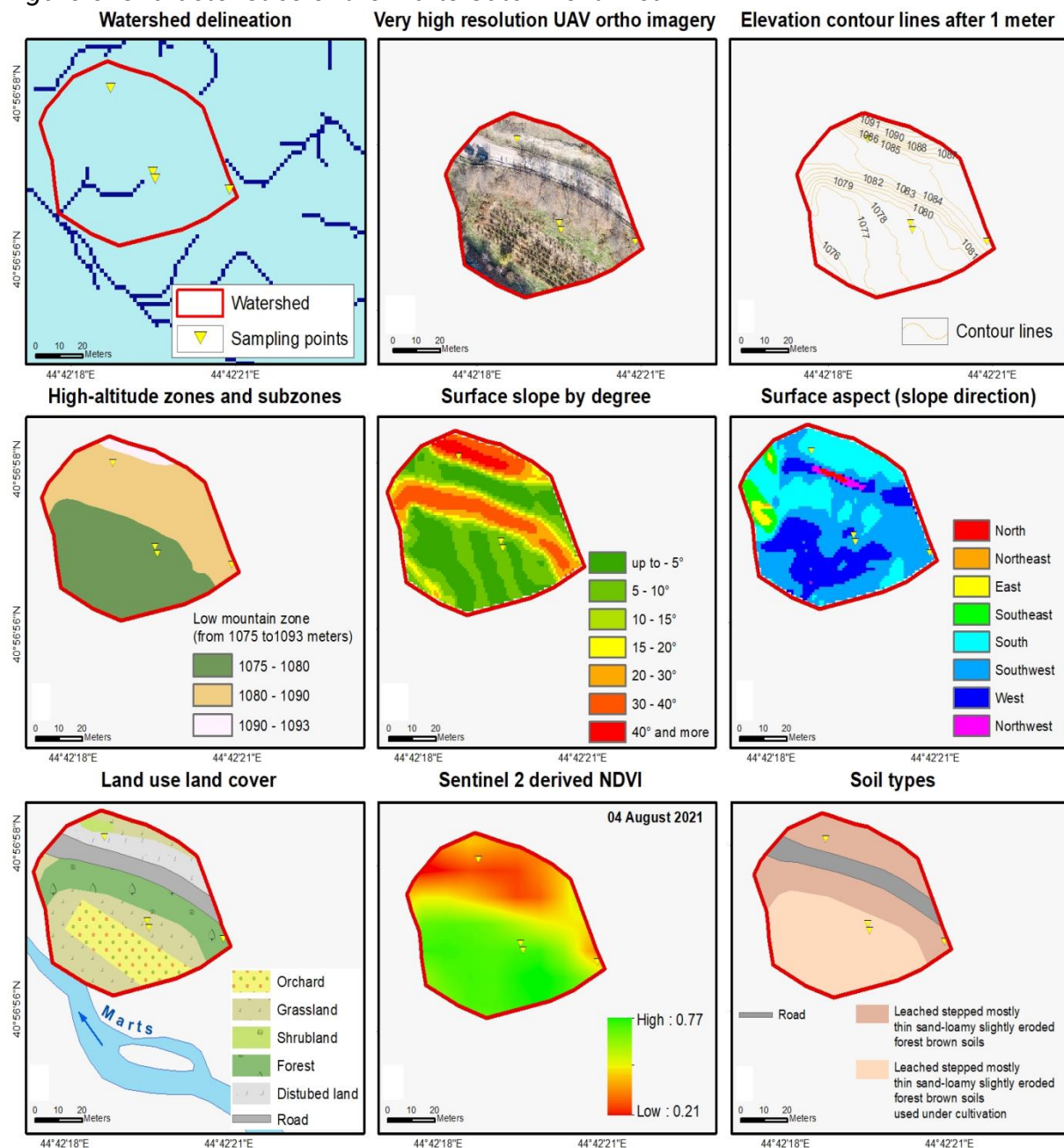
Geomorphological characteristics		Soil type		Total
		Forest brown washed-out steppe mostly weak sandy loam slightly eroded	Forest brown drained steppe weak sandy loam slightly eroded cultivated	
Spreading zone of the soil (m)		1077-1093	1075-1081	1075-1093
Area (ha)		0.22	0.18	0.40
Surface areas of different slopes (ha)	0-5°	0.03	0.08	0.11
	5-10°	0.03	0.07	0.10
	10-15°	0.02	0.02	0.04
	15-20°	0.02	0.01	0.03
	20-30°	0.04	-	0.04
	30-40°	0.07	-	0.07
	40° <	0.01	-	0.01
Surface areas of different	NW	0.006	-	0.006
	S	0.100	0.014	0.114

orientations (ha)	SE	0.010	0.004	0.014
	SW	0.083	0.090	0.173
	E	0.003	0.003	0.006
	W	0.018	0.069	0.087
NDVI 04.08.2021		0.207-0.69	0.667-0.775	-

Source: Author's work

The depth fragmentation is 0.013 m/m². Due to soil formation regime and processes, forest brown soil type with its subtypes was formed in the area (Figure 5).

Figure 5: Characteristics of the Marts Catchment Area



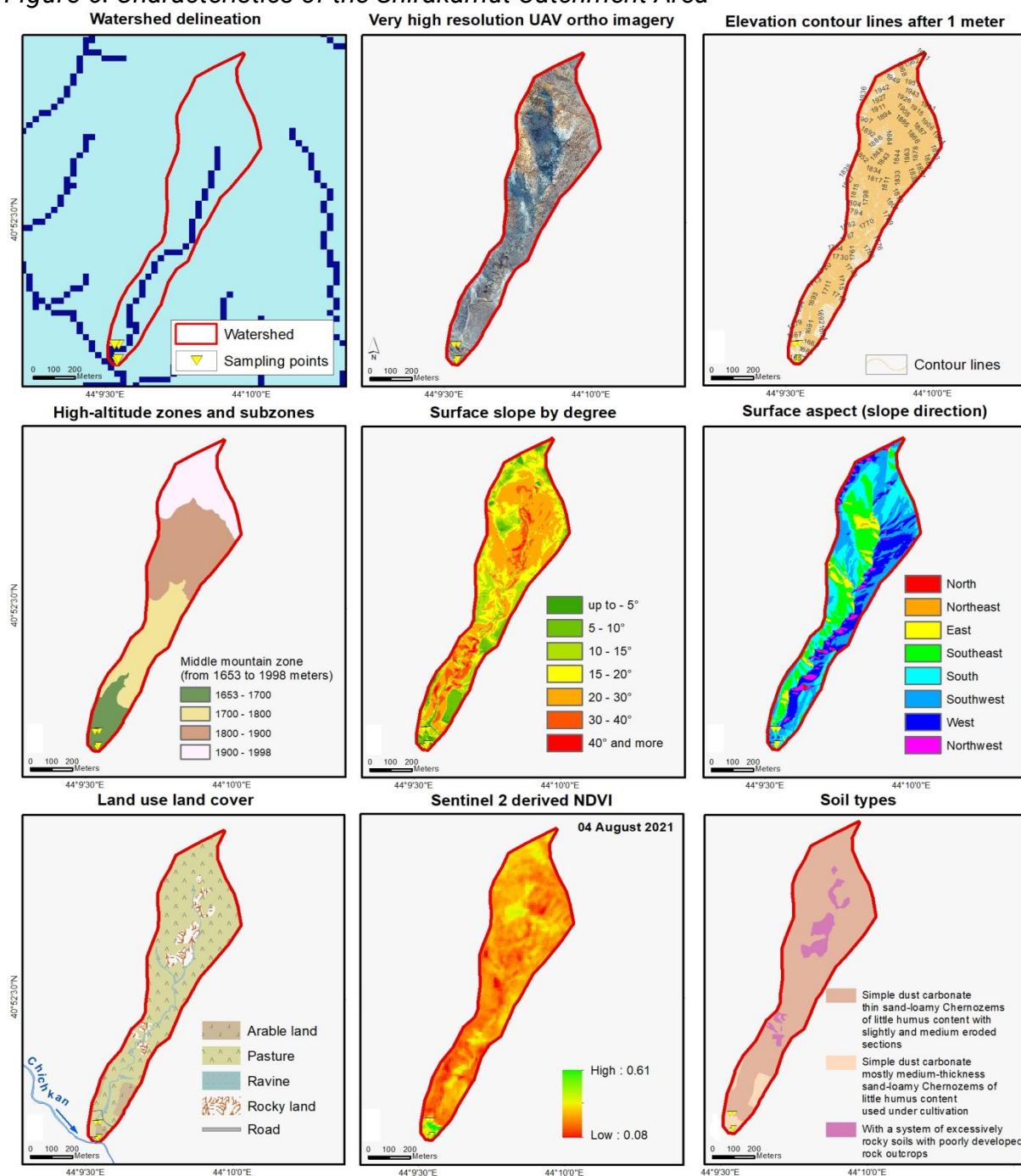
Source: Author's work

Brown forest soils are characterized by high humus content (10-14%), which decreases rapidly with depth. In eroded soils, the amount of humus in the upper horizons does not exceed 2-2.5%. The amount of humic acids and fulvic acids in humus materials is almost equal. The described soils have mainly loamy sand mechanical composition. Accumulation of clay fractions is observed in the transitional and lower horizons, physical clay often reaches 55-70%. The absorption capacity is high, Ca is the dominant among the absorbed cations. The reaction is neutral or weakly basic. These soils have good physical and hydrophysical properties, a well-defined structure. Disruption of landscapes here is 40% (Table 6).

Characteristics of Shirakamut catchment area

The basin lies at absolute altitudes of 1653 to 1998 meters. The average height of the area is almost 1826 meters, and the difference in elevations of the terrain is 345 meters (Table 4). The depth fragmentation is 0.004 m/m^2 . The area has a moderately cold mountain climate, the average annual air temperature is 4-8°C, and the average annual precipitation is 450-550 mm. Due to the regime and processes of soil formation, the type of mountain black soils with its subtypes was formed in the area (Figure 6). Disruption of landscapes here is 88.5% (Table 6).

Figure 6: Characteristics of the Shirakamut Catchment Area



Source: Author's work

Table 4: Geomorphological Characteristics of Shirakamut Site

Geomorphological characteristics		Soil type			Total
		<i>Black soils, common dust carbonate, weak humus, weak sandy loam, some places weakly and moderately eroded</i>	<i>Black soils common dust carbonate weak humus mostly medium strength sandy loam cultivated</i>	<i>Bedrock outcrops with an incompletely developed complex of highly rocky</i>	
Spreading zone of the soil (m)		1662-1998	1653-1713	1726-1937	1653-1998
Area (ha)		30.8	2.0	2.8	35.6
Surface areas of different slopes (ha)	0-5°	0.4	0.3	-	0.7
	5-10°	2.2	1.4	-	3.6
	10-15°	5.8	0.2	-	6.0
	15-20°	8.0	0.1	0.1	8.2
	20-30°	12.0	-	1.7	13.7
	30-40°	2.2	-	0.8	3.0
	40° <	0.2	-	0.2	0.4
Surface areas of different orientations (ha)	N	0.1	-	-	0.1
	NE	0.1	-	-	0.1
	NW	1.0	-	-	1.0
	S	7.1	0.8	0.6	8.5
	SE	6.0	0.1	1.1	7.2
	SW	8.6	1.0	0.7	10.3
	E	1.7	-	0.2	1.9
	W	6.2	0.1	0.2	6.5
NDVI 04.08.2021		0.083-0.479	0.170-0.612	0.114-0.299	-

Source: Author's work

Characteristics of Archis catchment area.

The basin lies at absolute altitudes of 527 to 647 meters (Table 5).

Table 5: Geomorphological Characteristics of Archis Site

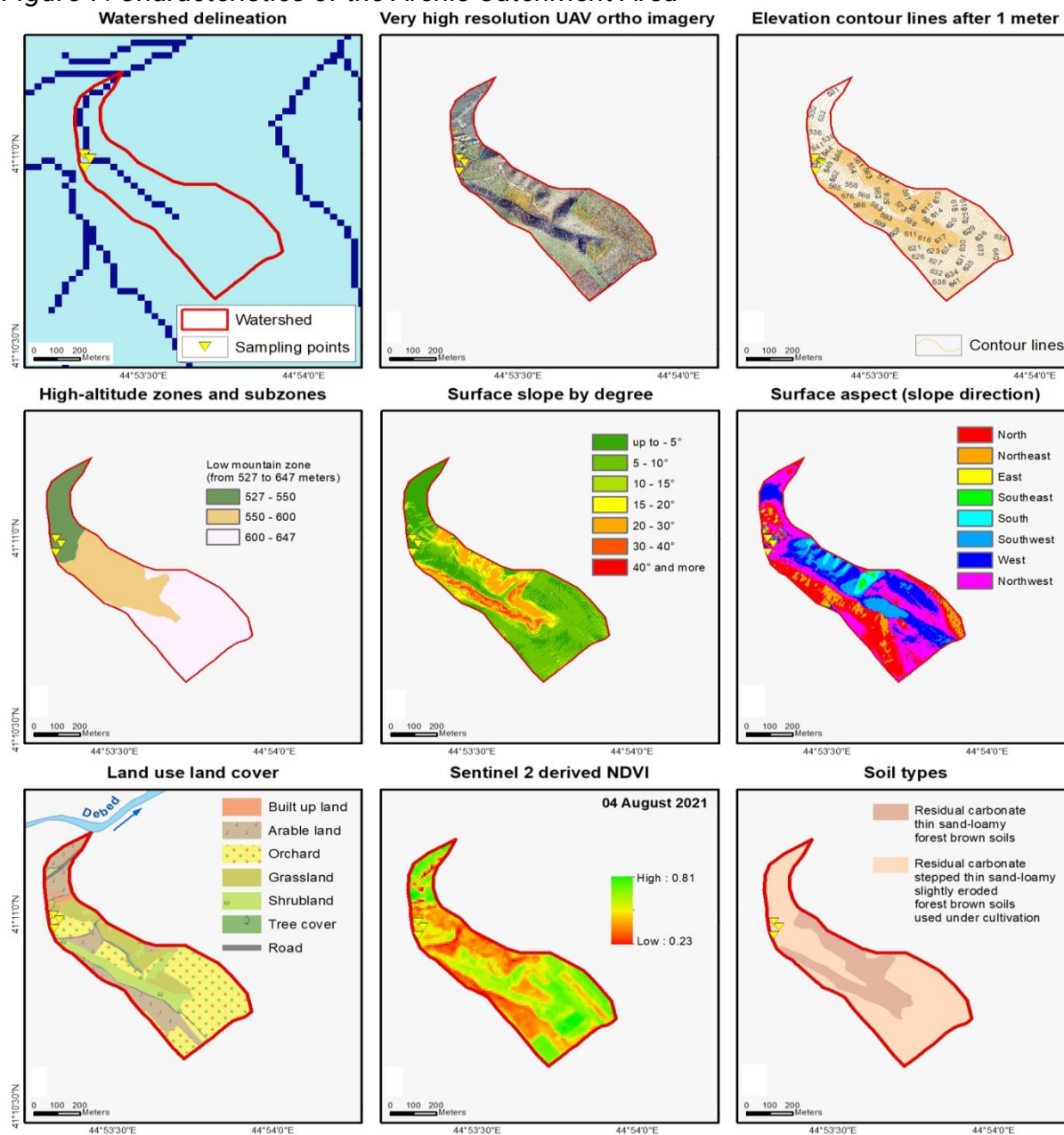
Geomorphological characteristics		Soil type		Total
		<i>Forest brown residual carbonate sandy loam with weak strength</i>	<i>Forest Brown Residual Carbonate Steppe Weak Strength Loam Weakly Eroded Cultivated</i>	
Spreading zone of the soil (m)		527-647	543-622	527-622
Area (ha)		8.8	23.1	31.9
Surface areas of different slopes (ha)	0-5°	0.1	8.0	8.1
	5-10°	0.5	12.9	13.4
	10-15°	1.0	1.6	2.6
	15-20°	1.8	0.5	2.3
	20-30°	4.2	0.1	4.3
	30-40°	1.1	-	1.1
	40° <	0.1	-	0.1
Surface areas of different orientations (ha)	N	1.9	5.8	7.7
	NE	1.0	1.3	2.3
	NW	3.4	10.1	13.5
	S	0.7	0.1	0.8

	SE	0.2	0.1	0.3
	SW	-	-	-
	E	-	0.1	0.1
	W	1.6	5.6	7.2
NDVI 04.08.2021		0.256-0.733	0.230-0.807	-

Source: Author's work

The depth fragmentation is 0.003 m/m². Due to soil formation regime and processes, forest brown soil type with its subtypes was formed in the area (Figure 7). The described soils have mainly loamy sand mechanical composition. Accumulation of clay fractions is observed in the transitional and lower horizons, physical clay often reaches 55-70%. The absorption capacity is high, Ca is the dominant among the absorbed cations. The reaction is neutral or weakly basic. These soils have good physical and hydrophysical properties, a well-defined structure. Forest brown soils were formed under moderately warm forest climates, under oak and beech forests, on porphyrites, tufabreccias, granitadiorites, limestones, sandstones, weathered materials, as well as silty loam and clay deposits. In watersheds where there is no forest and lush grass, in the presence of loose bedrock, steep slopes are exposed to the erosive activity of water currents. Disruption of landscapes here is 70.5% (Table 6).

Figure 7: Characteristics of the Archis Catchment Area



Source: Author's work

Quantitative data of modern land use of the study area (Kurtan, Marts, Shirakamut, Archis) and magnitudes of anthropogenic disturbance are presented in Table 6.

Table 6: Land Use and Anthropogenic Disturbance of the Study Areas (ha)

Land use	Kurtan	Marts	Shirakamut	Archis
Arable land	14.4	-	1.6	7.1
Grassland/Hayfield	9.4	0.14	-	4.8
Pasture	7.0	-	29.8	-
Orchard	-	0.07	-	14
Road	0.8	0.05	0.1	1.0
Disturbed land	-	0.04	-	-
Built up land	-	-	-	0.4
Shrubland	-	0.01	-	4.5
Tree cover/Forest	11.1	0.09	-	0.1
Forest glade	0.1	-	-	-
Ravine	1.3	-	1.3	-
Rocky land	-	-	2.8	-
Total	44.1	0.4	35.6	31.9
Disturbance (%)	71.7	40.0	88.5	70.5

Source: (Harutyunyan, 2023)

Discussion

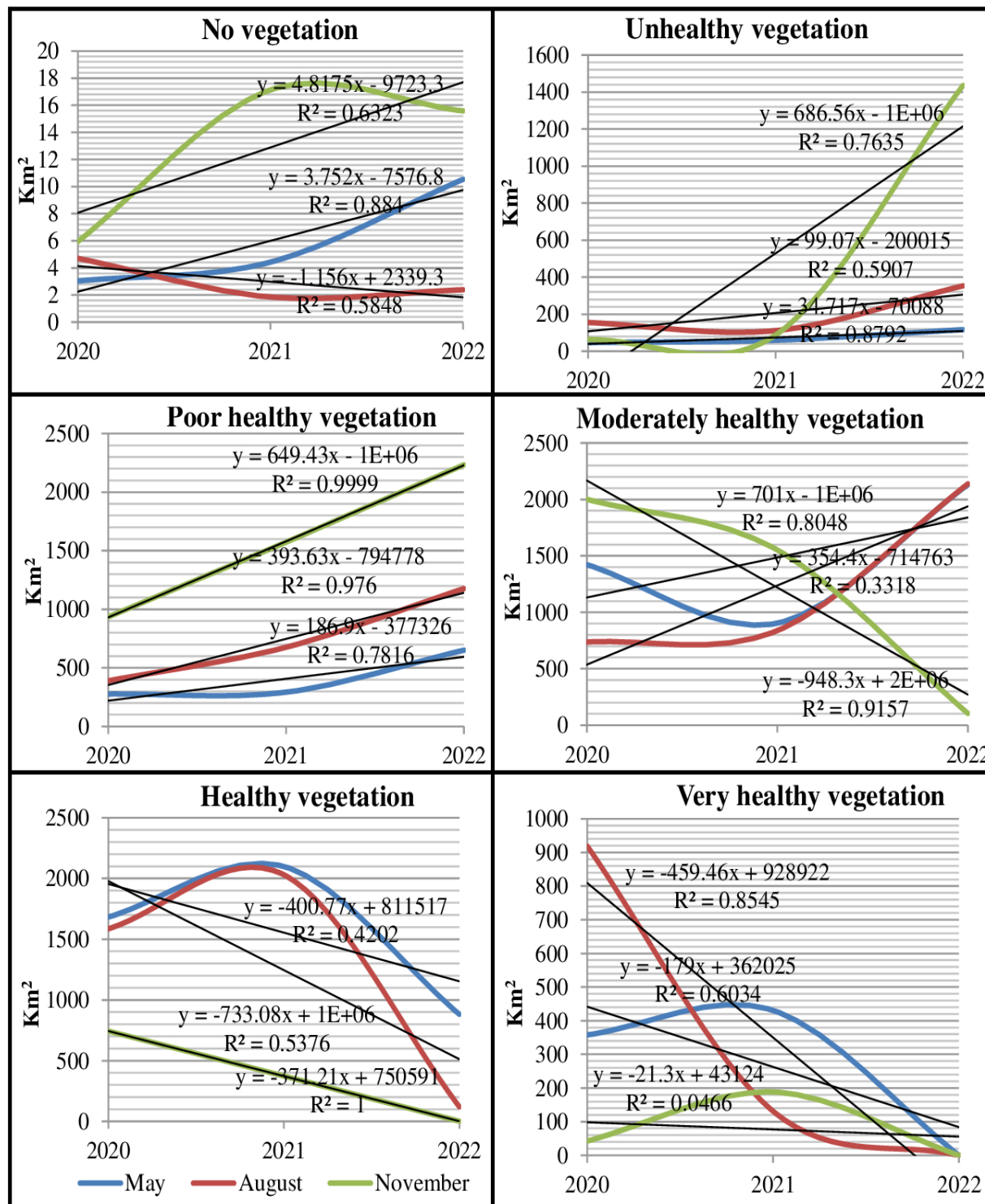
According to the seasonal assessment of the NDVI of the Debed river basin, it is found that the range of indicators lies in the following ranges: -0.460420042 to +0.999621868 in May, -0.773153 to +0.999581 in August, -1.0 to +1.0 in November, and the average of the vegetation period is -0.830188 - +0.692242 (Table 1). The selected period corresponds to different phenological stages of vegetation in the study area, as well as land use forms and features.

Analysis of NDVI values for May, August, and November 2020, 2021, and 2022 (Graph 1) shows that areas with no vegetation, unhealthy vegetation, poorly healthy vegetation, and moderately healthy vegetation are generally increasing, while areas with healthy vegetation and areas with very healthy vegetation are markedly reduced. The expansion of areas with low-value and unhealthy vegetation, as well as areas devoid of vegetation, in the Debed catchment area is of great concern.

According to the May NDVI data, the vegetation in the high mountain zone is weaker than in the middle and low mountain zones. This is explained by the stages of plant phenological development, which is subject to a well-defined upward zonation. Due to the nature of land use and types of natural landscapes, the middle and low mountain zones of the study area have mostly positive NDVI indicators, and the high mountain zone has negative NDVI indicators. Taking into account the fact that during the spring months in the studied area, abundant atmospheric precipitation is observed, it can be assumed that the upland zone, having a weak vegetation cover, is subjected to different intensity of erosion. Erosion processes are relatively weak in the middle and low mountain zones. In the spring, the erosion process also activates in arable land that is not yet covered with vegetation (Figure 3).

In August, the meadow vegetation of the high mountain zone affects the NDVI, positive indicators become dominant. A certain change is observed in the middle and low mountain zones, an increase in negative NDVI indicators is observed due to agricultural activities: grazing of pastures, harvesting of grain fields and grasslands. However, in general, the NDVI of the middle and low mountain zones is influenced by the forest landscape occupying large areas, which determines the dominance of positive NDVI indicators. During that time, although the atmospheric precipitation decreases, soil erosion trends are observed in the vegetation-free areas of steep slopes (Figure 3).

Graph 1: NDVI Values of Debed River Basin for May, August and November 2020, 2021 and 2022



Source: Author's work

In November, positive NDVI indicators decrease widely, which is explained by the end of plant vegetation, as well as the final harvest of agricultural lands occupied by various crops and plowing of arable land. During that time, atmospheric

precipitation increases and soil erosion becomes more active on barren mountain slopes (Figure 3).

Based on the NDVI data, the erosion trends and its intensity in the high mountain zone and areas of active agricultural land use become evident. It becomes more illustrative by combining the land use and NDVI data of the four smallest selected areas in the Debed River basin: Kurtan, Marts, Shirakamut and Archis. In order to have accurate results, by comparing the drone pictures, modern land use and surface slope maps of the studied areas with NDVI maps of the same period, a direct relationship between the amount of soil erosion and vegetation cover was found (Figure 4, 5, 6, 7). The obtained results show the disturbance of the studied areas (Table 6). The analysis of the data in the table shows that about 67.7% of the land area of the study areas has been changed by man, that is, natural landscapes have been transformed into cultural landscapes.

Conclusions

Thus, the NDVI indicators of vegetation in the Debed river basin in different seasons of the year express the vegetation coverage of the area, which makes it possible to evaluate the spatiotemporal manifestations of the possible development of soil erosion. It also provides insight into land use patterns, especially agricultural land use, and thereby identifies eroded areas. The specific observations made in the study areas selected in the Debed river basin prove that NDVI indicators are important indicators for the assessment of vegetation cover. It is evident from the study that during the vegetation period, the green areas decrease over the years, while the non-vegetated areas increase. Due to this phenomenon, erosion processes have been activated. The influence of the slope, orientation and soil types on land use patterns was determined by observing the details of individual specific sites, which determines the magnitude of the vegetation index and the manifestation of soil erosion. In the catchment area of the Debed River, large areas are occupied by slopes with a slope higher than 30-40°, which are mostly deprived of soil cover. Eroded bare slopes are spread mainly in the lower and middle mountain zones of the Debed river catchment. Erosion processes are intensively expressed on the mountain slopes with a southern orientation. On slopes with a northerly orientation, even under conditions of a 20° slope, the soil types have a greater capacity than soils on slopes with other orientations under conditions of a small slope. On slopes with a slope of 5° to the south, the strength of soils approaches the indicator of slopes with a slope of 20° to the north. In the catchment area of the Debed River, slightly eroded and non-eroded land areas occupy 89% of the entire area, and moderately and strongly eroded lands occupy 11%.

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WOMEN SUSTAINABLE ENTREPRENEURSHIP IN THE WESTERN BALKAN REGION: FROM SUSTAINABLE BUSINESS MODELS TO SUSTAINABLE ENTREPRENEURSHIP ECOSYSTEM

Oliana SULA

Aleksandër Mosiu University of Durrës, Albania
olianasula@uamd.edu.al

Abstract

Background: The Western Balkans (WB) region has promising opportunities for women's sustainable entrepreneurship as sustainable business models are developing as the integration of the three approaches of sustainable development (environmental, social, and economic) are being integrated into the different business models. The women entrepreneurship ecosystem in the WB region remains fragmented; there is a lack of coordination and synergies in the regional initiatives. A sustainable entrepreneurship ecosystem needs to be developed. Sustainable entrepreneurship has different individual, organizational, and contextual drivers. The development of sustainable business models is a catalyst for the elaboration of women's sustainable entrepreneurship ecosystem.

Objectives: This paper aims to investigate how sustainable business models can help to build a sustainable entrepreneurship ecosystem.

Methodology: The methodological approach of this study is qualitative. An online focus group interview was conducted with seven women sustainable entrepreneurs from WB the region from the tourism industry, fashion industry, cosmetics industry, and interior design industry to understand the interaction between sustainable business models and sustainable entrepreneurship ecosystems. Thematic analysis was used to analyze the focus group interview.

Findings: The main themes that emerged from the thematic analysis were sustainable development approaches in current business models, sustainable entrepreneurial ecosystem perception, and regional cooperation and sustainable entrepreneurship ecosystems. The main sustainable development approach integrated into women's sustainable business models is the environmental approach. The main barriers identified in terms of the sustainable entrepreneurship ecosystem are access to finance, lack of support structures, education, and the quality of stakeholder engagement. There is also a lack of shared knowledge. Regional cooperation is needed to foster women's sustainable entrepreneurship ecosystem.

Keywords: Women Sustainable Entrepreneurship, Sustainable Business Models, Regional Ecosystems

JEL classification : L26, M13, R1

Introduction

In the WB region, sustainability is among the top priorities in the EU accession process, and transnational cooperation between countries in the region remains crucial. The region's countries have made progress in meeting sustainable development goals (SDGs), but sustainability awareness in the WB region remains problematic. Women entrepreneurship in the region remains low at 25.5% in countries like Albania (Regional Cooperation Council, 2022). Green Agenda for the Western Balkans was adopted in 2022, highlighting that some progress was made in the region in developing entrepreneurial initiatives that include circular economy business models. To support green transition in the region, several initiatives are being promoted, especially in reinforcing the circular economy roadmap and reinforcement of capacity building. Women remain underrepresented in the WB region; this can be because gender stereotypes influence persisting (UNDP, 2024). Entrepreneurship is perceived rather as a masculine "job." Structural reforms, access to finance, and capacity building are needed to incentivize women's entrepreneurship in the WB region.

Green entrepreneurship and green business can serve as change makers for green transition in the region (PIPS, 2022). Women's sustainable entrepreneurship and inclusive innovation are critical for achieving (SDGs) (UNDP, 2023). Women's sustainable entrepreneurship is the solution for the challenges linked to sustainable development's environmental, social, and economic dimensions. Women entrepreneurs remain critical actors in developing entrepreneurial ecosystems in developing countries where they are perceived as an important facet for tackling economic and social failures (Fergany, 2016). Ecosystem analysis is crucial to leverage different opportunities for sustainability and sustainable transformation as sustainable development has made the competition among firms more complex, resulting in a need for transformation of business models that include the dimensions of sustainable development. Sustainable entrepreneurship goes beyond social and green entrepreneurship; it combines all the components of sustainable development holistically, aiming to converge between commercial purposes of entrepreneurship and environmental and social purposes.

This study aims to analyze women's sustainable entrepreneurship in the WB region through the interaction between sustainable development businesses and the sustainable entrepreneurship ecosystem. In the first section, literature review is presented. Research methods, results, and discussions are presented in the third section, and conclusions in the fourth section.

Literature review

Sustainable entrepreneurship refers to a perspective that combines the creation of environmental, social, and economic value creation for future generations (Muñoz & Cohen, 2018). It is possible to develop commercial, entrepreneurial ventures that can also have a social and environmental impact. This is supported by Sheperd & Patzelt

(2011), who affirm that sustainable entrepreneurship includes the three dimensions of sustainable development: the development of economic gains, non-economic gains to individuals, and non-economic gains to society. On the other hand, traditional entrepreneurship has also been considered detrimental to the environment and society (Rosário et al., 2022). Kabbara (2023) affirms that women's entrepreneurship contributes to multiple value creation. Women entrepreneurs have social awareness and innovation, leadership, and creative capabilities to identify sustainable entrepreneurship opportunities. Sustainable development's social and environmental dimensions also affect women's entrepreneurial learning (Agarwal et al., 2020). Profit generation and competitiveness remain essential for sustainable entrepreneurship without neglecting environmental and social implications. The core business models integrate Social and environmental values (Muñoz & Dimov, 2015). The lasting success of a sustainable business depends on maintaining the balance between social, environmental, and economic aspects. Entrepreneurs who engage in sustainable entrepreneurship activities are also supposed to have altruistic motivations compared to traditional entrepreneurs (Dean & McMullen, 2007). Rodríguez et al. (2022) conclude that altruistic motivations and innovation positively influence sustainable entrepreneurship. Some other drivers of sustainable entrepreneurship are individual (demography, background, personality, and motivational factors), organizational drivers (resources and capabilities), and contextual aspects (Lazarte-Aguirre, 2024). Ribeiro & Leitão (2024) consider sustainable leadership an antecedent of sustainable entrepreneurship. Moreover, the attitude toward sustainability and perceived entrepreneurial desirability influence the sustainable entrepreneurial orientations of entrepreneurs (Vuorio et al., 2018). In developing countries, sustainable entrepreneurial intention is determined by a sustainable entrepreneurship attitude (Agu, Kalu, Esi-Ubani & Agu, 2021).

Sustainable transformation and internationalization have reshaped product usage cycles and specific sustainability challenges, and they have expanded new industries and sustainable entrepreneurial business opportunities (Hockerts & Wüstenhagen, 2010). Attitudinal and behavioral factors can have an impact on the development of sustainable business models (Walker et al., 2009). Sustainable business model innovation represents new sustainable business opportunities for entrepreneurs (Ferlito & Faraci, 2022). It consists of incorporating in the current value proposition of the business models sustainable principles and goals, the extension of the concept of economic value creation to shared value creation, the consideration of non-financial factors in decision-making processes, and the promotion of a sustainability mindset compatible with different needs of the stakeholders. Geissdoerfer et al. (2018) earlier defined business model innovation as implementing new business models or transforming business models.

Women entrepreneurship in developing countries can be a catalyst for meeting SDGs (Rizvi et al., 2024). In terms of women's sustainable entrepreneurship, Manolova et al. (2020) suggest that the development of sustainable business models by women sustainable entrepreneurs can only be possible by considering economic and social structures that influence women's sustainable entrepreneurial activity. Women are supposed to make ethically oriented decisions compared to men (Hechevarria, 2016).

They try to accomplish their commercial goals by causing a beneficial social impact on their communities. In a study that aims to provide a framework on gender influences on sustainable business models in women tourism entrepreneurship in Turkey, Kutlu & Ngoasong (2023) conclude that sustainable business model archetypes are technological, social, and organizational. Gender influences decision-making in sustainable business models where either compliance, ignoring male dominance, or redoing gender. Another study from the fashion industry by Todeschini, Cortimiglia, et al. (2017) suggests that the main trends and drivers for innovation and sustainable business models are the circular economy (CE), corporate social responsibility (CRS), sharing economy, technological innovation, and consumer education. The main challenges rely on the design phase strategy, consumer education, and expectation and value alignment with the supply chain. Birsan et al. (2022) suggest that after the pandemic, developing business models that support sustainable development by women entrepreneurs in Romania was a suitable solution for crisis resilience, especially compared to pre-pandemic business models.

Audretsch&Belitski (2017) define entrepreneurial ecosystems as system-level institutional, informational, and economic contexts and a community of interdependent actors, including entrepreneurs, consumers, suppliers, the government, etc. Entrepreneurship ecosystems need collaboration, collective actions, and knowledge sharing. Volkman et al. (2019) investigate how ecosystems contribute to sustainable entrepreneurship. They argue that sustainable entrepreneurship should be investigated from an ecosystem perspective, suggesting a framework for achieving SDGs. Different elements of ecosystems promote sustainable entrepreneurship. Sustainable entrepreneurial ecosystems include an economic dimension (GDP per capita, industry, innovation, and infrastructure), a social dimension (quality of education and reduced inequalities), and an environmental dimension (environmental quality, responsible production, and responsible consumption). A recent study by Audretsch et al. (2024) provides a conceptual framework on how entrepreneurial ecosystems and sustainable development have dimensions that integrate into the respective frameworks of entrepreneurship ecosystems and sustainable development, such as entrepreneurship, geography, and inter-organizational networks. Stasiškienė et al. (2021) use the seven dimensions of innovation ecosystems 4.0 (virtual & real-life hubs, connectivity, multidimensionality, rethinking of governance, methods, and tools for collaboration, ethics, and meaning & values). It is concluded that co-creating sustainable models through engaging different regional stakeholders can contribute to creating a regional innovation ecosystem. In a study in South Korea, Joo& Shin (2018) show that customer participation in business models can create value for sustainable business ecosystems. Three strategic actions are suggested to build sustainable business ecosystems: alignment, systemization, socialization, and co-evolution. Ecosystems can more be more sustainable in terms of the sustainability orientation of actors, sustainable resources, collaborative innovation, and developing markets for sustainable products. Baiocco&Paniccia (2023) conclude that circular economy practices add value to business model innovation.

The first gap identified in the literature is that, firstly, in terms of sustainable entrepreneurship, there is not a clear connection between sustainable business

models and sustainable business model ecosystems. The few recent studies are not explicitly focused on sustainable women entrepreneurship, sustainable business models, and sustainable business ecosystems.

In terms of women's sustainable entrepreneurship in the WB region, previous studies refer to the theoretical concept of sustainable entrepreneurship. The theoretical concept that is more often used is green entrepreneurship (Balkan Green Foundation, 2022). The definition of green entrepreneurship is not clear. There are some local initiatives in sustainable business and sustainable business projects. North Macedonia is the first country in the region to perform desk research in terms of green entrepreneurship, and Serbia has more achievements compared to the other countries in the region in terms of green entrepreneurship. There are some signs of a nascent entrepreneurial ecosystem in the WB region (GIZ, 2021). There is a need for a stronger commitment to the region. The ecosystem lifecycle model (activation, globalization, attraction, and integration) is suggested for analyzing WB start-ups. In terms of women entrepreneurship, women entrepreneurs remain underrepresented in the WB region compared to their male counterparts (Regional Cooperation Council, 2022). There is a lack of targeted policies on women's entrepreneurship. Access to finance remains challenging, and sectoral analysis is needed, especially in the agricultural sector. Entrepreneurship education is oriented primarily towards formal education, and supporting structures and stakeholder engagement remain fragmented. There is a lack of studies focused on women's sustainable entrepreneurship, sustainable business models, and sustainable entrepreneurship ecosystems in the WB region.

This paper explores how sustainable business models can foster sustainable entrepreneurship ecosystems for women sustainable entrepreneurs in the WB region.

Research Methods

This study employs a qualitative research approach from the previously identified gaps in the literature and the lack of studies on women's sustainable entrepreneurship and sustainable business models in the WB region. A qualitative research approach is suitable when it explores the meaning or understanding of research phenomena (Creswell, 2014).

Data collection

The instrument used for data collection is a focus group interview. Focus group interviews are group interviews based on the interaction between the group participants and the researcher. Focus groups allow data to be collected simultaneously from different participants, and group interaction is used as part of the method (Kitzinger, 1995). Focus groups can offer insights into participants' experiences, perceptions, and beliefs. Gill & Baillie (2018) empathize that the evolution of digital technology has transformed qualitative data collection. Traditionally, focus groups and semi-structured interviews have been conducted face-to-face, but video,

online forums, online platforms, and forums can be used for qualitative data collection. In this study, the technique used for data collection was an online focus group conducted through the online platform Microsoft Teams. The online platform Microsoft Teams was an easier way to gather participants in the online focus group because they were living and working in different countries of the WB region. The online platform Microsoft Teams also has a recording feature that is essential for qualitative data collection. The researcher moderated the online focus group, and the language of the focus group was English. It was recorded and transcribed. The semi-structured question grid of the focus group contained questions regarding sustainable aspects of their business models and what challenges they encountered in the current ecosystem in the region as well as their perception of how these sustainable business models can contribute to the development of sustainable entrepreneurship ecosystem for women entrepreneurs in the area.

Sampling

The optimal number of participants in the focus group depends on the topic, the data's depth, and the participants' willingness to participate. The optimum size of a focus group varies from four to twelve participants (Morgan, 1997). The sampling technique used is purposive. Punch (2004) suggests that the strategy for participant selection should include ontological, epistemological, and axiological perspectives. The purposive sampling technique of a focus group is not casual or random because it wants to ensure that the participants included will respond to the characteristics of the participants needed in the sample. The participants of the online focus group of this study are seven women entrepreneurs from the WB region. As the sampling technique is purposive, it was made sure that the participants represent different countries of the WB region from different industries and different areas of residence. The sectorial and residential aspects are crucial for sustainable entrepreneurship because some sectors of economic activity such as cosmetics, design, tourism, or healthcare, have been developing sustainable business practices in the region. In terms of tourism or agriculture, sustainable entrepreneurship is emerging, especially in the rural areas of the WB region. The participants of the online focus group were three women entrepreneurs from Albania, two from Kosovo, one from North Macedonia, and one from Serbia. Three women entrepreneurs were from the cosmetics industry, one from the tourism industry, two from the fashion industry, and one from the interior design industry. Five women entrepreneurs operated in the urban areas and two in the rural areas of their respective countries.

Data analysis

Data were analyzed manually through thematic analysis. Thematic analysis is used to interpret themes on a dataset and find different patterns of interpretation. It includes several steps, such as coding, theming, and interpretation (Thomas, 2006). After transcription, data was coded manually after transcription, and codes were grouped into themes.

Results and Discussions

After coding the qualitative data, three themes emerged from the thematic analysis following themes emerged from thematic analysis:

Theme 1: Sustainable development approaches in current business models

For women entrepreneurs in the tourism sector, the environmental approach is integrated through using sustainable energy sources through photovoltaic panels as well as using local products, which has both an environmental impact and a social impact and economic impact. Social impact is also reflected in community devotement and local stakeholder engagement. In the fashion and interior design sectors, sustainable business models are oriented more towards circular business models through the application of the concept of 4R. In the cosmetics industry, the environmental approach remains the most important regarding the social and economic approach of sustainable entrepreneurship; interviewees have different perceptions as they consider that this impact depends on the support they receive from the entrepreneurial ecosystem. A women entrepreneur estimates that starting with the willingness to have an environmental impact is already a good start, especially in the WB region. The main identified challenges in integrating sustainable development approaches in the current business were customer education and customer engagement. Customers in the region lack awareness of sustainable products. Businesses offering sustainable productions are considered niche markets, especially in the fashion industry, such as the cosmetics industry. Generally, customers of sustainable products in the fashion and cosmetics industries are women who are usually aware of the importance of sustainability in their customer choices. Interviewees perceive that in their industries, customers still tend to prefer traditional products due to the lack of customer sustainable awareness and education on sustainable consumption. An important tool was suggested to develop business models: the sustainable business canvas model that integrates to the traditional business canvas model sustainability approach.

Theme 2: The sustainable entrepreneurial ecosystem perception

Elements of sustainable ecosystems perceived to promote sustainable entrepreneurship were quality of education, support structures, access to finance, and the quality of stakeholder engagement. Regarding access to finance, there is no dedicated financing to sustainable women entrepreneurship or sustainable initiatives led by women. Stakeholder engagement remains low, as, in general, stakeholder engagement with sustainability in the region is still poor. The main challenge for women entrepreneurs was that there are several fragmented sustainable entrepreneurship initiatives in the region, especially those led by women entrepreneurs who, in the WB region, tend to be more sensitive to sustainability than their male counterparts. This is due also to the lack of support structures. Another main issue related to the ecosystem perception identified by the interviewees is the lack of

collaboration, synergies, and networking between different sustainable initiatives led by women entrepreneurs in the WB region. There is also a lack of shared knowledge. Through their business models, women entrepreneurs should raise awareness among consumers and stakeholders, but on the other hand, customers and stakeholders can also be integrated into sustainable business models.

Theme 3: Regional cooperation and sustainable entrepreneurship ecosystems

Women entrepreneurs suggested that a sustainable entrepreneurship ecosystem has to take a regional perspective, as there is regional collaboration and a regional market in different sectors. The regional perspective perception is still confusing to different stakeholders. Sustainable entrepreneurship perception is still a confusing and ill-defined concept in the WB region. Building a regional ecosystem could also be beneficial for social and cultural barriers to women's entrepreneurship. Regional cooperation remains fragmented, and there are no coordinated initiatives in terms of women entrepreneurship and women sustainable entrepreneurship. This is due to the lack of women's entrepreneurial culture in the region, as the majority of participants empathized. Entrepreneurship in the region remains necessity-driven rather than opportunity-driven.

Conclusion

This study was focused on bridging sustainable business models and sustainable entrepreneurship ecosystems in the WB region, especially for women sustainable entrepreneurs. The results show that sustainable business models in tourism, cosmetics, fashion design, and interior design are especially integrated with sustainable development's environmental and social approaches. Further integration of the sustainability concept in current business canvas models is needed. Regarding the ecosystem perspective, the main barriers women sustainable entrepreneurs face in the WB region are the lack of finance, support structures, regional networking, and stakeholder engagement, especially among consumers. Regional cooperation remains fragmented even if it is considered a mechanism of support for women's sustainable entrepreneurship in the region. Women's sustainable entrepreneurship business models can contribute to sustainable ecosystem development, but there is still a need to overcome existing cultural and societal barriers to women's entrepreneurship. Future research can be focused on investigating other components of sustainable business models and sustainable entrepreneurship ecosystems in women sustainable entrepreneurship perception and behavior, especially focusing on internal factors of women's sustainable entrepreneurship intention such as self-efficacy, motivation, etc. Further empirical contributions in the field are needed through quantitative studies after the operationalization of variables.

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OFFICE WORK AUTOMATION IN POLISH ENTERPRISES. CHALLENGES, BENEFITS AND LIMITATIONS – A REVIEW OF RESEARCH RESULTS

Marzena REMLEIN

*Poznań University of Economics and Business, Institute of Accounting and Financial
Management, Department of Accounting and Financial Audit, Poland
marzena.remlein@ue.poznan.pl*

Dariusz NOWAK

*Poznań University of Economics and Business, Institute of Management,
Department of Corporate Resource Management, Poland
dariusz.nowak@ue.poznan.pl*

Abstract

Background: *The application of automation in office work brings measurable benefits, but it is also associated with a number of problems, costs, and challenges. The implementation of advanced technologies requires significant financial investment, may lead to unforeseen complications, and necessitates ongoing updates and maintenance of the deployed systems. Additionally, automation can introduce risks related to cybersecurity.*

Objectives: *The purpose of the study was to identify the benefits and limitations of implementing office work automation in Polish enterprises.*

Methodology: *The study was conducted in the first quarter of 2024 in the form of a survey on a sample of 109 Polish enterprises. The research problem was the benefits and limitations of office work automation in Polish enterprises. Within each research problem, a number of variables were identified, which were assessed on a 5-point Likert scale. The obtained results were transformed into a numerical form that enabled statistical analysis. First, basic parameters were calculated, and then a factor analysis procedure was used to reduce the many variables describing the given problem to a few most significant ones, within which the original information was accumulated.*

Findings: *The research results confirmed that the automation of office processes in enterprises brings numerous benefits, but it is also associated with challenges and certain limitations. Key benefits of automation include increased transparency of processes, reduction of error risk, and an overall increase in the efficiency of enterprises. On the other hand, negative aspects of the automation process include the limitation of interpersonal relationships and a weakening of employee initiative.*

Keywords: Office Work Automation, Automation Benefits, Limitations of Automatization, Polish Enterprises

JEL classification: M11, M40, M41, M54

Introduction

One of the most characteristic trends in the modern economy is the rapid development of automation. Automation is applied in almost all areas of business activity, from office work and customer relationship management to production and logistics processes. In the area of office work, automation allows for a significant reduction in the time needed to complete routine tasks, thereby increasing operational efficiency. In managing relationships with clients and suppliers, it enables better tracking of interactions and more personalized service. In production and logistics, process automation contributes to increased efficiency, minimizes errors, and optimizes costs. Technological innovations, such as robotics, artificial intelligence, and ERP systems, are becoming indispensable elements of modern enterprises striving to maintain competitiveness in the global market. Moreover, automation also supports sustainable development by enabling more efficient resource management and reducing the carbon footprint. All of this makes automation not only shape the current economic reality but also set the direction for its future development.

However, it is important to emphasize that automation, while bringing tangible benefits, also comes with a range of problems, costs, and challenges. The implementation of advanced technologies requires significant financial investment, both in purchasing equipment and software and in training employees who will operate the new systems. Moreover, it can lead to unforeseen complications, such as resistance from employees who fear job losses or difficulties in integrating new technologies with existing business processes. A key challenge is also the need for constant updating and maintenance of the implemented systems, which generates additional costs and requires appropriate technical resources. Additionally, automation can introduce risks related to cybersecurity, as a greater number of automated processes increases potential vulnerabilities in a company's IT systems.

The aforementioned problems have been the focus of research on the impact of automation on office work: transformations, challenges, and opportunities in the era of digital change. This study presents an overview of the results of two complementary studies that included an analysis of both the benefits and costs of office work automation in Polish enterprises. To provide a more comprehensive perspective, the analysis was enriched with the results of a qualitative study, in which respondents had the opportunity to express their opinions freely, allowing for the capture of individual approaches of entrepreneurs to the ongoing changes.

Theoretical Aspects of the Development of Work Automation

Office work automation is the process of replacing manually performed tasks with computer systems and software robots capable of automating repetitive, routine tasks (McKay, 2023; Choi, R'bigui, and Cho, 2021). This applies to both simple, repetitive tasks and more advanced problems that require the use of artificial intelligence and machine learning. It encompasses activities such as filling out forms, data processing, copying and pasting, as well as more complex operations like database management

or handling electronic correspondence (Siderska, 2020). Office work automation is part of the broader context of business process automation, which aims to increase a company's operational efficiency by utilizing modern technologies. As noted by Nesterak and Gąsiorek (2020), the main goal of automation is to reduce human labour in repetitive tasks, allowing for better use of human resources for more creative and intellectually demanding activities.

Automation is applied in many areas of life, from industry and services to trade and distribution. It is primarily used in departments such as accounting, human resources management, logistics, customer service, document management, financial planning, and treasury management (Gotthardt et al., 2019). In industry, it is mainly used to optimize production processes, where automated production lines can operate continuously, increasing the efficiency and precision of tasks performed (van der Aalst, Bichler, Heinzl, 2018). In logistics, automation influences the optimization of the supply chain, where warehouse management systems can monitor inventory levels and control the flow of goods (Kaya et al., 2019; Chopra, 2018). In the financial sector, it includes automated bookkeeping, automation of tax-related processes, and the automatic generation of financial reports. Modern automation tools also include Robotic Process Automation (RPA) solutions, which automate repetitive office tasks such as invoice processing and data entry (Fersht, Slaby, 2012). In the service industry, it covers processes such as customer service, order processing, and financial management (Willcocks, Lacity, Craig, 2016).

Office work automation brings numerous benefits to enterprises, which can be categorized into several key areas. Firstly, automation enables faster and more accurate execution of repetitive tasks, which increases office work productivity (van der Aalst, Bichler, Heinzl, 2018). Employees who previously handled routine tasks can focus on more complex and valuable activities, enhancing their job satisfaction and the organization's efficiency. Automated processes also allow for shorter project completion times and improved quality of tasks performed. Office process automation leads to a reduction in operational costs by decreasing the need to hire employees for simple, repetitive tasks (Fernandez, Aman, 2018). Additionally, it facilitates better data management. Automated systems can collect, process, and analyze large amounts of data in real-time, aiding decision-making and process optimization. The use of automated solutions in accounting, on the other hand, helps reduce errors in settlements and the generation of financial reports (Remlein et al., 2022).

Automation also enables easy scaling of operations without the need for a significant increase in the number of employees (Dubey, Singh, Singh, 2023). Companies can quickly adapt to increased demand, such as during peak periods (e.g., holidays or seasonal promotions). Another significant benefit of automation is its impact on the quality of customer service. By implementing automation, companies can provide faster and more personalized customer service, which enhances customer satisfaction and loyalty (Geyer-Klingenberg et al., 2018).

Despite numerous benefits, office work automation also presents certain challenges and risks that can affect an organization's functioning. One of the most apparent issues is the potential reduction in jobs. Replacing humans with machines, especially

in areas where processes are simple and repetitive, can lead to job cuts, raising social concerns and potentially contributing to increased social inequality (Talvar, 2020; Frey and Osborne, 2017). Moreover, a significant limitation is employee resistance to the implemented changes. Fears of job loss, a lack of trust in new technologies, and habits formed around traditional working methods can lead to resistance against adopting modern solutions (Frank, Chrysochou, Mitkidis, 2021). Additionally, this process requires significant financial investment, both for purchasing the technology and for its maintenance and development (Moderno, Nascimento, Gomes, 2021). Furthermore, funds are needed for employee training, which can be a barrier for smaller enterprises.

The implementation of automated systems often also requires modernization of existing IT infrastructure, which further increases ongoing operational costs. It is noted that automated systems are usually designed to perform specific tasks, which limits their flexibility in dynamically changing business conditions. In the event of a system failure or software issues, there may be significant disruptions to the company's operations, which over time can affect its operational stability. Additionally, automation is associated with data security risks. Automated systems that collect and process data can be targets for cyberattacks, potentially leading to the loss of confidential information (Chu, 2023; McKinsey Global Institute, 2018). A key direction in the development of automation is the increasing use of robotics, especially in industry and logistics. Modern robots are capable of performing increasingly complex tasks, allowing for the automation of processes that were previously reserved for humans (Zieliński, 2022). In logistics, automation covers areas such as warehouse management, where robots can automatically sort, package, and transport goods.

The development of automation also focuses on enhancing the integration of various systems and platforms. Business process automation requires collaboration between different tools and IT systems, leading to the development of new technologies that enable seamless integration and data exchange between systems (Hermaniuk, 2021).

In summary, automation is a key element of digital transformation that offers many benefits, such as increased efficiency, cost reduction, and error minimization. However, the implementation of automation also comes with challenges, such as the risk of job loss and the need for initial investments. Despite these challenges, the development of automation focuses on enhancing the flexibility and intelligence of automated systems and integrating various tools and systems.

Research Methodology and Sample Characteristics

The study focused on the impact of automation on office work: transformations, challenges, and opportunities in the digital era. It covered all key areas of business operations, including accounting, human resources, supply chain management, customer service, inventory logistics, human resource management, planning, and financial aspects. The research was conducted in the first quarter of 2024, using a survey distributed to a sample of 109 enterprises via Google Forms.

The survey consisted of several parts, including a metric that allowed for a detailed characterization of the study sample, a part in which entrepreneurs had the opportunity to freely speak about automation, as well as specific issues, each of which constituted a separate research problem. In particular, it concerned: the costs of automation, benefits, drawbacks, causes, directions of development, etc. A range of variables related to these issues was identified and assessed using a 5-point Likert scale. The results were digitized for statistical analysis. Basic parameters such as mean, median, mode, variance, standard deviation, and quartiles were calculated. Subsequently, factor analysis was applied to reduce the numerous variables describing each issue to a few key factors, consolidating the primary information.

This report presents the results of the study, which involved 109 companies characterized in various aspects, including size, legal form, market presence, domain of activity, and fundamental strategy. A detailed characterization is provided in Table 1.

Table 1: Characteristics of the Research Sample

No.	Description	Number of references N=109	Percentage share
Size of the enterprise			
1.	Large	25	22,9
2.	Medium-sized	36	33,0
3.	Small	48	44,0
Year of establishment			
1.	Up to 1990	23	21,1
2.	1991-2000	31	28,4
3.	2001-2010	19	17,4
4.	after 2010	36	33,0
Core activity			
1.	Production	26	23,9
2.	Industry supply	21	19,3
3.	Production services	58	53,2
4.	Other (administration, science, finance)	4	3,6
Legal form			
1.	Sole proprietorship	17	15,6
2.	Limited liability company	75	68,8
3.	General partnership	1	0,9
4.	Joint-stock company	4	3,7
5.	Civil partnership	2	1,8
6.	Limited partnership	7	6,4
7.	Other	3	2,8
Dominant type of market served			
1.	Local market	11	10,1
2.	Regional market	14	12,8
3.	National market	39	35,8
4.	International market	32	29,4
5.	Global market	13	11,9
Dominant type of applied base strategy			
1.	Quality strategy (differentiation)	24	22,0
2.	Pricing strategy (cost leadership)	6	5,5
3.	Differentiated strategy – depending on the served regions, enterprises	21	19,3

No.	Description	Number of references N=109	Percentage share
4.	Niche strategy	5	4,6
5.	Mixed strategy (average quality for average price)	32	29,4
6.	Lack of a clear strategy	20	18,3
7.	Follower strategy	1	0,9

Source: Own elaboration

Benefits and Costs of Automation in Empirical Research

The first study aimed to identify and systematize the benefits of office process automation. Initially, based on a literature review, personal reflections, and consultations with entrepreneurs, a range of variables were identified and subsequently assessed on an interval scale. The results confirmed earlier assumptions that entrepreneurs highly value automation as an effective tool for improving company operations. The main benefits that companies see in automation include a reduction in administrative work, more efficient use of working time, better document management, and time savings for both employees and customers. These aspects were rated the highest by respondents, indicating their key importance for the operational activities of the enterprise.

Table 2: Ranking of Automation Benefits in the Enterprise

No.	Factors (Automation Benefits)	Basic parameters			Percentage of indications				
		N	Me	M	1	2	3	4	5
1	Reduction of office work	4,34	5	5	0,0	4,6	14,7	22,9	57,8
2	More efficient use of working time	4,14	4	5	0,0	7,3	13,8	36,7	42,2
3	Better document management	4,11	4	5	2,8	2,8	15,6	38,5	40,4
4	Time savings for employees and customers	4,07	4	5	2,8	3,7	17,4	35,8	40,4
5	Increase in enterprise productivity	4,03	4	4	1,8	3,7	17,4	44,0	33,0
6	Increase in process transparency	3,63	4	4	2,8	9,2	30,3	39,4	18,3
7	Increase in data security	3,6	4	4	3,7	15,6	22,9	33,0	24,8
8	Support for decision-making	3,58	4	4	2,8	11,9	27,5	41,3	16,5
9	Reduction of operational costs	3,46	3	3	0,9	13,8	36,7	35,8	12,8
10	Sustainable development	3,35	3	3	5,5	11,0	44,0	22,9	16,5

N – significance coefficient, Me – median, M – mode, 1 – no significance, 2 – little significance, 3 – moderate significance, 4 – high significance, 5 – very high significance, o – overall.

Source: Own elaboration

When analyzing the results, it is important to highlight that automation significantly reduces manual work, which in office tasks is often repetitive and time-consuming. As a result, employees can focus on more valuable tasks, leading to increased work efficiency. Improved time management and better document handling, which were also highly rated by entrepreneurs, enable the company to operate more smoothly, minimizing the risk of errors and ensuring better organization of processes.

Not all variables related to automation were rated equally high. Factors such as sustainability, reduction of operational costs, and support in decision-making

processes, despite their importance, did not rank highly in the hierarchy of benefits. However, it should be noted that the variation in the assessment of these variables may stem from the subjective interpretation of respondents, suggesting the need for further, more advanced analyses to precisely determine the actual benefits of automation.

As previously noted, to simplify and synthesize the research results, a factor analysis procedure was applied, which allowed for the reduction of the original variables into a group of key factors that have the greatest impact on realizing the benefits of automation. Following this procedure, a correlation matrix was constructed, where a high and moderate degree of interdependence between various variables was observed. For example, the increase in employee efficiency shows a strong correlation with the overall rise in company productivity, improvement in work quality, and greater process transparency. The high degree of correlation suggests that automation affects various areas of business operations in a complex and mutually reinforcing manner, highlighting its versatile nature and multidimensional impact.

As a result of the analysis, seven key benefits of automation were identified, explaining over 66% of the total variance of the examined variables, as presented in Table 3. The most significant of these factors turned out to be the increase in process transparency within the organization. This transparency encompasses elements such as operational clarity, streamlined information flow, effective reporting, and activity monitoring. Enhanced transparency not only facilitates the identification of areas needing improvement but also enables a swift response to emerging issues, while simultaneously strengthening trust among employees and stakeholders. Consequently, decision-making within the organization becomes more transparent and rational, minimizing the risk of errors and contributing to increased operational efficiency.

Table 3: Most Significant Benefits of Work Automation

Benefits		% variance	cumulative %	Own value	Cumulative own value
B1	Increase in process transparency	32,48	32,48	7,79	7,79
B2	Minimization of the risk of errors	7,67	40,15	1,84	9,63
B3	Increase in enterprise productivity	6,42	46,58	1,54	11,17
B4	Improvement in job satisfaction	5,7	52,28	1,36	12,54
B5	Reduction of operational costs	5,24	57,56	1,25	13,8
B6	Reduction of human error risk	4,46	61,99	1,07	14,87
B7	Improvement in internal communication	4,26	66,26	1,02	15,9

Source: Own elaboration.

Another important factor related to automation is the minimization of error risk. Automation processes effectively eliminate a large portion of manual tasks that are prone to errors resulting from human inattention, fatigue, or lack of focus. By standardizing tasks, automation ensures consistent quality in process execution, regardless of employees' skill levels and experience. Additionally, automated data

management systems guarantee consistency, security, and easy access to information, which is a key element in reducing the risk of decision-making and operational errors.

The third significant benefit is the increase in company productivity. Automation promotes more efficient management of resources and working time, which leads to the optimization of operational processes. In particular, the automation of accounting and financial processes allows for faster and more efficient data processing, eliminating errors and shortening task completion time. This, in turn, enables employees to focus on more creative and strategic aspects of their work, further enhancing the value of their contributions.

Automation also has a positive impact on job satisfaction. Delegating monotonous and repetitive tasks to automated systems reduces pressure on employees, lowers the risk of burnout, and increases their engagement and motivation. As a result, employees can focus on more creative and developmental tasks, which directly translates into a higher level of job satisfaction and an improvement in organizational culture.

The next three identified benefits, though of lesser significance, also play an important role in reaping the advantages of automation. One of them is the reduction of operational costs, where automation allows for a significant decrease in expenses related to manual labor and process management. The implementation of modern technologies not only increases productivity but also enhances the efficiency of human capital, enabling a quick response to changing market conditions without incurring additional costs.

Another benefit is the improvement of internal communication, which promotes the efficient flow of information between employees and departments, a key factor for coordinating actions and avoiding misunderstandings. Automated communication systems allow for task assignment, progress monitoring, and quick responses to changes, further streamlining operational processes.

In conclusion, process automation brings a number of significant benefits, such as increased process transparency, minimization of error risk, increased productivity, and improved job satisfaction. Although it comes with certain challenges, such as the need to manage change and integrate new technologies, automation is a key tool that supports the development and efficiency of businesses. Its implementation enables companies to better manage resources, complete tasks more quickly, and create a more supportive work environment, ultimately leading to improved operational and strategic outcomes.

A complementary study to the benefits of automation was the analysis of the limitations related to the implementation of modern solutions that facilitate work. Similarly to the previous case, variables (22) were first identified, which respondents evaluated on an interval scale, and then their basic parameters were calculated, allowing for the quantification and systematization of the importance of costs

associated with implementing automation in enterprises, taking into account their varying degrees of impact. The ranking of selected variables is presented in Table 4.

Table 4: Ranking of Process Automation Limitations in the Enterprise

No.	Factors (Automation Limitations)	Basic parameters			Percentage of indications				
		N	Me	M	1	2	3	4	5
1	Integration of automation with existing systems	3.76	4	4	1,8	11,9	21,1	38,5	26,6
2	High implementation costs	3.72	4	4	0,9	7,3	28,4	44,9	17,4
3	Excessive dependence on automation	3.49	4	4	4,5	21,1	18,3	33,0	22,9
4	Repetition of errors	3.44	3	4	2,8	19,3	28,4	30,3	19,2
5	Cyberattacks	3.42	4	4	6,4	12,8	30,3	33,0	17,4
6	Rapid obsolescence of tools	2.91	3	3	7,3	31,1	32,1	22,0	7,3
7	Difficulties in change management	2.9	3	3	9,1	26,6	38,5	16,5	9,1
8	Decrease in job satisfaction	2.88	3	2	13,8	28,4	25,7	19,3	11,9
9	Ethical and social concerns	2.37	2	2	26,6	33,9	22,9	9,1	7,3
10	Negative impact on company culture	2.29	2	2	26,6	34,9	25,7	0,8	4,6

N – significance coefficient, **Me** – median, **M** – mode, **1** – no significance, **2** – little significance, **3** – moderate significance, **4** – high significance, **5** – very high significance, **o** – overall.

Source: Own elaboration.

The study revealed that a key aspect is the compatibility of new systems with existing IT infrastructures, which represents one of the main challenges associated with automation. Companies often use various systems that are not designed to work with modern technologies, leading to the need for updates or modifications. For example, data migration between systems can be time-consuming and risky, requiring additional resources to integrate new solutions with already functioning platforms.

The second significant challenge identified is the high cost of implementing automation. Expensive hardware and software require additional specialized knowledge during installation, which increases the overall expenses associated with implementation. Additionally, companies must invest in employee training to ensure they can effectively use the new tools, as well as in system maintenance, which needs to be regularly updated and monitored to ensure proper functioning. The high implementation costs can pose a significant barrier, especially for small and medium-sized enterprises with limited financial resources.

Another significant factor identified in the study is the concern about excessive dependence on technology. The high ranking of this variable reflects entrepreneurs' worry that automation may lead to over-reliance on technological systems, which, in the long term, could limit employee initiative and creativity. Such dependence may also cause stagnation in a company's technological development and increase reliance on software providers. Additionally, it may raise concerns about losing control over internal processes, negatively impacting the company's operational security and stability.

An interesting conclusion from the study is the low assessment of factors such as the negative impact of automation on organizational culture, ethical and social issues, and job satisfaction, which were rated relatively low by respondents. These results suggest that entrepreneurs perceive these aspects as less significant challenges related to the implementation of automation, which may stem from several reasons. Primarily, entrepreneurs view automation mainly as a tool for supporting efficiency and process optimization, which explains the low rating of its potential negative impact on organizational culture, ethical and social concerns, and job satisfaction. In the operational context, these factors seem less relevant; however, in the long term, their importance may grow, especially if automation begins to directly affect interpersonal relationships and work structure.

It is worth noting that the differences in the ratings of individual variables were relatively small, making it difficult to clearly interpret the results and identify factors that genuinely represent significant barriers to office work automation.

To more accurately determine the key factors related to the costs of automation, factor analysis was applied, as in the previous case. This method allowed for the reduction of the original variables and the identification of major groups of issues. The correlation matrix analysis also revealed that many variables are strongly correlated. For example, high automation implementation costs are correlated with system compatibility issues, high maintenance costs, and application upkeep. Similarly, problems with integrating automation into existing systems are correlated with security risks and dependency on software providers. The results of further analysis indicate the existence of several key factors that together explain over 66% of the total variance, as presented in Table 5.

Table 5: Key Limitations of Work Automation

Limitations		% variance	Cumulative %	Own value	Cumulative own value
L1	Limitation of interpersonal relationships	28,6	28,6	6,17	6,17
L2	Limitation of creativity	8,79	36,85	1,93	8,1
L3	High implementation costs	7,91	44,77	1,74	9,85
L4	Negative impact on company culture	6,28	51,05	1,38	11,23
L5	Security threats	5,69	56,74	1,25	12,48
L6	Need for continuous monitoring	4,96	61,71	1,09	13,57
L7	Ethical and social concerns	4,60	66,31	1,01	14,58

Source: Own elaboration.

The reduction of interpersonal relationships is one of the most significant challenges associated with the automation of office work processes. The decrease in interactions between employees and between the company and its clients results from replacing traditional communication processes with automated systems. Many activities that previously required direct collaboration or communication are now automated, leading to a reduction in human interactions. An example of this is automated management

systems, such as task planning platforms or automated customer service systems, which minimize the need for contact between employees and clients. Consequently, these relationships become more formal, limited to structured interactions, reducing personal contact and affecting the quality of collaboration.

The second key factor is the limitation of employee creativity and intuition. Automation simplifies tasks, which can make work monotonous and devoid of challenges. Additionally, it reduces the need for employees to engage in more complex tasks, which can ultimately limit their intellectual growth and creative potential. Employees who are forced to perform repetitive tasks often lack the space to generate new ideas or initiatives. This, in turn, affects the company's innovation, which largely relies on the creativity and ability of employees to introduce new ideas. The absence of stimuli for development, intellectual challenges, or opportunities to experiment leads to burnout, manifested by reduced motivation, decreased engagement, and increasing levels of absenteeism and employee turnover.

Another challenge is the costs associated with implementing automation, which requires technologically advanced equipment, leading to significant upfront purchases, along with ongoing maintenance and system updates. These costs are further increased by the need to hire specialists to manage the new systems and train employees who must learn to use the new tools. Automation may also lead to the restructuring of business processes, resulting in additional costs related to adapting the company to new requirements. Moreover, there may be alternative costs, such as the potential risks of employee burnout or the loss of creativity, which could lead to unforeseen expenses. It's also important to consider the costs related to downtime caused by technical issues or errors during the integration of new systems with the company's existing infrastructure.

The fourth factor, which causes smaller but significant problems, is the negative impact of automation on company culture. The introduction of automation can lead to a weakening of bonds between employees and a reduction in the sense of community and engagement within the company. Employees may perceive their work as less satisfying, which negatively affects motivation and the atmosphere in the workplace. The final significant factor is the security risks associated with automation. Automation involves the processing of large amounts of data, which increases the risk of cyberattacks and unauthorized access to sensitive information. Companies must invest in advanced security systems to protect themselves from potential threats. Inadequate data protection can lead to serious consequences, such as loss of customer trust, financial penalties resulting from violations of data protection regulations, or even the loss of strategic information about the company's operations. The costs associated with data security can be high, but they are necessary to ensure the proper functioning of automated systems and to protect the company from financial risk and reputational damage.

The remaining two factors are of much lesser importance and concern the need for continuous monitoring as well as ethical and social doubts. The first is related to ensuring that systems operate as intended, which can generate additional costs and

require advanced supervisory infrastructure. The second concerns fears about job loss, increasing inequality, and the lack of transparency in decisions made by autonomous systems.

In conclusion, the survey results indicate that process automation brings numerous benefits, but it also presents significant challenges. The main issues that need to be considered during the planning and implementation of new solutions include the reduction of interpersonal relationships, the risk of burnout, implementation costs, and security threats. Despite these challenges, proper management of automation processes and attention to organizational culture can help companies effectively leverage automation as a tool to support their growth and operational efficiency.

The study employed a triangulation of research methods, incorporating a qualitative-quantitative approach. The quantitative research was supplemented with open-ended responses from participants, enriching the analysis with their individual perspectives on the costs and benefits of automation. This allowed for a more complex and multidimensional view of the phenomenon, taking into account not only hard data but also the personal experiences and opinions of the study's participants.

The analysis of the responses shows that the overall attitude toward automation is overwhelmingly positive. Most respondents view it as a necessary step in the development of a company, driven by technological progress and changes in the business environment. It is important to note that while entrepreneurs recognize the benefits of automation, they are also aware of certain challenges and issues that must be considered during the implementation process.

According to the respondents, automation should be regarded as a natural stage in a company's development. They emphasized that the implementation of automation promotes the development of internal processes and reduces the need for human labor. Automation enables increased work efficiency, which leads to higher productivity and more optimal use of resources. In the opinion of the respondents, automation is an essential tool for maintaining competitiveness in a rapidly changing market. This perspective is illustrated by the statement of one participant, who noted that "office process automation is key to the company's growth because it allows for increased operational efficiency, cost reduction, and minimization of human errors."

Despite the positive reception of new solutions, entrepreneurs also point to challenges associated with automation. A significant issue is the potential for technical problems, as automation carries the risk of technical failures and system errors, which can be difficult to detect and fix. According to the respondents: "Errors made by automated systems are often hard to identify because they may result from non-obvious issues, complex data dependencies, or hidden processes, and over-reliance on technology can lead to serious operational problems." In the event of a malfunction or improper system configuration, work efficiency can drop significantly, and fixing such errors may be time-consuming.

There are also concerns related to an over-reliance on technology. Some entrepreneurs express doubts about whether automation may lead to stagnation in the development of employees' skills. Automation can limit workers' initiative and creativity in problem-solving. One respondent noted that "office process automation should support employees, not replace them entirely," highlighting the need to maintain a balance between the use of technology and human resources.

A problem pointed out by some respondents is the potential threat of job reduction. Automating routine office tasks may lead to a decreased demand for employees, raising concerns about increased unemployment. As one of the respondents noted, "In some areas, automation is recommended; it can save employees a lot of work, but in others, it may contribute to job reductions and employees becoming lazy." Additionally, some emphasize that excessive automation could negatively affect interpersonal relationships within companies, which in turn may weaken the organizational culture. Despite the many identified challenges, entrepreneurs also recognize the benefits of automation. First and foremost, automation allows for significant time savings by eliminating the need to manually perform repetitive tasks, which can now be handled by automated systems. As a result, employees can focus on more complex and demanding activities, which positively impacts their efficiency and job satisfaction. One of the respondents noted that "automation saves time, enabling employees to perform other, more complex tasks with greater accuracy".

It should also be emphasized that automation helps reduce human errors, which can have serious consequences for a company. Automated systems are able to process data with greater precision than humans, minimizing the risk of mistakes. Additionally, automation facilitates access to information, increasing mobility and flexibility in the workplace, especially in the context of the growing popularity of remote work. Entrepreneurs highlight that process automation enables better management of time and human resources, resulting in higher organizational efficiency. For example, one respondent pointed out that "office process automation allows for significant time savings and better use of human resources in other areas of activity; it is also beneficial in minimizing human errors".

An analysis of the statements indicates that office process automation is developing dynamically and will continue to be improved in the future. Entrepreneurs agree that it is an integral part of technological and economic development, and companies that adapt to these changes more quickly will gain a significant competitive advantage. One respondent stated that "automation is inevitable; the faster we adapt, the better market advantage we will gain," reflecting the widespread belief in the necessity of adapting to modern technologies.

At the same time, entrepreneurs emphasize that automation requires constant supervision and modernization. Regular system updates, monitoring, and integration with other tools are crucial for ensuring the smooth operation of automation processes. In the future, entrepreneurs expect even more advanced technological solutions that will allow for further process optimization and the minimization of current issues associated with automation.

In summary, it should be noted that implementing many modern solutions is both beneficial and essential for building competitive advantage. Key benefits include time savings, error reduction, and increased efficiency. On the other hand, it requires commitment to addressing issues such as the risk of system errors, job loss, and the weakening of interpersonal relationships. Entrepreneurs agree that automation is inevitable and crucial for maintaining market competitiveness; however, it requires balance and proper management to ensure that human potential and interactions are not neglected.

Conclusion

In summarizing the research findings, it is important to note that the automation of office processes in companies brings numerous benefits, but also presents challenges that require attention and action. First, the research confirmed that automation is highly valued by entrepreneurs, primarily due to the reduction of manual workload, time savings, and more efficient document management. These results indicate that automation contributes to improving the functioning of companies by minimizing the risk of errors, enhancing work organization, and increasing productivity. Key benefits of automation include increased process transparency, error risk reduction, and overall efficiency gains, as well as its versatile and multi-dimensional impact on operational activities, as highlighted by respondents. Additionally, delegating repetitive tasks to automated systems enables employees to focus on more demanding and creative tasks, positively influencing their engagement, motivation, and overall job satisfaction. It should also be noted that the implementation of automation brings challenges that require proper management to minimize the risk of negative impacts on interpersonal relationships, organizational culture, and employee skill development. While automation increases efficiency, it can limit interpersonal interactions and weaken employee initiative, highlighting the need for a balanced approach when introducing modern technologies.

The research findings also indicate that further studies are needed, particularly focusing on an in-depth analysis of the factors influencing the implementation of automation, especially those related to long-term costs and the challenges of integrating new technologies with existing systems. It is also recommended to examine the long-term impact of automation on employee skill development and the organizational culture of companies. Defining strategies to help minimize the negative consequences of automation, such as the reduction of interpersonal interactions or creativity, is essential for companies to fully benefit from its implementation without losing human capital and the value of interpersonal relationships.

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ECONOMIC PATTERNS IN CROATIAN PUBLIC PROCUREMENT: CONSTRUCTION CONTRACTS AND BROADER FUNDING CONTEXT

Marin ROMIĆ

Algebra University and Projekt jednako razvoj Ltd.
marin.romic@pjr.hr

Ines GRUICA DEVČIĆ

Projekt jednako razvoj Ltd.
ines.gruica.devcic@pjr.hr

Ivan SERDARUŠIĆ

Projekt jednako razvoj Ltd.
ivan.serdarusic@pjr.hr

Abstract

Background: Public procurement is vital to the construction industry and, thus, the overall economy. However, public works contracts contain many inefficiencies, value discrepancies, and a lack of forecasting capabilities. These issues are compounded by regulatory constraints and market volatility, which affect the ability to align estimated and concluded values of procurement contracts.

Objectives: The research explores the relationship between public procurement values and construction sector performance metrics. It also seeks to evaluate the level of alignment between estimated and concluded contract values, emphasising contracts financed through EU mechanisms to identify discrepancies and propose recommendations for improved practices.

Methodology: This study uses a mixed-methods approach, drawing on publicly available datasets from procurement platforms and statistical reports from the construction sector. Pearson correlation coefficients are applied to evaluate the relationship between procurement values and construction metrics. Furthermore, a thorough analysis of contract value ratios offers insights into estimation accuracy and procurement trends.

Findings: The analysis reveals a strong correlation between public procurement values and construction sector indicators such as revenue and profit. While most contracts align closely with their estimated values, a significant number of outliers highlight the need for improved forecasting and regulatory adaptation. These findings emphasise the need for enhanced forecasting methodologies and greater transparency to optimise public procurement outcomes.

Keywords: Public Procurement, Construction Sector, Contract Value Discrepancies, EU Funding, Cost Estimation

JEL classification: H57, L74, R42

Introduction

Public procurement is a key instrument for ensuring transparency in the operations of the public sector and, in certain cases, the private sector. According to the European Commission (n.d.), public procurement refers to the process by which public authorities purchase goods or services. Procurement rules ensure the proper utilisation of public funds when engaging other, mainly private entities. “Public procurement accounts for 13% of GDP in OECD countries” (OECD, 2023, p. 2), while in developing countries it mainly accounts for 15-22% of GDP (World Bank Group, 2020). Besides public contracting authorities, the Croatian Public Procurement Act (Official Gazette No. 120/16, 114/22) also defines sectoral contracting authorities as procurement entities. In line with the Public Procurement Act, Croatian procurement procedures align with EU Directives, which aim to standardise and ensure transparency across member states. The EU Directives governing public procurement are based on the Treaty on European Union, the Treaty on the Functioning of the European Union, and the “Fundamental Freedoms” set therein: movement of goods, right of establishment, freedom to provide services, as well as the principles deriving therefrom, such as equal treatment, non-discrimination, mutual recognition, proportionality and transparency (Consolidated versions of the Treaties, 2016). EU Directives prescribe that for public contracts above a certain value, provisions are drawn up so as to ensure that those principles are given practical effect and public procurement is opened up to competition (Directive 2014/24/EU Preamble, para 1; Directive 2014/25/EU Preamble, para 2). Transparency mandates the public disclosure of all key information regarding procurement processes. Open competition facilitates a fair market environment, enabling bidders from all member states to compete under the same rules and conditions. Sound management ensures consistent application of rules and criteria throughout the procurement process to guarantee fairness, prevent corruption, and optimise the use of public resources. Additionally, the principles of non-discrimination and equal treatment require that bids are prepared, published and evaluated transparently and solely on objective criteria.

Public procurement holds particular significance for the construction sector. Procurement in construction is a complex process offering numerous options and approaches (Ruparathna & Hewage, 2015). In most EU countries, the construction industry generates significant annual revenue, contributing a major share to the national GDP, with a large portion of activities involving the public sector (Bolpagni, 2013). In Croatia, the construction sector is a substantial part of the national economy, with a share of 17,6% of GDP in 2023, according to the Croatian Bureau of Statistics (2024) and the Financial Agency (n.d.). Moreover, 8,2% of the total workforce in 2023 was employed in construction (Croatian Bureau of Statistics, 2024). The ratio of revenue to employment highlights the sector’s relatively high productivity, potentially driven by specialised expertise, advanced technologies, and a focus on high-value projects, such as EU-funded infrastructure and reconstruction efforts.

Since 2019/2020, there has been a large and significant increase in total public procurement spending in the Republic of Croatia (Ministry of Economy, n.d.). The COVID crisis, the Ukraine crisis, and two earthquakes in Zagreb, Petrinja, and surrounding areas in 2020 further facilitated this. These events resulted in a

substantial increase in EU Funds and public spending. Thus, the construction sector became even more important as there was increased demand for construction works and extensive use of EU funds for reconstruction, presenting new challenges and requirements in procurement procedures. The total share of construction works in Croatia's total public procurement from 2019 to 2023 was 36%, 38%, 43%, 39%, and 46%, respectively (Ministry of Economy, n.d.). Reconstruction efforts were partially financed by national funds and supplemented by over €1 billion from the EU Solidarity Fund for infrastructure, building, and cultural heritage restoration (European Commission, 2023). Additional funding included nearly €600 million from the Mechanism for Recovery and Resilience and €98 million from the European Regional Development Fund for earthquake recovery. Strict adherence to public procurement regulations is essential to ensure these funds are utilised effectively.

The European Union sets value thresholds for the application of its procurement directives, revising them for each 2-year period and integrating them into member states' laws. As of January 1, 2024, the threshold for public works is €5.538.000. For 2022 and 2023, the threshold was at €5.382.000, while for 2020 and 2021 it was €5.350.000. At the same time, the Croatian Public Procurement Act recognises "public procurement of high value" (above Directives' thresholds), "public procurement of low value" (below Directives' thresholds but above €66.360), and "single tender" (below €66.360) for which the Public Procurement Act is not even applicable. These thresholds influence the complexity and regulations governing procurement procedures. Public procurement plays a vital role in economic development by enabling fair resource allocation, enhancing transparency, and ensuring the optimal use of public funds.

Taking into account the high average amount of work contracts specific to construction procurement, deviations between the estimated and actual contract values are often observed. According to EU Procurement Directives, in particular, to the principle of transparency, the method used to calculate the estimated value of procurement must not be designed to exclude it from the Directive's scope, and procurement must not be subdivided to avoid its inclusion unless justified by objective reasons. Although these deviations may not necessarily indicate malpractice, they require thorough analysis to understand their causes.

This paper aims to analyse the relationships between the contracted values of construction works and key economic indicators, including corporate profits, revenues, employment levels, and the number of construction companies. It places special emphasis on identifying the differences between estimated and contracted values in public procurement for works from 2019 to 2023, particularly examining whether EU-funded projects show smaller discrepancies in the Republic of Croatia. Furthermore, the study evaluates patterns of these discrepancies for both high-value and low-value projects, providing recommendations for minimising differences while adhering to the strict requirements of EU regulations. Through this analysis, the paper seeks to enhance the understanding of public procurement in the construction sector and suggest measures to improve practices in Croatia.

Literature review

Public sector procurement, which constitutes a significant share of construction industry turnover, is characterised by inefficiencies and a lack of client knowledge. The Chartered Institute of Building (CIOB, 2010) highlights issues like poor communication, outdated practices, and inadequate education among stakeholders. Addressing these gaps requires standardisation, client training, and early contractor involvement to ensure sustainable and efficient procurement practices (CIOB, 2010).

Undoubtedly, one of the most challenging issues faced in the public procurement system is the correct valuation of publicly tendered projects. According to Turudić and Dragojević (2024), this problem has emerged because the estimates tendered do not correspond with market values and are affected by economic fluctuations, increasing material and employee costs, and poor predictive models. Furthermore, these problems are worsened in the tendering for public works, where rigid rules and regulations do not allow adequate modifications to be made to complex estimates in order to enhance accuracy. Such inefficiencies can negatively affect procurement productivity in terms of cost escalations and delays in implementation. For example, in Croatia, construction costs surged by 33% between 2019 and 2023 due to inflation and limited competition, as highlighted by Turudić and Dragojević (2024). To address these challenges, enhanced forecasting methods, market reforms, and structured approaches are essential.

At this fundamental level, the issues related to systemic and procedural conditions are the main obstacles to public procurement. Dubois and Gadde (2002), in their research in the construction industry, defined it as a “loosely coupled system” where the issues come from poor coordination and the fact that the stakeholders rarely collaborate. Gunawardana et al. (2021) also agree that issues like corruption, fraud, and outdated technology are some obstacles that further incapacitate the systems. As a result, procurement cannot contribute to developmental and environmental protection objectives. Although these studies differ, they show that the number of challenges encountered with public procurement is multi-layered. This fact necessitates aligning the procedural and structural features during the comprehensive reforms to resolve the issue.

In developing countries, public procurement challenges are elaborated by unstable economic environments and institutional inefficiencies. Ogunsanya, Aigbavboa, and Thwala (2016) identify factors like inadequate legislative frameworks, corruption, and insufficient knowledge of procurement methods as major obstacles. These issues result in delays, cost overruns, and a lack of sustainable practices. Resolving these systemic problems requires directed treatment avenues like capacity building, transparent regulatory practices, and a higher level of stakeholder accountability.

At the procedural level, risk management becomes a key focus area for improvement. Dita, Rohman, and Nurcahyo (2020) have pointed out that some of the risks, including, for instance, poor coordination, biased specifications, and inadequate scope definitions, in public procurement may rise. These challenges often arise from

unprofessional planning and limited staff capacity, highlighting the need for early risk identification and better stakeholder alignment. Addressing these risks can significantly improve procurement outcomes.

Another recurring issue is the renegotiation of public contracts. Decarolis and Palumbo (2015) show that while Design and Build (D&B) contracts reduce delays, they often lead to cost overruns due to less detailed project specifications. This trade-off emphasises the need to strike a balance between flexibility and rigour in selecting procurement methods. Auction formats and job complexities further complicate procurement outcomes, emphasising the importance of sophisticated methods for contract management and risk sharing.

The integration of sustainability into procurement practices is gaining traction. Fazekas and Blum (2021) underscore the transformative potential of tools such as e-procurement and centralised framework agreements. These innovations have demonstrated a cost-saving potential of up to 50% while enhancing transparency and accountability simultaneously. However, the lack of high-quality evidence regarding their long-term impacts requires further research to optimise these interventions and align them with broader sustainability goals.

International best practices provide invaluable insights for fixing inefficiencies within public procurement. In Poland, for example, inconsistent documentation and out-of-date regulations have resulted in procedural inefficiencies and numerous appeals. Radziwelska-Zielina (2011) advocates establishing standardised guidelines and enhancing training initiatives to streamline processes and bolster compliance. Likewise, Palaneeswaran, Kumaraswamy, and Ng (2003) propose a procurement approach centred on “best value”, emphasising structured frameworks that balance cost efficiency with the long-term benefits of projects. In addition, Lædre et al. (2006) emphasise the need for innovation and methodological rigour based on their study in Norway. They found that most public owners tend to reuse familiar procurement routes without adequately considering the specific characteristics of individual projects. This lack of tailored decision-making undermines project efficiency and cost-effectiveness (Lædre et al., 2006).

The literature review underscores the complex challenges in public procurement, such as inefficiencies, value mismatches, and a lack of sustainability integration. However, innovations like D&B contracts, e-procurement, and centralised frameworks offer potential solutions. Developing tailored policies that enhance transparency, flexibility, and affiliation among stakeholders is crucial. By nurturing a culture of innovation and ongoing enhancement, public procurement systems can support sustainability and developmental objectives more effectively.

Methodology

This study utilised a combination of diverse data sources to comprehensively analyse the challenges and patterns in construction procurement. The methodology was

designed to ensure the accuracy and relevance of findings by employing both publicly available data and specific datasets tailored to the study's objectives. Below is a detailed description of the methodological framework.

For the first part of the study, which focuses on comparing the values of construction works and statistical data from the construction sector, publicly accessible data sources were utilised. Key datasets were derived from the annual statistical reports available on the Public Procurement Statistics website (Ministry of Economy, n.d.). These reports provided detailed insights into public procurement indicators, specifically the values of high-value and low-value projects.

Additional statistics related to the construction sector were obtained from the Financial Agency's InfoBiz platform, filtered under the category "F – Construction" (Financial Agency, n.d.). Indicators such as profit, total revenues, number of employees, and the number of companies were used to calculate percentage changes in industry trends. Pearson correlation coefficients were then computed to identify relationships between selected variables and the total value of public procurement projects.

In the second part of the study, the comparison between contracted values (excluding VAT) and estimated procurement values was conducted using a dataset from the application *ma.te.a* created by Projekt jednako razvoj Ltd, linked via an API to the EOJN data (Electronic public procurement portal of the Republic of Croatia, n.d.). This dataset contains data on awarded contracts, with each row representing a winning tender along with associated variables. As Turudić and Dragojević (2024) explain, in the EOJN system, contract award notices form an integral part of the repository created upon initiating a public procurement procedure. These repositories document all subsequent changes and documents related to the procurement process. The repository is closed once the procurement contract is awarded through a contract award notice. Since the repository contains quarterly renewals that carry redundant or irrelevant information, exclusions were made for these specific contract award notices. The dataset was then filtered to include only public procurement procedures where both the estimated and final contract values were available. Such a situation with data exists not only in the Croatian public procurement system. According to the OECD (n.d.), public procurement data is not always collected robustly and consistently, leading to unreliable statistical information that cannot be used for procurement decisions in its available form.

After initial data collection, the dataset underwent a rigorous cleaning process to ensure accuracy and reliability, as follows:

- **Category Filtering:** Data was filtered to include only construction works, resulting in 17.082 unique contracts.
- **Error Removal:** Contracts with discrepancies exceeding $\pm 300\%$ between estimated and contracted values were manually reviewed and excluded (295 contracts) to avoid possibly incorrect entries from the EOJN system.
- **Duplicate Removal:** Contracts with duplicate publication numbers, often caused by grouping contracts under multiple entities, were removed (4.828 contracts).

Additionally, contracts appearing multiple times with identical amounts (340 contracts) or identical names (428 contracts) were excluded, too.

- **Threshold Filtering:** Contracts below the threshold for a single tender (€66.360) were excluded from the analysis (818 contracts).

After these steps, 10.373 contracts remained for further analysis. Of these, 789 contracts were identified as EU-funded and analysed separately to explore their specific dynamics.

It is important to acknowledge the potential limitations of the data-cleaning process. Certain contracts with identical publication numbers that contain different product groupings (lots) were excluded. Similarly, recurring maintenance contracts with identical values were also removed. However, these exclusions represent a relatively small portion of the dataset. The remaining dataset is statistically significant and sufficiently large to support the study's objectives of comparing estimated and contracted values. By employing a comprehensive methodological approach, this study ensures that its findings are robust and reflective of the underlying trends and challenges in public construction procurement.

Research results

This chapter discusses the results obtained from analysing public procurement in the construction industry, concentrating on three main areas. First, we look at the relationship between the total value of public construction procurement and relevant statistics for construction firms, including profit, revenue, workforce size, and the number of active entities. This analysis shows how public procurement activities influence and correspond with broader industry trends.

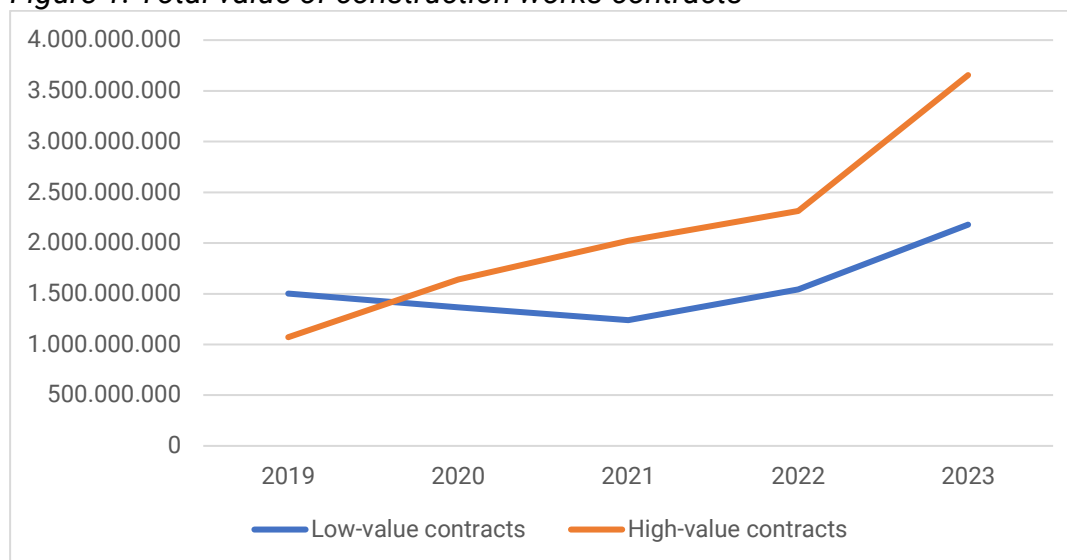
After that, we compare the estimated values of public procurement contracts with their actual awarded values. By analysing this relationship, we aim to identify patterns and discrepancies, shedding light on the accuracy of procurement forecasts and the potential factors driving deviations.

Finally, we conduct a detailed comparison of estimated and actual values for contracts marked as EU-funded. This segment evaluates whether EU-funded projects exhibit distinct trends in terms of procurement accuracy and adherence to initial cost estimates, contributing to a better understanding of their efficiency and management. Through these analyses, this chapter aims to provide a comprehensive overview of the challenges and trends in construction procurement, highlighting areas for improvement and opportunities for enhanced alignment between procurement practices and market realities.

Figure 1 displays the total value of public procurement contracts for construction works categorised into low-value and high-value contracts over the period from 2019 to 2023. The values are plotted annually, showing their respective trends. The total value of high-value contracts shows a consistent and significant upward trend from

2020 to 2023. Over the observed period, high-value contracts experienced steady growth, with a particularly sharp increase between 2022 and 2023, surpassing €3,6 billion in 2023. This indicates a growing focus on larger procurement projects, potentially reflecting increased government investment in large-scale infrastructure development.

Figure 1: Total value of construction works contracts



Source: Authors' work based on the data from the Ministry of Economy, n.d.

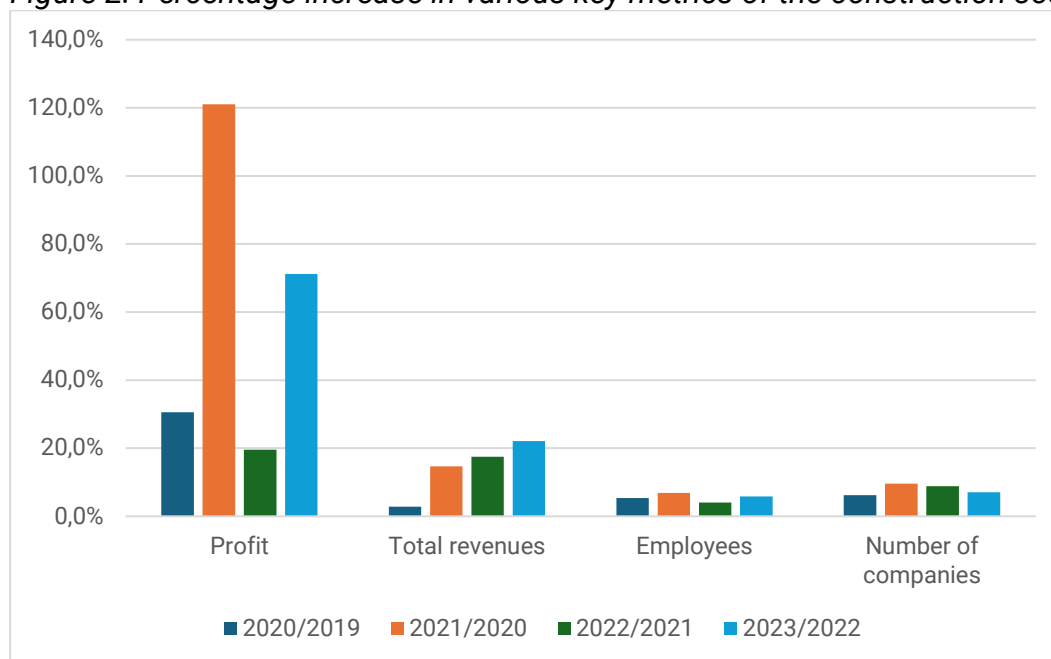
On the other hand, low-value contracts follow a relatively stable trend compared to high-value contracts. High-value contracts demonstrate a much steeper growth trajectory compared to low-value contracts, especially post-2021. By 2023, the total value of high-value contracts was more than double that of low-value contracts. This trend could indicate a focus on larger, capital-intensive projects, potentially financed by EU funds. It also indicates an increased reliance on large-scale procurement to address broader economic and infrastructure development goals.

Figure 2 presents the percentage increases (each compared to a previous year) of various key metrics of the construction sector (sector F) from 2020 through 2023. No metric shows a decrease during the analysed period.

Profit shows the most significant fluctuations, especially in 2021, where there was a dramatic increase of over 120%, likely influenced by post-COVID-19 recovery or increased demand for construction projects following the earthquakes in Zagreb, Petrinja, and surrounding areas. A high increase (around 70%) is also observed in 2023 compared to 2022, reflecting continued profit growth but at a lower rate compared to 2021. Revenue growth shows a moderate but consistent increase across the years. The growth in employment remains modest throughout the period, with increases under 10% for all years. This indicates that while the sector has grown in revenue and profit, job creation has been relatively stable, possibly due to technological advancements or productivity improvements. The stability presented by a slight increase in the number of companies in the sector suggests that the sector has not experienced significant market entry or exit during this time frame, possibly reflecting

barriers to entry or a stable competitive environment. The relatively low growth in the number of employees and number of companies suggests that the sector's growth has been driven more by efficiency and scale rather than workforce expansion or new market entrants.

Figure 2: Percentage increase in various key metrics of the construction sector



Source: Authors' work based on the data from Financial Agency, n.d.

In addition, to assess the relationship between public procurement for works and relevant statistics for the construction sector, we calculated the Pearson correlation coefficients (R) between the total value of public procurement for construction works and various indicators of the construction sector: total revenues, profit, number of employees and number of companies. These coefficients measure the strength and direction of the linear relationship between the two sets of variables, with values ranging from -1 (perfect negative correlation) to +1 (perfect positive correlation).

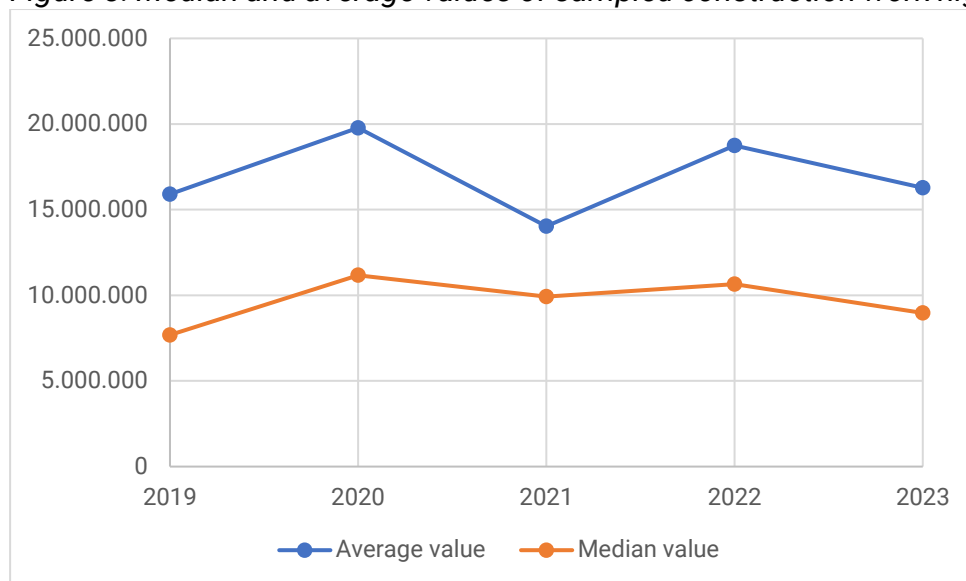
The correlation between total revenues and values of public procurement for works stands at 0,9752. There is a very strong positive correlation between the total revenues of the construction sector and the total value of public procurement contracts. This indicates that as public procurement value increases, total revenue in the construction sector tends to rise proportionally. We found a very similar correlation when we compared the value of public procurement for works with company profits over the same time period, as R is 0,9705. The number of employees (R= 0,9153) and the number of companies (R=0,9177) also show a very strong correlation, although the relationship is slightly weaker compared to revenue and profit.

The high correlation coefficients across all indicators highlight the pivotal role of public procurement in shaping the performance and structure of the construction sector. Public procurement activities not only contribute to revenue generation and profitability but also impact employment levels and the number of active companies

in the market. The connection between the construction sector and public procurement can also be seen in Croatia's construction sector revenues' total share of public procurement. In the 2019-2023 research period, those stood at 32%, 37%, 35%, 35%, and 43%, respectively. These results reinforce the importance of efficient and effective public procurement processes for the development of the construction industry.

Figure 3 illustrates the average and median values of high-value procurement sampled contracts from 2019 to 2023.

Figure 3: Median and average values of sampled construction work high-value contracts

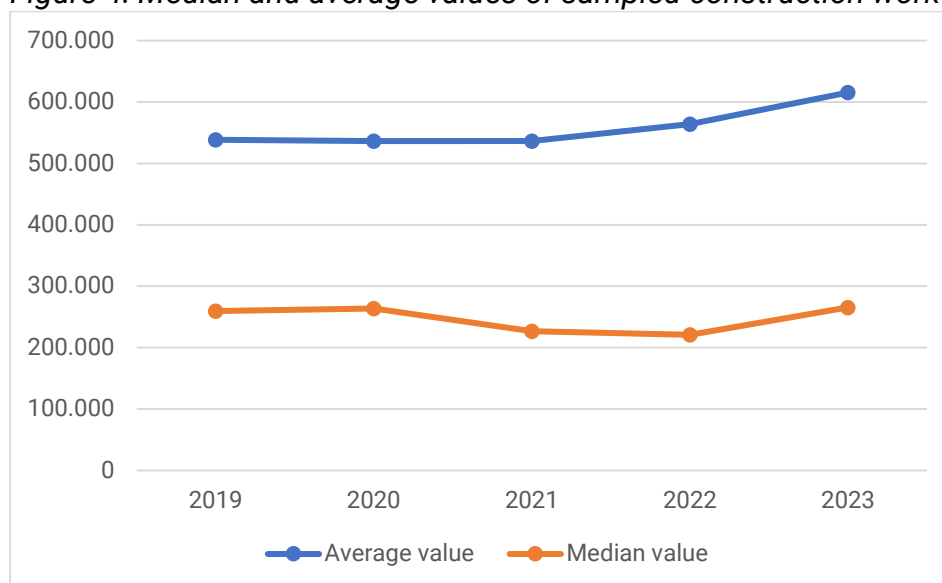


Source: Authors' work based on the EOJN data

Analysing the trends in average and median values, we highlighted notable patterns in the distribution of contract sizes over the observed period. The highest average value was recorded in 2020, suggesting that some exceptionally large contracts were awarded during that year, which elevated the average. Unlike the average, the median does not show large spikes, indicating that the central tendency of contract values (the middle point of the data distribution) is more consistent and less affected by outliers. The divergence between the average and median values underscores the presence of outliers or a heavy-tailed distribution in the data, where a small number of high-value contracts inflate the average. The chart highlights the importance of considering both average and median metrics to understand procurement trends comprehensively and avoid overemphasising extreme values when analysing data.

After analysing high-value contracts, we did the same for the low-value contracts. Figure 4 illustrates the average and median values for low-value public procurement contracts from 2019 to 2023, highlighting trends in smaller-scale procurement activities.

Figure 4: Median and average values of sampled construction work low-value contracts



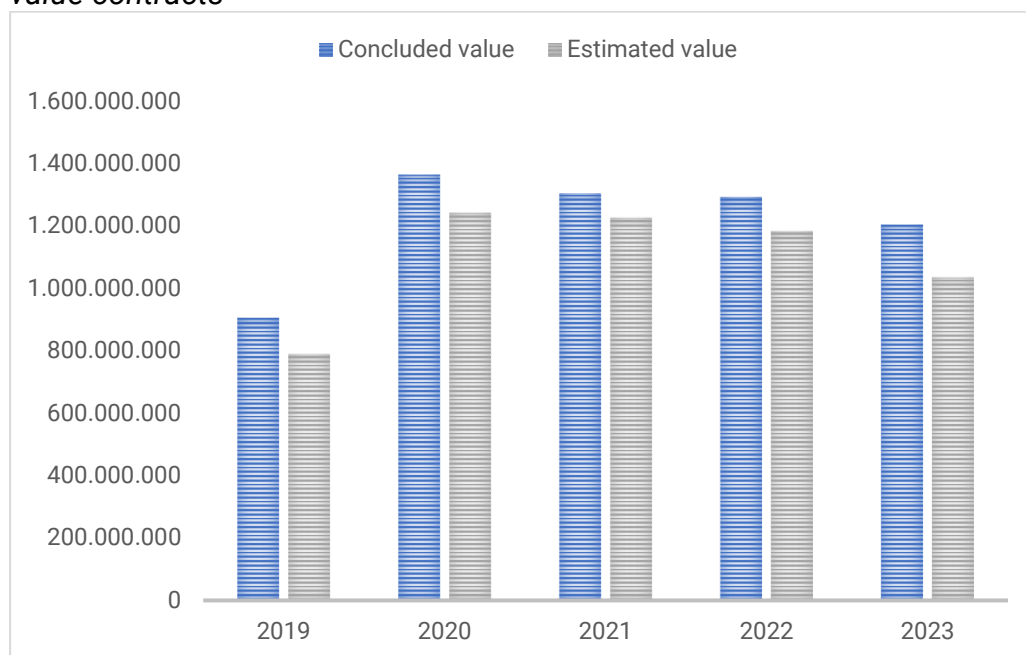
Source: Authors' work based on the EOJN data

Gradual increase in average value suggests that the size of low-value procurement contracts has been slightly growing over the years, potentially reflecting inflation, increased material and labour costs, or higher project complexity. The observed trends suggest a gradual increase in the scale and value of low-value procurement contracts over time, potentially driven by rising costs or changes in procurement thresholds. The median's stability highlights that while the overall value of contracts is increasing, the majority of contracts remain within a predictable and consistent range, with only a few higher-value contracts influencing the average.

Building on the methodology outlined earlier, which focuses on analysing discrepancies between estimated and concluded public procurement contract values, Figure 5 visually represents these differences for high-value contracts from 2019 to 2023. The comparison aligns with the study's objective of assessing the accuracy of procurement estimates and identifying patterns or systemic challenges in the public procurement process.

Figure 5 compares the concluded values and estimated values for high-value public procurement contracts from 2019 to 2023. It highlights discrepancies between the initial estimated values of contracts and their actual concluded values. The gap between the two values persists throughout the years, indicating a recurring trend of underestimating procurement values.

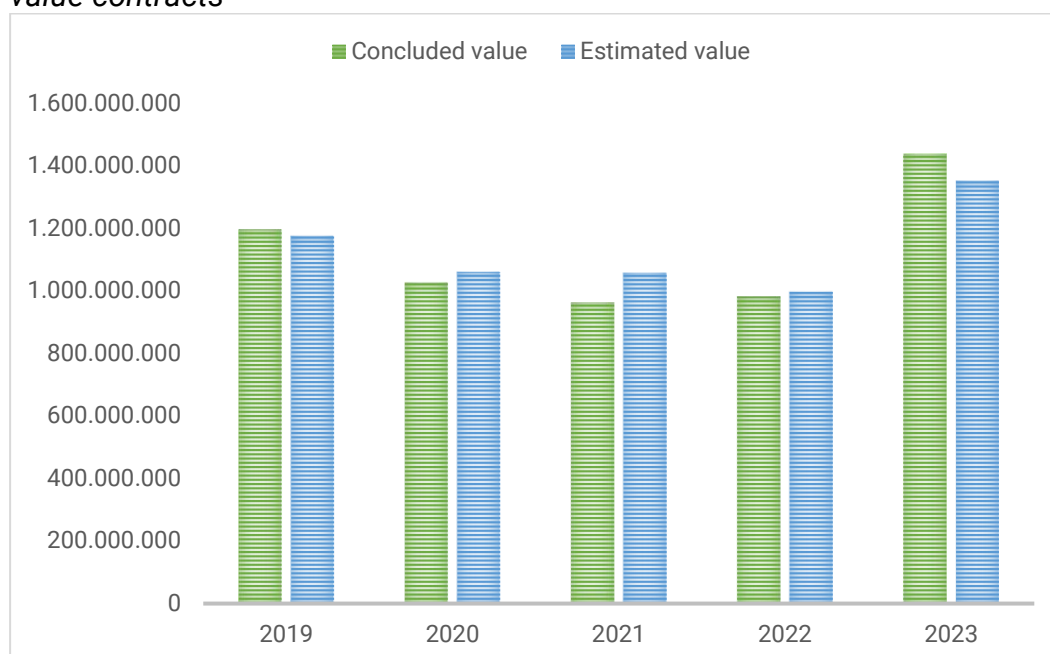
Figure 5: Comparison of concluded and estimated contract values for sampled high-value contracts



Source: Authors' work based on the EOJN data

The same comparison was made for the low-value contracts (Figure 6).

Figure 6: Comparison of concluded and estimated contract values for sampled low-value contracts



Source: Authors' work based on the EOJN data

Figure 6 compares the concluded values and estimated values for low-value public procurement contracts from 2019 to 2023. It provides insights into the accuracy of cost estimation for smaller procurement projects over this five-year period. The

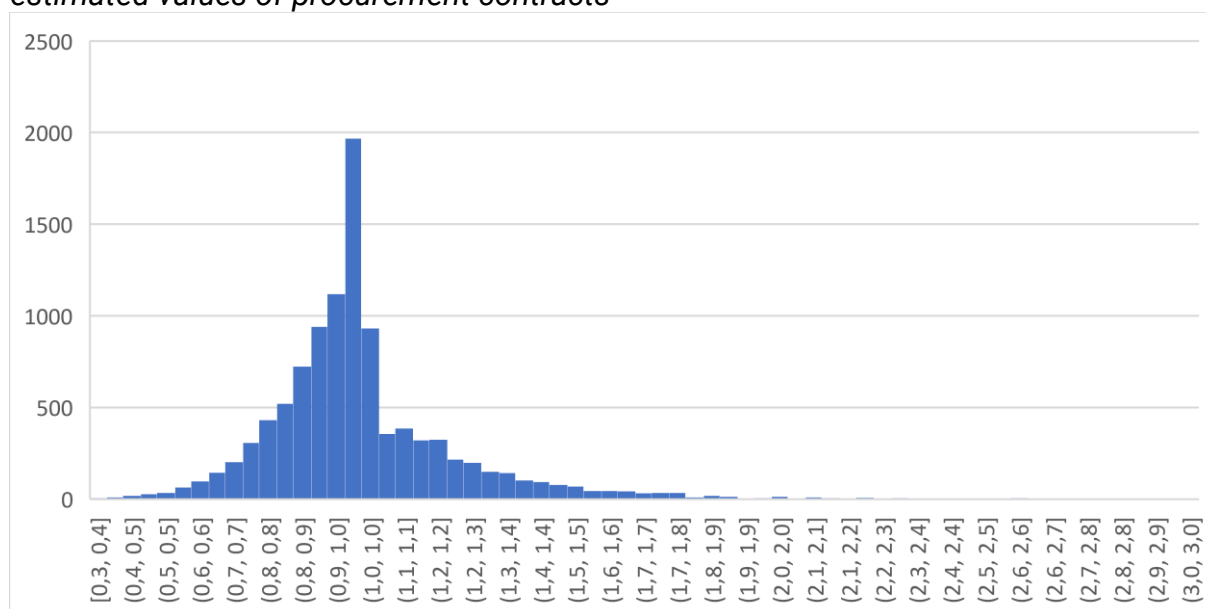
estimated and concluded values are relatively close in all years compared to high-value procurement trends.

A notable shift occurred in 2023, where both estimated and concluded values increased significantly, indicating either a rise in procurement activity or market conditions that inflated the cost of smaller projects. The close alignment of estimated and concluded values suggests robust cost estimation methods for low-value contracts, contrasting with the challenges observed in high-value procurements. The minimal discrepancies highlight the importance of effective cost estimation tools, which are more achievable for smaller scale projects due to less complexity and fewer unknowns.

It highlights the effectiveness of current forecasting practices while identifying deviations that may indicate inefficiencies or inaccuracies in the procurement process. By visualising these patterns, the chart supports the study's aim of evaluating procurement accuracy and offers insights that can guide improvements in cost estimation and policy development, ultimately contributing to more effective and reliable public procurement practices.

To provide a detailed analysis of the alignment between estimated and concluded contract values in public procurement, Figure 7 presents the distribution of frequency ratios.

Figure 7: Distribution of frequency ratios between the concluded (contracted) and estimated values of procurement contracts



Source: Authors' work based on the EOJN data

Figure 7 represents the distribution of frequency ratios between the concluded (contracted) and estimated values of procurement contracts. Each bar shows the number of contracts falling within a specific range of this ratio, providing insights into how closely the estimated values align with the final contracted amounts. The highest

frequency is observed in the range of 0,9 to 1,1, indicating that most contracts have a concluded value close to their estimated value. The peak around the ratio 1,0 suggests that a significant proportion of contracts are awarded at or near their estimated value, reflecting either good estimation practices in these cases or price anchoring regarding estimated value. The distribution appears normal-like, with most values clustering around 1,0 and tapering off symmetrically on both sides. However, a slight skewness toward values greater than 1,0 indicates that, in some cases, concluded values exceed estimated values.

While the central tendency indicates effective practices for the majority of contracts, the outliers highlight areas where further analysis is required to understand the drivers of significant deviations. Insights from this distribution can guide improvements in forecasting methodologies, cost control measures, and procurement policies. Further analysis of the ratios is shown in the table below.

Table 1: Ratios between the concluded (contracted) and estimated values for sampled procurement contracts

	2019-2023	2019	2020	2021	2022	2023
Sample's average ratio	1,003	1,026	0,975	0,940	0,985	1,069
EU funded contracts	1,150	sample size too small for analytical presentation		1,014	1,121	1,161
High-value contracts	1,152	1,137	1,117	1,090	1,243	1,180
High-value contracts (EU funded)	1,310	sample size too small for analytical presentation				
Low-value contracts	0,998	1,023	0,969	0,932	0,975	1,066
Low-value contracts (EU funded)	1,135	sample size too small for analytical presentation				

Source: Authors' work based on the EOJN data

Table 1 presents the ratios between the concluded (contracted) and estimated values for procurement contracts across different categories and timeframes. The average ratio for all contracts over the period 2019-2023 is 1,003, indicating that, on average, the concluded values closely match the estimated values. The average ratio for EU-funded contracts across available years is 1,150, suggesting that these contracts are often concluded at values higher than initially estimated. The average ratio for high-value contracts across the entire period is 1,152, indicating that larger contracts are consistently concluded at values higher than estimated, similar to the EU-funded contracts. High-value contracts financed by the EU have an average ratio of 1,31, significantly higher than other categories, indicating a consistent trend of concluded values far exceeding estimates for this subset of contracts. The overall average ratio for low-value contracts is 0,998, indicating close alignment between estimated and concluded values. Low-value contracts financed by the EU have an average ratio of

1,135, highlighting a tendency for concluded values to exceed estimates, albeit less significantly than for high-value EU-funded contracts.

The majority of categories demonstrate ratios close to 1,0, indicating generally accurate cost estimation practices. However, notable deviations in specific subsets (e.g., high-value and EU-funded contracts) highlight areas for improvement. EU-funded projects consistently show higher ratios, pointing to cost overruns potentially due to specific requirements, delays, or administrative complexities associated with EU funding. Cost overruns in the sampled data amount to more than €275 million. High-value contracts exhibit more significant deviations from estimates than low-value ones, suggesting that larger projects may face greater uncertainties or estimation challenges.

Discussion and Conclusion

The analysis of public procurement processes in the construction sector reveals a complex interplay of systemic inefficiencies, market dynamics, and regulatory challenges, particularly in the context of developing countries. Across the studies reviewed and the data analysed, several key themes emerge that shape the procurement landscape and influence outcomes.

Challenges in accurately estimating procurement values are a persistent issue. Turudić and Dragojević (2024) highlighted that discrepancies between estimated and concluded contract values arise from market volatility, inflation, and inadequate forecasting methods. In practice, for almost all projects, the project designer (most commonly architects or civil engineers) estimates the procurement value for works based on current market prices, always specific for each project, before projects are launched for tendering. This method provides more certainty regarding future contract prices (combined with the legal obligation to publish the estimated procurement value in the tender notice, which may cause price anchoring). In this respect, if the methods of procurement were different, such as design and build, or if the estimated value of the procurement is not published, the consequences could be that the actual value of the procurement both significantly rises and that the duration of the contracts is significantly increased (especially in design and build projects).

On the other hand, potential improvement methods could include standardising procurement prices within project design. However, such methods bring questions of responsibility for such standards, price and material updates, different opinions on the material and work quality, the subjectivity of workforce prices, etc. From this aspect, such a method is difficult to implement. Specifically, it needs to be considered that public procurement follows project design. Timewise, public procurement tenders may be published immediately after project design is completed, but they may also take much longer (up to several years). By extending this time interval, the probability of price modification increases (because of changes in the prices of elements that comprise the tender price).

The observed trends in the Croatian construction sector, including a significant 33% increase in costs between 2019 and 2023, underscore the need for enhanced forecasting tools, regulatory adjustments, and better alignment with market realities.

In addition, systemic inefficiencies in public procurement processes, including poor communication, outdated practices, and inadequate stakeholder knowledge, hinder project success. Gunawardana et al. (2021) and Ogunsanya, Aigbavboa, and Thwala (2016) identify corruption, political influence, and a lack of standardisation as critical barriers to effective procurement. These issues not only delay project delivery and inflate costs but also undermine the sector's contribution to sustainable development goals. Addressing these challenges requires targeted interventions, such as stakeholder training, improved legislative frameworks, and the adoption of innovative procurement methods.

Furthermore, risk management and contract structures are critical factors in optimising procurement outcomes. Dita, Rohman, and Nurcahyo (2020) highlight the importance of early risk identification, while Decarolis and Palumbo (2015) emphasise the trade-offs inherent in different contract types. For example, Design and Build (D&B) contracts could both reduce and increase delays but often lead to higher costs due to less detailed project specifications. Tailoring contract structures to project-specific needs and balancing flexibility with rigour is essential for mitigating risks and achieving value for money.

The exploration of procurement values for high- and low-value contracts further illustrates the disparities in performance. Data analysis shows that high-value contracts often exceed their estimated values, particularly when financed by the EU, as seen in the significantly higher average ratios for these contracts. This reflects not only the complexity of large-scale projects but also the pressures to utilise allocated funds efficiently. Conversely, low-value contracts demonstrate better alignment with their estimates, though they also face challenges in specific contexts, such as those financed by the EU.

Additionally, the analysis of sectoral statistics highlights a sector marked by growth in profit and revenue, particularly in 2021 and 2023, despite modest increases in employment and company numbers. This suggests that sectoral expansion is driven by efficiency gains and larger-scale projects rather than workforce growth or new market entrants.

In conclusion, public procurement in construction faces multifaceted challenges, from estimating values accurately to managing systemic inefficiencies and fostering sustainability. Addressing these issues requires a holistic approach that combines regulatory reforms, innovative practices, and capacity building. The integration of advanced tools like e-procurement, enhanced forecasting methodologies, and a focus on sustainability metrics can significantly improve procurement outcomes. By fostering transparency, stakeholder collaboration, and adaptability, public procurement can better align with its objectives of delivering value for money, ensuring project success, and contributing to broader developmental goals.

Acknowledgement

The authors gratefully acknowledge the support and provision of data by Projekt jednako razvoj Ltd. The access to the comprehensive database of public procurement contracts via the Projekt jednako razvoj ma.te.a application has been invaluable for the analysis and findings presented in this research.

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THE IMPACT OF GAMIFICATION IN HIGHER EDUCATION: EXAMINING ACADEMIC PERFORMANCE THROUGH PARTIAL AND FULL GAMIFICATION INTERVENTIONS

Martin KISELICKI

Faculty of Economics – Skopje, North Macedonia
martin.kiselicki@eccf.ukim.edu.mk

Kalina TRENEVSKA BLAGOEVA

Faculty of Economics – Skopje, North Macedonia
kalina.trenevska@eccf.ukim.edu.mk

Ana JOSIMOVSKA NIKOLOV

HalkBank AD Skopje, North Macedonia
ana.josimovska@halkbank.mk

Abstract

Background: This study examines the effects of gamification in higher education, focusing on its impact on academic performance, internal motivators, and student satisfaction.

Objectives: The research aimed to evaluate how varying levels of gamification—partial and full—affect students' engagement and learning outcomes. A total of 162 students participated, divided into three groups: a control group, a partially gamified group, and a fully gamified group.

Methodology: Data were collected through a structured survey and analyzed using statistical techniques such as Cronbach's Alpha for reliability, Chi-Square tests, Levene's test, and ANOVA to determine the influence of gamification on academic metrics and motivation.

Findings: The findings show that full gamification significantly improves academic performance and internal motivators like autonomy, goal-setting, and social interaction, while partial gamification has mixed effects. However, neither form of gamification showed a significant impact on overall student satisfaction. These results highlight the potential of full gamification to boost academic achievement and motivation, while also suggesting that satisfaction may depend on additional factors beyond gamification. The study contributes valuable insights for educators and policymakers seeking to implement gamification strategies in higher education. It emphasizes the importance of a holistic approach to enhance both student engagement and satisfaction.

Keywords: Gamification, Higher Education, Academic Performance, Student Motivation, Student Satisfaction

JEL classification: I23, O33, C83

Introduction

The adoption of gamification, the integration of game-design elements such as points, badges, and leaderboards in non-game contexts, has rapidly expanded across sectors, including higher education (Deterding et al., 2011; Kapp, 2012). In educational settings, gamification has been introduced as a strategy to boost student engagement, motivation, and academic performance by creating more interactive and enjoyable learning environments (Seaborn & Fels, 2015). This transformation of traditional teaching methods into a gamified experience aims to motivate students to actively engage with course material and stay committed throughout their academic careers (Hamari et al., 2014).

In North Macedonia, where higher education has traditionally relied on lecture-based instruction, the introduction of gamification offers an innovative solution to address challenges such as student disengagement, high dropout rates, and prolonged completion times (Deci & Ryan, 2000). Educators are turning to gamification to enhance learning experiences, fostering both intrinsic motivation and a sense of achievement (Nicholson, 2015). By incorporating game mechanics, courses are designed to make academic tasks more appealing and encourage students to take ownership of their learning process (Kim, 2015).

Despite the increasing popularity of gamification, there is limited empirical research on its effectiveness in improving academic outcomes, such as course points and final grades. Some studies suggest that partial gamification—where only select game elements are integrated—can increase short-term engagement but may have limited impact on overall academic performance (Buckley & Doyle, 2016). On the other hand, full gamification, where game mechanics are deeply embedded throughout the course, has been associated with more significant improvements in academic achievement (Landers & Landers, 2014).

This study seeks to fill this gap by examining whether the implementation of partial and full gamification in higher education leads to improved academic performance. Specifically, the research focuses on the impact of gamified learning environments on the number of points students earn during the course and their final grades. Understanding these effects is crucial for determining whether gamification can provide sustainable benefits to student outcomes in higher education settings.

Objectives of the study

- To investigate whether the implementation of gamification in higher education positively affects students' academic performance.
- To explore the effect of partial gamification on the number of points students earn during the course and their final grades.
- To assess the impact of full gamification on students' points and final grades.
- To provide recommendations for improving gamification strategies to enhance student performance in higher education.

Given the increasing reliance on digital tools and innovative teaching methods, understanding how gamification impacts academic success is critical. This study aims to contribute to the growing literature on gamification in higher education by providing empirical evidence on its effectiveness in boosting student achievement, and offering practical insights for educators and policymakers on the use of gamified learning interventions.

Literature Review

Gamification in education

Gamification, defined as the use of game mechanics such as point systems, leaderboards, and badges in non-game contexts, has seen widespread application across various sectors, including education (Deterding et al., 2011; Kapp, 2012). In higher education, gamification is employed to increase student engagement and motivation by transforming the learning experience into a more interactive and rewarding process (Seaborn & Fels, 2015). By integrating game-like elements into academic environments, educators aim to make the learning process more appealing, thus fostering intrinsic motivation and improving academic performance (Deci & Ryan, 2000).

Research on gamification in education suggests that it can lead to both short-term engagement and long-term academic benefits. A meta-analysis by Hamari, Koivisto, and Sarsa (2014) concluded that gamification tends to improve motivation and participation, particularly when students are provided with tangible rewards such as points or badges. Similarly, Landers and Landers (2014) found that the use of leaderboards in gamified systems significantly increased student time-on-task, thereby contributing to better academic outcomes. However, while the motivational benefits of gamification are well-documented, its direct impact on academic performance remains an area of ongoing debate.

In particular, partial gamification—where only certain game elements, such as points or badges, are integrated into the learning process—has shown mixed results. Some studies suggest that while partial gamification can increase engagement, it may not significantly affect final grades or overall academic achievement (Buckley & Doyle, 2016). On the other hand, full gamification—where game mechanics are embedded throughout the entire learning process—has been associated with more substantial improvements in academic performance (Kapp, 2012). This study aims to build on these findings by investigating the effects of both partial and full gamification on student performance in higher education.

Motivational theories and gamification

Gamification is rooted in motivational theories, particularly self-determination theory (SDT), which posits that human behavior is driven by the fulfillment of three basic psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 2000).

According to SDT, students are more likely to engage in activities that make them feel competent, autonomous, and socially connected. Gamified systems leverage these psychological mechanisms by providing immediate feedback (competence), offering choices (autonomy), and fostering collaboration or competition (relatedness) (Nicholson, 2015).

Gamified learning environments are designed to satisfy these psychological needs, thereby promoting deeper engagement with course material. For example, the use of points and badges provides students with a clear sense of progress and achievement, reinforcing their competence (Kapp, 2012). Moreover, features such as leaderboards and peer collaboration promote social interaction, which fulfills students' need for relatedness (Deterding et al., 2011). However, the effectiveness of these mechanisms in improving academic performance may depend on the extent to which they are integrated into the learning process.

Partial vs full gamification

The distinction between partial and full gamification is critical in understanding how different levels of gamification impact student outcomes. Partial gamification involves the selective use of game mechanics, such as points or badges, without fundamentally altering the course structure. This approach is relatively easy to implement and can lead to short-term increases in student engagement (Buckley & Doyle, 2016). However, some studies suggest that partial gamification may not be sufficient to produce meaningful changes in academic performance. For instance, Hanus and Fox (2015) found that while partial gamification increased participation in class discussions, it did not significantly improve exam scores.

In contrast, full gamification integrates game mechanics throughout the entire course, creating a comprehensive gamified experience. This approach is more immersive and has been associated with greater improvements in academic outcomes (Landers & Landers, 2014). Full gamification typically involves the use of a narrative structure, where students progress through levels or stages by completing academic tasks, earning rewards for their achievements. Studies have shown that this approach can increase not only engagement but also deeper learning and retention of course material (Kim, 2015).

The present study aims to contribute to this literature by comparing the effects of partial and full gamification on student performance in higher education, with a specific focus on the number of points earned during the course and final grades.

Methodology

This study used a quasi-experimental design conducted between academic years 2018 through 2021, to assess the impact of gamification on university students' academic performance. The students are divided into three groups: a control group of

51 students (no gamification), a partial gamification group with 55 students, and a full gamification group with 56 students. The primary objective is to compare the academic performance (measured in terms of course points and final grades) of students across these groups, thereby testing the hypotheses regarding the effects of partial and full gamification on academic outcomes.

- H1: Partial gamification positively influences the number of points students earn during the course.
- H2: Partial gamification positively influences the final grades students receive in the course.
- H3: Full gamification positively influences the number of points students earn during the course.
- H4: Full gamification positively influences the final grades students receive in the course.

This design allows for a comparison of both the immediate effects (points earned throughout the course) and the long-term effects (final grades) of gamification on student performance. In the partial gamification group, students were exposed to basic game mechanics integrated into the course. These mechanics included point systems, badges, and leaderboards. Students earned points for completing assignments, attending classes, and participating in discussions, with badges awarded for specific achievements, such as submitting all assignments on time. The leaderboard displayed the top performers in the class, fostering a competitive environment among students. This partial gamification approach aimed to enhance engagement by rewarding specific academic behaviors without drastically altering the course structure.

In contrast, the full gamification group experienced a more immersive and comprehensive gamified environment. In addition to points, badges, and leaderboards, students participated in a course designed with a narrative structure and levels. They progressed through the course by completing academic tasks, such as quizzes and projects, unlocking rewards as they advanced. The full gamification setup included team-based tasks and individual competition, fostering both collaboration and competition. This group's learning experience aimed to deeply integrate game elements throughout the course, encouraging sustained engagement and motivation.

The control group followed the standard curriculum, with no gamification elements applied. This group served as the baseline for comparing academic performance across the different levels of gamification.

Data were collected on two primary measures of academic performance: the number of points students earned during the course and their final grades. Course points were tracked throughout the semester and reflected performance on assignments, quizzes, participation, and other academic activities. Final grades were recorded at the end of the semester, based on overall academic performance, including exams and projects. In addition to these academic metrics, students in the partial and full gamification groups completed a brief survey at the end of the course to assess their perceived engagement, motivation, and satisfaction with the gamified elements.

For data analysis, descriptive statistics were calculated to summarize the points and final grades for each group. One-way analysis of variance (ANOVA) was conducted to test for statistically significant differences in academic performance between the control, partial gamification, and full gamification groups. Post-hoc tests (Tukey's HSD) were performed to determine which groups differed from each other. Additionally, multiple regression analysis was conducted to examine the relationship between the type of gamification (partial or full) and academic performance, while controlling for demographic variables such as gender and faculty. All analyses were conducted using SPSS, with significance levels set at $p < 0.05$.

This methodology was designed to provide a clear comparison of how partial and full gamification influence students' academic performance, specifically focusing on the number of points earned and final grades achieved. By using a combination of descriptive and inferential statistics, the study aimed to provide robust insights into the effectiveness of different gamification strategies in higher education.

Results

The study surveyed 162 students, divided into a control group (51 students), a partial gamification group (55 students), and a full gamification group (56 students). The **Chi-Square Test** was employed to verify the homogeneity of the groups based on gender, age, and year of study. Additionally, **Levene's Test** was used to assess the equality of variances within the groups, which is necessary for further ANOVA analysis.

The Chi-Square test showed that there were no statistically significant differences between the control, partial gamification, and full gamification groups in terms of gender ($p = 0.984$), age ($p = 1.000$), and year of study ($p = 0.988$). This confirms the demographic homogeneity across the groups, which is crucial for valid comparisons. Levene's test confirmed that the variances for age, gender, and year of study were not significantly different across the three groups, with p-values ranging from 0.861 to 0.972. Thus, the assumption of equal variances is satisfied, allowing for a valid application of ANOVA in subsequent analyses.

Reliability testing with Cronbach's Alpha

To ensure the internal consistency of the survey items measuring intrinsic motivators and student satisfaction, **Cronbach's Alpha** was used. A threshold of 0.7 is generally considered acceptable for reliability.

Table 1: Cronbach's Alpha

Construct	Control Group	Partial Gamification	Full Gamification
Autonomy	0.719	0.770	0.721
Skills	0.808	0.748	0.798
Goals	0.765	0.861	0.793
Progress	0.775	0.729	0.743
Social Interaction	0.731	0.837	0.749
Satisfaction	0.857	0.789	0.791

Source: Author's work

All constructs across the groups demonstrated acceptable internal consistency, with Cronbach's Alpha values ranging from 0.719 to 0.861. This reliability assures the validity of the measures for intrinsic motivators and satisfaction.

RQ: Does Gamification Improve Academic Performance?

The research question aimed to determine whether gamification enhances students' academic performance. This was tested through four hypotheses (H1, H2, H3, H4) focusing on the impact of partial and full gamification.

Partial Gamification (H1, H2)

For **H1** (partial gamification improves points) and **H2** (partial gamification improves final grades), the results did not show significant differences compared to the control group:

Table 2: Academic Performance For Partial Gamification Group

Group	Additional Points (0-20)	Total Points (0-100)	Final Grade (5-10)
Control Group	9.16	64.75	6.98
Partial Gamification	9.65	67.51	7.18
F-value	0.369	1.921	0.791
p-value	0.545	0.169	0.376

Source: Author's work

No significant differences were observed in additional points ($p = 0.545$), total points ($p = 0.169$), or final grades ($p = 0.376$) between the control and partial gamification groups. Thus, **H1** and **H2** were rejected, indicating that partial gamification does not significantly improve academic performance.

Full Gamification (H3, H4)

For **H3** (full gamification improves points) and **H4** (full gamification improves final grades), the results were much more favourable. The full gamification group performed significantly better than the control group in all measures:

Table 3: Academic Performance for Full Gamification Group

Group	Additional Points (0-20)	Total Points (0-100)	Final Grade (5-10)
Control Group	9.16	64.75	6.98
Full Gamification	15.89	72.57	7.77
F-value	96.039	19.972	15.950
p-value	< 0.001	< 0.001	< 0.001

Source: Author's work

The analysis revealed significant differences between the control and full gamification groups in additional points ($p < 0.001$), total points ($p < 0.001$), and final grades ($p < 0.001$). Therefore, **H3** and **H4** are supported, showing that full gamification leads to improved academic performance.

The results provide clear evidence that **partial gamification** does not significantly enhance academic performance, as reflected in both additional points and final grades. This suggests that partial gamification elements alone may not be sufficient to impact students' learning outcomes meaningfully.

In contrast, **full gamification** demonstrates a marked improvement in all performance metrics. Students in the fully gamified environment scored significantly higher on additional points, total points, and final grades compared to the control group. These findings underscore the effectiveness of full gamification in fostering better academic outcomes, likely due to the deeper engagement and motivation that comprehensive gamification strategies provide.

Discussion

The findings of this study underscore the importance of adopting a comprehensive approach to gamification in higher education. The evidence indicates that full gamification has a significant and positive impact on academic performance, with students in the fully gamified group achieving higher additional points, total points, and final grades compared to both the control group and the partially gamified group. This suggests that a fully integrated gamification environment effectively enhances student engagement and motivation, leading to improved academic outcomes. These results align with existing literature, which highlights the efficacy of immersive gamified systems in fostering meaningful and sustained learning experiences (Hamari et al., 2014; Seaborn & Fels, 2015). By fully embedding game elements throughout the educational process, students are not only encouraged to participate actively but also to engage in deeper learning practices that contribute to their overall success (Kapp, 2012; Landers & Landers, 2014).

The success of full gamification can be attributed to its capacity to fulfil key psychological needs identified in self-determination theory: autonomy, competence, and relatedness (Deci & Ryan, 2000). Through the use of structured narratives, progressive challenges, and opportunities for collaboration, the fully gamified environment appears to have created a compelling and rewarding learning experience.

The sense of achievement gained from completing levels, earning rewards, and meeting goals likely reinforced students' intrinsic motivation. Additionally, the inclusion of team-based and competitive tasks may have fostered a sense of community and social connection, which are critical motivators in educational settings (Nicholson, 2015; Deterding et al., 2011). These social interactions and peer-driven dynamics play a pivotal role in sustaining engagement over time. In contrast, the partial gamification approach did not utilize these elements as effectively, potentially explaining its more limited impact on academic performance.

Partial gamification, while simpler to implement, failed to deliver comparable improvements in students' academic metrics. Features such as points, badges, and leaderboards can be effective for generating short-term engagement, but they may lack the depth and coherence needed to bring about substantial changes in learning outcomes (Buckley & Doyle, 2016; Hanus & Fox, 2015). Without a comprehensive framework to integrate these game mechanics into the overall course structure, partial gamification risks being perceived as superficial or disconnected from the learning objectives. This limitation highlights the need for careful design and implementation of gamification strategies. Educators must ensure that game elements are not merely additive features but are deeply integrated into the pedagogical approach, providing a cohesive and immersive experience that aligns with the curriculum's broader goals (Kim, 2015).

Interestingly, the study also revealed that neither partial nor full gamification had a significant effect on student satisfaction. This finding raises important questions about the broader role of gamification in higher education. While gamification can create a more engaging and interactive learning environment, it may not address all dimensions of the student experience. Factors such as the quality of instructional delivery, the relevance and clarity of course content, and individual preferences for learning styles may play a more substantial role in shaping student satisfaction (Seemiller & Grace, 2016). Furthermore, satisfaction is a complex construct influenced by emotional, social, and cognitive factors. It is possible that while gamification improves specific academic and motivational metrics, its impact on satisfaction requires complementary strategies, such as incorporating student feedback, enhancing the usability of digital tools, and ensuring that gamified elements do not overwhelm or distract from the learning process (Nicholson, 2015).

Another consideration is the potential variability in how students perceive and respond to gamified learning environments. For instance, individual differences such as prior gaming experience, attitudes toward competition, or preferences for collaborative versus individual learning may influence the effectiveness of gamification. These nuances suggest that while full gamification can produce statistically significant improvements in academic performance, its broader application must be tailored to diverse student needs and expectations (Gefen & Straub, 1997; Hamari & Koivisto, 2015). This underscores the importance of adopting a flexible and student-centred approach when designing gamified courses. Incorporating adaptive gamification systems, which adjust game elements based on student preferences and performance, could address this variability more effectively.

The findings demonstrate the considerable potential of full gamification to enhance academic performance and motivation, particularly when implemented as a cohesive and immersive system. However, the lack of impact on student satisfaction highlights the need for a more nuanced approach that considers other dimensions of the educational experience. While gamification can be a powerful tool for driving engagement and achievement, it should be complemented by other pedagogical strategies to create a holistic and fulfilling learning environment. This multidimensional perspective will help educators leverage the strengths of gamification while addressing its limitations to meet the complex needs of students in higher education.

Conclusion

The goal of this study was to assess the impact of gamification on higher education by examining its effects on academic performance, internal motivators, and student satisfaction. A total of 162 students participated, divided into three groups: a control group, a group with partial gamification, and a group with full gamification. The study utilized statistical methods, including Cronbach's Alpha for reliability, Chi-Square tests for group homogeneity, and Levene's tests for variance homogeneity, to validate the results.

The results show that full gamification significantly enhances academic performance, with students in the fully gamified group achieving higher scores and final grades than those in the control or partially gamified groups. Notably, full gamification also had a more substantial positive effect on internal motivators like autonomy, goals, and social interaction. Students exposed to full gamification reported higher levels of motivation and engagement, particularly in setting and achieving personal goals. These findings suggest that a comprehensive gamification approach is more effective in driving student engagement and academic outcomes compared to a partial implementation.

However, while full gamification improved performance and internal motivators, neither full nor partial gamification significantly impacted overall student satisfaction. This indicates that while gamification may boost academic success and motivation, it does not automatically translate into higher satisfaction levels. This highlights a need for educators to explore other factors beyond gamification, such as course design or teaching methods, to enhance student satisfaction.

These findings offer critical insights for educators and policymakers aiming to improve academic outcomes through gamification. Implementing a fully gamified environment that focuses on autonomy, goal-setting, and social interaction can significantly improve student performance and motivation. Yet, to increase satisfaction, additional strategies that address the broader learning experience may be required.

Future research could investigate other variables, such as the long-term effects of gamification on retention or the role of external motivators in enhancing student satisfaction. Expanding the research to different educational contexts and

demographics could also help determine whether these findings are generalizable. This study contributes to the growing body of evidence supporting gamification in education but also emphasizes the importance of a holistic approach to student engagement and satisfaction.

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GENDER DIFFERENCES IN GEN Z IN GAMIFIED APP ENGAGEMENT: THE CASE OF THE MOJDDV APP

Saso JOSIMOVSKI

Faculty of Economics – Skopje, North Macedonia
saso.josimovski@eccf.ukim.edu.mk

Lidija PULEVSKA IVANOVSKA

Faculty of Economics – Skopje, North Macedonia
lidija.pulevska@eccf.ukim.edu.mk

Marina MIJOSKA

Faculty of Economics – Skopje, North Macedonia
marina.mijoska@eccf.ukim.edu.mk

Abstract

Background: This study examines gender differences in Generation Z's engagement with the MojDDV app, a gamification initiative designed to reduce tax evasion and promote fiscal transparency in North Macedonia.

Objectives: The research aims to explore how gender shapes app usage and the influence of key factors—performance expectancy, effort expectancy, social influence, and facilitating conditions—on behavioral intention to use the app.

Methodology: A structured questionnaire was distributed to 120 Generation Z users of the MojDDV app, equally representing male and female participants. The data were analyzed using descriptive and inferential statistics, including independent samples t-tests and multiple regression analysis, to identify gender-specific engagement patterns.

Findings: The findings reveal significant gender differences, with females reporting higher levels of social influence and overall engagement with the app compared to males. Social influence emerged as the most significant predictor of behavioral intention, particularly for female users, while facilitating conditions also played a key role in driving app usage. Conversely, performance expectancy and effort expectancy showed no significant gender differences, though both positively influenced overall app engagement. These results highlight the importance of gender-specific strategies to enhance engagement with government-led gamification initiatives. Leveraging social networks and providing reliable technical support can significantly increase app adoption, particularly among women, fostering broader participation in digital fiscal systems.

Keywords: Gender Differences, Gamification, Fiscal Transparency, Youth Engagement, Generation Z

JEL classification: H26, M15, D83, O33, J16

Introduction

The shadow economy, encompassing economic activities that are neither officially reported nor taxed, presents a persistent challenge to governments globally, particularly in developing economies. In North Macedonia, the shadow economy constitutes a significant portion of the national GDP, fueling tax evasion and constraining the government's ability to generate public revenue. According to the International Monetary Fund (IMF), the shadow economy in North Macedonia is estimated to account for approximately 38% of the GDP (IMF, 2021). To combat this issue, the North Macedonian government launched the MojDDV app in 2019 as part of a comprehensive strategy to reduce tax evasion and encourage citizen participation in the formal fiscal system.

The MojDDV app employs a gamification model, offering financial incentives for users to scan their purchase receipts and receive partial refunds on the value-added tax (VAT) paid. Its primary objective is to enhance tax compliance and fiscal transparency by motivating citizens to request and scan receipts, thereby curtailing opportunities for businesses to avoid VAT reporting. Since its introduction, the app has registered over 500,000 users and has significantly increased VAT reporting rates (Akademik, 2021). By blending financial incentives with engaging digital tools, the app transforms tax compliance into an interactive and rewarding process for users.

Despite the documented success of the MojDDV initiative, little research has been conducted on the role of gender differences in app engagement, particularly among Generation Z. As digital natives, members of Generation Z are uniquely equipped to engage with gamified applications. However, studies indicate that gender may influence how users interact with technology, with men and women often responding differently to gamification elements, ease of use, and social influence (Venkatesh et al., 2003; Hamari & Koivisto, 2015). Understanding these gender-based engagement patterns is essential for assessing the app's broader societal impact and optimizing its potential to drive widespread tax compliance.

This study aims to investigate the gender differences in MojDDV app engagement among Generation Z users. Specifically, it explores how male and female users differ in their interaction with the app, usage frequency, and the impact of gamification elements on their engagement. By analysing these patterns, the research seeks to provide actionable insights for public-sector gamification initiatives, offering recommendations to tailor such tools to diverse demographic groups and maximize their effectiveness.

Objectives of the study

- To investigate whether **gender** influences the engagement with the MojDDV app among Generation Z.
- To explore **differences in usage patterns** between male and female users.
- To analyze how the app's **gamification features** impact male and female users differently.
- To provide recommendations for improving gender-specific engagement in

public sector digital initiatives.

As digital tools increasingly underpin efforts to promote tax compliance and public participation in governance, understanding gender differences in digital engagement has become imperative. Insights derived from this study not only enrich the growing body of literature on gender and technology but also provide valuable guidance for policymakers and app developers in designing inclusive and effective public-sector tools. By addressing the needs and preferences of diverse demographic groups, such tools can achieve greater societal impact. Moreover, this study's focus on Generation Z offers critical perspectives on the behaviors and preferences of a demographic poised to shape the future of digital governance.

The role of gender in technology adoption has been widely documented, with research consistently showing that males and females approach digital platforms differently. These differences are particularly evident in gamification and mobile app engagement. For example, Venkatesh et al. (2003) found that social influence significantly impacts technology adoption among females, whereas performance expectancy holds greater importance for males. Similarly, Hamari and Koivisto (2015) demonstrated that gamified systems appeal to males through competitive and reward-driven features, while females are more motivated by collaborative and community-oriented elements. These distinctions suggest that gender differences likely influence how Generation Z users in North Macedonia engage with the MojDDV app, which leverages both gamification incentives and social mechanisms to encourage tax compliance.

This study aims to bridge the knowledge gap surrounding the gender-specific dynamics of government-led gamification initiatives. By analyzing how male and female Generation Z users interact with the MojDDV app, the research seeks to uncover actionable insights that can inform the design of digital public services. Understanding these gendered patterns of engagement is essential for developing targeted strategies to maximize user participation, foster inclusivity, and enhance the effectiveness of such initiatives.

Literature Review

Gamification in public sector initiatives

Gamification, defined as the application of game-like elements (e.g., point scoring, competition, rewards) to non-game contexts, has been increasingly adopted by governments and public institutions to encourage citizen engagement and participation. The goal is to create engaging experiences that drive behavior change by leveraging the psychological mechanisms found in games (Hamari, Koivisto, & Sarsa, 2014). Gamification has been effectively applied in a variety of public-sector initiatives, including education, healthcare, and tax compliance. In the context of tax systems, gamification can enhance user engagement by turning otherwise mundane tasks—such as scanning receipts or submitting tax filings—into rewarding activities.

Buheji (2019) notes that the use of gamification in public sector initiatives can yield tangible results even in a short time-frame, emphasizing the potential of the mechanism. Governments have been using gamification for over a decade in various initiatives, such as lotteries, feedback initiatives or recruitment (Chin, 2016), while Kazhamikiakin et al. (2015) note successful gamification usage for incentivizing sustainable urban mobility. The use of gamification in fiscal systems is particularly relevant in combating the shadow economy, a long-standing issue in many countries, including North Macedonia. The MojDDV app exemplifies this approach by offering citizens a financial incentive to scan their receipts, thereby encouraging VAT compliance. Previous studies have shown that gamified applications can significantly increase motivation and engagement in a variety of sectors, particularly when users are incentivized with tangible rewards. However, the success of such initiatives can vary based on the user's demographic characteristics, including gender, which plays a significant role in technology adoption and interaction with gamified elements.

Research has also shown that gamification's effectiveness is influenced by the context of its application. Studies in the healthcare sector, such as by Sardi et al. (2017), reveal that gamification can motivate sustained behaviour change, particularly when designed with user-centric principles.

Gender differences in technology adoption and gamification

The Unified Theory of Acceptance and Use of Technology (UTAUT) model, developed by Venkatesh et al. (2003), provides a comprehensive framework for understanding technology adoption. Li and Glass (2008) note that males might move faster in technology adoption, while Kotze et al., support the theory that there are no significant gender differences in recent years. The model identifies key factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions that influence a user's behavioural intention to use technology. Notably, the UTAUT model also highlights that demographic factors, including gender, can moderate the relationships between these constructs and technology adoption (Chen et al., 2024).

Gender differences in technology adoption are well-documented in the literature. Studies have found that males and females interact with technology in different ways, influenced by factors such as motivation, social context, and perceived ease of use (Venkatesh et al., 2003). For example, males are often driven by performance-related factors, such as the perceived usefulness of a technology, whereas females are more likely to be influenced by social factors, such as peer recommendations or societal expectations (Gefen & Straub, 1997). These differences extend to the use of gamified systems, where males tend to respond more to competitive elements and rewards, while females may be more motivated by collaborative and community-driven aspects (Hamari & Koivisto, 2015).

Recent research has expanded on these gendered dynamics in gamification. For instance, Koivisto and Hamari (2019) found that women are more likely to engage with

gamified systems that emphasize social connectedness and collaboration, while men prefer elements that reward individual achievement and competitiveness. Similarly, Turel and Qahri-Saremi (2018) observed that males were more likely to be motivated by task-related outcomes in gamified educational tools, whereas females prioritized ease of navigation and interpersonal interactions.

Gamification and gender in fiscal initiatives

There has been limited research on the role of gender in gamified tax compliance initiatives, particularly in developing economies like North Macedonia. However, studies in related fields provide some insights. Research has shown that men are more likely to engage with competitive elements in gamified systems, such as leaderboards or reward points, which may enhance their motivation to use such platforms (Werbach & Hunter, 2012). Women, on the other hand, often place greater emphasis on the ease of use and social aspects of these systems, preferring platforms that foster a sense of community and support (Bittner & Shipper, 2014).

In the context of the MojDDV app, these gender differences could manifest in how males and females engage with the app's various gamification elements. For example, men may be more likely to participate in the app's reward-based system, while women might be more influenced by social factors, such as peer recommendations or the perceived fairness of the tax system. Understanding these differences is critical for designing public sector initiatives that are inclusive and appeal to a diverse user base.

Generation Z and digital engagement

Generation Z, born between the mid-1990s and early 2010s (Jayatissa, 2023), is the first generation to have grown up with digital technology as an integral part of everyday life. As digital natives, members of Gen Z are highly familiar with mobile apps, social media platforms, and other digital tools, making them prime candidates for engaging with gamified government initiatives like MojDDV (Seemiller & Grace, 2016). However, despite their technological fluency, Gen Z's engagement with digital platforms can still be influenced by demographic factors such as gender.

Studies on Gen Z's technology use have shown that while both males and females are highly engaged with digital tools, their reasons for engagement differ. Males are more likely to be motivated by competition, efficiency, and immediate rewards, while females often prioritize ease of use, design aesthetics, and social interaction (Smith, 2017). In the context of the MojDDV app, these gender-based preferences could influence how effectively the app engages its users and drives VAT compliance.

Relevance of gender-based research in public policy

Research into gender differences in technology adoption is particularly relevant for

policymakers who aim to design effective and inclusive digital platforms. By understanding how men and women engage differently with gamified public sector initiatives, governments can tailor their strategies to maximize user engagement. This is especially important in initiatives like MojDDV, which rely on widespread public participation to achieve their goals of reducing the shadow economy and increasing tax compliance.

Studies have suggested that public policy initiatives that do not account for gender differences in technology use may fail to reach certain segments of the population, thereby reducing their overall effectiveness (Cui, 2016). For example, if an app like MojDDV primarily appeals to one gender, it may not achieve the desired level of engagement across the entire population, limiting its impact on tax compliance. Therefore, a nuanced understanding of gender-based engagement patterns can help policymakers design more effective interventions.

Despite the growing body of research on gender differences in technology adoption and gamification, there is a lack of studies that specifically focus on gender differences in government-led gamification initiatives for fiscal compliance. While studies have explored how men and women differ in their engagement with commercial gamified systems, there is limited understanding of how these dynamics play out in public sector contexts, particularly in developing economies like North Macedonia. This paper seeks to fill this gap by analyzing gender differences in Generation Z's engagement with the MojDDV app, providing insights that can inform the design of more inclusive and effective public policy tools.

Methodology

This research employs a quantitative approach to examine gender differences in the usage of the MojDDV app among Generation Z users. The study focuses on understanding the role of gender in app engagement by investigating the frequency of use, responses to gamified features, and the influence of social factors.

Research design

A structured questionnaire served as the primary data collection instrument. The questionnaire was designed to capture a comprehensive range of variables, including:

- **Frequency of app usage:** How often users interacted with the MojDDV app.
- **User satisfaction:** Overall satisfaction with the app's features and performance.
- **Perceived ease of use:** How intuitive and user-friendly respondents found the app.
- **Engagement with gamification elements:** Interaction with specific features such as rewards, leaderboards, and scanning incentives.
- **Social influence:** The role of peer and societal factors in influencing app usage.

The questions were primarily closed-ended and measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to facilitate quantitative analysis.

Demographic information, including age, gender, and education level, was also collected to contextualize the results.

Sampling and data collection

The target population for this study comprised Generation Z users (aged 18–24) who were registered users of the MojDDV app. To ensure the sample was representative of the target demographic:

- Respondents were required to have used the MojDDV app at least once in the past three months.
- A total of 120 valid responses were collected, with the gender distribution being 52% female and 48% male.

The questionnaire was disseminated online through multiple channels, including email, social media platforms, and MojDDV's official communication channels. Online distribution ensured wide reach and accessibility to the Generation Z population, known for its high digital literacy.

Data analysis

Data were analyzed using **SPSS (Statistical Package for the Social Sciences)** software. A variety of statistical techniques were employed to ensure robust analysis:

1. Descriptive Statistics:

- Calculated means, standard deviations, and frequency distributions to provide an overall picture of app engagement within the sample.
- Results were disaggregated by gender to identify trends and patterns specific to male and female users.

2. Inferential Statistics:

- **Independent samples t-tests:** Conducted to test for statistically significant differences between male and female users concerning frequency of use, satisfaction, perceived ease of use, and interaction with gamified features.
- **Chi-square tests:** Used to analyze associations between gender and categorical variables, such as participation in the reward system or frequency of scanning receipts.

3. Regression Analysis:

- **Logistic regression:** Performed to evaluate the influence of gender, perceived ease of use, and social influence on the likelihood of engaging with the app's gamification features. Gender served as a categorical predictor, with additional predictors including social influence and perceived ease of use.
- The model's explanatory power was assessed using R^2 values, and coefficients were examined to interpret the relative importance of each factor.

4. Reliability Testing:

- **Cronbach's Alpha:** Used to assess the internal consistency of multi-item

scales measuring constructs like perceived ease of use, satisfaction, and social influence. All scales demonstrated acceptable reliability, with alpha values exceeding the standard threshold of 0.7.

Results

Descriptive statistics

The first section of the results focuses on the descriptive statistics of the study sample. Of the 120 respondents, 65.4% reported that they had used the MojDDV app, indicating a solid level of engagement among the surveyed population. Gender distribution was relatively balanced, with 52% of respondents identifying as female and 48% as male. Most of the respondents, 97.5%, were aged between 18-24 years, consistent with the study's focus on Generation Z.

In terms of MojDDV app usage, there were noticeable gender differences. Among female respondents, 71.4% reported using the MojDDV app, compared to 58.6% of male respondents. This suggests that women in Generation Z may be more engaged with the app than their male counterparts. Further, when asked about scanning receipts, 85% of female users reported scanning all or most receipts, compared to 77% of male users.

Gender differences in UTAUT constructs

To understand the gender differences in perceptions and experiences with the MojDDV app, we calculated the mean scores for the UTAUT constructs (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) across both male and female respondents. The table below shows the average scores for each construct by gender.

Table 1: Average Scores for UTAUT Constructs

UTAUT Construct	Mean (Male)	Mean (Female)	Standard Deviation (Male)	Standard Deviation (Female)
Performance Expectancy	4.10	4.20	0.85	0.80
Effort Expectancy	3.78	3.88	0.92	0.89
Social Influence	3.76	4.21	1.02	1.08
Facilitating Conditions	3.50	3.44	0.90	0.91

Source: Author's work

Overall, females had higher average scores across most UTAUT constructs, particularly for **Social Influence**, where the mean score for female respondents was 4.21, compared to 3.76 for males. This suggests that social factors play a more significant role for women in engaging with the MojDDV app. Performance Expectancy was also slightly higher for females (4.20) than males (4.10), indicating that women perceive the app as slightly more useful in achieving its goal of enhancing tax compliance. Interestingly, males reported slightly higher scores for Facilitating

Conditions, suggesting they may feel more confident in the technical resources and support available for using the app.

Inferential statistics

To examine whether these gender differences were statistically significant, independent samples t-tests were conducted for each UTAUT construct. The results of these tests are summarized below.

Table 2: Independent T-Test

UTAUT Construct	t-value	p-value
Performance Expectancy	0.678	0.499
Effort Expectancy	0.679	0.498
Social Influence	2.153	0.034*
Facilitating Conditions	0.292	0.771

Source: Author's work

The results show that the difference in **Social Influence** between males and females was statistically significant ($t = 2.153$, $p = 0.034$), with females reporting significantly higher levels of social influence on their use of the MojDDV app. This finding supports the hypothesis that women are more likely to be influenced by their social networks in adopting and using the app. However, the differences in Performance Expectancy, Effort Expectancy, and Facilitating Conditions were not statistically significant, suggesting that these factors do not differ substantially by gender in this sample.

Regression analysis

To further investigate the role of gender in app engagement, a multiple regression analysis was performed using gender, perceived ease of use (Effort Expectancy), and Social Influence as independent variables, and behavioral intention to use the MojDDV app as the dependent variable. The results of the regression analysis are presented below.

Table 3: Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.622	0.387	0.368	0.619

Source: Author's work

The regression model explained 38.7% of the variance in behavioral intention ($R^2 = 0.387$), indicating a moderate relationship between the predictors and behavioral intention. Gender and Social Influence emerged as significant predictors of behavioral intention, while Effort Expectancy was not statistically significant.

Table 4: Regression Model

Predictor	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t-value	p-value
(Constant)	0.891		2.476	0.015
Gender (Female)	0.312	0.299	2.763	0.007*
Social Influence	0.399	0.403	4.213	<0.001*
Effort Expectancy	0.112	0.105	1.126	0.262

Source: Author's work

The regression results indicate that **gender** is a significant predictor of behavioral intention to use the MojDDV app, with females being more likely to report higher engagement ($B = 0.312$, $p = 0.007$). **Social Influence** was also a strong predictor of behavioral intention ($B = 0.399$, $p < 0.001$), reinforcing the finding that social factors play a crucial role in app usage. However, **Effort Expectancy** did not significantly predict behavioral intention ($B = 0.112$, $p = 0.262$), suggesting that perceived ease of use was not a major factor in determining whether respondents intended to continue using the app.

Discussion

The findings of this study offer valuable insights into how gender differences influence engagement with the MojDDV app, a gamification initiative aimed at fostering tax compliance. While the results establish Social Influence as a critical predictor of behavioral intention, especially for females, the implications of these differences extend beyond the statistical outcomes. This discussion section explores the broader context of these findings, shedding light on their significance and potential applications in digital public service design.

The higher levels of engagement and Social Influence among female respondents point to the nuanced role of social validation and peer dynamics in their interaction with gamified platforms. This aligns with existing research that underscores the importance of community-oriented features in driving technology adoption among women (Hamari & Koivisto, 2015). The MojDDV app's success in leveraging social dynamics, such as peer recommendations and societal norms, suggests that government-led gamification initiatives must incorporate socially engaging elements tailored to women's preferences. Features like referral systems, community challenges, or leaderboards emphasizing collaboration rather than competition could further amplify this effect.

Conversely, the study highlights that men, while slightly less influenced by Social Factors, are equally motivated by the app's gamified design. The absence of significant differences in Performance Expectancy between genders suggests that both men and women recognize the app's utility in achieving its intended purpose—promoting tax compliance. This insight supports the idea that universal features, such as transparent reward structures and ease of use, remain critical for engaging all demographic

groups.

Interestingly, the non-significant role of Effort Expectancy in predicting behavioral intention contrasts with much of the UTAUT literature, where ease of use is typically a strong determinant of technology adoption (Venkatesh et al., 2003). This finding may reflect the digital fluency of Generation Z, for whom navigating mobile applications and gamified interfaces is intuitive and rarely perceived as a barrier. As a result, public sector applications targeting this demographic might prioritize innovation and functionality over simplicity, assuming a baseline level of technical competence among users.

The role of Facilitating Conditions, while not strongly gendered, emerges as a key factor in sustaining long-term engagement. Ensuring that users have access to stable technological infrastructure, intuitive interfaces, and responsive customer support can mitigate potential frustrations that deter sustained usage. For women, in particular, the perception of adequate support systems may enhance trust in the platform, aligning with findings that emphasize women's reliance on dependable technological frameworks (Gefen & Straub, 1997).

Another critical consideration is the interplay between intrinsic and extrinsic motivators. While the MojDDV app successfully incentivizes user participation through financial rewards, the lack of significant influence from Performance Expectancy or Effort Expectancy on behavioral intention suggests that intrinsic motivators—such as a sense of civic duty or social responsibility—may not be fully leveraged. Future iterations of the app could benefit from incorporating features that emphasize these intrinsic values, such as educational elements highlighting the societal benefits of tax compliance or narratives that connect individual actions to collective outcomes.

Conclusion

This study examined gender differences in Generation Z's engagement with the MojDDV app, a gamification initiative designed to promote tax compliance and reduce the shadow economy in North Macedonia. Using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, the research focused on how key factors—Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions—shape behavioral intention to use the app, with a particular emphasis on gender-specific patterns.

The findings highlight several important insights:

1. **Social Influence as a Key Driver:** Social Influence emerged as the strongest predictor of behavioral intention, particularly for female users. Women in Generation Z showed higher levels of engagement with the app, driven by the impact of peer networks and social validation. This underscores the need for policymakers to prioritize strategies that leverage social connections, such as peer recommendations, referral programs, and community engagement

campaigns, to boost app adoption among women.

2. **The Role of Facilitating Conditions:** Facilitating Conditions also played a significant role in app engagement for both genders, emphasizing the importance of reliable technology and user support. Ensuring that users feel confident in the app's infrastructure and accessibility is critical for sustained engagement across the board.
3. **Limited Gender Differences in Other Constructs:** While Performance Expectancy and Effort Expectancy were positively associated with behavioral intention, they did not exhibit significant gender differences. Both men and women generally found the app useful for promoting tax compliance and easy to use. However, the stronger influence of Social Influence on women suggests that tailored approaches are necessary to fully engage this demographic.

These findings demonstrate that while universal factors like technical reliability are crucial, gender-specific strategies can significantly enhance the effectiveness of gamification initiatives. For women, incorporating social elements into app design and promotional efforts may be particularly impactful, while for men, focusing on performance-related outcomes may align better with their engagement drivers.

The implications for policymakers are clear: to maximize the reach and impact of gamification initiatives like the MojDDV app, strategies must balance universal technical reliability with gender-tailored engagement mechanisms. Addressing the specific motivators for different demographic groups can help ensure inclusivity and effectiveness.

Future research should explore additional variables, such as trust in government, perceived fairness, and cultural attitudes toward taxation, to build a more comprehensive understanding of factors influencing app adoption. Expanding the demographic scope to include other age groups and socioeconomic strata could further clarify whether the observed gender dynamics hold across different populations. Longitudinal studies tracking user behavior over time would also provide valuable insights into the long-term efficacy of gamified public-sector initiatives like MojDDV.

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DIGITAL NOMADISM IN EUROPE: CHALLENGES, OPPORTUNITIES, AND POLICY IMPLICATIONS

Christoph LUTZ

BI Norwegian Business School Oslo, Norway

christoph.lutz@bi.no

Cristina MIGUEL

University of Reading Whiteknights House, United Kingdom

c.miguel@reading.ac.uk

Abstract

Background: Digital nomads are professionals who travel while working remotely. The digital nomad lifestyle has seen rapid growth in recent years, propelled by the Covid-19 pandemic and increasing flexibility in working arrangements. As remote work becomes increasingly viable and popular, Europe has seen a significant rise in digital nomads.

Objectives: This paper offers an overview of the emerging digital nomad ecosystem in Europe, showing the challenges and opportunities faced by different stakeholders, particularly in a Southern European context.

Methodology: Drawing on the emerging scientific literature and broader sources such as news stories, we examine the implications of digital nomadism for key stakeholder groups in Europe, namely digital nomads themselves, European destinations, residents, and businesses.

Findings: We reflect on challenges such as negative perceptions by residents, loneliness among digital nomads, and legal uncertainty. Conversely, we highlight the opportunities, including the potential for economic diversification, the attraction of global talent, and the fostering of cross-cultural exchange. The chapter offers examples across European contexts, showing how different regions are adapting to digital nomads. Finally, we discuss policy implications, showing the need for supportive frameworks that can enhance the positive impacts of digital nomadism while addressing its challenges. Our conference paper thus contributes to the broader discourse on the future of work and mobility in a digitally connected Europe.

Keywords: Digital Nomads, Future of Work, Remote Work, Destination Management

JEL classification: Z32, Z38

Introduction

In recent years, digital nomadism has evolved from a niche subculture into a rapidly growing lifestyle, driven by technological advancements and shifts in workplace practices (Miguel et al., 2023a, 2023b, 2024). Digital nomads are individuals who leverage digital technologies to work remotely while maintaining a lifestyle centred around geographical flexibility (Cook, 2023; Hannonen, 2020; Mancinelli, 2020; Reichenberger, 2018). This phenomenon is characterized by the convergence of work and travel, where professionals can sustain their careers while moving relatively frequently between different locations. The rise of digital nomadism is connected to broader socio-economic trends, particularly the increasing prevalence of remote work and the growing digital and physical infrastructures that supports such a lifestyle (Chevtaeva & Denizci-Guillet, 2021; Jarrahi et al., 2021; Orel, 2019) as well as the quest for individualism and freedom (Atanasova et al., 2024; Prester et al., 2023; Xiao & Lutz, 2024).

The concept of digital nomadism is not entirely new (Makimoto & Manners, 1997). However, its expansion in scale and visibility has been particularly notable since the start of the COVID-19 pandemic (Ehn et al., 2022; Pita et al., 2022). The global health crisis accelerated the adoption of remote work, as businesses were forced to adapt to lockdowns and social distancing measures. In many cases, employees could work from home, and as restrictions eased, some took the opportunity to work from anywhere (Hensellek & Puchala, 2021). Digital nomadism, which was once the preserve of freelancers and entrepreneurs in the technology and creative industries, has now broadened to encompass a wider range of professionals from various sectors, including corporate employees, consultants, and academics (Cook, 2023).

Europe has been at the forefront of this trend, with numerous destinations emerging as digital nomad hubs (Angiello, 2022; Demaj et al., 2021). Countries such as Portugal, Spain, Croatia, and Estonia have actively courted digital nomads, offering visa schemes, coworking spaces, and digital infrastructure to attract this mobile workforce (Bednorz, 2024; Danko et al., 2024; Sánchez-Vergara et al., 2023). At the same time, less-established digital nomad destinations, such as those in rural areas, are also seeking to capitalize on the trend, recognizing the potential for economic development and innovation that digital nomads can bring (Kelly, 2024; Tsvetcoff et al., 2024). As Europe grapples with economic recovery in the post-pandemic era, digital nomadism has been viewed by some policymakers and stakeholders as a potential avenue for diversifying local economies, attracting global talent, and fostering international collaboration (Van den Broek et al., 2023).

Despite the enthusiasm about digital nomadism, this lifestyle is not without its challenges. Digital nomads often face difficulties related to legal status, taxation, and residency, as their mobility does not always align with existing regulatory frameworks (Cook, 2022; Macinelli & Germann Molz, 2024). While some countries have introduced digital nomad visas to address these issues, the legal landscape remains complex and fragmented across Europe (Sánchez-Vergara et al., 2023). Furthermore, there is growing concern about the socio-cultural impact of digital nomads on local

communities (McElroy, 2020). In popular destinations, residents have expressed concerns about rising housing costs, gentrification, and the transient nature of digital nomad communities, which can lead to social disconnection (Bozzi, 2020). For digital nomads themselves, challenges such as loneliness, burnout, and maintaining a sense of belonging are common, as they navigate life in different locations without the stable social networks that more traditional forms of living and working provide (De Loryn, 2022; Miguel et al., 2023a, 2024).

In addition to the challenges, digital nomadism presents significant opportunities for Europe. From an economic perspective, digital nomads are dynamic consumer base for local businesses, particularly in sectors such as hospitality, tourism, and real estate (Chevtaeva & Denizci-Guillet, 2021; Hannonen et al., 2023; Xiao & Lutz, 2024). Furthermore, by attracting digital nomads, destinations can position themselves as innovation hubs, fostering connections between local entrepreneurs and global networks of knowledge and expertise. Digital nomads often bring valuable skills and experiences from around the world, which can enhance local industries and stimulate new business ventures. Moreover, digital nomadism can contribute to cultural exchange, as individuals from different countries and backgrounds live and work alongside each other, creating a unique cosmopolitan atmosphere in host destinations.

This paper provides an overview of the digital nomad ecosystem in Europe, highlighting the key challenges and opportunities faced by different stakeholders. We consider digital nomads themselves, local communities, destination managers and tourist businesses, and governments/the state as the core stakeholders. Drawing on the emerging scientific literature on digital nomadism, as well as broader sources such as news stories and policy reports, we paint a comprehensive picture of the current digital nomad landscape in Europe. In doing so, we offer insights into how digital nomadism is reshaping the future of work and mobility in Europe.

The chapter is structured as follows. In the next section, we outline the methods used to gather data on digital nomadism in Europe, including the selection of case studies from different European contexts. In the results section, we present findings on state of digital nomadism in Europe based on an analysis of the different stakeholders mentioned, including strategies employed by European destinations to attract digital nomads, and the responses from local residents and businesses. The discussion section reflects on the implications of these findings, with a particular focus on the need for supportive legal and regulatory frameworks that can maximize the benefits of digital nomadism while addressing its challenges. By providing illustrative examples and policy recommendations, this paper contributes to the broader discourse on the future of work and mobility in a digitally connected Europe.

Methods

While we did not conduct a comprehensive systematic literature review, we searched Web of Science and Google Scholar for relevant literature on the topic of digital nomads/digital nomadism in Europe. On Web of Science and as of early October 2024, only 14 entries matched the search strings “digital nomad*” AND europ* (156 entries match the search string “digital nomad*” in general). Table 1 displays these 14 articles with key findings for twelve of them. On Google Scholar, this search yielded 1770 results. Thus, a lot of grey literature on this topic exists, including conference proceedings, Master’s and PhD theses and news articles. In addition to the literature search, we relied on our existing broad and holistic knowledge of the digital nomad literature through extensive empirical research on the topic in the last couple of years (e.g., Miguel et al., 2023a, 2023b, 2024; Xiao & Lutz, 2024). Complementing the literature search, we also broadened our scope to news articles. We used Google News to search for relevant news stories that feature the keywords above (“digital nomad” AND Europe, here without the wildcards), giving us a better understanding of the evolving landscape of digital nomadism in Europe.

Google News displayed 100 news stories, with the oldest from 26 August 2021 and the newest from 2 October 2024. The stories focused mostly on attractive digital nomad destinations (e.g., “5 best cities in Europe for digital nomads”, “I have visited every country in Europe and this was my favorite digital nomad destination”, “These are the best cities for UK digital nomads”), visa issues and questions (“Which European passport is best for digital nomads?”, “Cheapest digital nomad visas in Europe [2024]”, “The best EU digital nomad visas: Expert insights from Immigrant Invest”, “Best 6 EU-based digital nomad visas for 2024”) as well as socio-economic implications of digital nomadism (“Laptop squatters’: Cafes in Europe are fed up with space-hogging digital nomads”, “Economic momentum in Eastern Europe reshapes landscape for digital nomads and remote eDiscovery professionals”, “Workers in Portugal taking second job or emigrating as digital nomads push up costs”). The outlets ranged from established news sites such as *Bloomberg*, the *Economist*, *Euronews*, *Forbes* and *Business Insider* to more specialized tourism-, travel- and digital nomad-oriented sources such as *Travel Off Path*, *TimeOut*, *NomadCapitalist* and *Skift*. *Travel Off Path* was by far the most frequent source, making up one third (33) of the 100 stories.

Table 1: Web of Science Search Results and Key Findings

Reference	Key Findings
<i>Håkansson & Bejaković (2023)</i>	- The Croatian islands must shift from traditional tourism to digital nomadism to stimulate economic development. - Tolerance, especially towards immigrants and LGBTQ+ groups, alongside technological infrastructure like 5G, are key factors in attracting digital nomads to the Croatian islands. - The remoteness and tranquillity of Croatian islands, often seen as downside, can be an advantage for digital nomads who value isolation and do not need to commute physically to work.
<i>Bozzi (2024)</i>	- Digital nomads are not entirely free in their destination choice; essential factors such as internet connectivity, affordable living, and transport accessibility are crucial. - The mobility patterns of digital nomads vary, with some traveling quickly and globally, while others adopt slower, more sustainable mobility practices, raising questions about the long-term nature of the lifestyle. - Policymakers must balance opportunities and threats of digital nomadism, focusing on negative impacts like gentrification and socio-economic segregation while fostering economic and social integration.
<i>İlhan et al. (2024)</i>	- Digital nomads' destination choices are spatially clustered, with Asia, Europe, and America as the preferred regions, reflecting traditional tourism trends. - Safety is a crucial factor for digital nomads' destination choice, showing the importance of secure environments in attracting this demographic. - Marketing strategies and safety measures should be aligned with the preferences of digital nomads to enhance tourism sustainability.
<i>Parreño-Castellano et al. (2022)</i>	- Digital nomadism in Spain overlaps strongly with tourism, as digital nomads often choose destinations based on leisure considerations, rather than work-based criteria. - Public policies in Spain during the pandemic aimed to attract digital nomads, but they often reproduced uncritical narratives and overlooked socio-economic disparities and sustainability concerns. - Digital nomadism may contribute to income imbalances and precarious labour conditions, as many nomads choose destinations where their income offers comparative advantages.
<i>Angiello (2022)</i>	- Focus on two cases in Southern Europe: Madeira (Portugal) and Venice (Italy). Both stress the importance of infrastructure (internet and workspaces), strategic partnerships with local stakeholders, and community-building efforts to attract and retain digital nomads. - The "Digital Nomads Madeira Islands" project has been successful in attracting thousands of digital nomads through initiatives like free coworking (CW) spaces, reduced taxation (Madeira Free Zone scheme), and high-quality internet infrastructure, diversifying the island's economy. - In Venice, the "Veniwhere" initiative tries to reverse population decline and foster a thriving community of

	remote workers by offering soft landing services (visa, tax, and health insurance support), modern coworking spaces in historic buildings, and activities that integrate nomads with local artisans and businesses.
<i>Hannonen et al. (2023)</i>	- Gran Canaria has successfully integrated digital nomads into the local community, with digital nomads being viewed as “new locals”. - The pandemic accelerated the development of Gran Canaria as a digital nomad hotspot, accommodating digital nomads' working needs through co-living spaces and work-friendly accommodations within hotels. - Destinations like Gran Canaria must balance economic growth with preserving the quality of life for residents, to prevent unplanned, potentially negative social changes.
<i>McElroy (2020)</i>	- Digital nomadism in Cluj is intertwined with double dispossession: Roma communities are evicted by Western digital nomads and tech firms, while Roma identity is appropriated in technocapitalist narratives. - The arrival of digital nomads in Cluj is framed within a larger context of techno-imperialism, with digital nomadism reflecting Orientalist histories and legacies of racial and material dispossessions. - A connected approach is needed to understand these dispossessions, transcending simple comparisons and examining the historical, spatial, and narrative interconnections between urban transformation, racial banishment, and global capitalist expansion
<i>Mesquita et al. (2023)</i>	Excluded due to unavailability of the text and the text being in Portuguese
<i>Danko et al. (2024)</i>	- Co-working spaces in mid-sized cities in Central and Eastern Europe foster local stakeholder engagement and integrate digital nomads into local creative ecosystems. - Co-working spaces act as drivers of the creative economy by adapting to remote work and freelancing needs, often evolving into hybrid spaces like fablabs and makerspaces. - Despite positive outcomes, challenges such as market distortion from public investment and reliance on EU funds hinder real competition in shared spaces.
<i>Carreiras (2024)</i>	- A sharp contrast in housing conditions exists between migrant groups in Portugal, with lower-skilled migrants facing precarious housing, while others, including digital nomads, benefit from privileged access to the real estate market through programs like citizenship by investment. - Duality of public policies in Portugal: policies aiming to reduce housing inequalities for vulnerable migrants have limited scope, while investment-driven programs (e.g., for DNs) exacerbate housing imbalances. - The housing dynamics reflect Portugal's peripheral European status, showing that although legal norms exist to safeguard housing rights, structural issues like urban growth and unequal housing access persist.
<i>Erakovic & Bojanic (2023)</i>	Excluded due to lack of topical fit
<i>Avdikos et al. (2024)</i>	Co-working spaces in cities like Athens and Berlin shape consumption patterns of workers, including digital nomads, and act as mediators of financial and

	investment flows, contributing to transnational gentrification and urban transformation. • Digital nomads contribute to residential displacement in housing and local economies, as their economic superiority allows them to dominate local markets. • Co-working spaces are increasingly financialized, particularly in Berlin, as they adopt corporate logics and financial techniques.
<i>Keseru et al. (2021)</i>	• The digital nomads scenario, one of the preferred future scenarios selected by stakeholders, stresses the role of remote work and mobility in shaping Europe's transport and mobility system for 2030. • The methodology allows for a participatory process where stakeholders, including digital nomads, can evaluate and influence transport futures. • The study built a stakeholder community through continuous participation and feedback, resulting in the European Action Plan for User-Centric and Cross-Modal Transport in 2030.
<i>Rainoldi (2024)</i>	• The COVID-19 pandemic has made digital nomadism a mainstream phenomenon, where the traditional boundaries between work and leisure are increasingly blurred as digital nomads determine how, when, and where they work. • Typology of digital nomads, identifying six archetypes based on their border management practices in navigating the relationship between work and leisure.

Source: Author's work

Results

Table 2 shows an overview of key stakeholders in the digital nomad ecosystem in Europe and provides challenges and opportunities that we identified, based on the academic literature and news stories.

Table 2: Overview of Key Stakeholders in the Digital Nomad Ecosystem in Europe, Their Challenges, and Opportunities

Stakeholder	Opportunities	Challenges
<i>Digital nomads</i>	• Flexibility to work and travel simultaneously. • Access to diverse cultural experiences and networking opportunities. • Enhanced work-life balance.	• Legal uncertainty around taxation and visas. • Loneliness and lack of stable support networks. • Managing work across time zones. • Sustainability issues (maintaining digital nomadism over time)
<i>European destinations</i>	• Potential for economic diversification, especially in less-	• Strain on local infrastructure and services.

Stakeholder	Opportunities	Challenges
	- developed or rural areas. - Attraction of global talent and innovation.	Gentrification and rising costs of living.
<i>Residents</i>	- Cross-cultural interactions and knowledge exchange. - Potential economic benefits from increased spending by digital nomads.	- Rising housing prices and displacement. - Cultural tensions due to transient populations and lack of integration.
<i>Local businesses</i>	- Access to a new consumer base. - Opportunities for partnerships with nomad-driven businesses and services (e.g., Co-working spaces, local tours).	- Difficulty in forming long-term relationships with transient customers. - Potential competition with digital nomads running remote businesses.
<i>Governments/Polymakers</i>	- Opportunity to attract skilled professionals through digital nomad visas. - Potential for policy innovation and creating competitive advantages for destinations.	- Navigating complex issues around taxation, residency, and labour laws. - Balancing the needs of local populations with nomad-friendly policies.

Source: Author's work

Digital nomads

Although digital nomads frequently move between countries, 80 percent prefer to stay in one location for three to nine months, primarily due to visa restrictions and cost considerations (Gualdi, 2024). Many destinations have straightforward visa requirements. However, a person's country of origin can still heavily influence their travel options (O'Donoghue, 2024). Most digital nomads worldwide come from the US (46%), while six European countries are on the top 10 list, including the UK (7%), Russia (5%), Germany (5%), France (3%), The Netherlands (2%) and Spain (2%) (Statista, 2024a). The Nomad Passport Index (NPI) evaluates 199 passports worldwide based on factors such as visa-free access, global reputation, and taxation policies. The ranking also emphasizes dual citizenship opportunities and personal freedom (O'Donoghue, 2024). Eight out of the top ten positions were occupied by European countries. Switzerland secured the top spot, with Ireland and Portugal ranking second and third, respectively. They were followed by Luxembourg (4th place), Finland (5th), The Netherlands (7th), Norway (8th) and Germany (9th) (Nomad Capitalist, 2024).

The digital nomad lifestyle provides various advantages, such as flexibility in work arrangements, work-life balance, high mobility and freedom, as well as the chance to discover new locations and meeting like-minded people (Woldoff & Litchfield, 2021; Gualdi, 2024; Miguel et al., 2024). Nevertheless, challenges remain, especially around legal complexities related to taxation and residency. Navigating the bureaucratic system of visas and taxes can be overwhelming for digital nomads, and working across time zones may reduce the efficiency of global collaboration. Moreover, while loneliness and lacking social ties are often cited as drawbacks of the nomadic lifestyle (Miguel et al., 2023a, 2024; Thompson, 2019), Croatia's thriving digital nomad community mitigates these issues to some extent. Overall, in the Croatian context – and also in other popular European digital nomad destinations –, the opportunities largely surpass the challenges for digital nomads themselves, making it one of the most favourable environments for this lifestyle.

European destinations

The latest report from Statista (2024b) about the leading countries visited by digital nomads shows that the US is the top destination, while Spain, the UK, Germany, France, Italy, and Portugal were also within the top 10 preferred countries by digital nomads. On the other hand, the top five cities that welcome digital nomads in Europe, according to a recent article from Silicon Republic (Varley, 2024), are Palermo, Berlin, Lisbon, Tallin, and Kraków. The reporter points to the weather, the Internet infrastructure and the cost of living as the main attractions for digital nomads to these destinations. Another popular destination outside of the Schengen area (often used by digital nomads to stay in Europe beyond the restrictive 90-day Schengen rule) is Tirana. After travelling in 40 countries, the popular travel blogger Vinicius Costa, claims that Albania is his favourite European country as a digital nomad (Costa, 2024). In terms of European established digital nomads hubs, Tbilisi, Budapest, Barcelona and Athens are the cities that have experienced the fastest growing number of digital nomads in last five years (Nomads.com, 2024). Moreover, Croatia's vibrant cities such as Split, Zagreb and Zadar, along with more tranquil and rural areas (e.g., Croatian islands such as Milna, Mljet and Rab, see Håkansson & Bejaković, 2023) provide ideal environments for remote workers seeking both professional productivity and leisure. The relatively affordable cost of living, combined with a high quality of life and favourable climate, makes Croatia attractive to nomads.

For European destinations, like Croatia and Portugal, the benefits of attracting digital nomads can be substantial. For example, Portugal has capitalized on the economic potential of digital nomadism, particularly in touristy regions like Madeira, where initiatives such as the "Digital Nomads Madeira Islands" (Angiello, 2022) project have spurred economic activity and global visibility. The influx of remote workers helps diversify local economies, which were previously reliant on tourism or seasonal work, and may transform these areas into innovation hubs. Extremadura, one of Spain's least populated autonomous regions, with one of the country's lowest GDPs per capita and highest unemployment rates, has recently introduced a program offering digital nomads up to €15,000 to relocate there. Specifically, the authorities have allocated €2

million with the goal of attracting 200 digital nomads to settle in the region. Women, individuals under 30, and those relocating to towns with 5,000 residents or fewer are eligible for a €10,000 grant, while others can apply for up to €8,000. After two years, those in the first category will receive an additional €5,000, and those in the second category will receive €4,000).

However, there are also concerns about over-dependence on transient populations, and the strain on infrastructure in popular hubs. In Lisbon, for example, the influx of digital nomads and expats has contributed to rising housing prices, pushing out local residents and leading to gentrification (Avdikos et al., 2024; McElroy, 2020). There is a fine line between harnessing the economic potential of digital nomadism and managing its societal impacts. While digital nomads bring clear economic opportunities, the long-term sustainability of these benefits depends on careful planning and regulation, for example regarding tolerance of the local community (Håkansson & Bejaković, 2023), safety of digital nomads (İlhan et al., 2024) and reliable transportation infrastructures (Keseru et al., 2021). In many cases, the opportunities for European destinations tend to outweigh the challenges (Håkansson & Bejaković, 2023), though careful management is needed to ensure that the benefits are more widely distributed.

Residents

From the perspective of local residents, digital nomadism presents a more mixed picture. In Portugal, particularly in Lisbon and Porto, the rise of digital nomads has been associated with increased property prices and gentrification, which have displaced some local populations and shown the stark contrast between different migrant groups (Carreiras, 2024). These developments can exacerbate social inequality and create friction, especially when digital nomads are perceived as transient or disengaged from local communities (Bozzi, 2024). McElroy (2020) offers a particularly striking case in point by problematizing the impact of digital nomads in the city of Cluj (Romania), specifically on the local Roma community. “While Roma are materially dispossessed to make way for new IT office buildings and residential complexes, they are doubly dispossessed by the conjuration of the deracinated digital nomad/Gypsy” (p. 3079).

However, there are also positive aspects for residents. Digital nomads contribute to the local economy by spending on services such as dining, leisure, and transportation, creating new opportunities for residents involved in these sectors (Hannonen et al., 2024). Moreover, digital nomadism can foster cross-cultural exchange, particularly in smaller towns and rural areas where residents may otherwise have limited exposure to international visitors (Håkansson & Bejaković, 2023). Residents in rural regions may see more opportunities from nomadism than those in major cities, where rising living costs and tensions over housing tend to outweigh the benefits (Carreiras, 2024).

Local businesses

Local businesses in Europe have generally benefited from the presence of digital nomads, especially those offering coworking spaces, hospitality services, and recreational activities (Angiello, 2022; Avdikos et al., 2024; Danko et al., 2024; Hannonen et al., 2023). In cities like Split and Lisbon, local businesses have adapted their offerings to cater to this highly mobile, tech-savvy demographic. Digital nomads are often seen as reliable customers for cafes, restaurants, and leisure activities, helping boost revenue in sectors that might otherwise face seasonal fluctuations (Van den Broek et al., 2023). However, some cafes owners have reported that digital nomads are not profitable customer since they often order just a single drink and then occupy a table for several hours. For this reason, some cafes across Europe are starting to ban laptops completely while others charge an hourly rate for using them (Hughes, 2024).

Moreover, partnerships with digital nomads have spurred the creation of start-ups and new businesses catering to the needs of remote workers (Hannonen et al., 2023; Van den Broek et al., 2023). Yet, there are challenges for more traditional businesses, particularly those reliant on longer-term relationships with customers. The transient nature of digital nomads means that while businesses may see short-term spikes in demand, they can struggle to maintain consistent customer bases. Additionally, local businesses may face competition from digital nomads themselves, as some nomads run online businesses that may compete with local enterprises (Cook, 2022). On balance, however, the opportunities for local businesses outweigh the challenges, particularly for those able to adapt to the group of digital nomads and its preferences.

Governments/Policy makers

For governments and policymakers in Europe, digital nomadism presents both an exciting opportunity and a regulatory challenge. Most nomads travel on 90-day tourist visas, which do not allow to work in the destination (Mancinelli & Germann Molz, 2024). To extend their stay, digital nomads often engage in 'visa runs', which means leaving the country and re-entering again a few days later to renew their tourist visa (Ehn et al., 2022; Mancinelli & Germann Molz, 2024). European governments have been proactive in capitalizing on the digital nomad trend by introducing digital nomads visas (Bednorz, 2024; Sánchez-Vergara et al., 2023). To attract digital nomads, 18 European countries are currently offering digital nomads visas. The duration of European countries' digital nomad visas range from six months (e.g. Iceland, Finland, Türkiye) to one year (e.g. Spain, Latvia, Italy, Hungary) to two years (Montenegro, Norway), and some countries allow the renovation of the digital nomad visas for another year (e.g. Italy, Greece) and even up to five years in the case of Spain (Euronews Travel, 2024). These types of visas not only help to streamline the bureaucratic process for nomads but also positions the countries as a competitive and forward-thinking destinations for global talent. Tax regulations for digital nomad visas are complex and differ from country to country. Digital nomad visas include a number of benefits, such as discounted rates, tax reductions, or full tax exemptions (Gualdi, 2024).

For policymakers, digital nomadism offers a chance to innovate in areas such as immigration policy, remote work regulation, and infrastructure development (Bozzi, 2024; Keseru et al., 2021). However, there are significant challenges that governments need to navigate. Taxation, residency, and labour laws often do not fit the flexible, transient nature of digital nomadism, and governments need to find ways to ensure that nomads contribute fairly to the tax system while avoiding double taxation issues (Cook, 2022). Additionally, there is the challenge of balancing the interests of local residents, who may feel displaced or economically marginalized, with policies that favour the influx of nomads. This is particularly relevant in cities like Lisbon, where the rise in property prices has led to criticism of government policies that seem to favour international workers over local populations (Carreiras, 2024).

Discussion

In this conference paper, we looked at the digital nomad ecosystem in Europe. Focusing on different sources, including the emerging academic literature and news stories, we analysed how five key stakeholders (digital nomads themselves, European destinations, residents, local businesses, and governments/policymakers) face challenges and opportunities through digital nomadism. The analysis highlighted how for digital nomads themselves - and despite some difficulties such as loneliness and sustainability-, the advantages of the lifestyle outweigh its disadvantages, showing that Europe presents an attractive location for them. For the other stakeholders, the overall picture is more mixed (European destinations, local businesses and governments/policymakers) or tending to the negative (residents). Of course, these stakeholders partly overlap. For example, a local businessperson positively affected by digital nomadism can, at the same time, be a resident and negatively affected by it. Future research could study intra-role conflicts and tensions among different stakeholders.

Policymakers should balance the diverse stakeholder needs and avoid falling prey to too one-sided solutions. For example, promoting quick fixes too favourable towards digital nomads in the short term might risk residential disruption, and therefore, be an unsustainable solution in the longer run. Thus, regular consultation with the key stakeholders is essential. Policies that focus on aligning the diverging interests are particularly promising, especially those of digital nomads and residents. For example, citizen juries and collaborative multi-stakeholder workshops that bring digital nomads, residents and policymakers in conversation with each other and then feed into deliberative processes are a good way forward.

Overall, for European governments and policymakers, digital nomadism presents an opportunity to boost the economy and attract talent, but only if managed carefully. The benefits tend to outweigh the challenges when proactive and inclusive policy frameworks are in place. However, poorly managed digital nomad policies can lead to social unrest and exacerbate issues like housing affordability. The rapid rise in digital nomadism may pressure individual countries and the EU to adjust their legal frameworks to accommodate this evolving work model. As observed by Van den Broek

et al. (2023), the primary legal objective for both countries and the EU should be to harmonize regulations around the working environment and conditions, alongside taxation and social insurance, as these currently pose the greatest challenges for both employers and employees. Additionally, there should be a strong focus on educating employers and employees about existing regulations, as there is a significant lack of awareness regarding compliance and its consequences.

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BIBLIOMETRIC ANALYSIS OF THE USE OF ARTIFICIAL INTELLIGENCE IN ACCOUNTING: SUSTAINABILITY ISSUES

Serhii LEHENCHUK

Zhytomyr Polytechnic State University, Ukraine
lsf@ztu.edu.ua

Dmytro ZAKHAROV

Zhytomyr Polytechnic State University, Ukraine
dima.zakharov@ztu.edu.ua

Ana REP

University of Zagreb, Faculty of Economics & Business, Croatia
arep@efzg.hr

Abstract

Background: Artificial intelligence is a technology that plays a significant role in the further development of accounting. However, its impact on the accounting profession, particularly on the ability to use it to solve the problems of sustainable development, remains poorly studied. In this study, an attempt was made to describe the features of the use of artificial intelligence in accounting and to understand its trends and regularities based on the use of bibliometric analysis tools.

Objectives: The study aims to identify trends and regularities in the publications of scientists related to the application of artificial intelligence in the accounting system, particularly in the context of ensuring sustainable development goals.

Methodology: A bibliometric analysis of scientific publications from the scientometric databases Scopus and Web of Science for the period 2014-2024 was carried out. The technical implementation of bibliometric analysis was carried out using R software with the Bibliometrix package.

Findings: The following trends and regularities in using artificial intelligence in accounting were found: the total number of studies in this field began to grow significantly in recent years, particularly in the context of solving problems of sustainable development; specialisation of such research is gradually taking place with the use of individual means of artificial intelligence; the use of artificial intelligence in accounting, along with its advantages, simultaneously leads to risks and harmful side effects; the study of the simultaneous impact on the accounting system of Artificial Intelligence, Big Data and the Internet of Things is observed; the importance of artificial intelligence in ensuring the implementation of the accounting control function is confirmed; none of the current topics on the application of artificial intelligence in accounting is characterised by a high level of development, maturity, and depth since is not central to this field of research.

Keywords: Artificial Intelligence, Accounting Profession, Machine Learning, Sustainability, Bibliometric Analysis

JEL classification: M41, O33

Introduction

The digitalisation of the economy in the context of the transition to Industry 4.0 has created all the necessary prerequisites for the transformation of traditional approaches to the implementation of accounting activities at enterprises since the emergence of innovative technical and technological tools allows expanding the object-time framework of the accounting system, as well as forming new methods of collection and processing, visualisation, transfer and disclosure of accounting information to decision-making subjects. Such technologies increase the efficiency of the accounting profession from the point of view of achieving sustainable development goals (SDGs) since their simultaneous use gives a synergistic effect on the development of enterprises and their digital transformation.

One such innovative technical and technological means, which has one of the most significant impacts on the work of accountants, is artificial intelligence (AI), which allows focusing the work of accountants on making professional judgments, providing support for making management decisions and contributing to the minimisation of accounting routines. Those accounting procedures characterised by a high share of the creative component cannot be completely or even partially replaced by means of AI since they do not allow for full simulation of the activity of an accountant, at least based on the current level of development and capabilities of such means (machine learning, deep learning, robotic process automation, expert systems, natural language processing, etc.).

Researchers in the field of accounting call AI a technology that solves the main accounting problems (provides better and cheaper data for decision-making, provides deeper analysis of accounting data, focuses on more creative and valuable tasks) (ICAEW, 2017; Luthfiani, 2024); changes and significantly and radically transforms the accounting profession (Stancheva-Todorova, 2018; Braden, 2021; Hasan, 2022, Peng et al., 2023; Kapasia & Sodha 2024, Indrayani et al., 2024); is the key to using opportunities and improving accounting into a new era (Luo, Meng & Cai, 2018); has the potential to dramatically change and disrupt the work of accountants in the near future (Moll & Yigitbasioglu, 2019); is changing the reality of the accounting field (Stancu & Dutescu, 2021); is a building block of digital enterprise transformation (Bhimani, 2021); is a historic development that promises to transform the field of management accounting entirely (Almulla et al., 2024).

Along with all the advantages for the further development of the accounting profession, the use of AI leads to the following risks: loss of complete control over accounting procedures, creation of new threats to the security of credentials ethical consequences of using AI in accounting, hybridisation of the accounting profession, transformation of approaches to the training of accounting personnel in the conditions of digitalisation of the economy and development of new educational programs, the need for accountants to acquire additional knowledge, IT skills, and competencies, narrowing of the market of accounting and analytical specialists, and changing the role of the accounting institute in society. Therefore, accounting scholars should assume a responsibility to society to question and study the many problems associated with

the emergence of AI (Sutton et al., 2016).

While AI offers unprecedented opportunities for innovation, it also increases the urgency to address sustainability challenges (Tavares et al., 2024). Therefore, accounting researchers should focus their attention not only on the possibility of increasing the efficiency of the accounting system based on the introduction of AI tools but also on the possibility of stimulating sustainable development, finding ways to increase the environmental and social efficiency of the enterprise by improving the existing accounting tools (accounting measures of sustainable development, reporting on sustainable development, etc.).

To minimise the risks of using AI in the accounting system and to maximise the use of its potential in solving the problems of sustainable development, it is necessary to form a deeper understanding of its role in the development of the accounting system, the accounting profession, in general in achieving SDG, as well as clear directions for its use for the improvement of accounting practices. Only by choosing such a way of interaction between AI and the accounting system, we will be able to ensure its maximum efficiency and contribute to the achievement of SDGs. A deep understanding of the changes that will take place in the accounting profession under the influence of AI will allow the subjects of the accounting system organisation to be ready for current transformations and respond in a timely and adequate manner to the challenges of the times. In particular, this will allow accounting to find its new place in the composition of other systems that provide information support for management decision-making in conditions of total digitalisation of the economy.

One of the ways to determine and substantiate the meaning and role of AI in accounting in the context of the digitalisation of the economy and the implementation of the achievements of Industry 4.0 is to conduct a bibliometric analysis of scientific publications related to this field of research. This will make it possible to identify and analyse the main trends of scientific publications on this issue, identify the most popular and most relevant thematic areas, understand the relationships and tangents between the main terms and keywords in the field of AI and accounting research, and identify location and intensity of publications of such research.

The challenges in bibliometric analysis of scientific publications and a systematic review of the literature on the use of AI in accounting are devoted to the research of Gray et al. (2014), Sutton, Holt, & Arnold (2016), Moll & Yigitbasioglu (2019), Stancu & Dutescu (2021), Silva et al. (2022), Hasan (2022), Ayad & Mezouari (2022), Kapasia & Sodha (2024), Almulla et al. (2024), Indrayani et al. (2024). These studies analyse the role of AI in the development of accounting as a practical activity, its separate subsystems and related fields, in particular, management accounting, tax accounting, and auditing, and also analyse the impact of AI from the standpoint of the development of accounting education and conducting scientific research in the field of accounting. Only some studies pay attention to the analysis of the role of AI in accounting in solving the problems of sustainable development (Peng et al., 2023; Zhao & Farinas, 2022; Tavares & Vale, 2024; Adelakun et al., 2024). The existing variety of scientific works reflects this technological innovation's high level of significance in ensuring the digital

transformation of accounting as an institutional and socially significant practice.

Thus, the purpose of the article is to identify trends and patterns in scientists' publications related to the use of AI in the accounting system, particularly in the context of ensuring SDG.

Methodology

The research was conducted based on the use of bibliometric analysis, which made it possible to reveal the formal, substantive, and functional characteristics of scientific publications placed in scientometric databases. It made it possible to determine the position and meaning of each publication in the wider scientific discourse, contributing to a thorough meaningful interpretation of statistical indicators characterising the parameters of publications (periodicity, chronology, intensity, localisation, authorship, interconnections, etc.).

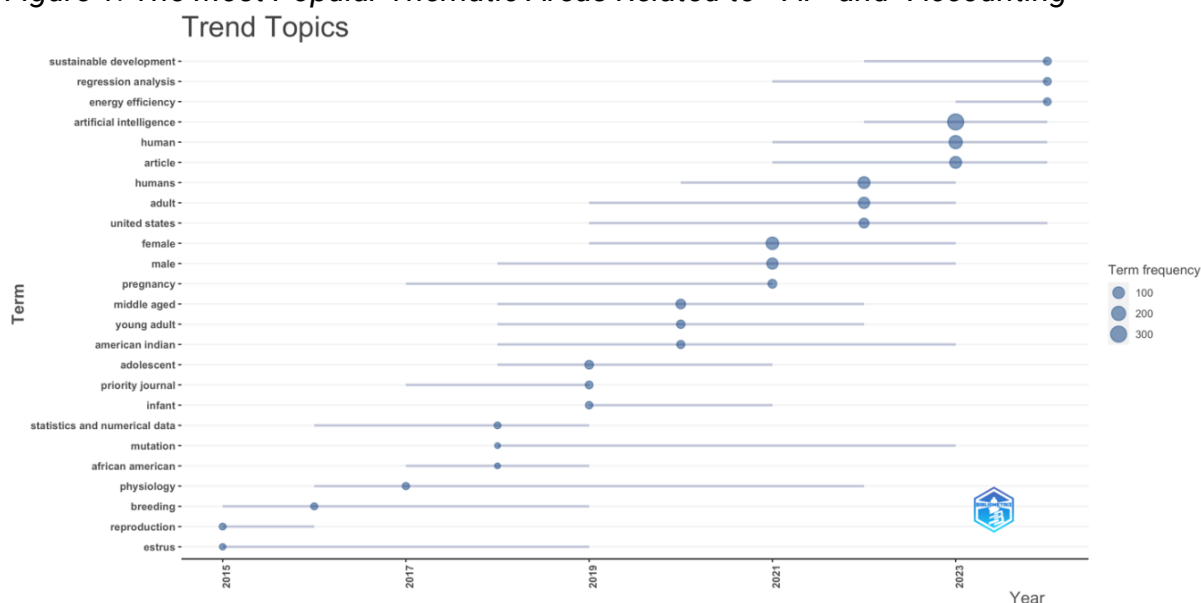
The selection of publications to be analysed was formed based on the use of scientometric databases Scopus (1042 articles) and Web of Science (2834 articles) using the search terms "AI" and "Accounting", which covered the period 2014-2024. The search was conducted in September 2024 with no language or publication type restrictions. For quantitative and qualitative analysis, the resulting sample was refined by manually removing duplicate entries and standardising keywords to increase the clarity and accuracy of the results.

The collected data were imported into the R software using the Bibliometrix package, which made it possible to visualise bibliometric relationships and build terminological maps and graphs (Tree Map, Factor map, Core Sources graph, Thematic Map, Three-field plot, etc.) based on keywords and terms in the titles and abstracts of the researched publications.

Research results

The conducted analysis made it possible to establish that the total amount of research in the field of "AI" begins to grow significantly from around 2020. This trend indicates a growing interest among scientists in the problems of applying AI technologies in various fields, including accounting (Figure 1).

Figure 1: The Most Popular Thematic Areas Related to “AI” and “Accounting”



Source: Authors' own elaboration using Bibliometrix in R Studio software

In the last three years, the significant attention of scientists has also begun to be devoted to establishing the role of AI in solving the problems of sustainable development and ensuring enterprises' energy efficiency. This shift in research focus reflects the growing recognition of the need to use AI tools to minimise the impact of global human challenges and achieve SDGs. The accounting system in such a relationship can be considered a mediator, which can be improved based on the introduction of AI tools, which, in turn, will contribute to increasing companies' sustainable performance.

Figure 2 visualises the distribution of key terms in scientific publications that investigate the problems of applying AI in accounting.

Tree

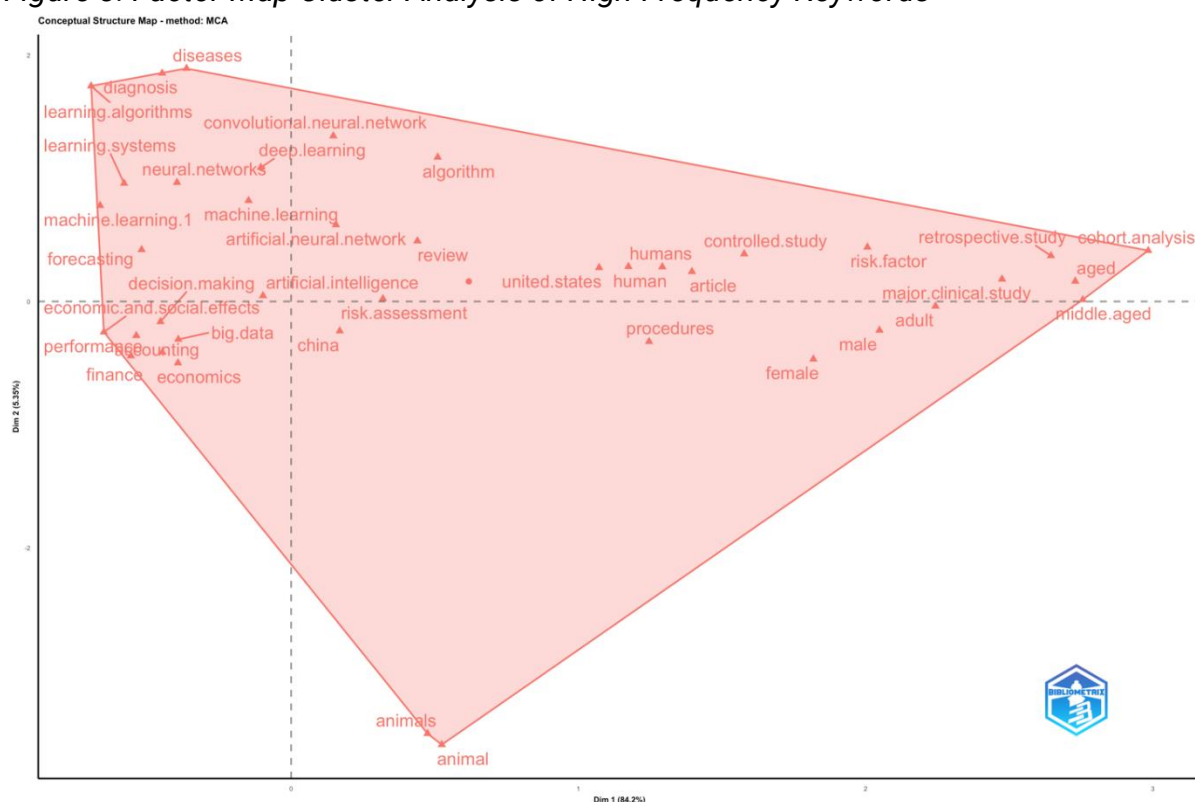
Topic	Count	Percentage
artificial intelligence	301	13%
humans	109	5%
deep learning	88	4%
male	87	4%
decision making	63	3%
machine-learning	56	2%
article	108	5%
united states	50	2%
risk assessment	41	2%
forecasting	36	2%
aged	35	1%
procedures	33	1%
learning systems	48	2%
finance	32	1%
neural networks	30	1%
pregnancy	30	1%
big data	29	1%
adolescent	28	1%
human	159	7%
machine learning	106	5%
algorithm	26	1%
correlational neural network	25	1%
bibliometrics	22	1%
child	22	1%
economics	22	1%
controlled study	46	2%
diseases	26	1%
diagnosis	25	1%
animal	21	1%
retrospective study	21	1%
american indian	20	1%
prevalence	20	1%
middle aged	46	2%
review	26	1%
risk factor	24	1%
artificial neural network	19	1%
accounting	18	1%
animals	18	1%
diabetes mellitus	18	1%
adult	89	4%
major clinical study	42	2%
china	25	1%
young adult	24	1%
cohort analysis	19	1%
performance	19	1%
learning algorithms	18	1%
diagnostic imaging	17	1%
economic and social effects	17	1%
sustainable development	17	1%
female	132	6%

The term “AI” occupies the most important place in the analysed scientific works – 13%. In addition, they pay special attention to certain tools and technologies that function based on their application: “machine learning” – 5%; “deep learning” – 4%; “neural network” – 1%. These terms expand the subject area of AI research in the field of accounting and can reflect the progress of applying these specific AI tools to improve accounting procedures, in particular, predictive analytics, audit automation, and detection of errors and violations, etc. The use of the term “neural network” in scientific publications indicates that scientists are already beginning to pay attention to more specific cases of the implementation of AI in accounting information systems of the new generation, which are characterised by a wider range of solving accounting problems of increased complexity.

Another tool that was used for bibliometric analysis is the factor map. It helps to

understand the interrelationships and tangents between key topics in the field of AI and accounting research (Figure 3).

Figure 3: Factor Map Cluster Analysis of High-Frequency Keywords



Source: Authors' own elaboration using Bibliometrix in R Studio software

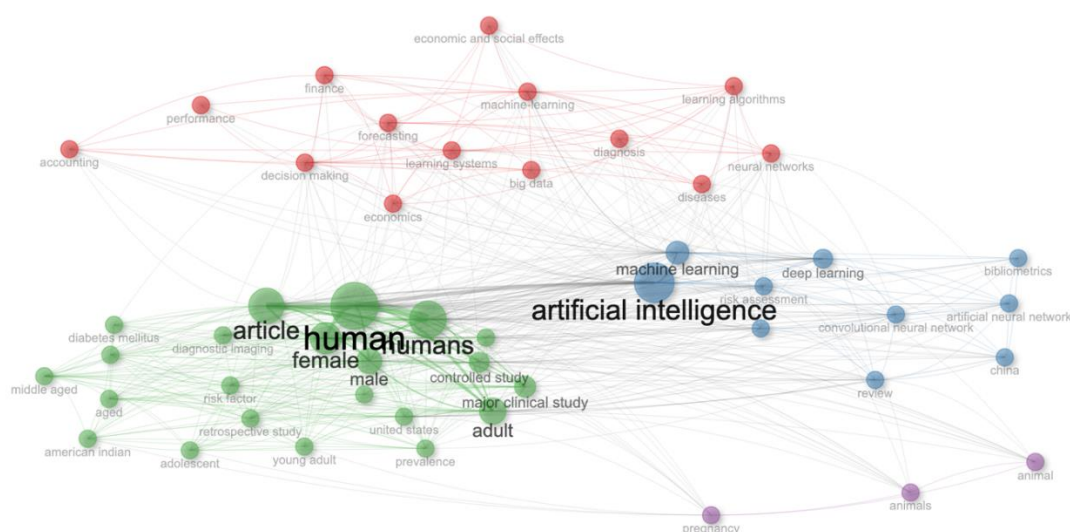
The axes of the factor map (Dim 1 and Dim 2) explain most of the variability in the data. They show the main dimension of conceptual differentiation between terms. The further apart two terms are along this axis, the less likely they are to co-occur in the literature. Dim 2 (15.3%) explains less variability but provides additional insight into less prominent thematic differences.

On the right side of the factor map are terms such as “people” and “controlled study”, as well as terms associated with demographic characteristics such as “male”, “female”, “adult”, and “middle-aged”. The left side of the factor map is characterised by terms such as “productivity”, “accounting”, “big data”, “finance”, and “economic and social effect”. In this part, the terms are more closely related to the business and economic aspects of AI, especially those related to accounting. The proximity of these terms on the factor map indicates that there is a significant amount of research devoted to the analysis of the impact of AI on accounting.

The placement of the terms “AI”, “deep learning”, “machine learning”, and “neural networks” in the centre of the factor map indicates the prevalence of these AI techniques for both accountant-oriented research and accounting information systems. It also confirms the active interaction and interdependence of various Industry 4.0 technologies on each other, which collectively provide a synergistic effect

for the development of enterprises and their digital transformation. In particular, the proximity of the terms “big data” and “AI” indicates the active use of AI tools for processing, analysing, and visualising big data for management needs. The proximity of terms such as “risk assessment,” “forecasting,” and “decision-making” confirms the trend of using AI for forecasting, analysis, and management decision support. Analysis of the network of relationships between keywords in AI and accounting studies illustrates how these topics are interconnected (Figure 4).

Figure 4: Keyword Network Analysis



Source: Authors' own elaboration using Bibliometrix in R Studio software

Figure 4 shows the three most significant research clusters (blue, red, and green), reveals the subject areas that require further study, as today they receive insufficient attention from scientists, and determines the most popular areas of research (having the giant coloured ball).

The term AI is central to the blue cluster, indicating its critical role as a primary focus of accounting research. The proximity of “machine learning” and “deep learning” in the AI sector suggests that these technological fields of restudy are among the most common tools used by accountants to minimise routine work and increase the efficiency of accounting procedures, in general, allowing them to transform the traditional functions of accounting.

The connection between “AI” and “risk assessment” is solid, indicating the ability of the former to detect atypical business transactions and assess potential risks more effectively than replacing routine accounting procedures in the form of a virtual accountant. This connection indicates that using AI in accounting improves not only the information function but also the control function, allowing the detection of intentional and unintentional errors, atypical actions of accountants, the level of

compliance with accounting regulatory requirements, etc.

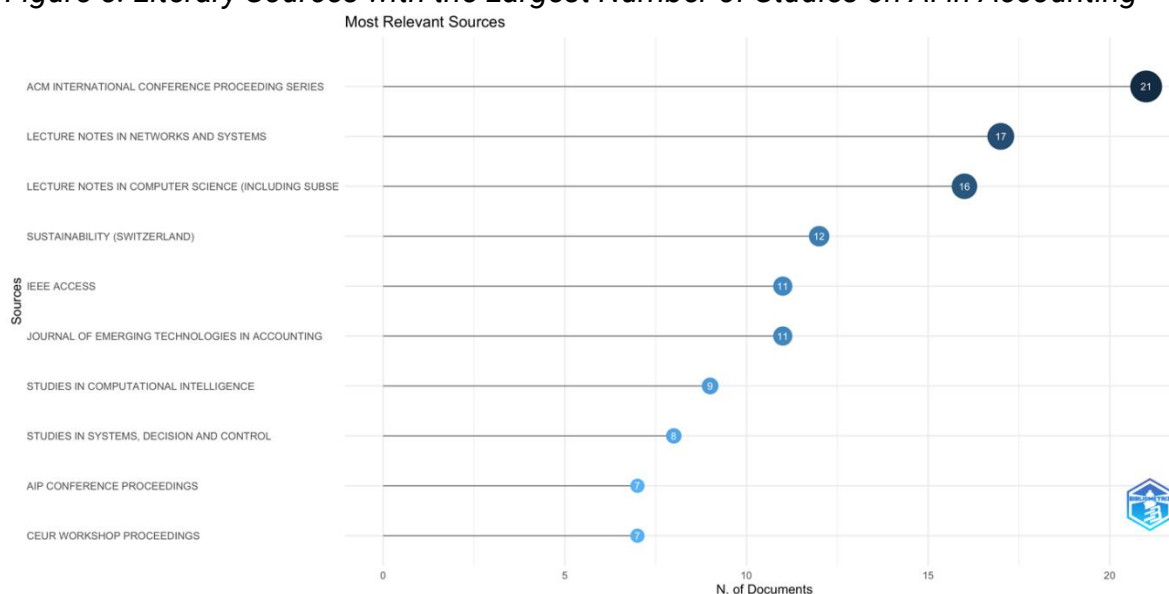
The presence of nodes “artificial neural networks” and “convolutional neural networks” indicates that AI methodologies are not only theoretically described but have practical applications in modern accounting computerisation systems. Such systems use advanced algorithms for processing large data, forecasting, and detecting errors or atypical business operations (manipulation, creative accounting techniques, falsification), which are reflected in the accounting system.

The red cluster contains terms such as “finance”, “accounting”, “productivity”, “risk assessment” and “decision making”. The network of connections revealed between these terms directly indicates the use of AI to improve the financial results of the enterprise and to minimise its risks. Such a relationship demonstrates that the role of AI in accounting is not limited to replacing accountants with virtual employees but is related to improving organisational capabilities in making management decisions thanks to the processing of big data and more accurate consideration of requests and information needs of management.

The green cluster of the relationship network includes terms related to human factors research: “humans”, “man”, “female”, “adult”, “young adult”, “controlled study”, etc. These terms form the social dimension of research on the application of AI in accounting. Such studies examine approaches to determining the impact of AI on accountants' performance of their duties at enterprises in the modern digital environment.

Figure 5 presents an analysis of the most relevant sources in AI and accounting research based on the number of scientific publications published in each source. This makes it possible to determine the focus of scientific journals and collections of conference materials on this issue's coverage.

Figure 5: Literary Sources with the Largest Number of Studies on AI in Accounting

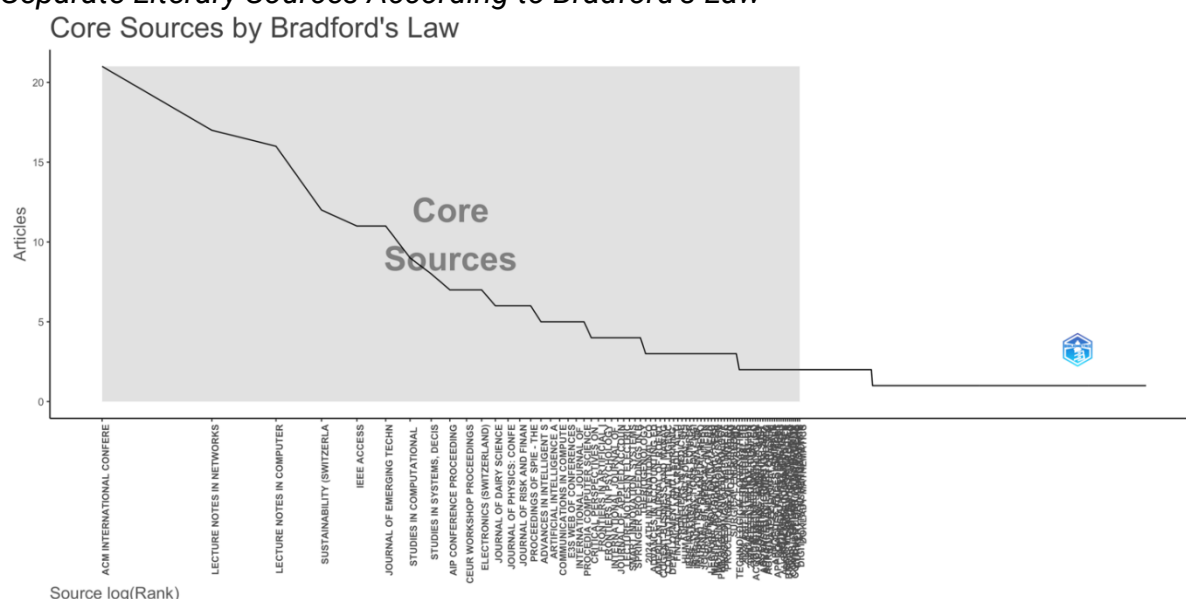


Source: Authors' own elaboration using Bibliometrix in R Studio software

The largest number of studies in the selected direction (Figure 5) is presented in the “ACM International Conference Proceeding Series”, which highlights the possibilities of practical application of AI in accounting and the issue of building its theoretical foundations. “Lecture Notes in Networks and Systems”, which focuses on interdisciplinary research in networks and systems, is also a popular publication. Therefore, the issue of applying AI in accounting is often discussed in the context of systems theory, where such tools are considered as a component of larger financial or organisational systems. The presence in the list of the most popular resources of the scientific journal “Sustainability” indicates the emergence of a tendency to consider AI as a new tool that increases the effectiveness of implementing sustainable development practices and achieving sustainable performance of enterprises. The popularity of such sources as “Sustainability” and “Studies in Systems, Decision and Control” indicates that the issue of applying AI in accounting is not limited to traditional accounting journals but is part of a wider range of research on sustainable development and systems theory.

Figure 6 presents a schedule of the definitions of the main studies of AI in accounting according to Bradford's law. Bradford's law is a bibliometric theory that helps to objectively determine the most influential journals or sources in a certain field, taking into account their distribution and publication frequency.

Figure 6: The Intensity of Publication of Research in The Field of AI In Accounting in Separate Literary Sources According to Bradford's Law



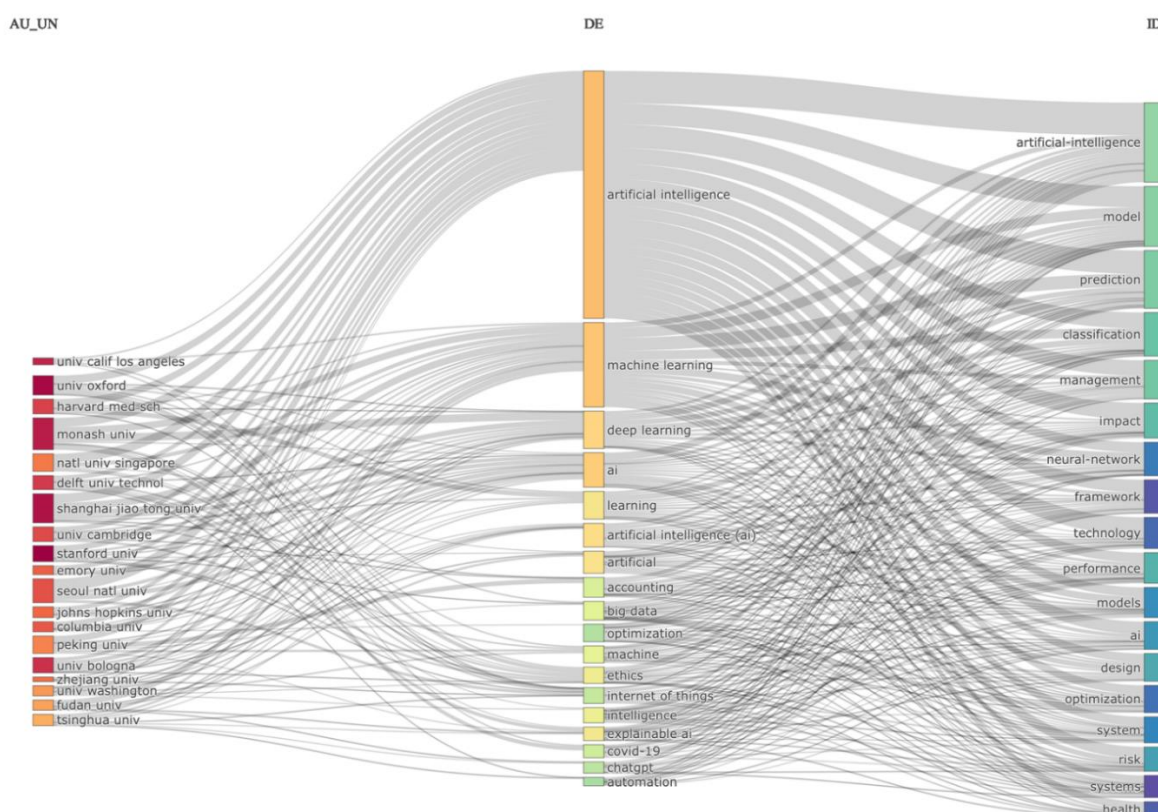
Source: Authors' own elaboration using Bibliometrix in R Studio software

The Core Sources graph in the field of AI in accounting (Figure 6) shows a sharp decrease in the number of articles in individual sources, which indicates the concentration of research in a relatively small number of journals. This trend is a positive phenomenon from the point of view of increasing the quality of scientific research, as it indicates the creation of separate “scientific platforms” that take on the role of leaders in discussing problems in the field of application of AI in accounting.

Within the framework of these “scientific platforms”, a scientific community of scientists with a high level of knowledge and skills in the researched field is formed, who can act as leaders of scientific research and reviewers of scientific works, contributing to the improvement of their general scientific level. In addition, it allows for the expansion and deepening of the level of study of the investigated problem due to the concentration of efforts on this innovative tool, which radically transforms the accounting profession in the conditions of total digitalisation of information processing processes at the enterprise. In particular, it allows exploring the features of using AI in accounting in the context of achieving SDGs – optimising the use of enterprise resources, implementing innovative technologies for processing and transferring accounting data, and forming financial reporting.

Figure 7 shows the research directions of leading universities (AU_UN) through key topics (DE) to specific concepts or keywords (ID) in the field of AI in accounting and related fields of knowledge.

Figure 7: Three-Field Plot Analysis of Affiliation (AU_UN), Key Themes (DE) And Specific Concepts or Keywords (ID)



Source: Authors' own elaboration using Bibliometrix in R Studio software

The obtained results (Figure 7) made it possible to establish that the main topics of research occupying a high share include “accounting”, “big data”, “ethics”, and “explainable AI”, which indicates an increase in the number of studies in these specialised industries. The presence of a significant share of research devoted to the topics of “ethics” and “explainable AI” indicates the existence of a problem of

transparency and moral consequences of the use of AI in accounting, which must be solved by scientists in the context of achieving SDGs. The integration of the key themes of “AI” with the issues of “Big Data” and “Internet of Things” demonstrates the potential to ensure the synergistic interaction of Industry 4.0 technologies in the direction of the development of the accounting profession and the digital transformation of enterprises.

Discussion

The results obtained in this article turned out to be quite controversial, as they partially confirmed and partially refuted scientists' previous conclusions regarding the development of research in the field of AI application in accounting.

One of the first analyses of publications on the use of AI in accounting was conducted by Gray et al. (2014). The authors found that the volume of publications on expert systems, as a type of AI used in accounting, began to decrease starting in the early 1990s. The gradual cessation of the use of expert systems at enterprises in the late 1990s caused the existence of such a situation. Similar findings were confirmed by Sutton, Holt, & Arnold (2016), who also found that at the turn of the century, there was some lull in publications in this direction. However, these authors, in contrast to Gray et al. (2014) found that AI research in accounting has a strong upward trend. This conclusion was also confirmed in our study based on the bibliometric analysis of publications from the scientometric databases Scopus and Web of Science for the years 2014-2024 and correlates with the results of studies by Stancu & Dutescu (2021), Ayad & Mezouari (2022), Kapasia & Sodha (2024).

At the same time, Silva et al. (2022) note that the existing literature linking these concepts of AI and accounting is still underdeveloped both theoretically and practically. We also confirmed this generalisation based on the analysis of the formed Thematic map, which allowed us to discover that research in the field of application of AI in accounting is still at a fairly early stage of its development. The obtained conclusion is also confirmed by the fact that in the scientific works analysed in the article, the main attention is paid to determining the role of AI in the accounting system, and only in some works its role in separate accounting subsystems is considered – in management accounting (Almulla et al., 2024) and in tax accounting (Ayad & Mezouari, 2022).

Findings obtained in the article based on the analysis of the most popular thematic areas also confirm the conclusions of Tavares & Vale (2024) regarding the growing level of convergence between accounting, sustainability and AI, which characterises the general trend towards the expansion of research areas in the context of the pair of researched terms “AI-Accounting”. This is also confirmed by the fact that the scientific journal “Sustainability” is one of the most popular resources, where the problems of the development of accounting based on the use of AI tools are considered. At the same time, such studies are in an early development phase, confirming the position of Zhao & Farinas (2022).

Based on the study's results, it was determined that accountants should adapt to the new conditions in which enterprises will operate, which implies the need to acquire new knowledge and skills for working with AI tools. This confirms similar conclusions obtained by Stancu & Dutescu, 2021; Silva et al., 2022; Hassan, 2022; Indrayani et al., 2024; Almulla et al., 2024.

The Core Sources graph confirmed Gray et al.'s (2014) findings regarding the concentration of research in AI in accounting in separate literary sources, which allows the creation of “scientific platforms” for conducting research in this field.

In addition to highlighting and analysing the benefits that the use of AI brings to the accounting profession, scientists also note the existence of several risks and harmful side effects (Sutton, Holt, & Arnold, 2016; Moll & Yigitbasioglu, 2019; Stancu & Dutescu, 2021; Hasan, 2022; Zhao & Farinas, 2023; Almulla et al., 2024). This conclusion was also confirmed in this article with the help of the Three-field plot, particularly regarding the emergence of the problem of unemployment of accountants, ethical and moral problems, security problems, transparency, and confidentiality of accounting data.

One of the most relevant areas of research in the field of application of AI in accounting is the integrated implementation of various innovative technologies of Industry 4.0 in accounting practice, in particular, Big Data and Internet of Things, which confirms the conclusions of research by Ayad & Mezouari (2022). This becomes especially relevant in the context of directing the activities of enterprises to achieve SDGs since AI tools have the ability to predict future impacts on the environment, as they can use data from the Internet of Things devices with sensors to monitor it. In addition, AI tools can explore social networks, messengers, and other sources of Big Data generation to measure changes in social sentiment. This will allow real-time processing and transmission of information for the formation of indicators characterising the company activities in the context of ensuring sustainable development (carbon footprint, waste, and pollution management, social responsibility, customer loyalty, reputation in society, etc.) and have operational tools for sustainable management of the enterprise.

The combination of AI with Big Data and the Internet of Things also allows for more accurate, transparent and reliable reporting on sustainable development and other similar types of reports (ESG reports, integrated reports, non-financial reports, etc.), to analyse and interpret the obtained indicators in the mode in real-time and present them in a visualised form to managers to make decisions aimed at achieving SDGs. This will allow management to respond more promptly to changes in indicators characterising the environmental and social aspects of the enterprise's activities, as well as to more effectively adjust sustainability practices and the general strategy for achieving SDGs at the enterprise.

Conclusion

The conducted research contains important scientific results that characterise the existing trends and regularities in the field of research on the application of AI in accounting. Taking into account the high potential of AI as one of the innovative technical and technological tools of Industry 4.0 for the development of accounting, bibliometric analysis of the use of AI in accounting allows to form a clear vision of the state of development of the problem, ways and prospects of its solution, in particular, in the direction of achieving SDGs.

The conducted analysis made it possible to establish that:

- the total number of studies in the field of the use of AI in accounting has started to grow significantly in recent years, in particular, in the context of solving problems of sustainable development;
- there is a gradual specialisation of research with the use of individual tools of AI for the improvement of accounting information systems;
- the use of AI in accounting, along with its advantages, simultaneously leads to the emergence of risks and harmful side effects (a threat to the accounting profession, ethical and moral problems, transparency and confidentiality of accounting data);
- in studies related to the use of AI in accounting, the impact of other Industry 4.0 technologies (Big Data, Internet of Things) is simultaneously studied, which collectively provide a synergistic effect for the development of enterprises and their digital transformation;
- the importance of AI in detecting errors, manipulations and frauds is confirmed, which allows for more effective assessment of potential risks and strengthening the accountant's performance of the control function;
- the issue of applying AI in accounting is not limited to traditional accounting journals, but is part of a wider range of research on sustainable development and systems theory;
- there is a regularity of placing articles devoted to the problems of applying AI in accounting in the main journals, where “scientific platforms” have been formed, which take on the role of leaders in discussing such problems, creating an effective scientific environment for their solution;
- none of the current topics of research on the application of AI in accounting, in particular, in the direction of ensuring SDGs, is characterised by a high level of development, maturity, and depth and is not central to this field of research.

The identified trends and regularities allow scientists and practitioners in the field of accounting to gain a clear understanding of the state of research on the application of AI in accounting, identify existing gaps, and form a vision regarding the need for future scientific research in this field. The conducted bibliometric analysis not only supplements the existing literature with additional evidence or refutations of the conclusions of other scientists but also determines the directions and policies for the development of the accounting system based on the application of AI to ensure the achievement of SDGs.

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BUILDING 21st CENTURY COMPETENCIES: INTERDISCIPLINARY CURRICULUM ENRICHMENT THROUGH PROBLEM-SOLVING STRATEGIES AND ESG INTEGRATION

Marija GAURINA
University of Split, Faculty of Science, Croatia
mgaurina@pmfst.hr

Ivana KATAVIĆ
Center of Excellence of the Split-Dalmatia County, Croatia
ivanakatavic@ci-sdz.hr

Josip STEPANIĆ
Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb
josip.stepanic@fsb.unizg.hr

Ivana ŠTIBI
Josip Juraj Strossmayer University of Osijek, Department of Physics, Croatia
istibi@fizika.unios.hr

Abstract

Background: *Traditional teaching methods have long needed to be improved to meet the demands of the rapidly evolving modern world. This paper emphasizes integrating innovative teaching strategies, curriculum development, and educational standards that place problem-solving and ESG principles at the heart of educational processes through inter- and transdisciplinary approaches.*

Objectives: *By focusing on these critical areas, we aim to transform the educational ecosystem to better prepare students for future challenges. Problem-solving and critical thinking are foundational skills that foster adaptability, creativity, and resilience and prepare students for complex, inter- and transdisciplinary problems.*

Methodology: *This strategy, incorporated into the curriculum along with the ESG principles, promotes social responsibility and sustainability from an early age, helping to educate responsible global citizens.*

Findings: *The paper highlights the need to rethink and modernize educational standards to create a holistic, innovative learning environment through this multi-layered approach. By incorporating all these strategies, educators can better equip students with the skills and mindset they need for personal growth and contribution to society in an increasingly complex and interconnected world.*

Keywords: Problem-solving, critical thinking, ESG, interdisciplinary, curriculum

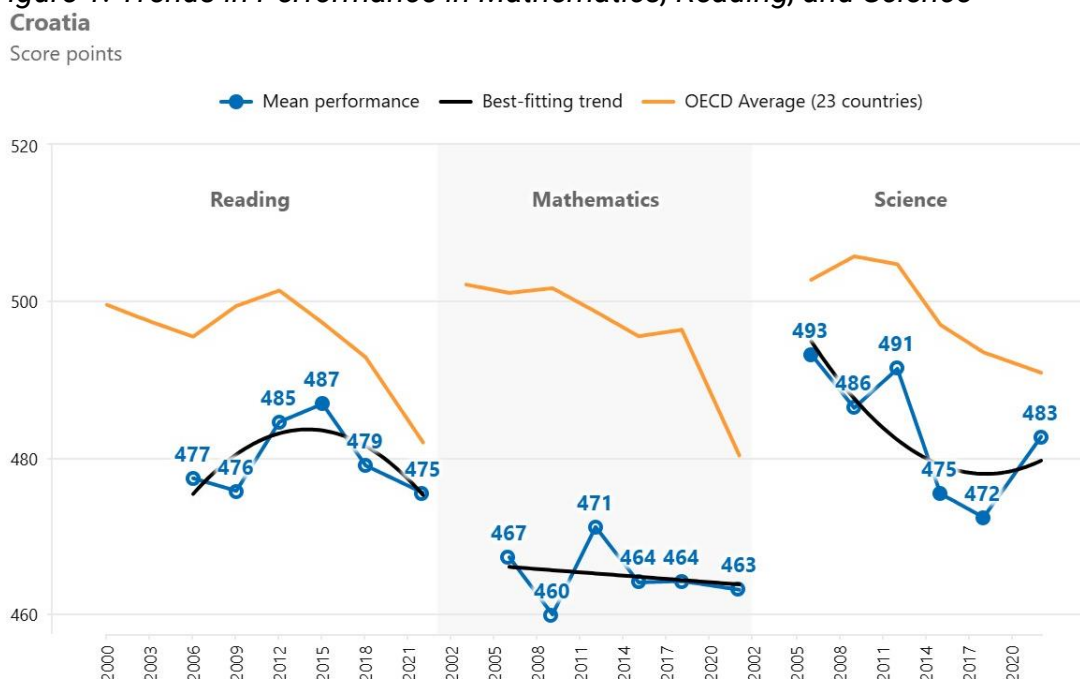
JEL classification: I21

Introduction

Like many other European countries, Croatia needs more qualified science teachers at both primary and secondary levels, particularly in physics. This shortage is partly due to the declining number of students in science faculties, especially those training future teachers. In the 2023/2024 academic year, as in previous years, only 3.8% of enrolled students in Croatia opted for a science degree. A closer look at the enrolment data shows a particularly worrying trend in choosing a physics degree, where student numbers continue to decline (DZS, 2023). This is exacerbated by the results of the state Matura examination, which have shown consistently low pass rates in recent years, particularly in physics (NCVVO, 2009-2024). As the subject of physics encourages critical and creative thinking, problem-solving skills, and scientific literacy, the persistently poor performance in the state of Matura is a cause for concern about how these skills are developed and assessed.

This challenge is reflected in international assessments, such as the Programme for International Student Assessment (PISA), conducted by the Organisation for Economic Cooperation and Development (OECD). PISA, conducted every three years, assesses 15-year-old students worldwide in reading, mathematics, and science. It focuses on how well students can apply their knowledge to real-world problems through critical and creative thinking and problem-solving. Since its first participation in PISA in 2006, Croatia's results (blue lines in Figure 1) in mathematics and reading have remained stable, while results in science show a negative trend until 2022.

Figure 1: Trends in Performance in Mathematics, Reading, and Science



Source: OECD, PISA 2022 Database, Tables I.B1.5.4, I.B1.5.5 and I.B1.5.6.

A closer look at Croatia's PISA results shows that, compared to the OECD average, fewer Croatian students reached the highest performance levels (Level 5 and 6) in all subjects, while a similar proportion reached the minimum performance level (Level 2 or higher) in all three subjects. As shown in Table 1, Croatian students are below the OECD average in all three areas.

Table 1: Top Performers and Low-performing Students in Mathematics, Reading, and Science

Science			
PISA level	Students, %		
			Mathematics
At least Level 2	OECD	69%	can interpret and recognize, without direct instructions, how a simple situation can be represented mathematically
	Croatia	67%	
Level 5 or 6	OECD	9%	can model complex situations mathematically and can select, compare, and evaluate appropriate problem-solving strategies for dealing with them
	Croatia	6%	
			Reading
At least Level 2	OECD	74%	can identify the main idea in a text of moderate length, find information based on explicit, though sometimes complex, criteria, and reflect on the purpose and form of the text explicitly directed to do so
	Croatia	77%	
Level 5 or 6	OECD	7%	can comprehend lengthy text, deal with concepts that are abstract or counterintuitive, and establish a distinction between fact and opinion based on implicit cues pertaining to the content or source of the information
	Croatia	4%	
			Science
At least Level 2	OECD	76%	can recognize the correct explanation for familiar scientific phenomena and can use this knowledge to identify, in simple cases, whether a conclusion is valid based on the data provided
	Croatia	78%	
Level 5 or 6	OECD	7%	can creatively and autonomously apply their knowledge of and about science to a wide variety of situations, including unfamiliar ones
	Croatia	5%	

Source: OECD, PISA 2022, Database, Tables I.B1.3.1, I.B1.3.2, and I.B1.3.3

In addition to the main areas of reading, mathematics, and science, PISA 2022 introduced a new dimension by assessing creative thinking for the first time. According to the PISA definition, creative thinking encompasses developing, evaluating, and improving ideas to find original and practical solutions, expanding knowledge, and promoting innovative expressions of imagination (OECD, 2023a, 2023b). While this concept is linked to a broader notion of creativity, it focuses on the cognitive processes underpinning creative work. Croatian students ranked 27th out of the 64 participating countries in this area with an average score of 50%, below the OECD average of 55%.

Table 2: Top Performers and Low-performing Students in Creative Thinking

PISA level	Students, %		
At least Level 3	OECD	78%	can generate appropriate ideas for simple to moderate complex expressive and problem-solving tasks, and they start to demonstrate the ability to generate original ideas or solutions in familiar task contexts
	Croatia	74%	
Level 5 or 6	OECD	27%	can generate, evaluate, and improve creative ideas in diverse and complex tasks, including abstract design tasks or more constrained/unfamiliar scientific and social problem scenarios
	Croatia	18%	

Source: OECD, PISA 2022, Database, Tables III.B1.2.2.

As shown in Table 2, Croatian students' creative thinking performance aligns with what would be expected based on their mathematics results but needs to be higher than their reading performance (OECD, 2024). One may argue that this discrepancy points to gaps in how the education system promotes 21st-century skills such as creative thinking and problem-solving. The subject still needs to be modified to address these challenges. The Croatian education system needs to be restructured to place more emphasis on the development of such skills and ensure that students are better equipped to meet the demands of a rapidly evolving world.

Embracing Complexity: Transforming Education for Creativity and Problem-Solving

The aforementioned data suggest that the existing teaching, the intensity and duration of which is currently undetermined, needs to be changed so that the average results of Croatian and other tested pupils eventually converge. We should consider a broader picture to contribute to the search for the specific form of the mentioned change. We should explicitly consider the complexity of our world. Let us take complexity into account and direct the change of the education system to be more responsive to complexity. We can expect a significant sustainability of the outcome of the changes. Creative thinking and problem-solving, distinct but partially overlapping concepts, are ultimately needed because of this complexity. Complexity explicitly means that the non-linearity of their mutual interactions permeates the components of our world. The non-linearity also permeates other levels, i.e., it determines the dynamics of the elements and their components, etc. From the detailed, formal, and more comprehensive approach to complex systems (Epstein, 1996; Gros, 2024), we want to single out their adaptability, emergent phenomena, the combination of cooperation and competition, and, in general, the delay in manifesting various consequences of the underlying interactions.

Complexity is implicit in the curricula of different classes, as it causes the phenomena, processes, and conditions to be learned. Nevertheless, explicit reference to complexity, learning its foundations, studying representative models of complex systems, discussing the range of its applications, and eliciting aspects of complexity in other areas of education could qualitatively improve students' understanding of our world and improve their ability to deal with complex and intricate problems. Ultimately,

one might expect better results from students on creative thinking and problem-solving tests as a reflection of such an approach.

However, one must consider the following peculiarities of the process. Problem-solving education contributes to a better understanding of complexity, leading to better problem-solving. It is an iterative approach that points to the intertwined concepts of complexity and problem-solving.

Enrichment of School Curriculum with Problem-Solving Strategies

Problem-solving and critical thinking are vital for achievement in contemporary education and beyond. Critical thinking is characterized as the capacity to examine, synthesize, and evaluate information for informed decision-making, which allows individuals to tackle problems systematically and reflectively. Problem-solving is the pragmatic implementation of critical thinking to solve particular academic, professional, or societal issues. Collectively, these skills are seen as crucial for fostering the cognitive flexibility necessary to navigate the complexities of modern life, which is marked by swift technological progress and unpredictable global challenges. Numerous studies underscore the need to incorporate problem-solving and critical thinking into educational courses. Jonassen contends that conventional education systems prioritize rote memorization and fail to equip students to address real-world challenges necessitating adaptive thinking and innovation (Jonassen, 2010). Conversely, curricula prioritizing problem-solving methodologies foster a more dynamic and inquiry-driven learning atmosphere, where students are motivated to interact actively with the content and utilize their knowledge in novel contexts.

Critical thinking and problem-solving are essential in STEM (science, technology, engineering, and mathematics) education, where students must comprehend theoretical concepts and apply them to address real-world challenges. Trilling and Fadel's study underscores the significance of these skills in facilitating profound learning and equipping students for their future professions. They contend that problem-solving enhances creativity, improves communication skills, and cultivates resilience—more sought-after attributes in a quickly evolving work environment (Trilling & Fadel, 2009). Moreover, these interdisciplinary competencies facilitate student success in academic and non-academic contexts (Jonassen, 2010; Trilling & Fadel, 2009).

In Croatia, as in several other nations, there is increasing apprehension regarding the need for more focus on these competencies within conventional education, especially in scientific disciplines like physics. Studies indicate that students frequently encounter difficulties in areas necessitating higher-order cognitive skills (Braš Roth, 2020). The issue is intensified by the diminishing interest in science courses, resulting in a deficiency of trained science educators. Incorporating problem-solving skills into the curriculum may significantly address these difficulties, enhancing students' academic performance and equipping them for the demands of the 21st century.

Problem-solving is an educational instrument that enhances cognitive abilities and is vital in tackling the sustainability issues confronting the globe today. The principle of sustainability – fulfilling present needs without jeopardizing the capacity of future generations to satisfy their own needs – necessitates innovative, transdisciplinary approaches to intricate issues. Environmental degradation, resource scarcity, and social injustice are urgent challenges necessitating a new cohort of problem solvers capable of critical and imaginative thinking.

Leicht asserts that problem-solving abilities are crucial for students to attain a profound comprehension of sustainability and implement effective measures. Curricula that integrate sustainability with problem-solving activities promote students' consideration of the interdependence of global systems, including the environment, economy, and society. By tackling genuine sustainability issues within the classroom setting—such as minimizing carbon footprints or overseeing waste management—students may apply their knowledge, augmenting their cognitive and social-emotional development (Leicht, 2018).

The current study indicates that student engagement and comprehension of global concerns markedly improve when they encounter problem-solving scenarios about sustainability. In 2017, the authors discovered that students engaged in sustainability-oriented problem-solving activities exhibited heightened awareness of environmental issues and an enhanced capacity to devise inventive solutions. The findings substantiate the assertion that educational institutions must change to prioritize the instruction of critical thinking and sophisticated problem-solving skills to address future sustainability difficulties (Leicht, 2018; Shepardson et al., 2017).

ESG (Environmental, Social, Governance) and its Role in Educational Transformation

Integrating ESG (Environmental, Social, Governance) principles into the education system is central to promoting a holistic and progressive learning environment that effectively prepares students to address the complexities of the 21st century. Misconceptions and biases regarding complex ecological systems pose significant barriers to finding sustainable solutions, often leading to oversimplified conclusions about environmental challenges. Cognitive biases, such as the tendency to simplify intricate problems, hinder our understanding of the interconnectedness of ecological systems. Krsnik (2008) highlighted how students often draw incorrect conclusions about physical phenomena due to prior experiences or intuitive models that contradict scientific explanations (Krsnik, 2008). These misconceptions can also be transferred to understanding complex ecological processes, further complicating their ability to engage meaningfully with environmental issues.

As Sterman emphasized, a shift toward systems thinking is crucial to overcome these obstacles (Sterman, 2000). This approach allows educators and students to appreciate the bigger picture of how different elements within ecosystems interact and influence one another. By incorporating ESG principles into the curriculum, educators

can cultivate academically competent, socially responsible, and environmentally conscious students. ESG education fosters an understanding of pressing issues like climate change, resource depletion, and biodiversity loss. Through project-based learning focused on real-world environmental problems, students can enhance their critical thinking and problem-solving skills while tackling interdisciplinary challenges (Michel et al., 2020). For instance, the “Eco-Schools” program encourages students to engage actively in ecological initiatives, reinforcing sustainability principles within their communities (Eco-Schools, 2024).

The social dimension of ESG emphasizes equity, inclusion, and community engagement. Educators can nurture empathy and cultural awareness by promoting social responsibility through service-learning projects and community activities. This approach encourages students to critically assess their roles in society and the impact of their actions on others (Hays & Reinders, 2020). Programs like “Service Learning” in schools worldwide demonstrate how integrating social issues into education can inspire students to be more aware and active participants in their communities (SLP, 2024). Governance within ESG pertains to the ethical management of educational institutions, promoting a culture of integrity, accountability, and participatory decision-making. By modeling good governance practices, educators can instill ethical leadership and civic responsibility in students, preparing them to be responsible citizens and leaders (UNESCO, 2017). Initiatives like the “Good Governance in Schools” program exemplify how educational institutions can implement these values (Schools, 2024).

The impact of ESG on education can be assessed through quantitative metrics and qualitative feedback from students, teachers, and stakeholders about their experiences with ESG initiatives (EY, 2022). Analyzing outcomes may include evaluating students’ academic performance, critical thinking abilities, creativity, and sense of social responsibility (Karadag Caman & Iyengar, 2022). Transparent reporting and adherence to best practices are essential for assessing ESG’s impact on education (Pro, 2022).

Moreover, aligning these competencies with international frameworks, such as the United Nations Sustainable Development Goals (SDGs), highlights the need for quality education that fosters lifelong learning and critical thinking (Štibi et al., 2024). SDG 4 emphasizes equipping students with essential skills for sustainable development through inclusive and equitable learning environments. A curriculum overhaul is imperative, given Croatia’s underachievement in scientific disciplines and the increasing demand for innovative solutions to environmental challenges. Integrating problem-solving strategies centered on sustainability addresses current issues within the education system and equips students to emerge as future leaders and problem solvers in their communities and beyond.

In summary, integrating ESG principles into the education system is crucial for creating a transformative learning environment that prepares students for the complexities of the modern world. By focusing on environmental sustainability, social responsibility, and ethical governance, educators can equip students with the knowledge, skills, and

values necessary for personal growth and meaningful contributions to society. This holistic approach to education improves academic outcomes and fosters the development of responsible global citizens who can positively impact the world.

Introduction of Physics Concepts Through an Interdisciplinary and Transdisciplinary Approach

The evolving demands of the 21st-century education system require a shift from traditional, subject-focused learning to methodologies that promote interconnected thinking. Interdisciplinary and transdisciplinary pedagogies combine knowledge and methods from multiple fields and have gained significant interest in recent years. These approaches help students recognize the practical value of subjects like physics and deepen their understanding of connections between various topics. The historical roots of transdisciplinary education trace back to the 1840s with the concept of “consilience” – integrating knowledge across fields to form unified explanations (Glittenberg, 2004).

Universities predominantly employ a single-discipline framework, although many efforts have been made to adopt interdisciplinary and transdisciplinary methods to better meet real-world needs (Fortuin & Van Koppen, 2016). Addressing these challenges requires integrating modern pedagogy with diverse perspectives (Klaassen, 2018). Interdisciplinary learning incorporates principles and methods from other fields to provide students with a well-rounded educational experience. In contrast, transdisciplinary learning involves applying the resulting solution to a problem in the real world. This approach fosters critical thinking and encourages solutions beyond traditional academic boundaries. In physics, interdisciplinary and transdisciplinary methods enable more profound engagement with the subject, which means that an effective interdisciplinary curriculum should emphasize connections between physics and, for example, mathematics, technology, engineering, physical education, history, art, and others. According to Brand (2020), interdisciplinary courses can improve students’ understanding of physics by demonstrating its relevance to societal challenges like sustainability and energy (Brand, 2020). Moreover, as interest in science declines in many countries, Millar (2020) argues that combining physics with other disciplines through real-world applications can boost student motivation, making learning more meaningful (Millar, 2020).

Developing interdisciplinary and transdisciplinary curricula for young learners, especially in STEM education, is crucial in fostering critical thinking and problem-solving skills. Early exposure to physics through integrated learning can cultivate curiosity and prepare students for future STEM education (MacFarlane & Dailey, 2021). Such education plays a vital role in developing future talent capable of addressing complex challenges, including medical advancements, renewable energy, and agricultural innovations.

Conclusion

Integrating problem-solving strategies and ESG principles into the interdisciplinary curriculum represents a fundamental shift in modern education. This approach, based on constructivist approaches to learning, allows students to actively acquire knowledge and develop skills necessary for success in the 21st century. Implementing this approach requires systematic support, including continuous teacher training, the development of new teaching materials, and the creation of a supportive learning environment. It is also necessary to harmonize education policy with the needs of modern society and ensure that all students have equal opportunities to develop their potential. Integrating ESG principles into the curriculum will enable students to acquire the knowledge and skills to create a sustainable society and economy.

Integrating problem-solving strategies and ESG principles into the interdisciplinary curriculum is essential in building an education system that prepares students for the complex challenges of the 21st century. This approach will prepare students for the demanding labor market and enable them to become active citizens who will contribute to creating a sustainable and more just society.

Although this approach is promising, one must be aware of specific challenges. One of the biggest challenges is the need for teachers to be prepared to implement this approach. In addition, sufficient resources and time must be provided to enable high-quality implementation. There is also a risk of overloading the curriculum if the integration of new content needs to be carefully planned. Despite these challenges, the results of research to date suggest that this approach is worth the investment. To ensure successful implementation, it is necessary to develop clear guidelines for curriculum development, establish mechanisms to support teachers, and provide continuous monitoring and evaluation of performance. Because of all this, future research should focus on developing effective teaching methods, evaluating the impact on student achievement, creating a model for the broader implementation of this approach in the Croatian educational system and investigating the long-term effects on student's academic success and career development.

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MANAGEMENT OF DIGITAL EDUCATIONAL ENVIRONMENT: CASE OF ZHYTOMYR POLYTECHNIC STATE UNIVERSITY

Tetiana OSTAPCHUK
Zhytomyr Polytechnic State University, Ukraine
ostapchuk-a@ukr.net

Kateryna ORLOVA
Zhytomyr Polytechnic State University, Ukraine
orlova_ekaterina@ukr.net

Andrii MOROZOV
Zhytomyr Polytechnic State University, Ukraine
morozov@ztu.edu.ua

Abstract

Background: Today's challenges define the necessity of digitalizing all spheres of human life, including education. The activity of modern universities is inextricably linked with the use of digital solutions, which contribute to the formation of additional competitive advantages. Thus, the study of the peculiarities of management of a digital educational environment in the university activity is an essential prerequisite for ensuring its flexibility, adaptability, and efficiency.

Objectives: The purpose of the research is to define the peculiarities of managing the digital educational environment (DEE) and implementing digital solutions at the example of Zhytomyr Polytechnic State University. The set purpose involves solving the following tasks: to study the role of digitalization in the educational process; to define the structure of the DEE; to consider the peculiarities of management of DEE.

Methodology: The methodological foundation of the research is the system approach, which involves consideration of digitalization as an educational process general management component. The monographic method was used to review scientific publications and to define the peculiarities of digitalization processes. Analysis was used to identify trends in the educational digitalization process and its key manifestations. Generalization was used to draw conclusions.

Findings: Implementation of digital solutions in the activity of HEIs provides flexibility, efficiency of the resources, opportunities for data analysis, and enhances the communication role of the university. To manage DEE, universities can use both ready-made commercial software solutions and their own developments. Zhytomyr Polytechnic State University implements a combined approach in this regard. The key directions of DEE management of the university are educational process organization and management, and communication with stakeholders.

Keywords: digital educational environment, educational process, digital solutions, information system, management

JEL classification: I23, M15, L86.

Introduction

The development of social and economic relations is inextricably connected and is facilitated by the evolution and spread of digital technologies. Today, digital technologies cover almost all spheres of human life and increasingly permeate daily activities at all levels – from the individual to global socio-economic systems. The sphere of education is no exception because the processes of its digitalization are significantly accelerating. The COVID-19 pandemic, which posed a significant challenge to the traditional model of providing educational services, became an essential impetus for digitalizing educational activities. To prevent the spread of the virus, about 200 countries were forced to suspend the educational process (Azanza, Corres, Panos-Castro, & Petchame, 2024). Higher education institutions worldwide have intensified their activities in the field of active introduction of digital technologies directly into the educational process and management system. The next challenge in Ukrainian realities, which even more actualized the need to implement digital solutions in the activities of HEIs, is the full-scale invasion of the Russian Federation on the territory of Ukraine. A significant number of HEIs, which were located in the territory of direct hostilities or in the territories that were occupied, were forced to relocate to other regions of Ukraine. At the same time, for institutions of higher education that did not change their location, the use of remote digital technologies also became important from the point of view of both the safety of participants in the educational process and the provision of access to educational services for students who were forced to leave for safer regions.

The mentioned challenges caused the activation of the use of digital technologies in the education sphere, particularly in higher education. Today, it's hard to imagine an educational process without the use of digital solutions, which determines the necessity of constantly searching for directions and opportunities for improvement in the digitalization sphere.

Zhytomyr Polytechnic State University is a leading HEI of the Polissia Region (Ukraine). It stably holds the relevant positions in the rankings thanks to its innovativeness, technology, and high personnel potential. The active implementation of digital technologies in university activity started in 2014, and today, digitalization covers almost all business processes related to Zhytomyr Polytechnic activity. Thus, the study of the peculiarities of DEE management, as shown in the example of Zhytomyr Polytechnic State University, can become a basis for further improvement and development in the defined area.

Literature Review

The importance and relevance of the issues related to digitalizing the educational process define substantial scientific interest in this research sphere. M. Hervas-Torres et al. dedicated their research to defining the issues related to the peculiarities of forming students' digital competencies, comparing the paradigms of education in online and offline formats. The study also highlights the advantages of offline

education compared to the remote format (Hervas-Torres, Bellido-Gonzalez, & Soto-Solier, 2024). X. Chen considers the peculiarities of the formation of the management system of the educational process in colleges and universities (Chen, 2024). In their research, A. Hudrea, D. Spoaller, and N. Urs highlighted digital tools used in the higher education sphere in Romania (Hudrea, Spoaller, & Urs, 2023). J. M. Munoz Acuna, F. Hernandez-Perlines, and M. A. Ibarra Cisneros developed a theoretical model of digital transformation for HEI at the example of the Autonomous University of Chile. The authors consider the key dimensions of the digital transformation model for universities, highlighting the leading indicators within each dimension (Munoz Acuna, Hernandez-Perlines, & Ibarra, 2024). In the research by G. Azanza et al., the perception of the role of digital technologies in the educational process is assessed based on a survey conducted among 294 lecturers. The assessment of the impact of digital technologies on the educational process is provided from a teacher's perspective (Azanza et al., 2024).

The study by A. Gerchen concentrates on the managerial aspect of the educational process and the appointment process for professors. Based on data analysis from 85 universities, the author defines the key procedures of this process and considers the impact of digitalization on such procedures (Gerchen, 2024). V. Lakhno et al. define the opportunities for digital technology use and digital trace analysis for the study of students' activities. The study identifies digital trace components and considers the DEE system's peculiarities of data flow formation. The main emphasis is put on the development of methods and models for the analysis of the respective data (Lakhno, Akhmetov, Makulov, Tynymbayev, Tsiutsiura, Tsiutsiura, & Chubaievskyi, 2024). A. V. Morozov and T. A. Vakaliuk analyze the features of the formation of the digital environment of educational institutions, using the example of Zhytomyr Polytechnic State University. The article proposes the model of the HEI digital environment, which includes educational, scientific, organizational, and managerial components (Morozov & Vakaliuk, 2021). J. Rosak-Szyrocka considers the digitalization processes of educational activity in the context of forming a new university 4.0 paradigm, which increases the role of HEI in the communication processes (Rosak-Szyrocka, 2024).

Thus, we should note the trend toward activating scientific research in the digitalization of the educational process. At the same time, the mobility and uncertainty of the environment determine constant transformations in the specified area, which actualizes further research. The aforementioned determines the relevance of the research.

Purpose of the article

The research aims to define the peculiarities of managing the digital educational environment (DEE) and implementing digital solutions, using the example of Zhytomyr Polytechnic State University. The set purpose involves solving the following tasks: to study the role of digitalization in the educational process, define the structure of the DEE, and consider the peculiarities of management of DEE (at the example of Zhytomyr Polytechnic State University).

Methods

The methodological foundation of the research is the system approach, which involves consideration of digitalization as an educational process general management component, as digitalization is one of the managerial tools that can be used in information, communication, and marketing policies. The monographic method, which involves a detailed study of a particular process or phenomenon, was used to review scientific publications that consider the peculiarities of digitalization in the educational process and to define the peculiarities of digitalization processes. Analysis as a research method was used to identify the trends in the educational digitalization process, its key manifestations, and its impact on the educational process. Generalization was used to draw conclusions based on the research findings.

Results

The 21st century has discovered the era of digitalization, which is manifested in the constant growth of the role of digital technologies in the life of society. Digital technologies change the way consumers deliver value and affect business processes and the functioning of economic entities. Today, digital technologies, to one degree or another, are inherent to all spheres of human life, simplifying communication, ensuring connection, and increasing the efficiency of many business processes. The educational sphere is no exception, in which digital technologies acquire a dual nature: on the one hand, digital solutions form an academic environment and ensure an educational process. On the other hand, they are a subject of study by students to strengthen their digital skills. Developing and strengthening digital skills is critical to ensure inclusiveness and quality education (Hervas-Torres et al., 2024).

It is worth noting that some aspects of digitalization were inherent in the educational environment even before. At the same time, the COVID-19 pandemic and a full-scale war gave a strong impetus to the development and active implementation of digital solutions in the educational process in Ukraine.

Digitalization from the point of view of the subject of study by students is an important component of the educational process of Zhytomyr Polytechnic State University. The formation of basic digital skills is inherent for students of all specialties. In turn, the in-depth development of digital skills and competencies is carried out according to the specialties, considering the professional and qualification requirements for the relevant specialists and the subject area of the specialty.

In this study, we consider it expedient to emphasize the second direction of digitalization of the educational process, namely the management of a digital educational environment.

Digitalization of educational activities provides the following advantages:

- high level of flexibility, which is reflected in different approaches to the organization

of the educational process, e.g., combining offline and remote forms of the educational process;

- a higher level of efficiency in the use of time resources, which manifests in reduced time for the implementation of many business processes related to information, coordination, coordination, etc.;
- increased opportunities for data analytics and improving on this basis the elements of the educational process, in particular, with the technology of digital traces analysis (in terms of technical-technological, personal-psychological, behavioral, activity, competency, communicative, and reflective components) (Lakhno et al., 2024);
- the university acts as a hub for communication between different groups of stakeholders, which increases its role in society (Rosak-Szyrocka, 2024);
- ensuring inclusiveness and non-discrimination due to broad access to the educational process of various categories of students;
- increasing the level of transparency and integrity using digital technologies.

Thus, the formation of a DEE creates ample opportunities for the further competitive development of higher education institutions.

The key factors influencing the processes of digital transformation of a higher education institution are the following:

1. Knowledge management is a general approach to disseminating and implementing new technologies and ideas in practical activity.
2. Digital culture reflects the general level of digital skills and the share of digitalized business processes.
3. Organizational management structure as a set of units and divisions with cooperation and subordination relations between them.
4. Key resources in the university's possession can be used to foster the digitalization processes.
5. Ecosystem is a set of technologies, capacities, and stakeholders providing digitalization opportunities (Munoz Acuna et al., 2024).
6. Digital competencies of teaching staff and students are an essential prerequisite for successfully implementing digital technologies in the educational process (Azanza et al., 2024).
7. Technical resources include the level of providing the university with computer equipment, its modernity, productivity, and suitability for use in the educational process.

8. Flexibility and adaptability of participants in the educational process, that is, the readiness of the educational process participants to use new tools and approaches.

Forming a DEE is crucial in ensuring the quality and availability of educational services, effective management, and effective communication with key groups of stakeholders. We should note that DEE has a complex structure that ensures the implementation of key functions. According to scientists, the structure of the digital educational environment includes the external environment (consumers of educational services); the organizational subsystem and tools for ensuring the educational process (management subsystem), and the technical means (Lakhno et al., 2024).

An important prerequisite for achieving DEE management's effectiveness is ensuring the synergistic interaction of the specified components. According to X. Chen, the formation of a digital educational environment should be based on a thorough collection and analysis of the needs of both students and teachers (Chen, 2024). At the same time, we believe it is also important to consider the interests of the third group of stakeholders, namely the management of the HEI.

Zhytomyr Polytechnic State University is the leading higher education institution in the Polissia region of Ukraine, whose activity is built on the principles of innovation, people-centeredness, and sustainability. Considering the above, a team of university specialists led by Vice-Rector for Scientific and Pedagogical Work, Andrii Morozov is actively working on digitalizing the educational process. The active development of digital technologies in the university's activities began in 2014, and today, digitalization covers almost all business processes in the activities of Zhytomyr Polytechnic State University. The management of the digital educational environment at the university takes place in the following directions:

- e-learning platforms used for educational and methodological support of the educational process, such as placement of learning materials, communication between participants of the educational process;
- e-management system, which ensures key business processes of the university, stands as a managerial tool for implementing decisions and measures;
- communication systems, including means of telecommunication for remote classes and events, as well as means of communication with key stakeholder groups.

A digital educational environment can be formed by purchasing and implementing a commercial product or developing one's information system (Morozov & Vakaliuk, 2021).

Developing its information system provides several advantages for a higher education institution. For instance, the modules and tools within the information system can be adjusted to suit the needs of the university. The information system also allows us to increase the level of data confidentiality by avoiding leaks in the data transfer process. Also, using its digital product enables the educational institution to optimize long-term costs through the absence of license payments (Hudrea et al., 2023).

Zhytomyr Polytechnic State University uses a combined approach in its activities. In particular, the first direction is implemented within a ready-made software solution. The most common e-learning platforms include Moodle, Microsoft Teams, and Google Classroom. Zhytomyr Polytechnic State University uses the Moodle platform in its activities, which has the name Educational Portal of Zhytomyr Polytechnic State University (Zhytomyr Polytechnic State University - Educational Portal). The specified platform is actively used in the university's educational process and provides for the creation of teachers' and students' personal accounts. Using the Educational Portal offers the following opportunities for participants in the educational process:

- placement of educational materials in open access / limited access for corporate accounts. All employees and students of Zhytomyr Polytechnic (both extramural and intramural) receive corporate accounts that are used on the Educational Portal, in the e-management system, and to access corporate e-mail. Thus, the placement of educational materials on the Moodle platform can be carried out both in fully open access and in limited access for corporate users;
- placement of control tasks, tests, student evaluations, and formation of journals of current evaluations.

Today, considering the security situation, Zhytomyr Polytechnic State University uses a mixed format for organizing the educational process. In particular, intramural bachelor's degree students study in an offline format, while extramural students and intramural master's degree students study in an online (remote) format. At the same time, the e-learning platform is actively used in both online and offline educational processes.

The next component of the digital educational environment of Zhytomyr Polytechnic State University is the e-management system. The university uses its own development in this area, a digital product called "Digital University". The leading developer of this digital product is Andrii Morozov, Vice-Rector for Scientific and Pedagogical Work. The specified information system is fully adapted to the needs of the university, has different levels of access, and includes more than 30 modules that ensure the digitalization of the educational process of the Zhytomyr Polytechnic State University.

The main elements of the system are:

- personal accounts of students (Zhytomyr Polytechnic State University – Login to the electronic office of the applicant of higher education);
- personal accounts of teachers (Zhytomyr Polytechnic State University – Login to the electronic office of the academic staff);
- personal accounts of administrative staff (Zhytomyr Polytechnic State University – Login to the electronic office of the academic staff).

The student's personal account has the following modules:

1. Schedule module allows students to track links to classes and join classes using a personal account. It is worth noting that a corporate account is created for each student and teacher at Zhytomyr Polytechnic State University, and joining remote classes, both from the teacher's side and from the students' side, occurs exclusively with the use of corporate accounts.
2. Opportunity to participate in surveys of different levels. Zhytomyr Polytechnic State University specializes in organizing the educational process, considering students' opinions and building a human-centered education model. Therefore, the Department of Monitoring and Quality Assurance of the university regularly conducts surveys of students regarding the quality of teaching and the organization of the educational process. Participation in such surveys is carried out using an electronic account.
3. Voting opportunities - students can exercise their right to vote in the field of electing representatives of the student community to elected bodies, solving critical issues related to the educational process. According to the internal regulations of the Zhytomyr Polytechnic State University, at least 10% of all elected bodies at all levels (including academic councils of the university and faculty) must be represented by students. Thus, the elections of the respective representatives are also carried out using the respective accounts.
4. Selection of the disciplines as an optional part of curricula. Following the general requirements for education in Ukraine and the regulatory documents of Zhytomyr Polytechnic State University, at least 25% of the educational program should be represented by selective subjects, which are formed considering students' wishes and determining their individual educational trajectory. Thus, the department/university offers students a pool of disciplines to choose from, and students choose the ones they want to study with the help of a personal account.
5. The session results can be monitored through the personal accounts of the students. In students' personal accounts, grades for disciplines entered by teachers in electronic notices are displayed. Students can agree to the assessment or disagree and choose the final control through a test provided by the educational and methodical department.
6. A link to the trust box is also placed in the personal account, with the help of which students can contact the university administration in case they violate their rights and/or problematic issues.

The teacher's personal account has the following modules and capabilities (Morozov & Vakaliuk, 2021):

1. Access to the event calendar allows one to monitor and participate in all university events.
2. Access to the key information about students, including group lists, age, financing

basis, and lists of students by selective disciplines.

3. Summarize information about the teacher's qualifications and professional achievements, which is then integrated into the university's information system and the Unified State Electronic Database on Education. USEDE is an electronic database that summarizes all key information about educational institutions and educational offers and mediates the educational process (including admission) throughout Ukraine.

4. The schedule module is used for the organization of the remote educational process, as well as for communication with students. Given the significant component of distance learning, the teacher links classes that take place remotely. In addition, this system module is used as a communication channel with students. The links given by the teacher in his personal account are automatically pulled into the personal accounts of the students.

5. The session module allows the teacher to access electronic notices with grades, which provides an opportunity to track the time of exams/tests and assign grades to students. Grades posted in electronic notices are automatically displayed in the students' personal accounts.

The administrative staff of Zhytomyr Polytechnic State University have the most comprehensive access possibilities.

In general, the use of the "Digital University" information system provides ample opportunities for digitalization of business processes, in particular:

1. The admission campaign – the information system is interconnected with the Unified State Electronic Database on Education, which provides an opportunity to monitor the process of submitting applications for admission to the university online, analyze the necessary characteristics of applicants, and form appropriate rating lists.

2. Accommodation in dormitories – the system contains information about students who live in university dormitories, keeps track of available places for accommodation, and provides appropriate procedural support for the accommodation of students in dormitories.

3. Competition for filling vacant positions – the specified procedure is also digitalized. In particular, the information system contains data on the contracts of scientific and pedagogical employees of the university, the level of fulfillment of contract requirements, and the level of professional activity. Applications for participation in the competition to fill vacant positions are also submitted electronically.

4. The "Digital University" system allows the formation of curricula, integrating them into the general digital educational environment. In addition, the distribution of the teaching load of teachers is also carried out using the specified information system.

5. The system provides the opportunity to create an electronic schedule, considering

the requirements for using classrooms, restrictions on teachers' working hours, etc. In addition, in the case of remote education format, teachers enter links to video conferences in their personal electronic accounts, and students see them in their electronic accounts.

These and other modules contribute to the significant improvement of the opportunities for participants in the educational process.

Finally, one of the key directions of management of DEE at Zhytomyr Polytechnic State University is communication systems, which include means of telecommunication for remote classes and events, as well as means of communication with key groups of stakeholders.

Common streaming solutions include Big Blue Button, Google Meet, Microsoft Teams, Webex, and Zoom (Hudrea et al., 2023). Zhytomyr Polytechnic State University uses the Google Meet service to ensure remote classes and events, which allows for the security of events and classes from unauthorized users. According to university policy, teachers and students must connect using corporate accounts, which automatically allows them to join meetings hosted by a person from the university. At the same time, it limits the access of users not authorized in the corporate system. The meeting organizer has the technical ability to prevent such outsiders from entering the meeting.

The last but no less important component of the university's digital educational environment is communication. Like any other organization, the university is an open socio-economic system that interacts with the components of the external environment. Accordingly, such interaction should take place using effective communication links and tools. In particular, the main channels of communication of Zhytomyr Polytechnic State University with various groups of stakeholders are:

1. The university site (Zhytomyr Polytechnic State University – Official site) is the primary source of information about the university's educational activities. In particular, the website summarizes information in the following sections: University (general information on the structure of the university, portal of internal regulatory documents); To the applicant (admission information and the educational programs of the university); Education (general information about educational activities, links to the schedule, etc.); Science (information about the scientific and research works, opportunities for scientists, students science); International activity (data on academic mobility programs, projects in the implementation of which Zhytomyr Polytechnic State University is involved); Leisure (information on the possibilities of organizing leisure time, social and legal support for students and teachers); To graduates (Zhytomyr Polytechnic Alumni Association).

2. Zhytomyr Polytechnic State University conducts an active communication policy through social networks using SMM tools. In particular, the university has a marketing department that implements the communication policy and promotion of the university brand.

Thus, we can conclude that the formation of the digital educational environment of Zhytomyr Polytechnic State University is a complex process that covers a significant number of directions and is built following the needs of key internal and external stakeholders of higher education institutions.

Based on the study of scientific literature and the experience of the Zhytomyr Polytechnic, we can highlight the key prerequisites for ensuring the effectiveness of digitalization of the educational process:

- formation of a positive attitude of teachers towards the introduction of digital technologies (Azanza et al., 2024);
- conducting active outreach work. Quite often, introducing new technologies can be associated with resistance to changes on the part of teachers and students. One of the most effective tools for overcoming resistance to changes is the holding of relevant explanations, training, the formation of instructions, and methodical recommendations to increase the awareness of participants in the educational process;
- monitoring the needs of participants in the educational process to adapt digital solutions to the specifics of the activity and key needs of stakeholders;
- considering advanced achievements in the field of digitization.

Conclusion

The modern world and the challenges that have arisen recently require a proactive position of higher education institutions in the field of implementing digital technologies and forming a digital educational environment. Forming a DEE can provide significant advantages for HEIs, in particular, increasing the efficiency of the use of resources, ensuring inclusiveness and accessibility of educational services, and transparency and integrity. Zhytomyr Polytechnic State University is the leading higher education institution in the Polissia region of Ukraine, whose activity is built on the principles of innovation, people-centeredness, and sustainability. The active development of digital technologies in the university's activities began in 2014, and today, digitalization covers almost all business processes in the activities of Zhytomyr Polytechnic State University. The management of the digital educational environment at the university takes place in the following directions: e-learning platforms used for educational and methodological support of the educational process; e-management system, which ensures key business processes of the university; communication systems, including means of telecommunication for conducting remote classes and events, as well as means of communication with key stakeholder groups. Zhytomyr Polytechnic State University uses a combined approach to forming a digital educational environment. In particular, it uses the ready-made commercial solution Moodle as an e-learning platform and has developed the digital product "Digital University" as an e-management system. Implementing such an approach ensures an

optimal combination of external opportunities and own strengths in the process of digitalization.

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TECHNOCRATIC LINKAGE, POLARIZATION AND AUTOCRATIZATION IN THE POST-SOVIET REGION

Nino Imedashvili

PhD, Associate Professor, School of Governance, Caucasus University

E-mail: nimedashvili@cu.edu.ge

Lenka Bustikova

PhD, Professor of Political Science, Director of the Center for European Studies

E-mail: lenka.bustikova@ufl.edu

David S. Siroky

PhD, Professor of International Relations. University of Florida

E-mail: davidsiroky@ufl.edu

Abstract

Background: Since the collapse of the Soviet Union, local autocrats have leveraged the challenging regional environment, marked by tensions between Russia and the West, to consolidate their power. By instrumentalizing the fragile security landscape and perceived foreign threats in the post-Soviet space, autocrats have managed the decline of democratic governance. Since the 2000s, the international environment for post-Soviet countries has also become more polarized, with the West increasing its engagement and Russia seeking to assert its dominance and strengthen its economic standing.

Objectives: This paper examines the role of 'technocratic linkages' in autocratization, focusing on how leaders in Armenia, Belarus, and Georgia have used regional polarization, with Russian support, to reinforce repression, silence democratic voices, and consolidate authoritarian rule.

Methodology: The study applies a qualitative research approach, analyzing political developments, governance strategies, and external influences through case studies of Armenia, Belarus, and Georgia.

Findings: Two key events have significantly intensified regional polarization: the color revolutions in Georgia and Ukraine (2003–2004), which briefly fostered hopes for democratic progress, and Russia's full-scale invasion of Ukraine in 2022, which severely undermined those aspirations. The research highlights how post-Soviet autocrats have exploited this polarization to strengthen state control, suppress opposition, and accelerate democratic backsliding.

Keywords: Technocratic Linkage, Polarization, Georgia, Armenia, Belarus

JEL classification: D72, H11, P16, D78

The color revolutions, polarization and Russia's invasion

The color revolutions in Georgia and Ukraine demonstrated that authoritarianism is no longer the sole "legitimate" form of governance in the post-Soviet region and provided the people with a democratic alternative. Russia has pushed back against Western ideologies and influence, however. In the wake of the color revolutions, Russia and its allies utilized the new civic activism to disseminate strong anti-Western propaganda and to purge its own ranks. The leadership in Armenia and Belarus chose to emulate Russia, where leaders in Georgia initially opted to double down on becoming closer with the West.

The European Commission's Platform for Research and Innovation aptly summarized the measures taken by the region's authoritarian regimes to counter the potential for more color revolutions (CORDIS 2008).⁵ From 2004, Russia, Belarus, and Armenia employed repressive measures and strengthened their 'one-man rule' systems of governance. According to various international reports, all three countries recorded a significant decline in democracy during this period. Freedom House ranked Russia, for the first time since the collapse of the Soviet Union in 2004, as a completely "not free country" (Freedom House, 2005, p. 3). Belarus, which was already rated as "not free" and "partly free" Armenia both saw their ratings on political rights decrease (Freedom House, 2005, pp. 42-70). According to the same report, the October 2004 parliamentary elections and referendum in Belarus displayed signs of massive falsification.

The ruling party used a brutal campaign against independent media, political parties and civic groups. In April 2004, Armenia suppressed peaceful civic protests. By contrast, Georgia was in the midst of its "Rose Revolution", which brought in democratic changes that became a catalyst for awakening civic activism and popular mobilization against repressive political systems throughout the region, not only in Armenia and Belarus but also in Ukraine, Russia, and Kyrgyzstan. These changes were consolidated after holding its first free and fair presidential and parliamentary elections, and the international reports that followed confirmed it by coding Georgia as an "electoral democracy" (Freedom House, 2005, pp.5; 243).

The second major event that polarized the region was Russia's full-scale irredentist war against Ukraine in 2022 (Siroky & Hale, 2017). Local regimes again faced a clear choice between democracy (the West) and authoritarianism (Russia), and as before many leaders resorted to mobilizing the regime's coercive capacity. The leader of

⁵ These include the suppression of opposing youth organizations; banning of large gatherings of protesters, especially near government buildings; demonizing of organizations funded by the West; dividing the opposition and presenting them as an aggressive minority ruled by a "foreign power"; consolidation of coercive forces, strengthening of security apparatus and involvement in the repression of protesters; establishment of "clones" (government-run organizations) that mimic existing opposition movements and aim to confuse the public by spreading the pro-government agenda; mass arrest of protest leaders; use of national populism and religious narratives in government rhetoric, ensuring public figures are on their side; establishing alternative monitoring organizations. When rigged elections became catalysts for color revolutions, and OSCE findings evidence for the opposition, Russia staffed CIS observation missions with people that would ignore even the most blatantly violations.

Belarus reacted by deciding to fully integrate the country's military and security forces with Russia. The war also marked a turning point for Armenia, which coincided with military strikes from Azerbaijan. Armenia's undemocratic, pro-Russian opposition (with other forces) used the moment to destabilize the government but, instead of folding as before, the Armenian government did not take measures to strengthen authoritarianism.

The Georgian government responded, much like Belarus had previously at this stage of polarization, by initiating the so-called "Russian law" (twice), which it adopted despite massive public opposition in the summer of 2024. This 'lawfare' process was accompanied by a brutal campaign of mass intimidation, arrests of civic activists, physical assault, and the surveillance of opposition MPs by the ruling authorities. The same authorities then began using the increased polarization to create a false dilemma - either "Ukrainization", or "stabilization" (keeping the ruling authority, the Georgian Dream, in power). Since 'stabilization' has taken the front seat, Georgia's rankings in the democracy index have deteriorated significantly (Chkhikvadze, 2024).⁶

We first outline a conceptual framework that clarifies these shifts in behavior among the ruling authorities in the region during this period of regional polarization, and then we provide an empirical assessment of its explanatory power.

Linkage and Leverage in the Post-Soviet Region

To explain international influence in various regions of the world, including in the post-Soviet space, Levitsky and Way (2010) developed a concise theoretical framework called "leverage and linkage" in their book *Competitive Authoritarianism: Hybrid Regimes after the Cold War*. "Leverage" signifies the dependence of "governments" on external actors (in this case, European Union/Russia), and the degree of vulnerability to their influence. "Linkage", on the contrary, describes the strength and the density of the various ties to regional actors, and is central to understanding variation in the effectiveness of international pressure (Levitsky & Way, 2010, p.43).

Although Levitsky and Way (2010) distinguish several dimensions of "leverage and linkage", due to the compact nature of this study, we only focus on first three dimensions of "linkage": "economic", "intergovernmental" and "technocratic". While economic and intergovernmental linkage are driven by structural pre-dispositions, the technocratic linkage allows us to account for the agency of domestic elites as well as for ideological diffusion channeled by leaders. Technocratic linkages can be therefore directly associated with the ruling elites' policy and their behavior. Such linkages can also help to shed light on the dynamic relationship between international actors and domestic politics. To account for alternative explanations of a more structural nature, we investigate the effect of trade linkages and alliance formation in foreign policy. We

⁶ The Democracy Index prepared by Freedom House **Georgia's Democracy Score declined from 3.07 in 2022 to 3.04** in 2023. The Democracy Index, prepared by the Economist Intelligence Unit Georgia's democracy index score, declined from 5.5 in 2018 to 5.2 in 2023.

show that more structural linkages cannot account for polarization, although they serve as excellent indicators of target state vulnerability to external pressure. Ultimately, it is the technocratic linkage that allows for elite cuing and forging divisions in societies that reflect the contested international environment.

We now describe all three linkages in detail and elaborate on their measurement. We begin in 2003, which we view as a starting date of polarization. According to Levitsky and Way the *economic linkage* is the flows of trade (2010, p.43) . We therefore measure the share of exports and imports as a proportion of total trade with EU member countries and Russia since 2003. This enables us to assess whether more trade increases alignment with external actors. *Intergovernmental linkage* measures bilateral diplomatic and military ties as well as participation in Western-led alliances, treaties, and international organizations. This variable points to the country's official foreign alignments but is also related to elite foreign policy identities. We therefore also explore the official rhetoric on foreign affairs. Differences in institutional linkages and the rhetoric of elites highlight the need to account not only for structural determinants of diffusion but the ability of domestic elites to forge relationships with foreign actors.

The most important linkage we investigate is the *technocratic linkage*, which is the share of a country's elite that is educated in the West with has professional ties to Western universities or multilateral institutions. In this regard, we will look at the educational, professional and social ties between the governing elites of Armenia, Georgia and Belarus and the external actors (Levitsky & Way, 2010, p.44).⁷

"Economic linkage"

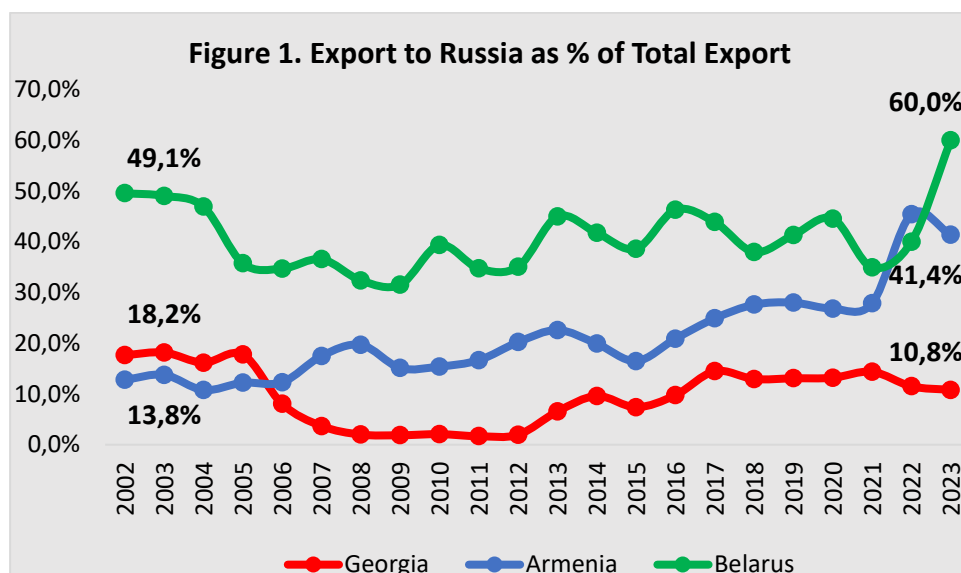
Over the past two decades, Russia's economic linkage with all three post-Soviet states has varied significantly. Belarus has had a long-term dependence on Russia; after 2022, however, its level of dependence skyrocketed. Economic linkages to EU were within 12%-20% until 2022. Then EU's linkage decreased because of the war, especially in exports, and because of the sanctions.

Armenia's dependence on Russia has been increasing since 2007 and, especially since 2022, it has increased significantly, especially in exports, because Armenia is one of the countries to bypass the sanctions by re-exporting to Russia. At the same time, its dependence on the European Union has been decreasing. In 2022-2023, exports to Russia compromised over 40% of total trade while trade with EU compromised about 11%. However, recently, Armenia halted military cooperation with Russia and initiated military training with the USA and political dialog with the EU. Georgia's dependence on Russia has decreased significantly over time. In 2003, Georgia's exports to Russia compromised 18,2% of total trade compared to 11,9% with EU. In 2006-2012, it fell

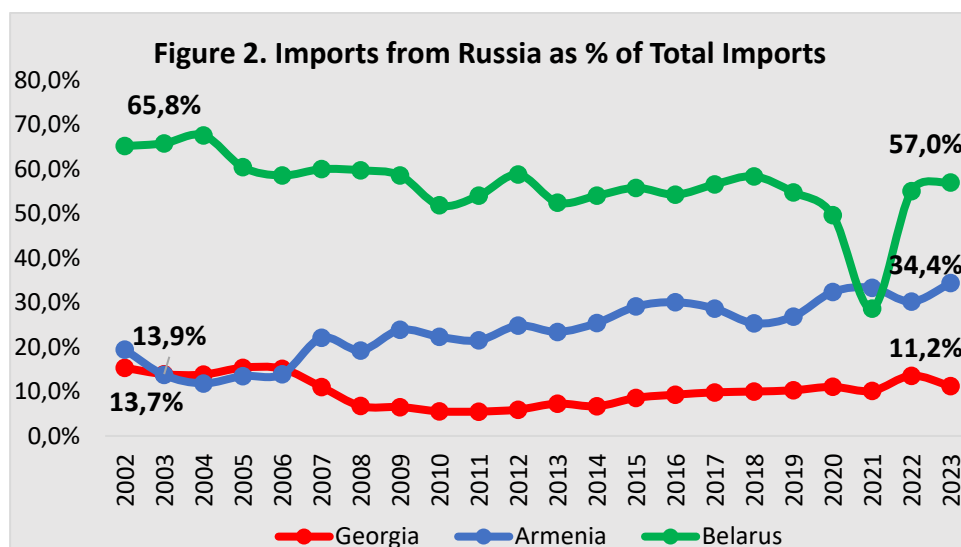
⁷ We disregard the other dimensions („social”, „information” and „civil society network”) of **linkage** identified by the authors since those are not directly related to government policy.

below 2% and then increased again, especially with imports. Georgia's trade dependence on the EU increased until 2015, but then decreased.⁸

Figures 1 to 4 show these data trends in more detail. Overall, the data suggest that economic linkages are important, but not deterministic. Countries still can break their trade linkages and re-direct the flow of exports and imports elsewhere.

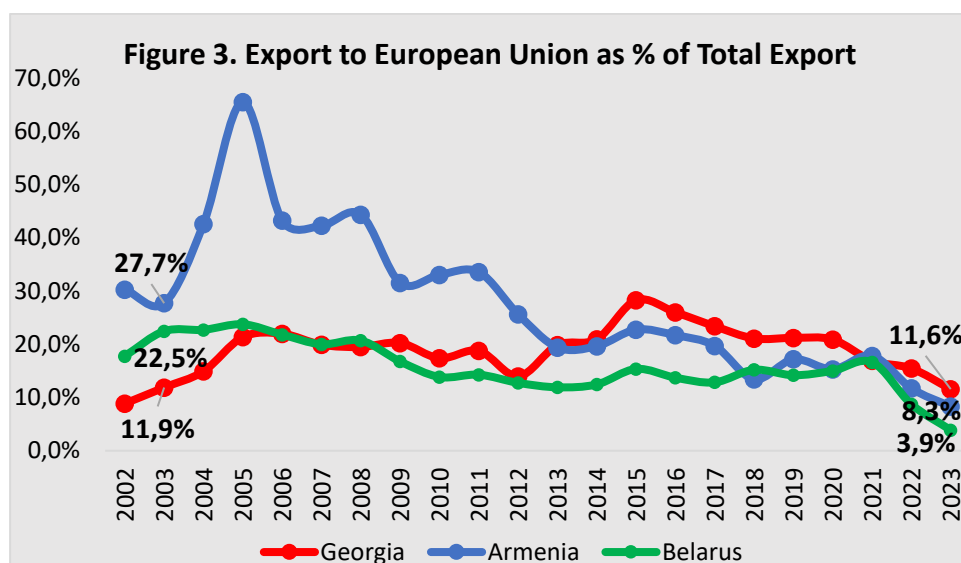


Source: National statistics offices, Eurostat, World Bank (WITS)

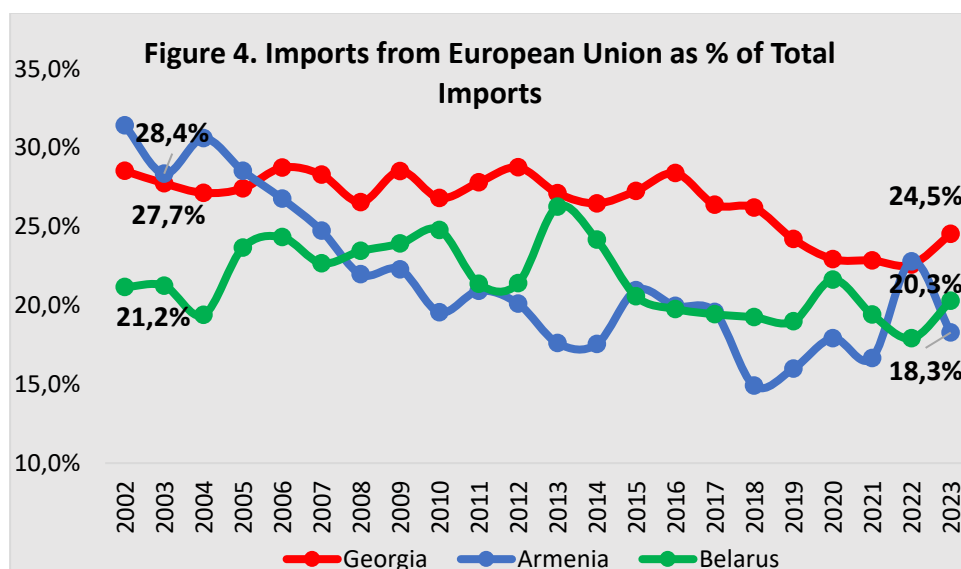


Source: National statistics offices, Eurostat, World Bank (WITS)

⁸ In 2023, imports from Europe increased significantly, but we do not know whether the increase will be maintained or not.



Source: National statistics offices, Eurostat, World Bank (WITS)



Source: National statistics offices, Eurostat, World Bank (WITS)

"Intergovernmental linkage"

"Intergovernmental linkages" are comprised of diplomatic and military ties as well as participation in Western-led alliances. While these ties are crucial, we demonstrate that official foreign policy need not be an obstacle to radically changing trajectories.

Armenia started out with strong intergovernmental linkages to Russia, and joined Russia-led political, economic and military alliances. Armenia (along with Belarus) was a founding member of the Russia-led military alliance, the Collective Security Treaty Organization (CSTO). Moreover, Russian 102nd military base is stationed in the Armenian city of Gyumri. Armenia is also a member of Russian political organization Commonwealth of Independent States (CIS) and economic organization Eurasian Economic Union (EEU).

Armenia's experience illustrates how intergovernmental linkage can be subjected to change.

During the first regional polarization in 2003, Armenia's political elites considered Russia (not the European Union and the West) to be the guarantor of Armenia's overall security and specifically the status quo in Nagorno-Karabakh. With the support of Russia, Armenian ruling class consolidated its grip on power. However, since 2018, Armenia's political elite no longer considered Russia as the guarantor of its security. Its feeling of being abandoned in clashes over Nagorno-Karabakh in 2020 and in 2023 further reinforced its movement away from Russia.

Despite structural intergovernmental ties, political elites may decide to shift allegiances. The political elite's technocratic (pro-western) linkages contributed to reshaping Armenia's pro-Russian orientation. Although Armenia still maintains membership in Russian-led alliances, it refused to host military drills by the CSTO in 2023 and instead hosted US military training (Reuters 2023). In the early 2024, Armenia also refused to fund CSTO and later suspended its participation "at all levels" (Hodunova, 2024). At the same time, it started to hint that it may consider joining the EU. Armenia's parliament speaker stated that will hold a referendum "in the near future" (Barseghyan, 2024). Elites are not tethered to intergovernmental and economic linkages, but can subvert them and reorient the country's foreign alignments.

Georgia has had linkages with both Russia and the European Union. Since 2012, its policy has varied from balancing between Russia and the West to bandwagoning with the West only to adopt an explicitly pro-Russian stance in recent years (Gvalia et al., 2019). Elite decisions diverted Georgia from what official intergovernmental linkages would otherwise imply. Starting in 2003, during the first period of polarization following the colored revolutions, political elites in Georgia's ruling elite aligned with the West, even though country was officially a part of CIS.⁹ The same political elite concluded 90% negotiations on the Association Agreement and DCFTA, and initiated visa liberalization dialogue, with the EU (Chkhikvadze, 2024). Since 2008, Georgia ceased all diplomatic relations with Russia and later officially suspended its membership in CIS. In 2022, in the wake of the early stages of the war in Ukraine and large pro-EU demonstrations, Georgia's political elite governing was compelled to submit an application for EU membership, even though the elite did not appear convinced that it was the right path. Although Georgia was granted EU candidate status, this process was promptly sabotaged by the ruling elite with the implementation of anti-democratic ('foreign agent') laws and hostile rhetoric against Western partners. As a result, the EU suspended Georgia's membership application process indefinitely in June, and the USA postponed its annual military drills with Georgia, which have been held annually in Georgia since 2015 as part of a 'comprehensive review of the United States–Georgia bilateral relationship' (OC Media, 2024). The country's ruling party then suspended talks on European Union accession and refused budgetary grants until 2028. The PM accused the EU of "a cascade of insults," "blackmail[ing]" the country, and "organiz[ing]" a revolution in the country (CNN, 2024). Georgia's trajectory shows that political elite

⁹ Georgia officially left the CIS in 2009.

decision-making and agency are central to understanding the effectiveness of international linkage and leverage.

Belarus has been a key ally of Russia since independence and is a core part of Russian-led alliances (e.g., CIS, CSTO, EEU and the Union State). The aim of the 'Union State' is to form a supranational union of Russia and Belarus with a common government and currency. In 2023, Belarus also joined the Shanghai Cooperation Organization (SCO). Russia currently has two military bases and is preparing to station tactical nuclear weapons in Belarus. During both period of heightened regional polarization, the political elite in Belarus have hued closely to Russia, both in its official rhetoric and its intergovernmental linkages.

"Technocratic linkage"

The third form of linkage is technocratic. Technocracy is form of linkage devoid of ideological content and anchored in expertise (de la Torre 2013, Bustikova & Guasti 2019, Aprasidze & Siroky 2020, Bickerton & Accetti 2021). Technocratic linkage as a form of diffusion is built on the premise that elites obtain education and acquire high skills abroad that, eventually, bring competency back home. This particular linkage also presumes that, on top of administrative, managerial and technocratic expertise, elites trained in the West or East internalize those norms, which extend beyond the art of realm of governance to encompass social norms, cultural attitudes and (il)liberal value. Personal beliefs, formed during formative years while studying abroad, shape and guide the actions of the new post-communist elite regardless of the structural linkages between their respective states and the places they have studied, worked and lived.

According to the logic of "technocratic linkage", the foreign and domestic political actions of the ruling elite educated abroad are also shaped by their social beliefs and values, developed through educational and professional "connections". "Technocratic linkage" establishes the professional and educational connections of the domestic elites toward the external actor. These attitudes extend beyond acquired skills, but include the effects of exposure to the West, which fundamentally governs their views of democracy and the rule of law. According to this dimension, the behavior of internal actors is determined by the strength of and types of ties they possess with the particular external actor. This ultimately affects the quality of democracy in the country when domestic elites have acquired liberal values and govern accordingly (Lebanidze, 2020, p.37).

According to, "technocratic linkage" is defined as the share of a country's elite that is educated in the West and/or which has professional ties to Western universities or Western-led multilateral institutions. This determines the value system and standard of behavior among the domestic rulers and elites. In short, [technocratic linkage] "facilitate[s] the diffusion of ideas and norms, and...has a powerful impact on actors' interests, incentives, and capabilities" (Levitsky & Way, p.45). Examining 35 empirical cases, Levitsky and Way conclude that the lack of educational or other professional

ties among the ruling elite (President, Speaker of the Parliament and members of the Cabinet of Ministers) with the West can become an obstacle to a country's democracy ((Levitsky & Way, p.42).

The relevance of "technocratic linkage" can be seen clearly in the role elites played during the colored revolutions, notably in Georgia. Following the Rose revolution, more than half of Georgia's political elite, and later almost 80% of it, were Western-educated young politicians or technocrats who had close contacts with Western academic and political circles. By contrast, at this time, the ruling elite in Armenia and Belarus (the latter unchanged until now) was still largely composed of old Soviet-style politicians with more academic or professional contacts in Russia than in the West (Lebanidze, 2020, p.99). The 'value system' of Georgian elites formed by "technocratic ties" (Western training and education) profoundly shaped their attitudes towards democracy and the West. The elite in Armenia and Belarus largely sided with Russia because their technocratic linkages were primarily with Russia.

The second period polarization, following Russia's invasion of Ukraine, has shown even more how the lack of Western training and ties influence value orientations and undermines technocratic linkages with the European Union. Following the change of government in Georgia in 2012, Bidzina Ivanishvili, a key figure in the ruling elite, maintained close professional and business ties to Russia. Through offshore entities, Ivanishvili and his associates still own dozens of Russian companies (Transparency International - Georgia', 2022). Ivanishvili also had direct educational ties with Russia, having defended his dissertation at the Labor Scientific Research Institute in Moscow (RFE/RL, 2020). This significantly shaped his pro-Russian and anti-Western value system as well as his perspective on democracy as something superfluous.

Although a significant share of state officials in Bidzina Ivanishvili's initial team (President, Prime Minister, Speaker of the Parliament, his deputy and other ministers and MPs) were educated in the West, he has gradually replaced them with loyalists. From 2012-2016, Ivanishvili replaced ministers and their deputies from the pro-European Republican and Free Democrats parties in his coalition. From 2016-2020, he replaced the Harvard educated vice-speaker, Tamar Chugoshvili, and five other MPs. Finally, in 2023, he replaced the Chairman of the Parliament, educated at the University of Nottingham, Kakha Kuchava, and five further deputies. Meanwhile, the pro-EU president, educated in France and the USA, Salome Zurbishvili, has been completely demonized (Kapanadze, 2024). After eliminating elites with Western technocratic linkages, Georgia exhibited a markedly different trajectory and reoriented itself toward Russia.

Armenia also demonstrated a radically different approach in the second period of polarization. Pashinyan's government significantly increased the appointment of individuals with professional ties to the West, or those who boasted experience working in Western non-governmental organizations. Armenia's elite deliberately sought to strength technocratic linkages with the West and to realign itself internationally away from Russia. This shift was also due to Russia's "abandonment" of Armenia in the war with Azerbaijan.

In sum, technocratic linkages shed new light on change and continuity in the pro-Russia and pro-West orientations of Armenia, Georgia and Belarus. In the next section, we provide with some prominent examples of authoritarian practices and democratic backsliding in the selected countries, which were facilitated by the lack of technocratic linkages and were supported directly by Russia.

Armenia

Armenia's ruling elite, backed by Russia, consolidated its authority during the first period of polarization. In order to marginalize and suppress the popular protests that started after the presidential and parliamentary elections in Armenia in 2003, which were deemed fraudulent, the government used its security apparatus and propaganda to maintain the narrative that "foreign (Western) forces", along with local NGOs and opposition parties, attempted a coup. The Armenian government directly accused the West of trying to overthrow the national government. During this time, the opposition organized months of peaceful street protests, with thousands of citizens demanding a referendum to determine public confidence in President Kocharyan (NYT, 2004). The opposition of Armenia hoped that the ruling authority would resign in a civilized way. Despite mass protests that started in April and continued until June, Armenia's opposition failed to organize an Armenian "color revolution". According to Kocharyan, "any attempt to repeat the Georgian revolution in Armenia was doomed to failure, as he [controlled] a stronger security apparatus and [had] a better economic situation than his ousted Georgian counterpart, Eduard Shevardnadze" (RFE/RL, 2004 as cited in Lebanidze, 2020). The Kocharyan government instrumentalized Armenia's fragile security environment to shift the population's focus from the rigged elections.

The process of protecting Nagorno-Karabakh was associated with Russia and Kocharyan, who was a former 'president' of Nagorno-Karabakh. If opposition mobilization posed a threat to Kocharyan's government stability, it would disrupt Armenia's favorable status quo in Nagorno-Karabakh. Under these circumstances, the "stability" established by Kocharyan was framed as exceptionally beneficial, and the public protests as being in the interest of "foreign agents". This strategy proved effective, as the public refrained from exerting strong pressure on the Armenian authorities, fearing it might weaken their government's position in the Nagorno-Karabakh conflict amid continued pressure from Azerbaijan (Lebanidze, 2020, p.144).¹⁰

Armenian government propaganda, again with political support from Russia, repeated a similar narrative during the 2008 post-election street protests, which were brutally suppressed, and resulted in the loss of life for 10 people. Mass public protests were again sparked by the formal transfer of power from Kocharyan to the Russian-backed candidate, former Defense Minister Serzh Sargsyan, following the presidential elections. Propaganda framed Armenia's popular protests as a decisive battle between "patriots" (Russian-backed government forces) and "foreign agents" (Western-led

¹⁰ In parallel, post-election mass protests were mounting in Ukraine. Kocharyan was one of the first to follow in Russia's footsteps by recognizing the victory of Yanukovich, the Kremlin-backed presidential candidate, in the second round of the presidential elections in Ukraine in 2004. Nonetheless, the results of which were later annulled by the successful color revolution.

protests). According to Hrant Markarian, a senior official of the pro-government ARF party, the opposition mobilization was part of a "foreign conspiracy" that sought to stage a "pro-Western revolution" in Armenia. He claimed that "unspecified external forces are trying to weaken the country", offering "fertile ground for external intervention"(Lebanidze, 2020, pp. 260-261). Propaganda portrayed the West as the enemy, attempting to undermine Armenian stability, especially considering the potential for an Azerbaijan offensive. This mass protest was also successfully marginalized and suppressed using the same methods.

After two terms of presidency, Putin's ally, Serzh Sargsyan returned for a third term in the position of Prime Minister. This was followed by a successful "Velvet Revolution" in 2018, during which Russia stepped aside. Russian analysts explained the "non-interference" of the West in this process thus: "This is not a color revolution," said Fedor Lukyanov, editor of the magazine *Russia in Global Affairs*. "Everyone understands that the roots of this crisis in Armenia are domestic - unlike several previous cases in the post-Soviet space, where the international presence was quite clear." (Demytrie, 2018).

Russia recognized that the Republican Party of Kocharyan and Sargsyan, which had ruled Armenia from 1997-2018, had completely lost its legitimacy. Even if Pashinyan's pro-democracy movement were to win, the country's economic and military dependence on Moscow would not change. In 2020, Russia deepened Armenia's dependence by mediating a ceasefire between Armenia and Azerbaijan and deploying a military unit to Nagorno-Karabakh. This conflict once again demonstrated the limited influence of the West. However, the full-scale war in Ukraine ultimately disrupted Armenia's fragile ceasefire, leading to Armenia's full capitulation to Azerbaijan in Nagorno-Karabakh in September 2023.

The loss of Nagorno-Karabakh undermined Russia's credibility as a patron. Due to this humiliating loss, even today, the Armenian government is still fighting for its political survival. However, it no longer relies on Russia. Destabilization caused by the Nagorno-Karabakh war led to frequent anti-government protests across the country in 2022 and 2023 and to a strong re-orientation to the West (Freedom House 2023). The protests were organized by pro-Russian forces, who demanded the resignation of Prime Minister Pashinyan in order to disrupt the peace deal with Azerbaijan. Police used force against protesters on several occasions (Freedom House 2024). Russian government-controlled media and officials did not hide that they were supporting anti-Pashinyan and anti-government voices (TACC, 2024).

Pashinyan's anti-Russian rhetoric, which had been present before he came to power, intensified with Russia's perceived "abandonment" during the conflict with Azerbaijan. He was thus emboldened to make ever stronger claims against Russia and to seek more enduring partnerships with the West, including in the security sector. According to a recent survey, 40% of Armenians named Russia as the third most dangerous country threatening Armenia, after Azerbaijan (86%) and Turkey (82%) (factor, 2024). From the early years of Pashinyan's rule, the Kremlin was not hesitant to deliver "unpleasant remarks" to Pashinyan's young administration on their desire to cooperate closely with the West. Not only did Russia criticize Armenia for warming up to the US,

it actively interfered in Armenia's internal affairs (Batashvili, 2019). Armenia was able to deepen its cooperation with the West because it possessed credible partners due to the "technocratic linkage" of the current ruling elite with Western institutions and organizations. This is in stark contrast with pro-Russian technocratic linkages cultivated during the previous government.

Belarus

President Aleksandr Lukashenko utilized the regional polarization caused by both the color revolutions and Russia's attack on Ukraine to further consolidate his authoritarian rule. The first major wave of mass repression by the regime followed the October 2004 legislative elections and the national referendum, which abolished the two-term limit of the presidency given by the Constitution. The elections were widely regarded as having been rigged.¹¹ No opposition candidates secured parliamentary mandates, and prominent members of the opposition (e.g., Mikhail Merinich, Valery Levanevsky, and Alexander Vasiliev) were sentenced to several years in prison.

There were widespread arrests of demonstrators, including the imprisonment of pregnant activist Aksana Novikova, who was sentenced to two and a half years for "slandering the President of Belarus" through anti-government leaflets that she distributed. The media were also subjected to strict state control. In 2004, journalist Veronika Cherkasova, of the opposition newspaper "Solidarnast", was killed. The courts also found reasons to temporarily shut down several civil organizations and independent media outlets. Similarly, universities also came under the total control of the state (Freedom House, 2005, pp.70-71). In 2004, the higher education course, Foundations of Ideology, based on Lukashenko's "ideas," became mandatory for students at all colleges and universities in Belarus.

From 2004 onward, the EU imposed sanctions on Belarussian officials, which contributed further to the consolidation of the ruling regime Hughes (Hubbard & Reed, 2020). Since 2006, sanctions have also been imposed on the President of Belarus, following his controversial third-term election. The subsequent peaceful demonstrations were violently suppressed. As of 2024, a total of 233 individuals and 37 organizations in Belarus are under sanction by the EU (European council 2024).

Russia's support was crucial at all stages of internal repression and foreign sanctions. Russian gas and oil subsidies, loans, and the Russian market, all helped the Belarusian authoritarian regime to survive and to maintain economic stability. Russia's backing for Lukashenko was evident not only in economic and political terms, but also through the direct involvement of Russian security special services in arresting an

¹¹ According to the exit poll conducted by Gallup Organization/Baltic Surveys, only 48.4% of voters in the country supported changing the presidential term. According to the results of the government, it was more than 77%. Thus, according to the data of an independent poll, the population refused to include such an amendment in the Constitution of Belarus at the referendum. Freedomhouse.org, 2005. Freedom in the World—2005 Survey. p.72. Available at: https://freedomhouse.org/sites/default/files/2020-02/Freedom_in_the_World_2005_complete_book.pdf

unprecedented number of peaceful demonstrators that were protesting his election for a sixth term (RFE/RL 2024). According to Pavel Slunkin, a Belarusian diplomat and political analyst, "It was an open threat [from Russia]: if the situation gets out of control, if the protests succeed, we will invade Belarus" (RFE/RL 2024). Between August and November 2020, 35,000 protesters were arrested in Belarus.

The heightened polarization after Russia's attack on Ukraine allowed Lukashenko to consolidate his power even more. He promoted the belief that only he could guarantee peace in Belarus, and that there would be no war if he remained in power. Lukashenko began to initiate institutional changes. The outcome of the referendum held on February 27, 2022, allowing Lukashenko to stay in power until 2035. With the same constitutional amendments, a new governing body, the "Belarusian People's Assembly" was created. It was given extensive executive and legislative powers, and is seen as a means of consolidating Lukashenko's control and influence beyond 2035 (Freedom House 2024). This was followed by anti-government demonstrations, which were also brutally suppressed, resulting in about 800 people being arrested.

The next wave of repression against the opposition and independent journalists is also related to the post-war period in Ukraine. The already displaced members of the coordination council, a civil society group formed in 2020, were tried *in absentia*. At the time, the purpose of the council was to organize a peaceful protest of the 2020 election results and offer a peaceful response to the state's post-election violence. In March 2023, opposition presidential candidate, Sviatlana Tsikhanouskaya, was sentenced to 15 years in prison *in absentia*. In September of the same year, her travel documents were revoked by presidential decree. Many other Belarusians residing abroad are no longer able to visit consular offices to renew or extend their passports.

Throughout 2023, 33 media outlets were declared "extremist" and 12 were declared "terrorist". In addition to the editors and journalists of these outlets, they were also listed as extremists, effectively preventing public outcry in support of their release. Even citizens who had donated to organizations "prohibited" by the state could not evade the long arm of the government. In August 2023, Lukashenko signed a decree that granted state security agencies complete access to monitor these unauthorized payments. Between December 2022 and January 2023, trade unions that organized labor strikes in protest of the 2020 rigged elections faced severe repression. Alongside the arrest of union leaders, hundreds of workers were detained; and some were sent to mental institutions, while others received long prison sentences. Even lawyers who defended these political prisoners were arrested or prohibited from practicing law. As of December 2023, reports indicate that 960 civil organizations have been forced to close. The government justified these repressions and the subsequent consolidation of power by citing the threat from hostile Western countries which were "plotting against sovereign Belarus." In response to these "threats", authorities began work on a draft law on the prohibition of "LGBTQ+ propaganda", and on criminalizing LGBTQ+ people, echoing similar legislation in Russia.

Despite the government propaganda asserting that Lukashenko is a guarantor of peace, Belarus is actively engaged in the war against Ukraine. Russia has launched

ballistic missiles and transported Russian military personnel and military equipment from the territory of Belarus. Further, Belarus provides the Russian military machine with refueling points and storage of weapons and military equipment (European Council 2024). In addition, according to a December 2023 report by the Yale Humanities Research Laboratory, between February 2022 and the end of October 2023, more than 2,400 Ukrainian children between the ages of 6 and 17 were housed in 13 state-controlled institutions in Belarus (Freedom House, 2024).

Since gaining independence, Belarus has not had any major state officials with educational or ideological ties to Western nations. The strong "technocratic linkage" between Belarus's ruling elite and Russia has significantly contributed to the absence of democracy in the country and the breakdown of political dialogue with the West (Lebanidze, 2020, p.100).

Georgia

The Rose Revolution triggered polarization. During the first wave of polarization, Georgia found itself on the Western side (Imedashvili & Siroky, 2023). This was related to the closeness of "technocratic ties" of its ruling elite with the West. The Georgian 2003 Rose Revolution, and numerous attempts at replication of it (the Orange Revolution in Ukraine in 2004, the Tulip Revolution in Kyrgyzstan in 2005, the Jeans Revolution in Belarus in 2006, and post-election mass protests in Armenia in 2004) were what led to the first major polarization in the region. Under Saakashvili, even though authoritarian tendencies prevailed, the EU and the US were able to persuade the incumbent regime to open up the political system and allow for a transition of power through elections (Lebanidze, 2020, p.100).

Following the peaceful transfer of power in 2012, Georgia's "technocratic linkage" with the West was replaced with pro-Russia leaders. Ivanishvili, the patron of Georgia's new ruling elite, had professional and societal ties to Russia. Investigative journalists have alleged he owns unreported business and real estate in Russia (OCCRP, 2024). Although an important share of state officials have had educational ties with the West (the current Prime Minister, Irakli Kobakhidze and Speaker of Parliament Shalva Papuashvili), they have either become executors of their patron's will or have "resigned" (as seen in the cases of Speaker of Parliament Kakha Kuchava in 2021, First Vice-Speaker of Parliament Tamar Chugoshvili in 2019, and several MPs and ministers and deputy ministers [2016-2023]). The only high level pro-EU official figure left is President Salome Zourabichvili, whom the ruling party tried to impeach for her unauthorized working visits to Europe to lobby for Georgia's EU candidacy in 2023 (Parulava, 2023).

Georgia has reached a critical juncture. The re-orientation of technocratic linkages facilitated and consolidated the process of turning away from the West towards Putin's Russia. Although the authoritarian character of Georgia's government was noticeable even before Ivanishvili, the new government dramatically increased its control over state institutions and coordinated campaigns to marginalize critical

media, opposition and civil society. The Georgian government painted the West as the "icon of the enemy", and accused it of trying to destabilize the country by interfering in its internal affairs. The government's rhetoric became fully antagonistic with regular attacks against Western politicians and ambassadors.

The government of Georgia also instrumentalized the fragile security of the country by weaponizing the fear of (renewed) war. It accused a large part of the opposition of trying to drag the country into the war and presented itself as the only guarantor of peace (Kandelaki, 2024). Georgian authorities also increased the scale of arrests, court fines, persecutions and intimidation of peaceful demonstrators.¹² In addition, the government began using terminology favored by Putin to discredit opponents. Phrases like "grant eaters", "puppets of the West" (used during the color revolutions), "liberal-fascism," and "Global War Party" (introduced after the invasion of Ukraine) have all been adopted by Georgia's ruling party to shape public perception and undermine dissent. (Imedashvili, 2022). The Georgian government has also claimed that the US government intends to overthrow its administration using the US Agency for International Development (USAID) (Civil.Ge, 2023).

In October 2023, the State Security Service of Georgia (known as SUSI in Georgian) interviewed NGO employees who had participated in USAID training. The investigation suggested a connection between the training and an alleged coup plot orchestrated by the US government. The Russian analogy is interesting in this context. Following the color revolutions, USAID-Russia faced a number of baseless accusations. In 2006, the Russian Duma accused the US of interfering in Russia's domestic affairs by supporting NGOs, and it called on the Foreign Ministry to take "urgent measures" to protect the country's sovereignty (Ambrosio, 2009). Over two decades, USAID's mission in Russia provided nearly \$3 billion in aid to organizations aimed at "social and economic development". The organization ultimately had to leave Russia in 2012 (Rojansky, 2012).

The government of Georgia also famously adopted the so-called "Russian law" and the homophobic anti- LGBTQ+ legislative package. During discussion of the anti- LGBTQ+ legislative package, the representatives of the ruling party of Georgia accused the West of being involved in Georgia's gay propaganda, and suggested the law was necessary to protect Georgian traditions (Kapanadze, 2024). The actions of the Georgian government have Russia's full political backing. Russian propaganda has claimed that the US was planning a coup to bring its proxies to Georgia. To circumvent this, Sergei Karnaukhov, a former employee of the Russian Ministry of Internal Affairs, and currently a co-anchor of the propaganda channel Soloviev Live, directly appealed to the Georgian authorities to officially apply for military-technical assistance to the President of the Russian Federation, telling them that such help would be found (Netgazeti, 2024). Russia also prizes the acts of the Georgian government in "strengthening [its] sovereignty", which, according to Kremlin ideologue Aleksandr Dugin, "means liberation from the West, not from us".

¹² During the second initiation of the Russian law, protestors were fined up to 150,000 GEL. Voice of America. 2024. 'Are Georgia's law enforcement agencies investigating violence against activists?' Available at: <https://fb.watch/tjQ-X1UGDv/>

Georgia's society is largely pro-European, with a long history of free civil society, academia and part of the media. Their significant contributions to building a pro-European Georgia offers hope that this democratic backsliding is temporary. Georgia's 2024 parliamentary elections on October 26th were seen as a pivotal referendum on the choice between a Western pro-EU course for the country, and a pro-Russia position. The ruling party, Georgian Dream, manipulated the process in the style of other authoritarian regimes in the region. At the time of writing, the local monitoring organizations, the President of Georgia, and the opposition parties are refusing to recognize the results. The President publicly declared that the country had fallen victim to a Russian 'special operation'. In response, U.S. Helsinki Commission Chairman Rep. Joe Wilson called on the U.S. State Department to investigate potential Russian interference in the electoral process (CSCE, 2024). The European parliament denounced the outcome of the recent parliamentary elections in Georgia and called for a new election within a year. It is yet to be seen whether mass protests will change the current course of Georgia and if pro-Western technocratic linkages will facilitate a return to Georgia's previous destination as a future member of the EU.

Conclusion

Technocratic linkages have a significant influence on why countries in the post-Soviet region have oscilated between the European Union and Russia since 2003. The colored revolutions and the full scale invasion of Ukraine led to heightened polarization and created fertile ground for autocrats to consolidate their power. These leaders demonized the West, suppressed technocratic linkages built up the European Union, dislodged elites educated in the West and utilized security instruments to strengthen autocratic systems of governance, aided by direct political-diplomatic support from Russia. Structural factors such as economic and intergovernmental linkages may have little or no influence on radically reorienting country's trajectory. Georgia and Armenia exemplify this point well.

In Belarus, Lukashenko is totally reliant on Russia to hold on to his power. However, even though economic linkages to EU were more that 20% until 2022 (reaching maximum 23,8% in 2005), such structural factors were not an obstacle for the ruling elite to consolidate power.

In Armenia, the first stage of regional polarization ended with the consolidation of authoritarianism, despite the fact economic linkage to EU was high. In 2003, economic linkages were 27,7% (compared 13,8% with Russia), increasing to 42,6% in 2004 (vs. 10,8% with Russia), and skyrocketed to 65,5% in 2005 (vs. 12,2% with Russia). The second period of polarization saw a political turn toward the West, despite the fact that economic linkage of Armenia to EU was low but was high with Russia compared to previous years. Exports to EU were 11,7% (vs. 45,4% with Russia) in 2022 and 8,3% (vs. 41,4% with Russia) in 2023. Intergovernmental linkage remained much the same when the ruling elite began to engage in anti-Russian rhetoric and hinted at closer ties with the West.

Georgia initially served as a catalyst for democratic processes during its peaceful revolution, despite close economic and intergovernmental ties with Russia. Georgia's exports to Russia amounted to 18,2% and to EU 11,9% in 2003; Georgia was a member of Russian-led CIS when its elite started to pursue a more pro-EU foreign policy. Nonetheless, its government has since sought to secure its power using authoritarian methods. Despite the fact that Georgia has EU candidate status and a strategic partnership with USA, and in 2022 Georgia's exports to Russia amounted to 11,5% (vs 15,5% with EU), the elite has paid closer attention to Moscow's interests than it did previously.

To understand this change and continuity, we applied Levistky and Way's conceptual framework "leverages and linkages", focusing specifically on the role of "technocratic linkages". As a result, we conjectured that elite connections through professional, educational and social networks with external actors (the West or Russia) have significantly influenced their preferred ideological and international alignments.

When ties to Russia are weak (as in the case of Georgia in 2003-2012, and Armenia in 2018-2024), the country tends to align more closely with the West, and their internal environment becomes more openly democratic. Conversely, when ties with Russia are closer (as in Georgia in 2012-2024, and Belarus in 2004-2024), countries choose authoritarianism and isolation from the West under the guise of "stability". However, the flexibility and agency associated with technocratic linkages suggest that the cycle can be broken if and when leaders decide to re-orient and empower elites educated and trained in the West.

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EFFICIENCY OF ONLINE PLATFORMS IN ASSESSING BUSINESS ENGLISH WRITING: TEST STRUCTURE AND EXPERIMENTAL RESULTS

Lusine A. HARUTYUNYAN

Armenian State University of Economics, Armenia
lusineharutyunyan100@yahoo.com

Susanna A. CHALABYAN

Armenian State University of Economics, Armenia
s.chalabyan@gmail.com

Kristina M. TORGOMYAN

Armenian State University of Economics, Armenia
kristitorgomyan@gmail.com

Abstract

Background: Business writing has long been a subject of significant academic interest for most educators worldwide. Still, its relevance increased with the introduction of online websites and platforms that are extensively used in educational institutions, especially after the emergence of Artificial Intelligence (AI) and its holistic impact on the development of written communication, making educators take special measures to decrease the usage of mobiles or other devices when testing business writing knowledge and skills during the English courses.

Objectives: During the Business English courses, educators and lecturers at the Armenian State University of Economics (ASUE) teach their students how to develop and design business letters, CVs, and cover letters. The emergence of AI and online chatbots has enabled students to use them to develop their writing. Our research carried out during one semester at ASUE aims to discover a possible way and method to organize the whole process without plagiarism used by the students when they get the business letter sample from the generative AI extensively used by them.

Methodology: We have applied comparative, quantitative, and qualitative analysis as well as descriptive analysis to achieve the research objectives. We chose two different groups of university students studying at ASUE. We identified two distinct online platforms to embed the tests we designed to check the knowledge of business letter writing, obtain the results, and analyze the efficiency of this type of testing.

Findings: The efficiency of online platforms and the business letter writing test format proved to be more productive. They led to better results, thus improving the students' business writing competence via online platforms and tools.

Keywords: Business English Writing, Artificial Intelligence, Business Letters, Written Communication, Technology

JEL classification: I23, I21, I29

Introduction

The paper delineates the research carried out in the domain of business letter writing, and the main findings of the experimental study carried out during the second semester of university studies. The modern global landscape is characterized by the emergence of technology and new opportunities provided by generative AI, as well as its positive and negative effects on every aspect of learning and teaching that is crucial in contemporary society. The hypothesis has been outlined: it concerns the administration of business letter writing by developing the assignment in the test format, embedding it in the online platforms, collecting the data, and analyzing the results. The scientific paper underscores the importance of business writing for students majoring in economics. The teaching methods applied, and competency assessment in letter writing was carried out as the final step of teaching business letter writing. The comprehensive research has been implemented among freshmen and sophomores in undergraduate studies after they have learned and mastered the guidelines of business writing and the rules governing them. The researchers have employed some new practices when testing the competence and proficiency of the students in the domain of business letter design and development: the authors have underlined the primary goals of checking students' knowledge by limiting the employment of generative AI tools when designing and developing their writings. The researchers have compiled the tests based on the guidelines previously explained and discussed during the lessons and embedded those tests into two different online platforms to be utilized during an offline lesson. The median results proved the efficiency of this type of approach the researchers applied: students could not use any online resources to develop any type of letter as they had to quickly answer the test questions, thus diminishing the usage of any other websites. Generative AI tools could not be utilized to answer the test questions posed correctly. The results were not as high as they used to be in previous cases when the comprehensive utilization of generative AI and online tools led the professors to question the eligibility of that method.

Literature Review

Language, especially foreign language proficiency, has a crucial and significant role in communication processes in different domains on local, international, and global levels. Learners mostly use English language skills (listening, speaking, reading, and writing) to ascertain their language knowledge, proficiency, and communication skills (Grabe & Stoller, 2002). Ahmadi (2017) emphasized that educators' teaching modes and methods when teaching languages during their lessons are integral and can further facilitate native and foreign language learning processes. Education professionals highlight the necessity of using technological advancements to provide high-quality and high-class education. Educators currently underline the fact that the education landscape should be completely reviewed and adjusted based on the needs of the learners and requirements set by the emergence of new technology, namely online platforms and tools, generative AI, and chatbots.

The following fact is crucial for educators when teaching languages: the timely and correct choice of suitable teaching materials and online resources proves to be beneficial for foreign language learners. Clements and Sarama (2003) underline the above-mentioned notion and assert that using appropriate technological tools and materials is crucial for learners. There are abundant online websites and platforms to be used during language courses. Still, we should identify those that will be used for the benefit of the learners, and that will be appropriate for every goal and objective set by educators and education institutions. Larsen-Freeman and Anderson (2011) underscored that technology enriches teaching resources, thus providing learners with novel and engaging learning experiences.

The embedding of technology and its widespread use in teaching and learning after the COVID-19 pandemic, the mitigation of its consequences, and the transfer of lessons to online settings have developed new teaching modalities. Modern technology and its different advances (in the form of learning management systems and online platforms) are integrated into the teaching and learning processes. They offer new opportunities and enrich the learning and teaching processes, leading to improved knowledge of the subject, which is language learning and teaching in our case. Integration of technology in the overall functioning and operations of the universities is already a reality, thus gaining popularity among the academia and the management and leadership of the universities globally. Integrating technology can have positive and negative impacts on education as a whole, so the role and expertise of the lecturers is pivotal in using the technologies for the benefit of the learners. Bransford, Brown, and Cocking (2000) underlined that computer and online technology and its applications enable educators and learners to build international communities to connect with people and other learners or students and provide opportunities for the cognitive process through this learning environment. They also pointed out that the positive influence of technology mostly depends on the modes and methods lecturers utilize during their lessons.

The 21st century is a century of technologies, advancements, modifications, and applications, thus entering people's lives without any prior notice. Still, its positive effect is the development of a more attractive setting and experience for the teaching and learning processes by involving an increasing number of students and making this process more vivid for educators as well. Modern technology, online platforms, and LMSs (Learning Management Systems) are extensively embedded in educational processes, broadening the horizons of the academic staff and making lessons more engaging, vivid, informative, agile, and innovative. Solanki and Shyamlee (2012) underlined that technology modified language teaching methods and modes, whereas the application of the technology benefits the learners based on their needs and interests.

Pourhosein Gilakjani (2013) states that modern technologies and advancements can change and transform language teaching modes by applying technological advances in the language teaching processes.

We should consider the fact that in the sphere of English or any foreign language teaching, competencies pivotal in the 21st century comprise soft skills, particularly communication, critical and creative thinking, cooperation, teamwork, time management, and problem-solving skills that should be taught in line with the foreign languages learned in educational institutions. Technology enables educators to have open access to abundant online learning materials that are not available in offline settings. On-demand learning and teaching and the availability of the above-mentioned resources are aimed at supporting lifelong or continuous learning (Bransford et al., 2006). In the 21st century, chalk-and-talk methods of teaching any language in offline settings are becoming obsolete and insufficient in teaching English, so some modifications and changes are necessary in modern teaching modalities. (Susikaran, 2013). Dawson, Cavanaugh, and Ritzhaupt (2008) and Pourhosein Gilakjani (2014) underscored the fact that technology use can lead to a learning environment that mainly concentrates on the learners, not on educators, which can further result in some positive changes.

Technology is being used to develop writing skills when teaching foreign languages, although in some cases, it can motivate learners to use AI tools and chatbots to design business letters and present them as their work. In our analysis, we will mainly handle this challenge by offering novel methods of embedding technology in teaching business writing to benefit educators and learners. Business writing is essential for future economists as they will predominantly deal with foreign clients, and their knowledge will enhance their standing in the company and even lead to future promotions. Two main studies focused on online assessment strategies for students' writing skills and issues EFL teachers have while assessing writing skills online. Namely, Dewi et al. (2023) did a descriptive qualitative study with 16 EFL teachers who evaluated the student's skills in writing reports, genre texts, short stories, summaries, and essay-based tests, which were generally administered using Learning Management Systems (LMS). The issues raised were academic integrity, time management, internet access, and the need for guidance and feedback. El Hasan (2023) evaluated past research and discovered common difficulties, such as high internet fees, inadequate connectivity, a lack of digital literacy, low student engagement, and academic dishonesty. Hasan proposes that teachers improve their digital literacy and use interesting resources to increase student enthusiasm. Both studies emphasize the need to address these difficulties to improve online assessments' effectiveness.

Methods

To address the primary goals and aforementioned objectives of the research, the following methods, techniques, and analytical tools have been employed and applied:

- Quantitative methods
- Comparative analysis
- Experimental analysis.

The types of business letters to be introduced by professors with subsequent questioning into the nature and guidelines of letter writing were identified, and letter

design and development were carried out in a new format, which led to the decision to experiment.

The research has employed a quantitative method of the experiment that was specifically designed to check the hypothesis: the test format (the novel approach) to business letter writing, and further assessment will be maximally fair and impartial as well as it will abolish the use of generative AI or other online tools or resources. The structured survey previously formulated by the researchers enabled them to identify the advantages and disadvantages of each online platform where the tests were embedded. It was of utmost importance to analyze online platforms, with all the peculiarities and distinguishing features to find the best ones to be used for the experiment.

The comparative analysis of the two online platforms (www.nearpod.com and www.moodle.com) for the implementation of the experiment has been conducted (from the perspectives of professors and students) that enabled the authors to conclude which online platform yielded better results and which one was highly preferred by the students. The statistical analysis of the results of the conducted tests allowed the researchers to conclude that the business letter assessment format proved beneficial for both sides as students mostly relied on their knowledge, did not cheat, but managed to get positive results. In contrast, the professors highlighted that the students worked independently, without using online tools (Chat GPT and other AI tools), and finished the test even earlier than had been planned.

Results

Contemporary society predominantly relies on email, instant messaging apps, and online forms of communication, the existence of which does not diminish the necessity to devise well-structured business letters that are not perceived as a remnant of the past. Technology has become one of the key pillars of teaching and learning in the 21st century. Modern classrooms are predominantly equipped with the technology necessary to deliver engaging lessons or lectures, carry out lively discussions or debates, and conduct active lessons enriched with fun and stimulating activities. In the course of our research, we have identified the primary goals that drove us to investigate the process of letter writing. Teaching the students the main principles of business letter writing is crucial, and the professors convey this knowledge to the students. We underlined the importance of including some examples of business letters that contain different types of mistakes in teaching business writing and asked the students to highlight those errors and correct them. This strategy will indicate that the students have mastered the overall understanding of business letter strategies and principles.

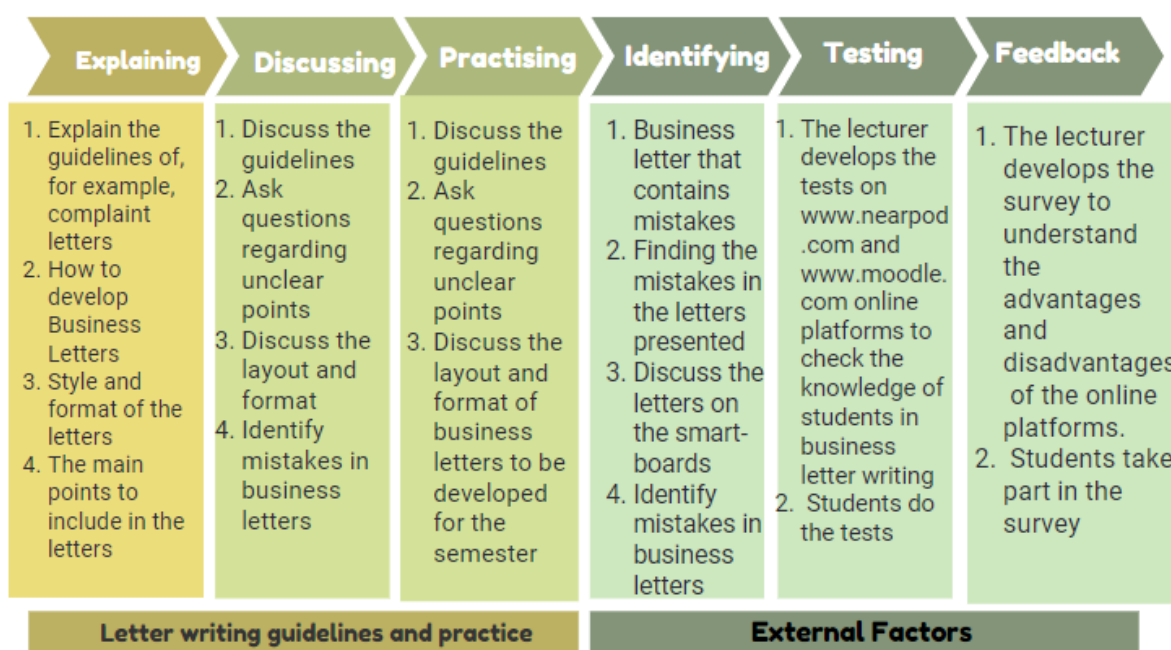
At first, professors teach the foundations of business writing: how to devise the letter, how to design and further develop it, letter layout, format, its constituent parts, as well as the circumstances in which this specific type of letter should be developed and sent. This is conducted during the face-to-face lesson that would highlight the whole

process of business letter writing, followed by the question-answer session where students delve into business writing guidelines based on the type of letter they learn during that specific semester of their education process. After explaining the guidelines and strategies of business letters, the lecturer introduces some letter samples developed correctly and containing some mistakes so that the students can identify and correct them. The lecturer can use the smart boards to create vividness and clarity in the letter-writing process.

After this initial phase, the students have an opportunity to read the guidelines and analyze them at home as the lecturers send all the information necessary to master the specific type of letter writing to either group email address or through online platforms, namely messengers, telegrams or other social media for the students to have it available at any moment they feel incentivized to study the information sent. The next phase is the preparation of the tests by the professors. We conducted the assessment via online tools and platforms as technology is entering the teaching modality even faster than expected. Two online platforms and types of business letters were thoroughly examined and employed for this specific semester. Namely, www.nearpod.com and www.moodle.com, where www.moodle.com is an institutional Learning Management System (LMS), and www.nearpod.com is an online platform freely available for educators without any institutional affiliation. The next phase was the organization of the testing process, which was a novelty for Armenian reality where letter writing, no matter the discipline (academic or business writing), is primarily carried out in the form of letter writing but not in the form of tests conducted via online platforms or LMSs. A new model was developed by us that will precisely depict the overall process of the initiation, implementation, and organization of the writing process, which was entitled the EDPIT F Business Writing Model that is introduced below.

Figure 1: Model 1- Business Writing Model designed and developed by the authors

Business Writing Model EDPIT F



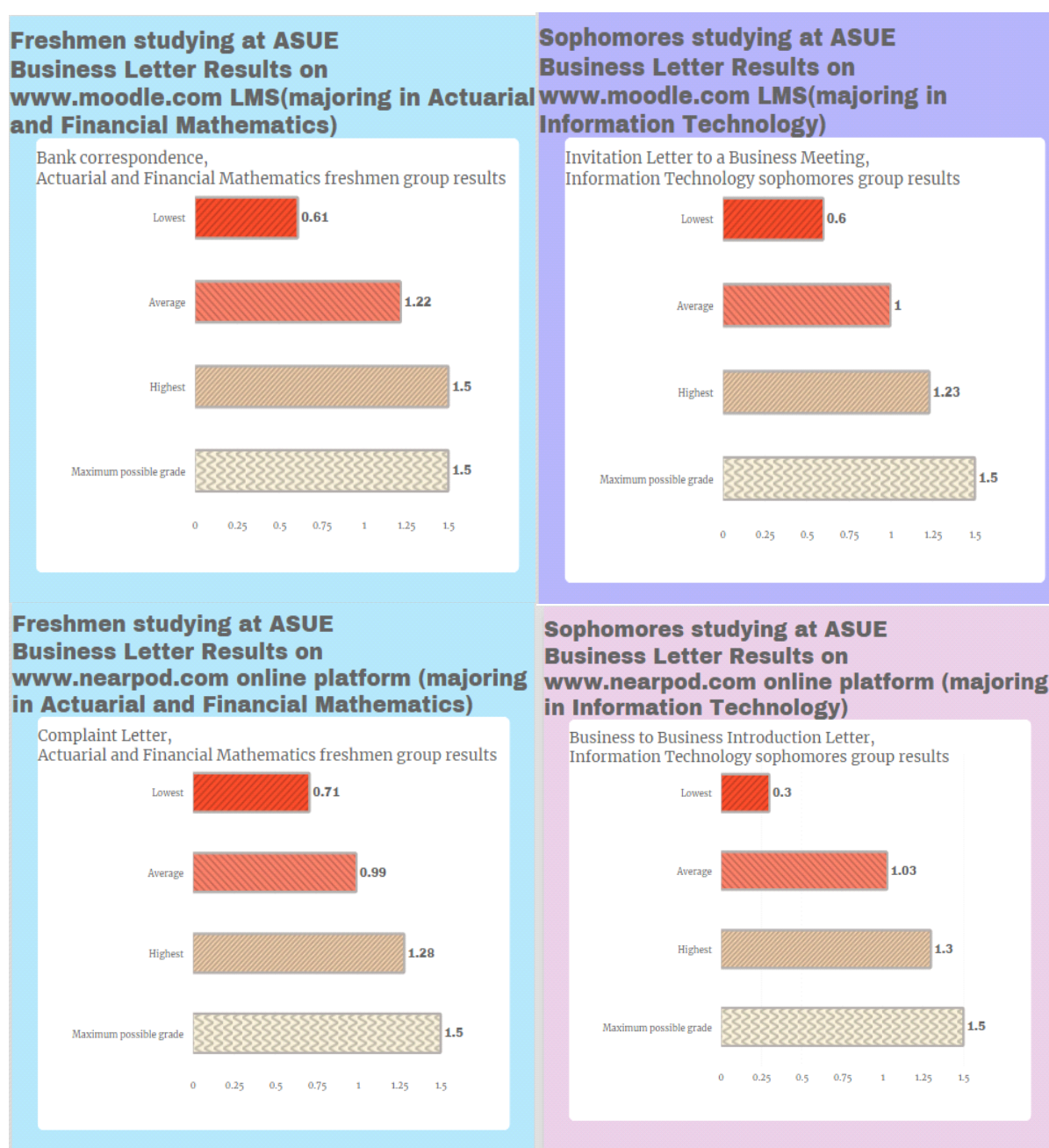
Source: Author's work

The Feedback phase is separated as this section of the holistic process is conducted after the students pass the tests and the lecturers send them the survey previously compiled to gauge the students' overall impression, to identify which online platform was more beneficial, easy to navigate, or user-friendly. Hence, this section of the model stands out from the rest of the model.

The test was developed for students at ASUE majoring in two different specialties (four groups, two groups studying in their first year and two groups studying in their second year). Still, the letter types were the same throughout the university, so the organization and coordination of this type of testing would lead to the same strategy being applied university-wide. Two business letters were identified for freshmen, and two other business letter types were developed for sophomores. Each group had to enter two different platforms: first, the test was conducted through www.nearpod.com, followed by the test on the institutional LMS www.moodle.com. The types of business letters were: freshmen studied how to develop *complaint letters* and *bank correspondence*, whereas sophomores studied the fundamentals for developing *business-to-business introduction letters* and *invitation letters to business meetings*. The test questions comprised the following types of questions: *true/false statements*, *multiple-choice questions*, as well as *drag and drop*, *choose from the list*, and *fill in the blanks* activities. The primary goal of this strategy was to diminish the usage of generative AI in the process of letter writing, and a time limit was assigned to the tests (20 and 25 minutes) depending on the number of questions and difficulty levels. The students could not use generative AI as they had to answer the questions at a faster pace to be able to answer all the test questions, which proved that this type of testing and assessment would emerge as beneficial for both students and professors. The students were not

deprived of using their mobiles. Still, their desire to use AI to generate the letter was decreased to zero, and the assessment was conducted without biases and was as fair or impartial as possible. The online platform checked the students' answers, and professors only saw the final result, the grade obtained from the test. Professors checked all the results and analyzed them, from the lowest grade to the highest one, and highlighted the average result for the groups of students. The graphs introduce and highlight the information compiled from the platforms that were generated by us through the online tool www.venngage.com which enabled the development of these graphs and results.

Figure 2: Test Results on Two Online Platforms with the lowest, average, and highest grade



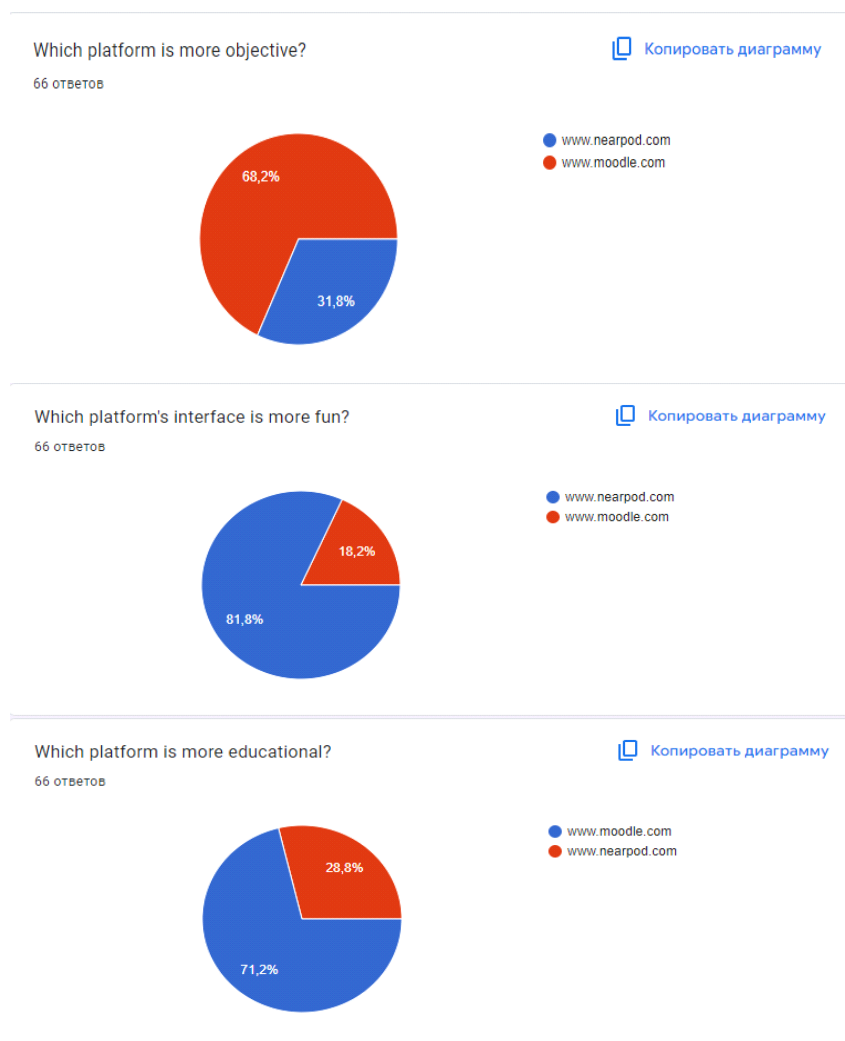
As we can infer from Figure 2, the lowest grade obtained by freshmen on www.moodle.com LMS was 0.61, and on www.nearpod.com – 0.71, and the highest grade on www.moodle.com was 1.5 and on www.nearpod.com – 1.28 whereas average grade was 1.22 and 0.99 respectively. The lowest grade the sophomores managed to get on www.moodle.com LMS was 0.60, and on www.nearpod.com – 0.3, and the highest grade on www.moodle.com was 1.23 and on www.nearpod.com – 1.3 whereas average grade was 1.23 and 1.3 respectively. When the students use generative AI to develop their writing, they generally make no mistakes, everything sounds professional, all the rules are observed, and the students get the highest grades. In contrast, the tests embedded in two online platforms proved that users could not collect maximum grades (only 2 students had the maximum grade), indicating the fairness and reasonable nature of this type of test and assessment where subjectivity is minimized, and cheating is diminished.

After testing, the researchers sent the previously prepared survey to reveal which online platform was more beneficial to the students, easy to use or navigate, fair and interesting, or attractive. Here are the survey results introduced in the form of pie charts.

Based on the survey results, where 66 students shared their opinions, the researchers identified the following: regarding the survey question on which online platform was more engaging when dealing with business correspondence assignment, 21 students preferred www.nearpod.com, and 45 students preferred www.moodle.com. The following survey questions were related to the online platform, which was more user-friendly, easy to navigate, and easy to use: 30 students identified www.moodle.com and 36 – www.nearpod.com. The next question included the inquiry into the more educational platform, where 19 students chose www.nearpod.com and 47 students – www.moodle.com. Regarding the attractiveness of the interface, 12 students highlighted www.moodle.com and 54 students – www.nearpod.com and the next question related to the objectiveness of the platform, where 21 students underlined www.nearpod.com and 45 students pointed out the online platform www.moodle.com.

Based on the students' choice, two peculiarities of www.nearpod.com, namely, the choice of the platform that was easy to navigate and which interface was fun when answering the test questions, were preferred by the students participating in the survey. The three peculiarities of www.moodle.com, namely engaging nature, educational character, and objectivity, were higher based on the student's choice. We can conclude that both platforms proved to be beneficial for the students and professors so that they can be used interchangeably for the implementation of the business letter-writing process.

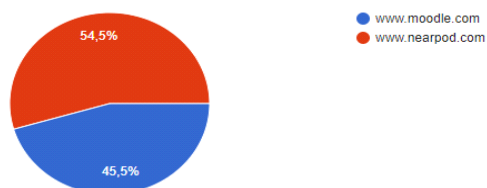
Figure 3: Survey Results of the Two Online Platforms Where the Tests Were Embedded Related to the Opinion of the Students After the Completion of the Test



Which platform is more user-friendly, easy to navigate and easy to use?

 Копировать диаграмму

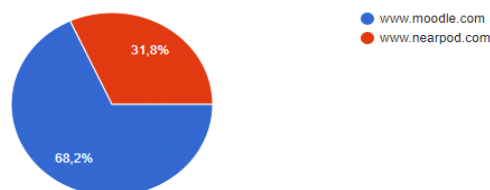
66 ответов



Which online platform is more engaging when dealing with business correspondence assignment?

 Копировать диаграмму

66 ответов



Conclusion

Technology enhances education and unleashes new modes of acquiring and testing knowledge and skills based on all the possibilities provided by advanced and emerging technologies, which are integrated into the classroom. However, the emergence of generative AI has caused new types of problems and new challenges for educators when organizing testing or assessments while teaching the disciplines.

The investigation into the domain of business letter writing in the course of language teaching has revealed the advantages and drawbacks of these two online platforms that were thoroughly introduced in the paper, and the following conclusions have been derived:

- The tests were compiled by the authors based on the guidelines of business letter-writing principles and strategies, and these tests were embedded into two online platforms, www.moodle.com and www.nearpod.com, that were utilized to check the letter-writing skills. These platforms allowed the authors to embed different types of test questions, not limiting the choice of questions to just multiple choice questions or true-false statements that prove to be an advantage for organizing compelling tasks with various options. The students were not bored by the uniformity of test questions and were incentivized to accomplish the tests.
- For the initiation, implementation, and organization of the writing process in the test format with subsequent utilization of online platforms, the authors have developed the *Business Writing Model*, which was entitled *EDPIT F* and stands for *Explaining* the rules and guidelines, *Discussing* the unclear points, *Practicing* some letters developed during the lesson, *Identifying* some mistakes in letter writing samples, *Testing* the comprehensive knowledge of

letter writing and ultimately, collecting *Feedback* on the holistic process of test administration and the overall impression from the identified online platforms.

- Based on the results and Feedback from students, the test format was more compelling and beneficial as they did not rely on AI tools or online resources. Instead, they have read the questions and the options, attempted to remember the guidelines, and answered the test questions fairly and impartially. Based on the median results, this mode of assessment resulted in academic integrity, plagiarism was sharply diminished, and the overall mood of the students was higher as they realized that they knew the fundamental rules of business letters.
- One of the competitive advantages of the online test administration is the fact that it saves time as the professors do not check the work of every student as it is carried out automatically by the online platforms and is kept in the section 'results', or 'reports' that should be just retrieved by the academic staff and recorded in the online or offline register.
- Based on the results of the survey carried out as the final step of the research, the authors concluded that these online platforms were beneficial and prioritized by the participating respondents (students), where students highlighted the benefits of each platform and the singularity of each assignment embedded into the online platforms. However, the Moodle LMS was prioritized for its compelling nature, educational environment, and objectivity.

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MAIN DETERMINANTS AND CHALLENGES OF INCOME AND PRICE CONVERGENCE OF THE MACEDONIAN ECONOMY ON THE ROAD TO THE EU

Gjorgji GOCKOV

*Faculty of Economics-Skopje, Ss. Cyril and Methodius University in Skopje, Republic of
North Macedonia*

gjorgji.gockov@eccf.ukim.edu.mk

Goran HRISTOVSKI

*Faculty of Economics-Skopje, Ss. Cyril and Methodius University in Skopje, Republic of
North Macedonia*

goran.hristovski@eccf.ukim.edu.mk

Kiril JOVANOVSKI

*Faculty of Economics-Skopje, Ss. Cyril and Methodius University in Skopje, Republic of
North Macedonia*

kiril.jovanovski@eccf.ukim.edu.mk

Abstract

Background: This paper analyzes the real convergence of the Macedonian economy by focusing on income and price levels. Real convergence requires less developed economies to grow faster than developed countries in a sustainable manner, and empirical research confirms that income convergence aligns with price convergence.

Objectives: Investigating the income and price convergence of the Macedonian economy on its path toward European Union membership, the study addresses three key questions: What are the dynamics and sustainability of Macedonia's real convergence? What are the determinants of the challenges to convergence? What strategies can accelerate convergence?

Methodology: A comparative analysis of key economic and institutional indicators was conducted.

Findings: The findings reveal that while the Macedonian economy has areas contributing positively to real convergence, improvements in institutional quality are critically needed for achieving sustainable convergence.

Keywords: Convergence, GDP Per Capita, Price Level, Productivity, Institutional Quality

JEL classification: O15, O47, E31, F15, F43

Introduction

The process of economic integration has been a central focus for countries aspiring to join the European Union (EU), especially those with relatively underdeveloped economies. As the Republic of RN Macedonia advances on its path toward EU membership, achieving real economic convergence remains a crucial objective. Real convergence refers to the gradual alignment of income and price levels of less developed economies with those of more advanced EU member states. This paper delves into the dynamics of real convergence, with a specific focus on income and price convergence, as it represents a significant challenge for RN Macedonia.

The central research objective of this study is to examine the determinants and challenges that shape the real convergence process of the Macedonian economy on its road to the EU. More specifically, the paper addresses three critical questions: (1) What are the dynamics and sustainability of Macedonia's real convergence in terms of income and price levels? (2) What are the key determinants and obstacles to this convergence process? (3) What strategies can policymakers adopt to accelerate convergence in line with EU standards?

The concept of real convergence is multidimensional and complex. In the literature investigating economic growth, real convergence is covered by two complementary concepts – beta and sigma convergence. Beta convergence occurs when lower-income economies grow faster than higher-income economies, that is, a convergence process occurs. This concept basically derives from neoclassical growth theory, which assumes that lower-income economies realize higher returns on capital compared to high-income economies, leading to faster capital accumulation and greater economic growth in less developed economies. Sigma convergence refers to the reduction in dispersion in income levels between economies over time and is basically conditioned by beta convergence. Real convergence basically requires that the less developed economies grow faster than the more developed economies and at a sustainable level, thereby bringing about a convergence of income levels between the two groups of countries.

A frequently researched and discussed issue in the literature is the concept of convergence conditionality. Adherents of unconditional (absolute) convergence believe that poorer countries grow faster than developed countries regardless of the institutional setting and policies implemented by the states (Barro and Sala-i-Martin, 2004). On the other hand, conditional convergence takes into account the institutional set-up and policies that may differ between countries. Due to these differences, it is possible that the convergence dynamics differ between countries, that is, economic growth in poorer countries cannot automatically be higher than growth in rich countries (Krugman, 1991; Gopinath & Rigobon 2008). Empirical research on the convergence of a large number of countries does not find convincing evidence for the presence of unconditional convergence, that is, in most cases, convergence is conditional and depends on policies, institutions and other circumstances specific to the country (Rodrik, 2011; Masuch, Moshhammer, & Pierluigi, 2016; Lane & Milesi-Ferretti, 2007). The application of the concept of conditional convergence indicates that economies

with similar characteristics are likely to converge to the same income level in the long run, which differs from the income level of another group of countries that have different characteristics (the so-called concept of club convergence) (Yin, Zestos & Michelis, 2003; Iancu, 2017).

Considering that convergence is not an automatic process, it is of great importance to determine the factors and conditions that support convergence and economic growth. The literature investigating the determinants of economic growth and income convergence is quite rich. Starting from the models of economic growth of Solow (1956) and Swan (1956) which focus on the accumulation of capital as the main factor of growth, while treating technological progress as an exogenous factor, later technological changes acquired the character of an endogenous variable in the models that include human capital accumulation, innovation, investment in research and development (Romer, 1990; Fagerberg & Verspagen, 2017). The criticism of these endogenous models is that the differences between countries in these variables can explain differences in income levels, but do not answer the question of why countries implement different policies in these areas. Therefore, from the end of the last century, research in this area began to focus on institutions as a fundamental factor of growth, that is, on the differences in real convergence between countries. Institutions are now understood as the "rules (formal and informal) of the game in society", and include property rights, an effective judicial system, control of corruption, quality of regulation and governance, conflict management and political stability (Rodrik, 2000; ECB, 2008; ECB, 2018). The new concept of sustainable economic convergence focuses precisely on the role of "healthy" institutions. To be sustainable, real convergence should be supported by sound policies and institutions, as confirmed by recent research showing that institutional quality is a significant explanatory variable for growth differences between EU countries and long-term growth in European economies (Badinger, 2005; Dreger, Kholodilin, Lommatzsch, Slacalek, & Wozniak, 2007; Becker & Dominguez-Torreiro, 2016). Also, for real convergence to be sustainable, the increase in aggregate demand should be consistent with the long-term potential for growth (Mankiw, Romer, & Weil, 1992; Kirova, 2020).

History shows that rapid convergence is possible – there are successful examples of countries that have experienced rapid convergence. It is characteristic that all countries that realized rapid convergence shared the same/common characteristics. Several necessary conditions for rapid convergence have been detected: growth driven by sustainable growth of the total factor of productivity, significant improvement of institutional quality, increase in the quality of human capital, favorable demographic trends, high investment rates (increase in foreign direct investment), strong external competitiveness (increased trade openness) and sustainable macroeconomic stability (Crespo & Fontoura, 2007; Melitz, & Ottaviano, 2008; Altomonte & Pennings, 2009; Havranek & Irsova, 2011).

Empirical research confirms that the process of income convergence is always accompanied by a process of price convergence. Price convergence results from the theoretical framework contained in the "law of one price", which assumes that in a market with perfect competition the prices of the same products expressed in the

same currency should be equal (Van Ark, O'Mahony, & Timmer, 2008; Stiglitz 2016; Hałka, & Leszczyńska-Paczesna 2019). However, considering that not all goods are tradable, but there are also non-tradable goods, deviations from this principle have been observed in practice. Such deviations in the literature are most often explained through the occurrence of the Balassa-Samuelson effect, which is related to differences in productivity in the tradable goods sector between countries (Balassa, 1964). The literature related to price convergence mainly recognizes two factors that explain the existence of this convergence: a reduction in differences in income levels, which leads to faster inflation in the process of income convergence, and increased competition in the common market, which leads to downward pressures on prices. However, in practice there are other factors that influence the process of price convergence, such as: transport costs, consumer preferences (depending on culture, tradition, standard of living), synchronization of business/business cycles, market characteristics (segmentation or concentration), different fiscal and regulatory systems (Velde, 2003; Wolszczak-Derlacz, 2006; Dreger et al., 2007; Monastiriotis, 2011; Stockhammer, 2013; Pinkovskiy & Sala-i-Martin 2020).

Given these complexities, this paper undertakes a comprehensive analysis of the factors that influence the real convergence of the Macedonian economy. By utilizing a comparative approach and quantitative analysis of key economic indicators, the study aims to provide actionable insights for policymakers. The findings will not only highlight the determinants that favorably impact convergence but also shed light on the structural and institutional challenges that need to be addressed for sustainable growth.

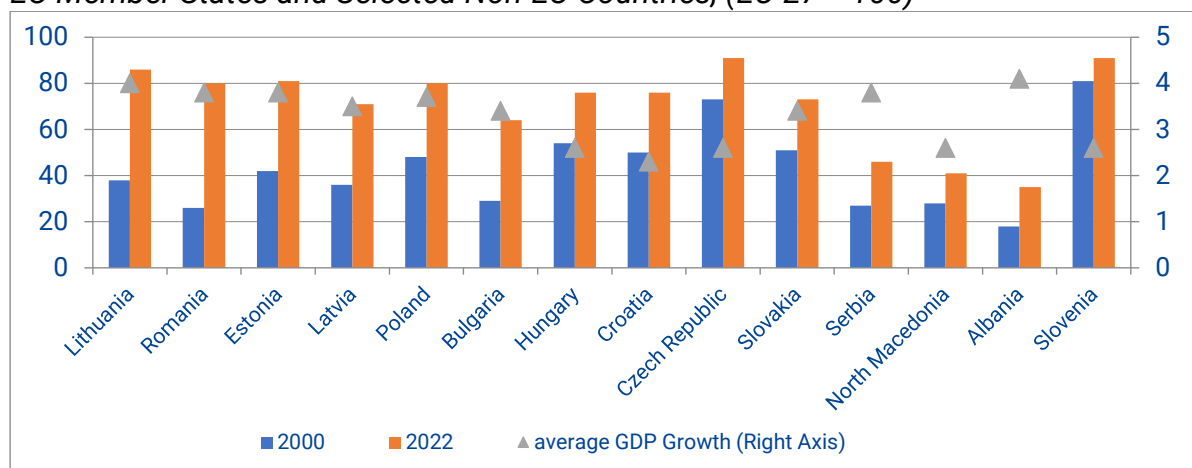
In the following part, the paper contributes to the ongoing discourse on real convergence by analyzing the Macedonian economy's current standing, the factors driving its progress, and the barriers hindering its alignment with EU standards. The study seeks to bridge the gap between theory and practice by offering evidence-based recommendations for accelerating convergence, thereby supporting RN Macedonia's integration into the EU.

Facts – Lagging in Income Convergence of Countries Outside the EU

The most used indicator for measuring income convergence is the Gross Domestic Product (GDP) per capita calculated according to purchasing power parity (PPP). According to this indicator, which is also used as a measure to compare the standard of living between countries, the Macedonian economy, as well as the rest of the European economies outside the EU, are significantly behind the EU average. Graph 1 shows data on GDP per capita and the average growth rates of the "new" EU member states and some European countries that are not yet members of the EU (RN Macedonia, Albania and Serbia). The significant backwardness of the Macedonian economy is evident - in 2022 GDP per capita in RN Macedonia is 41% of the EU-27 average. The same applies to the other countries that are outside the EU – Albania 35%, Serbia 46%. Compared to the year 2000, the income convergence of the Macedonian economy has increased by 13 pp, which, with the exception of Slovenia,

which initially had the highest level of income, represents the smallest dynamics of convergence of the income level. Albania and Serbia have similar dynamics of income convergence. It should be pointed out that initially (2000) the Macedonian economy had a similar level of GDP per capita as Bulgaria and Romania, which now (2022) have significantly exceeded it and their GDP per capita is 64% and 80% of the EU-27 average.

Graph 1: GDP Per Capita (Left Axis) and Average GDP Growth Rates (Right Axis) for New EU Member States and Selected Non-EU Countries, (EU-27 = 100)



Source: Eurostat, IMF, World Bank, own calculations

The backwardness of the Macedonian economy in the process of income convergence mainly results from the relatively low rates of economic growth realized in the period 2000-2022. Namely, the average GDP growth rate in this period is 2.6% per year, which is one of the lowest among the analyzed countries, lower than countries with initially similar levels of income, but also than countries with initially higher levels of income (Graph 1). Thus, in the case of the Macedonian economy, the concept of beta convergence is not consistently confirmed, that is, the growth rates of the Macedonian economy do not correspond to its initial level of income.

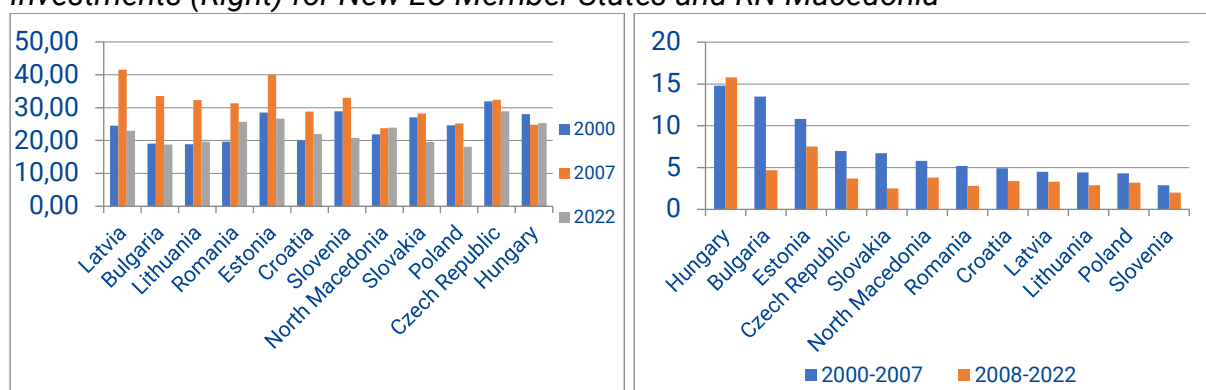
In the further part of the paper, a quantitative analysis of numerous variables is made in order to distinguish the factors that have a more favorable influence in the process of income convergence and the factors that are the main brake and reason for the backwardness of the Macedonian economy in the process of income convergence.

Determinants 1 – favorable macroeconomic indicators and trade integration

Analyzing the macroeconomic indicators, we can conclude that the Macedonian economy in the past 15-20 years has been characterized by macroeconomic stability and weak economic growth. Namely, stability is present in numerous segments of the economy - the real sector operates in an environment of relatively high price stability; in the external sector, we have a stable exchange rate, a relatively low and sustainable deficit on the current account from the balance of payments and a relatively solvent position of the external debt of the economy; the fiscal sector is mainly characterized

by low budget deficits and moderate public debt; the banking sector did not suffer significant shocks and remained stable maintaining high values of stability indicators. All these factors have been detected in the literature as factors that favorably affect economic growth and real convergence.

Graph 2: Gross Investments as a Percentage of GDP (Left) and Foreign Direct Investments (Right) for New EU Member States and RN Macedonia



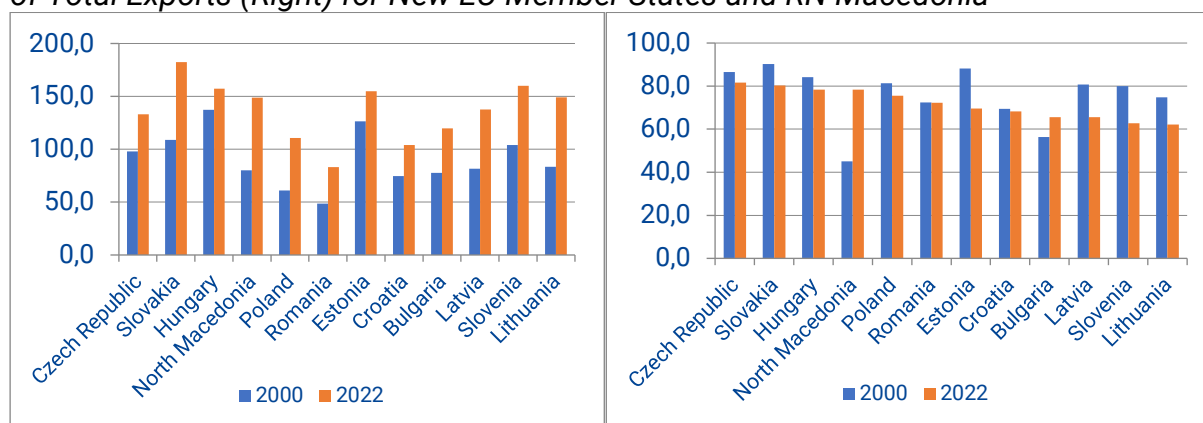
Source: World Bank, IMF, own calculations

The analysis of the gross investments of the new EU member states (Graph 2) clearly shows the benefits that the countries have from the EU membership. Namely, in the period immediately before and after EU membership (2000-2007), gross investments in most of the new EU member states recorded significant increases (over 10% of GDP in Latvia, Bulgaria, Lithuania, Romania, Estonia). In the same period, gross investments in the Macedonian economy recorded a small increase of 1.8% of GDP, and in 2007 they amounted to 23.7% of GDP, which is the lowest level compared to the new EU member states. The global economic and financial crisis of 2007/08 caused a significant decrease in gross investments among the analyzed countries. The exception is Hungary and especially RN Macedonia, which recorded a more significant increase in gross investments and in 2022 exceeded all analyzed countries. However, during such an analysis, the structure and purpose of the investments should be taken into account, in order for the increased investment activity to have a favorable effect on economic growth and real convergence. And the data on foreign direct investments confirm the thesis about the favorable influence of the country's membership in the EU on the inflow of foreign direct investments. Bulgaria, Hungary and Estonia recorded significant inflows of foreign direct investments in the period 2000-2007, while these inflows into the Macedonian economy were relatively small (Graph 2, right).

Other significant determinants that favorably influence real convergence are trade openness and integration. Graph 3 (left) shows the share of exports and imports of goods and services in GDP, as a measure of the country's trade openness. The analysis clearly shows that the Macedonian economy has a relatively high value of this indicator - close to the values of the new member states. That is, the Macedonian economy is characterized by relatively high trade openness. The same can be concluded when analyzing the trade integration of the Macedonian economy with the EU economy. Namely, the Macedonian economy exports 78% of the total export of goods to the

markets of the EU member states, which is approximately the same and even higher than some new EU member states (Graph 3, right).

Graph 3: Trade Openness as a Percentage of GDP (Left) and Exports to the EU as a Share of Total Exports (Right) for New EU Member States and RN Macedonia



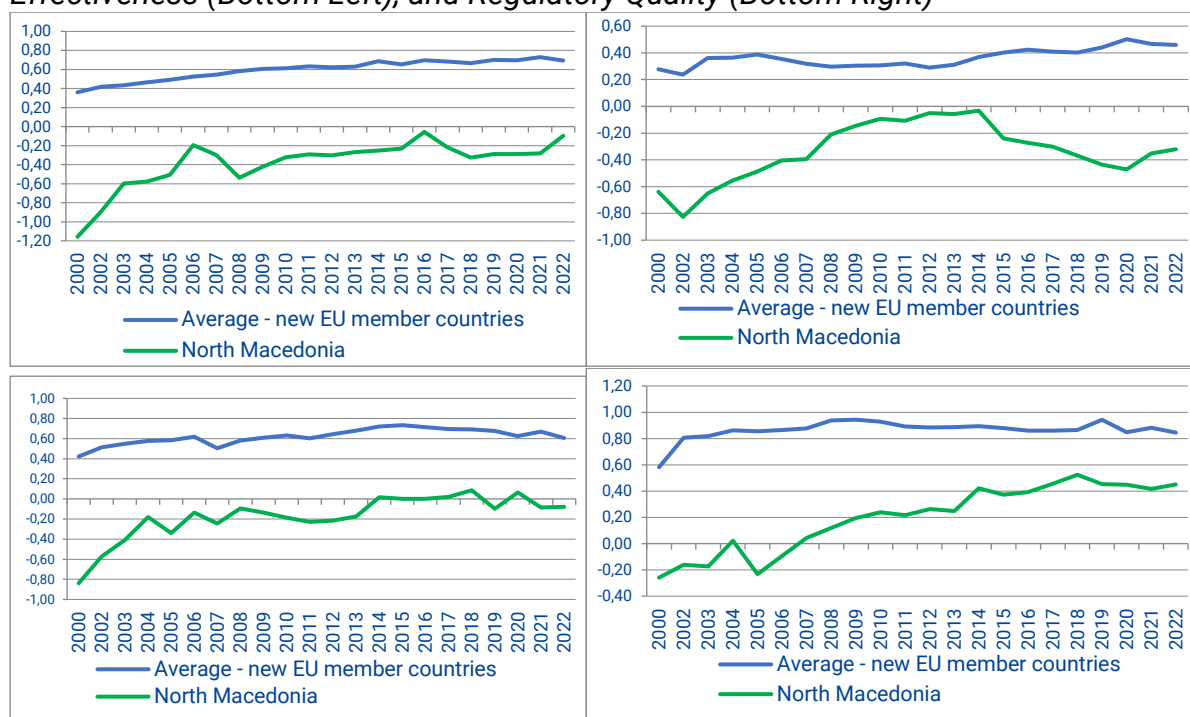
Source: Eurostat, Statistical Office, own calculations

High trade openness and high trade integration with the EU, together with macroeconomic stability, are determinants that favorably influence the process of real convergence of the Macedonian economy.

Determinants 2 – poor institutional quality

In contrast to macroeconomic stability and trade openness and integration, which have a favorable impact on the real convergence of the Macedonian economy, the indicators of institutional quality lag significantly behind the analyzed countries. According to the data of the World Bank (WGI, 2022), graph 4 shows the values of the institutional indicators for the new member states of the EU and RN Macedonia for the period 2000-2022, and for four areas: rule of law, control of corruption, government effectiveness and regulatory quality. It is evident that the institutional quality of RN Macedonia is lagging behind, especially in the area of rule of law and control of corruption (Graph 4, above). Not only are these indicators in the zone of negative values during the entire analyzed period, but there is also no approximation to the values of these indicators that refer to the new EU member states. Even in the case of control of corruption, in the last 7-8 years, further distance and increase of discrepancy has been observed. On the other hand, the values of these two institutional indicators in the new EU member states on average show stable movements with a moderate increasing tendency. That is probably one of the main benefits that countries get with EU membership.

Graph 4: Institutional Indicators for RN Macedonia and New EU Member States from 2000 to 2022 – Rule of Law (Top Left), Control of Corruption (Top Right), Government Effectiveness (Bottom Left), and Regulatory Quality (Bottom Right)



Source: *Worldwide Governance Indicators, World Bank, own calculations*

The assessment of government effectiveness (Graph 4, bottom left) is also significantly behind the average of the new member states in the EU and clearly indicates the need to increase the efficiency and effectiveness of the Macedonian public administration. Only progress has been observed in the indicator of regulatory quality (Graph 4, bottom right), which records continuous increases and is gradually approaching the average value of the new EU member states. This is probably a benefit of the EU membership process and the need to harmonize national regulation with EU legislation.

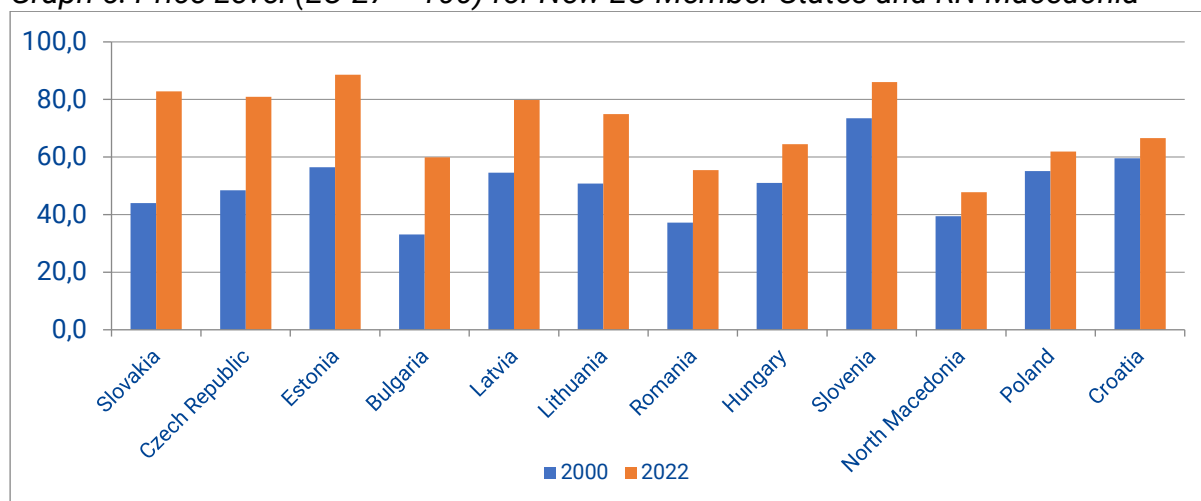
Given that the literature unequivocally confirms the direct and strong relationship between institutional indicators and economic growth, that is, income convergence, weak institutional quality is undoubtedly the main limiting factor and brake for faster income integration of the Macedonian economy.

Price convergence – weak price convergence of the Macedonian economy

Experiences show that the process of approximation to the EU, in addition to income convergence, is supported by price convergence as well. That is, the concept of beta and sigma convergence is also present when it comes to the convergence of price levels between EU member states. Graph 5 shows the price levels of the new EU member states and RN Macedonia in relation to the average price level in the EU. It is evident that in the process of negotiation and membership in the EU, the countries faced an increase in their price levels. At the same time, the countries that initially

(2000) had a relatively lower price level experienced a more significant price convergence. The Macedonian economy in the period 2000-2022 saw only a small movement in the price level (of about 8pp) and currently has the lowest price level (47.8% of the EU average). For comparison, Bulgaria and Romania, which initially had lower price levels, recorded a more significant price convergence and currently the price levels are 60%, that is, 56% of the EU average.

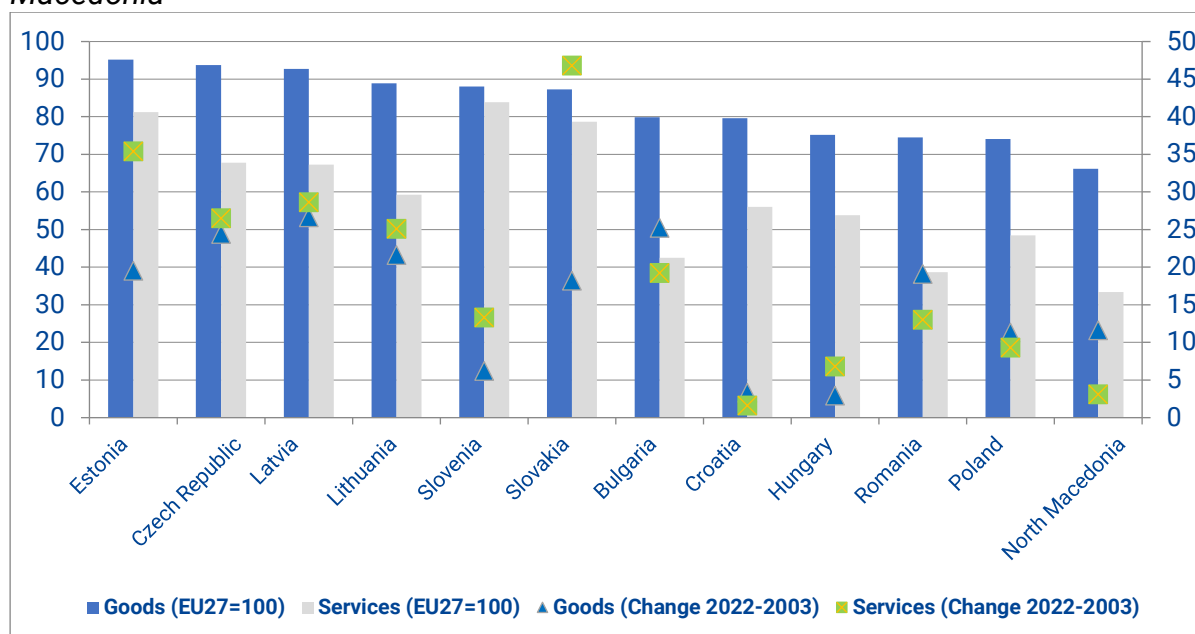
Graph 5: Price Level (EU-27 = 100) for New EU Member States and RN Macedonia



Source: Eurostat

The disaggregation of the price level of goods and services (graph 6) clearly shows that the weak price convergence of the Macedonian economy is mostly due to the "lag" in the prices of services. Namely, the level of prices for services in 2022 is only 33.4% of the EU average, that is, the intensity of convergence of prices for services in the last 22 years is relatively small (3pp). Just for comparison, in the same period, Bulgaria increased the prices of services by 19pp, Romania by 13pp, while the biggest movement was observed in Slovakia (47pp). On the other hand, the lag in the prices of goods in the RN Macedonia is not so great - in 2022 it is 66.2% of the EU average, which is an approximation of 12pp in the past 20 years. This confirms the thesis of greater convergence of the prices of tradable goods, but also the absence of a more significant Balasa-Samuelson effect in the case of the Macedonian economy. What should be expected in the coming period is an increase in the price level and a gradual approach to the price level in the EU, especially in the area of service prices.

Graph 6: Disaggregation of Price Levels for Goods and Services (EU27=100, left axis) and Changes from 2003 to 2022 (right axis) for New EU Member States and RN Macedonia

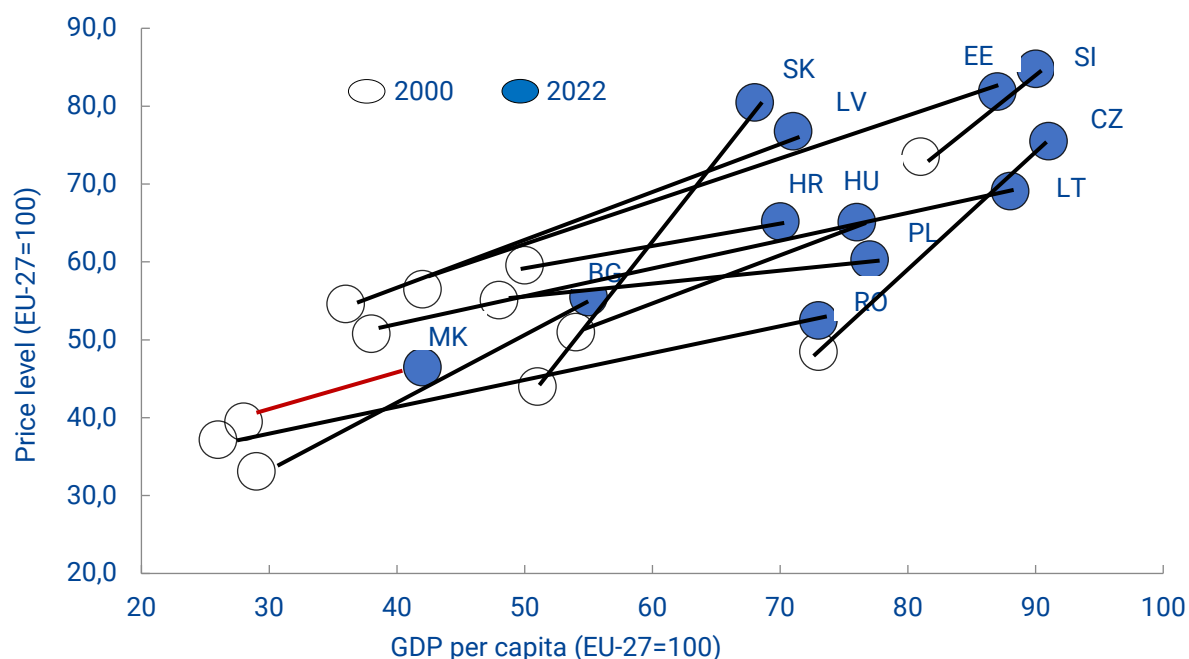


Source: Eurostat and own calculations

The literature identifies several determinants of price convergence. In the following, the subject of analysis are two factors that influence the price level and explain the "lag" in the price convergence of the Macedonian economy. One factor is income level and income convergence. Graph 7 shows the connection between the income and price convergence of the new member states of the EU and RN Macedonia. The connection between the process of income and price convergence can be clearly observed - in addition to convergence of income, countries also faced convergence of their price levels (some even experienced greater price than income convergence – Slovakia, Czech Republic, Slovenia). RN Macedonia lags behind in both income and price convergence. With the intensification of the income convergence of the Macedonian economy, an increase in the price convergence should also be expected.

Another determinant that affects the intensity of price convergence is productivity. Graph 8 presents the productivity growth rates of the new EU member states and the RN Macedonia in two periods: 2000-2007 (effect of the EU accession process) and 2008-2022 (effect of the global economic and financial crisis). One can clearly see the relatively high rates of productivity growth in the period immediately before and after the accession to the EU, as well as the lagging of the Republic of Macedonia in this period.

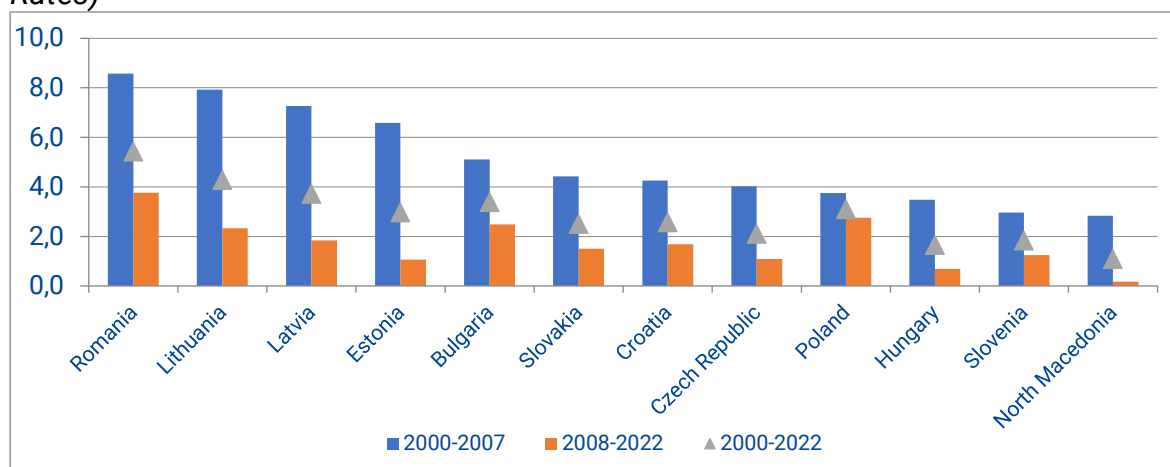
Graph 7: Relationship Between Income Convergence and Price Convergence in New EU Member States and RN Macedonia



Source: Eurostat, World Bank and own calculations

In the period after the global crisis, a significant decrease in productivity growth was observed in all new EU member states, and in the RN Macedonia, a decrease in productivity was also observed, or for the entire analyzed period (2000-2022), the Macedonian economy realized the lowest productivity growth rates compared to the new EU member states. This is one of the explanatory factors for the relatively low price level, the absence of the Balasa-Samulsen effect and the lag in the price convergence of the Macedonian economy.

Graph 8: Productivity in New EU Member States and RN Macedonia (Average Growth Rates)



Source: Eurostat, World Bank and own calculations

Discussion and Recommendations

The detected lag in the real convergence of the Macedonian economy made the need to increase the growth potential and accelerate the income convergence as key. The analysis of the determinants of income convergence clearly detects several factors that are crucial in that process and on which policymakers should focus.

First, improving institutional quality, which includes the rule of law, control of corruption, reduction of the gray economy and improvement of the quality of public services. According to all these parameters, which are detected in the literature as important determinants of economic growth and income convergence, RN Macedonia lags behind significantly. In addition to the need for significant reform in the above-mentioned areas, the increase in digitalization of public services is a measure that can significantly help in this direction (indicators for digitalization of public services in our country are significantly behind the EU average). Also, the reform process must be followed by quality investments in education and health, which would increase the accumulation and quality of human capital.

Second, improving the structure of investments, that is, directing investments in infrastructure. Namely, the analysis showed that the Macedonian economy is not behind in the level of investments, but in the effects of the investments. The lag in the quality of the infrastructure (roads, railways, electricity production facilities, medical and school equipment, the digitization of the economy) clearly show the areas where public investments should be directed. The improvement of the infrastructure would also increase the inflows based on foreign direct investments, which are also a significant variable in the process of income convergence.

Considering the connection between income and price convergence, the intensification of income convergence will face the Macedonian economy with the following challenges: change in the structure of consumption, caused by the change in consumer behavior. This will mainly be expressed through an increased share of services, which currently amounts to 23% in RN Macedonia, while the average in the EU is 40%, price increase and approaching the EU level, as a result of increasing productivity and a stronger Balassa-Samuelsson effect. This especially applies to the prices of services.

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CLOSING THE QUALITY ASSURANCE GAP FOR E-LEARNING IN GEORGIA'S HIGHER EDUCATION SYSTEM: LESSONS FROM ENQA WORKING GROUP VIII

Tatia DOLIDZE
European University
tatia.dolidze@eu.edu.ge

Abstract

E-learning has been legally permitted in Georgia for 13 years, with Article 47.4 of the Georgian Law on Higher Education regulating its provision and undergoing 6 amendments during this period. Despite these legal advancements, e-learning provision remains challenging due to the absent quality assurance mechanisms. While COVID-19 prompted temporary e-learning measures, the gap between legislation and practice persisted until recently. A significant shift came with the June 2024 amendments to the Law on Higher Education and the first-ever secondary legislation establishing rules for distance learning (Minister's Order №142/n, 30/08/2024), which provide an updated framework for quality standards development. In a significant step forward, Georgia's National Center for Educational Quality Enhancement (NCEQE) drafted e-learning quality assurance standards and submitted them for ministerial review in October 2024. This paper aims to inform you of the anticipated stakeholder consultation process that will follow.

This study presents a systematic analysis of existing Georgian quality assurance mechanisms against ENQA's "Considerations for Quality Assurance of E-learning Provision" (2018), which provides essential guidance for adapting European Standards and Guidelines (ESG) to e-learning contexts and which, as an ENQA member, NCEQE is expected to use as a reference point. Specifically, the study analyzes the alignment of the program accreditation standards with ESGs 1.1 to 1.10 (internal quality assurance guidelines) and institutional authorization standards with ESGs 1.1 to 2.7 (both internal and external quality assurance guidelines) when applied to e-learning, as interpreted in ENQA's guidance document.

It is noteworthy that institutional authorization standards, owing to their broader scope, demonstrate greater inherent flexibility for integrating e-learning. In contrast, program accreditation standards are found to necessitate more granular criteria to evaluate digital teaching and learning processes effectively. In both instances, detailed recommendations are offered for adapting Georgian quality assurance standards to e-learning in alignment with each ESG standard, informed by ENQA's report on quality assurance in e-learning.

Keywords: E-learning, Quality Assurance, ENQA, NCEQE, Higher Education

JEL classification: I23, I28, O38, K23, F15

Introduction

The 2011 amendments to Georgia's Law on Higher Education formally established the concept of e-learning, defining its format and educational levels at which it would be permitted (Article 47.4 E-learning) (Lezhava, 2021). Specifically, the 22 February 2011 version of Georgia's Law on Higher Education (Nº4209), Article 47.4, consisting of five points, defined e-learning as an internet-based learning process that should ensure the delivery of learning materials, communication, testing, and monitoring through a Learning Management System (LMS). This law permitted both synchronous and asynchronous e-learning formats and allowed enrollment in e-learning programs only at the bachelor's and master's levels. It mandated that electronic programs meet the standards of traditional programs and undergo accreditation when necessary (Legislative Herald of Georgia, 2011; Parliament of Georgia, 2011).

Since 2011, Article 47.4 of the Law on Higher Education regulates e-learning has been amended six times, with the latest changes in June 2024. Compared to its initial form, the September 2024 version of the law is more complex, with stricter technological requirements, enhanced student rights protections, broader applicability, and refined quality assurance and monitoring mechanisms (Parliament of Georgia, 2024). According to the latest version, e-learning is now permitted at the doctoral level, and master's programs can be entirely distance-based when accredited (Plenary Sessions, 2024). However, the format is now exclusively synchronous, limited to students physically present in Georgia. The expanded Article 47.4 on "E-learning," now with 10 points, provides a more detailed LMS definition, emphasizes licensed technology, and adds transparency and fairness principles. It also includes provisions for students in penitentiary institutions. Only theoretical courses can be conducted electronically; practical components like laboratory work, internships, and examinations must occur on-site. The law also grants students the choice to opt for e-learning, with institutions required to offer a non-electronic alternative. Additionally, institutions must notify the National Center for Educational Quality Enhancement (NCEQE) at least 60 days before launching a theoretical e-learning course to verify compliance (Parliament of Georgia, 2024).

The February 2011 and June 2024 versions of Georgia's Law on Higher Education represent the first and latest attempts to formalize and regulate e-learning, respectively. However, despite 13 years of legal framework history, regulating e-learning in Georgia's higher education system remains a significant challenge because of the absence of clear e-learning quality assurance standards, representing a significant gap between legislation and practice. This gap not only limits the potential for accrediting educational programs but also impedes quality control for existing online learning initiatives. Specifically, the accreditation of electronic programs is currently impossible, and individual online courses within accredited traditional programs are not awarded credits (Kikoria, Gachechiladze, & Pataridze, 2019). As a result, the modernization of Georgia's higher education system, its alignment with European standards, and its global competitiveness are significantly hindered.

Georgia's obligations under the EU Association Agreement now reinforced by its EU candidate status, call for a rapid modernization of its higher education system to align with European standards. Articles 358 and 359 of the Association Agreement emphasize the need for improving the quality and accessibility of education and modernizing higher education in line with European benchmarks (Official Journal of the European Union, 2014), - goals supported through e-learning and its quality standards' development. Fostering e-learning in Georgian HEIs is not just about technological advancement but a fundamental step in the country's Europeanization journey. There is an urgent need to develop and implement clear and compelling quality assurance standards for electronic programs and establish a clear operational framework for higher education institutions, which is essential for maintaining and improving the quality of higher education in Georgia.

The period of Covid 19 pandemic was when the National Center for Educational Quality Enhancement (NCEQE) stepped up to introduce e-learning quality assurance procedures given that the Ministry of Education, Science and Youth of Georgia had granted higher education institutions (HEIs) temporary permission to implement fully electronic learning in 'force majeure' circumstances (Ministry of Education, Youth and Science of Georgia, 2020a). The Ministry first advised higher education institutions to follow the guidelines for distance learning and quality assurance developed by the European Association for Quality Assurance in Higher Education (ENQA). Still, then a special supporting document for e-learning provision developed by NCEQE followed (National Center for Educational Quality Enhancement, 2020). Following the Ministry recommendations, universities developed new assessment mechanisms and started actively using various digital tools to support distance learning, including Zoom, Microsoft Teams, Moodle, and Google Classroom. Special manuals and video instructions were created to assist students and faculty. Curricula were adapted to optimize the learning process. Online lecture and seminar recordings were made available to students on relevant platforms. Both teaching methodology and assessment systems were reviewed and updated. (Ministry of Education, Science and Youth of Georgia, 2020b).

Most notably, in August 2020, the National Center for Educational Quality Enhancement (NCEQE) announced a consulting services tender to develop assessment criteria and guidelines for distance and hybrid learning (ENQA, 2020). This initiative aimed to help educational institutions maintain teaching quality during and after the pandemic under distance and blended learning conditions. This document was submitted on 30 November 2020, authored by Fiona Crozier and Anka Greer, and includes both general recommendations and detailed guidelines within the framework of Georgia's national authorization standards. It also provides preliminary action steps necessary before adopting any legislative acts or decisions regulating online and blended learning in Georgia (Crozier & Greer, 2020).

Consequently, the COVID-19 pandemic significantly accelerated the processes in higher education regarding e-learning quality assurance and became a catalyst for real change. Building on the momentum from pandemic adaptations, the latest amendments to Georgia's Law on Higher Education in June 2024 signaled a shift

towards more sustainable e-learning in Georgian higher education. Progress has been made at the secondary legislation level, which is a promising development for the first time in Georgia's e-learning history. At the end of August 2024, based on the recent changes to the law, the Minister of Education, Science, and Youth Affairs of Georgia issued Order №142/n, which, for the first time, approved the rule of distance learning in higher education institutions (Ministry of Education, Science and Youth Affairs of Georgia, 2024). This document defined the list of study fields and the maximum number of credits within which e-learning is permitted. It also established the fields in which master's programs can be completed entirely online (Minister's Order, 2024).

Currently, the latest version of Georgia's Law on Higher Education and the corresponding rule established by the Minister's order form a framework within which detailed regulations for e-learning must be developed, quality standards defined, and practical implementation paths established. The European Association for Quality Assurance in Higher Education (ENQA) document "Considerations for Quality Assurance of E-learning" (Huertas et al., 2018) serves as a key guideline in this direction, aiming to (I) establish a robust framework for e-learning quality assurance aligned with European Standards and Guidelines (ESG), (II) support HEIs and quality assurance agencies in addressing e-learning's unique aspects, and (III) promote a unified understanding of e-learning concepts and terminology. Based on this ESG interpretation of the e-learning provision offered by ENQA, quality assurance agencies across the European Higher Education Area (EHEA) are actively developing or adjusting e-learning quality assessment standards. Georgia's National Center for Educational Quality Enhancement (NCEQE), as an ENQA member, is also meant to regulate e-learning within this framework.

According to the National Center for Educational Quality Enhancement (NCEQE)¹³, a draft of e-learning quality standards has been developed and submitted to the Georgian Ministry of Education and Science for review. Once the Ministry completes its evaluation, the final working draft will be shared with stakeholders for public consultation and feedback. These include institutional leadership and administrative personnel responsible for e-learning implementation and internal quality mechanisms; the student population as primary beneficiaries of electronic educational delivery; academic faculty charged with pedagogical execution of e-learning methodologies; industry representatives whose interests align with workforce development and professional competency; and educational scholars focused on field advancement. This study offers an academic perspective to inform the upcoming stakeholder consultation process within this context.

¹³ This information was obtained in September 2024 through communication with representatives of the LEPL - National Center for Educational Quality Enhancement - specifically from Nikoloz Parjanadze, Head of Higher Education Quality Assurance Service, and his deputy Ketevan Inanishvili.

Methods

The *Standards and Guidelines for Quality Assurance in the European Higher Education Area* (ESG) serve as a foundational framework to ensure consistency and transparency in higher education quality across Europe. Since its first publication in 2005, with a significant update in 2015, the ESG has established common principles that apply to both traditional and digital education formats Europe-wide (EUA, 2023). Acknowledging the distinct challenges posed by digital education, the European Association for Quality Assurance in Higher Education (ENQA) Working Group VIII released a dedicated report in 2018, *Considerations for Quality Assurance of E-Learning Provision*, that provided essential guidelines for adapting ESG standards to e-learning (Huertas et al., 2018). The report serves as a valuable resource for quality assurance agencies and institutions striving to meet ESG standards in online education environments.

As Georgia embraces digital transformation in higher education through recent legislative changes, there is a pressing need to update its education program accreditation (National Center for Educational Quality Enhancement, 2020a) as well as institutional authorization standards (National Center for Educational Quality Enhancement, 2020b) to include quality assurance mechanisms for e-learning. Taking ENQA's *Considerations for Quality Assurance of E-Learning Provision* (Huertas et al., 2018) as a reference point, this paper identifies areas requiring enhancement and provides practical recommendations on both occasions.

Part 1 of the ENQA's report addresses ESG standards for internal quality assurance. In contrast, part 2 focuses on the methodological aspects of external quality assurance processes, providing guidance for quality assurance agencies on conducting their evaluations.

Correspondingly, this paper analyzes program accreditation standards against ENQA report Part 1 (ESGs1.1-1.10), which directly addresses the design, delivery, and support of educational programs considering e-learning quality assurance. The ENQA's interpretations of ESG 1.1-1.10 internal quality assurance standards for e-learning provide valuable guidance for enhancing program accreditation standards to evaluate digital education provision at the program level effectively. At the same time, the Authorization Standards for Higher Education Institutions represent the internal quality assurance requirements that institutions must meet, also corresponding to Part 1. In other words, authorization standards address institutional capacity to meet the internal quality assurance requirements, while accreditation standards focus on their implementation at the program level. Accordingly, both authorization and accreditation processes are assessed in this paper against ENQA's ESG interpretations provided in Part 1.

Moreover, the authorization process conducted by the National Center for Educational Quality Enhancement (NCEQE) embodies the external quality assurance mechanisms outlined in Part 2 (ESGs 2.1-2.7). After examining how Georgian Authorization Standards could be enhanced to better address e-learning considerations from an internal quality assurance perspective, this analysis then turns to the adaptations needed in the external quality assurance process to evaluate e-learning provision

effectively. This is particularly crucial as the growth of digital education demands specific considerations in evaluation methodologies, expert selection, and evidence review.

This paper thus examines each ESG standard (1.1–1.10) in Part 1 of the ENQA report against both Georgian program accreditation and authorization procedures, and it also analyzes ENQA interpretations of ESG standards (2.1–2.7) in Part 2 of the report, focusing on authorization standards only. In each case, the analysis identifies areas where the quality assurance process could be enhanced to better evaluate e-learning provision and provides specific recommendations to address these gaps, ensuring that the rigorous standards applied to regular learning in Georgian higher education extend fully to e-learning.

Results

Analysis of Georgian Program Accreditation Standards against ENQA's E-learning considerations for internal quality assurance (PART 1: ESGs 1.1-1.10)

This chapter examines how Georgia's Higher Education Accreditation Standards, originally designed for traditional face-to-face education, could be enhanced to encompass e-learning provision. Through systematic analysis of all ten ESG standards and their e-learning interpretations by ENQA, this chapter identifies where and how the existing Georgian framework can be amended to address the specific requirements of digital education. While the current standards provide a robust foundation for traditional teaching and learning, the analysis reveals opportunities for enhancement across various dimensions - from quality assurance processes to infrastructure requirements - to effectively accommodate e-learning delivery methods. For each standard, the analysis outlines specific recommendations for incorporating digital education provisions while maintaining the integrity of the existing framework.

Analysis of Georgia's program accreditation standards against ENQA's e-learning interpretation of ESG 1.1 (Policy for Quality Assurance) reveals significant gaps in the Georgian Accreditation Standards' approach to digital education quality assurance. While Standards 5.1-5.3 establish fundamental quality assurance processes, they lack specific provisions for evaluating e-learning components. The Accreditation Standards should incorporate specific methodologies for evaluating digital learning environments, including metrics for assessing online course delivery and virtual student engagement while ensuring external evaluation committees include expertise in digital education.

When evaluated through ENQA's e-learning guidelines for ESG 1.2 (Design and Approval of Programmes), the program accreditation standards indicate substantial gaps in the Georgian Accreditation Standards' treatment of digital program design. While Standards 1.1-1.5 comprehensively address program objectives and structure, they require significant enhancement to explicitly consider how e-learning delivery methods support learning outcomes and program accessibility. The Accreditation

Standards need to incorporate guidelines for structuring online courses, integrating digital resources, and developing virtual learning communities.

Examining Georgia's program accreditation framework through ENQA's e-learning interpretation of ESG 1.3 (Student-centered learning) highlights significant limitations in the Georgian Accreditation Standards' approach to digital learning environments. While Standards 2.2-2.4 address teaching and assessment methods, they primarily reflect traditional classroom environments. The standards require substantial enhancement to address student engagement in virtual settings, the development of skills through virtual laboratories and online simulations, and the integration of secure online assessment methods.

ENQA's e-learning framework for ESG 1.4 (Student admission, progression, recognition) reveals notable gaps in the Georgian Accreditation Standards' treatment of digital education pathways. While Standards 2.1-2.3 and 1.3 address student lifecycle processes, they lack specific provisions for e-learning programs. The standards need enhancement to include clear communication of technical requirements, digital competency expectations, and comprehensive frameworks for tracking and documenting student progress in virtual environments.

The assessment of program accreditation standards against ENQA's e-learning interpretation of ESG 1.5 (Teaching staff) indicates significant limitations in the Georgian Accreditation Standards' approach to digital teaching competencies. While Standards 4.1-4.3 establish basic qualification requirements, they require substantial enhancement to address specific skills needed for online teaching, virtual research supervision, and digital content creation. The standards should also incorporate particular workload considerations for e-learning environments.

Analysis of ENQA's e-learning guidelines for ESG 1.6 (Learning resources and student support) reveals substantial gaps in the Georgian Accreditation Standards' treatment of digital infrastructure. While Standards 3.1, 3.2, 4.4, and 4.5 address basic resource requirements, they need significant enhancement to address e-learning technological needs, virtual learning environments, and online support services. The standards should ensure sustainable funding streams for digital infrastructure and comprehensive support frameworks for online learners.

Evaluation of program accreditation standards through ENQA's e-learning interpretation of ESG 1.7 (Information management) indicates significant limitations in the Georgian Accreditation Standards' approach to digital data management. While Standards 5.1-5.3 establish basic monitoring requirements, they need enhancement to incorporate specific indicators for e-learning scenarios, comprehensive learning analytics, and provisions for collecting and analyzing online student engagement metrics.

Georgia's program accreditation standards, viewed through ENQA's e-learning framework for ESG 1.8 (Public information), reveal notable gaps in the Georgian Accreditation Standards' treatment of digital education transparency. While Standards

1.1-1.5, 2.1, 2.3-2.4, 3.1, and 4.4 address program-related information requirements, they need enhancement to include detailed communication about technical prerequisites, digital competency requirements and e-learning participation expectations.

Applying ENQA's e-learning guidelines for ESG 1.9 (Ongoing monitoring) highlights significant limitations in the Georgian Accreditation Standards' approach to digital program review. While Standard 5.3 establishes basic monitoring requirements, it needs substantial enhancement to address the evaluation of online teaching effectiveness, virtual learning environment functionality, and digital resource utilization. The standard should incorporate specific provisions for online feedback systems and virtual consultation methods.

Examining program accreditation standards against ENQA's e-learning interpretation of ESG 1.10 (Cyclical external quality assurance) reveals significant gaps in the Georgian Accreditation Standards' treatment of external evaluation processes. While Standard 5.2 establishes basic requirements, it needs enhancement to incorporate specific evaluation of e-learning program components, digital delivery methods, and virtual support systems. The standard should ensure engagement with e-learning experts and comprehensive evaluation of virtual learning environments.

Analysis of Georgian Institutional Authorization Standards Against ENQA's E-learning considerations for internal quality assurance (PART 1: ESGs 1.1-1.10)

Analysis of Georgian authorization standards against ENQA's e-learning interpretations of ESG standards reveals significant areas requiring enhancement to address digital education provision at the institutional level fully. The examination demonstrated that while authorization standards provide a comprehensive framework for traditional education delivery, they require substantial adaptation to effectively evaluate and ensure quality in online and blended learning environments.

Analysis of Georgia's Authorization Standards against ENQA's e-learning interpretation of ESG 1.1 (Policy for Quality Assurance) reveals significant gaps in the Georgian Authorization Standards' treatment of digital education within institutional quality assurance mechanisms. While Section 2.2 of the Authorization Standards provides comprehensive quality assurance frameworks, but explicitly addressing digital learning environments requires enhancement. The Authorization Standards should require institutions to integrate e-learning strategies within their broader institutional framework, encompassing dedicated resources and innovation pathways for quality development. This includes incorporating specific considerations for technological innovation and digital pedagogical models, currently absent from Section 3.1 of the Authorization Standards' program development methodology.

The evaluation of Authorization Standards through ENQA's e-learning interpretation of ESG 1.2 (Design and Approval of Programmes) indicates that Section 3 of the Georgian Authorization Standards requires significant enhancement for digital environments.

The Authorization Standards need expansion to require comprehensive digital innovation strategies informing curriculum design, with clear implementation pathways across institutional levels. Particular attention must be paid to the expertise requirements for e-learning program development, including technical and pedagogical competencies for digital environments.

Examination of ENQA's considerations for ESG 1.3 (Student-centered learning, teaching, and assessment) reveals that while Section 3 of the Authorization Standards addresses student-centered learning broadly, it lacks specific considerations for digital environments. Key gaps include the need for flexible learning paths in digital settings, online student engagement mechanisms, and comprehensive e-learning materials development frameworks. While Section 7.3 of the Authorization Standards generally addresses IT infrastructure, it needs specific provisions for aligning technological tools with pedagogical approaches, including e-assessment security measures.

The assessment of Authorization Standards against ENQA's interpretation of ESG 1.4 (Student admission, progression, recognition) indicates that Section 5.1 of the Authorization Standards requires significant enhancement for digital pathways. Critical gaps include communication of e-learning competency requirements, online readiness assessment, and workload transparency in virtual environments. The Authorization Standards need specific provisions for recognizing online qualifications and monitoring digital learning progression, particularly for certification documentation for online study modes.

A review of ENQA's e-learning interpretation of ESG 1.5 (Teaching staff) shows that several sections of the Georgian Authorization Standards require enhancement for digital delivery. While Sections 4.1, 4.2, and 6.2 of the Authorization Standards provide frameworks for staff development, workload management, and professional development, respectively, they need expansion to define specific roles and competencies for online teaching. The Authorization Standards should address technological proficiency requirements and digital pedagogy skills, while workload calculations need adaptation for digital environments.

Analysis of ENQA's considerations for ESG 1.6 (Learning resources and student support) reveals that Sections 7 and 5 of the Authorization Standards require substantial enhancement for digital provision. The Authorization Standards need specific requirements for e-learning infrastructure planning, with Section 7.3 requiring expansion to include comprehensive technology development plans. Section 7.2 of the Authorization Standards needs enhancement to address e-library services and virtual laboratories, while Section 5.2 requires significant adaptation for online student support contexts.

Evaluation of ENQA's interpretation of ESG 1.7 (Information management) shows that Section 7.3 and Section 2.2 of the Authorization Standards need expansion to address digital data management. The Authorization Standards should require specific indicators for online learning scenarios and comprehensive learning analytics

strategies while maintaining robust data protection protocols and appropriate access to digital learning data.

The Georgian Authorization Standards, when assessed against ENQA's e-learning considerations for ESG 1.8 (Public information), indicate that multiple sections of the Authorization Standards require enhancement for digital transparency. Sections 7.3, 3.2, 1.1, and 2.3 of the Authorization Standards need expansion to require clear communication of e-learning strategies, technical requirements, and support services, with particular attention to online pedagogical approaches and qualification recognition.

Applying ENQA's interpretation of ESG 1.9 (Ongoing monitoring) reveals that several sections of the Authorization Standards need enhancement for digital review processes. Sections 2.2, 3.1, 3.2, 1.2, and 6.3 should require specific monitoring of e-learning effectiveness, technological integration, and stakeholder feedback in online environments. The Authorization Standards must address evaluation criteria for different types of e-learning provision.

Examination of ENQA's e-learning interpretation of ESG 1.10 (External quality assurance) reveals the need for explicit recognition of digital education within external evaluation processes. Unlike other standards where specific sections of the Georgian Authorization Standards can be referenced, ESG 1.10 relates to the authorization process itself rather than particular authorization standards. Therefore, the enhancement needs identified here apply to the overall authorization framework. The process requires enhancement to address the assessment of virtual learning environments and digital support services, with specific attention to evaluator expertise requirements and documentation needs for e-learning provision.

Analysis of Georgian Institutional Authorization Standards Against ENQA's E-learning considerations for external quality assurance (PART 2: ESGs 2.1-2.7)

Building upon the analysis of ENQA's e-learning interpretations of ESG Part 1 standards vis-à-vis Georgian Authorization Standards, it is equally important to examine how the authorization process needs adaptation to evaluate e-learning provision effectively. While the previous analysis focused on enhancing the content of authorization standards, ENQA's interpretations of ESG Part 2 provide crucial guidance for improving the external quality assurance procedures through which these standards are evaluated.

Examining ESG 2.1 (Consideration of internal quality assurance) through ENQA's lens for e-learning provision reveals the need for specific attention to e-learning within the external evaluation of institutional quality assurance processes. While the Georgian authorization process examines institutions' internal quality assurance mechanisms comprehensively, it requires enhancement to specifically address how evaluators assess the effectiveness of internal quality assurance for e-learning provision. A primary consideration is the evaluation of institutional compliance with e-learning-

specific legal and ethical requirements. The authorization process should be enhanced to explicitly assess how institutions address data privacy, intellectual property rights, and accessibility requirements in digital learning environments. This should include clear guidance for evaluators on assessing compliance with European, national, and local policies specific to e-learning provision.

Considering ESG 2.2 (Designing methodologies fit for purpose) from ENQA's e-learning perspective indicates the need for specific methodological considerations in evaluating e-learning provision. The current authorization methodology requires substantial enhancement to incorporate evaluation approaches specifically designed for digital education. This should consider how virtual learning environments support pedagogical objectives, how online teaching innovation is fostered and evaluated, and how digital student support systems function. The methodology should be sufficiently flexible to accommodate various forms of e-learning while maintaining rigorous quality standards. The involvement of stakeholders in methodology design needs particular attention, with the authorization process ensuring meaningful participation from e-learning experts, online students, and digital education practitioners in developing and refining evaluation approaches. These methodological enhancements should be publicly available and regularly reviewed to ensure they remain relevant to evolving digital education practices.

ESG 2.3 (Implementing processes), viewed through ENQA's digital education framework, reveals significant areas requiring enhancement in executing authorization procedures for e-learning evaluation. While the current process includes self-assessment, site visits, reporting, and follow-up, each component needs specific adaptation for evaluating digital education provision. The self-assessment phase requires particular enhancement. Authorization procedures should require institutions to specifically address their e-learning strategy, including clear articulation of the rationale for digital education provision, a detailed description of online pedagogical models, a comprehensive explanation of virtual learning environments, evidence of technical infrastructure effectiveness, and documentation of digital support services. The site visit component needs substantial reconsideration for e-learning evaluation. The current procedure should be enhanced to include an examination of technical infrastructure in its primary location, virtual and face-to-face interviews with diverse stakeholders, direct access to and navigation of online learning environments, assessment of digital student support services, and evaluation of technical support mechanisms.

ENQA's e-learning guidance for ESG 2.4 (Peer-review experts) indicates the need for specific expertise in authorization panels evaluating e-learning provision. The expert selection process must ensure that panels include members with substantial experience in online teaching and learning environments. This should encompass both academic expertise in digital pedagogy and a technical understanding of virtual learning platforms. Student members of evaluation panels should have direct experience with e-learning from a learner's perspective, enabling them to provide valuable insights into the student experience. The authorization process should

include specific training for all experts in evaluating e-learning provision, ensuring they understand digital education delivery's unique characteristics and requirements.

In light of ENQA's e-learning considerations, ESG 2.5 (Criteria for outcomes) emphasizes the importance of consistent criteria application regardless of delivery mode. While maintaining this principle of consistency, the authorization process must ensure that evaluation criteria adequately capture the unique aspects of e-learning provision. This requires carefully considering how standard quality criteria translate into digital learning environments while maintaining equivalent rigor and expectations across all delivery modes.

The ESG 2.6 (Reporting) assessment using ENQA's e-learning framework suggests that while standard reporting procedures can be maintained, reports on e-learning provision require additional depth in certain areas. Authorization reports should thoroughly document the effectiveness of digital infrastructure, the quality of online pedagogy, the functionality of virtual learning environments, and the adequacy of digital student support. This enhanced reporting ensures transparency while providing valuable feedback for institutional improvement.

ESG 2.7 (Complaints and appeals), interpreted through ENQA's lens for digital education, indicates that existing procedures remain appropriate but require explicit communication regarding their applicability to e-learning provision decisions. Institutions should clearly understand their rights and the available mechanisms for appeal, regardless of their mode of educational delivery. This clarity ensures fair treatment and transparent processes across all forms of provision.

Discussion

The analysis confirms that Georgia's quality assurance frameworks - both program accreditation and institutional authorization standards - demonstrate strong compatibility with European Standards and Guidelines (ESG). This fundamental ESG alignment suggests that the existing frameworks are amenable to enhancement for digital education quality assurance as per ESG interpretations for e-learning provision offered by ENQA Working Group VIII in the 2018 document *Considerations for Quality Assurance of E-Learning Provision*. However, the analysis reveals distinct adaptation needs that vary significantly between program accreditation and institutional authorization frameworks.

For program accreditation standards, which focus on program-level implementation, the findings indicate a fundamental challenge in translating quality metrics to virtual environments. Standards 1.1-1.5 need enhancement in evaluating how program design and outcomes align with online delivery; Standards 2.1-2.4 require new frameworks for assessing virtual teaching effectiveness and online assessment validity; Standards 3.1-3.2 must address digital student support services; Standards 4.1-4.4 need specific criteria for evaluating online teaching competencies and digital

resource management; and Standards 5.1-5.3 require adaptation for monitoring quality in virtual learning environments.

For institutional authorization standards, the analysis was conducted against both internal quality assurance standards (ESG Part 1) and external quality assurance processes (ESG Part 2), revealing more complex adaptation needs. Regarding internal quality assurance, the findings show that Sections 1.1-1.2 need enhancement to ensure e-learning alignment with institutional strategy; Section 2.2 requires comprehensive frameworks for internal quality assurance of digital education; Sections 3.1-3.2 must address e-learning program development methodology; Sections 4.1-4.2 need expansion to include digital competency requirements in human resource management; Section 5 requires adaptation for online student services; Section 6.2 must incorporate specific professional development requirements for online teaching; and Section 7.3 needs enhancement to ensure sustainable digital infrastructure and data protection frameworks.

The analysis of authorization processes themselves (ESGs 2.1-2.7) revealed additional needs: authorization procedures must be enhanced to include e-learning experts in evaluation panels, develop specific methodologies for assessing virtual learning environments, and adapt site visit protocols to examine online delivery mechanisms. The findings indicate that while standard evaluation procedures can be maintained, they require significant modification to effectively assess digital education provision, particularly in areas such as technical infrastructure evaluation, online teaching observation, and virtual student support assessment.

These findings suggest that while both frameworks demonstrate ESG compatibility, their enhancement requires different approaches. The authorization standards demonstrate greater inherent adaptability to e-learning considerations due to their institutional-level focus and existing infrastructure evaluation components. This flexibility stems from their broader scope and systematic approach to institutional capacity. In contrast, program accreditation standards face more significant adaptation challenges due to their need for specific, granular criteria for evaluating digital teaching and learning processes at the program level.

However, these recommendations must be implemented within Georgia's evolving regulatory framework, particularly the September 2024 version of the higher education law and Minister's Order №142/n. This regulatory context creates additional complexities for quality assurance, especially regarding synchronous delivery requirements, geographical restrictions, and the distinction between theoretical and practical components.

One of the most challenging focuses is the interplay between these frameworks and regulatory timeframes, revealing a critical gap in quality assurance coverage. While program accreditation Standards can directly verify implementation quality in fully online master's programs, a monitoring gap emerges for hybrid programs. When programs add e-learning components within ministerially approved percentages (25% for standard bachelor's and master's programs, 30% for doctoral components, 33% for

international joint programs, and 20% for integrated teacher training programs), they may not require re-accreditation if changes constitute less than 30% of the program (The Ministry of Education, Science, Culture and Sport of Georgia, 2024). Program accreditation standards cannot ensure quality maintenance during this period until the next re-accreditation cycle.

This creates a complex situation where authorization standards must serve as an indirect quality assurance mechanism of the e-learning courses through their evaluation of institutional quality assurance systems. However, given that institutional authorization is granted for seven years, there exists a significant temporal gap where the quality of these e-learning components is monitored only through internal mechanisms, without external verification. Even with enhanced authorization standards that better address e-learning, this time gap represents a structural challenge neither framework can fully address under current regulatory timeframes.

These additional insights suggest that beyond the technical enhancement of existing standards, Georgia's quality assurance framework requires strategic reconsideration of how quality is monitored in digital environments, particularly during periods between external evaluations. This is particularly relevant during the interim period between the initial addition of e-learning components to traditional programs with no re-accreditation requirement and the universities' first reauthorization under enhanced e-learning standards.

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CHALLENGES OF ARTIFICIAL INTELLIGENCE TO COMPETITION LAW

Dominik VULETIĆ
University of Zagreb, Faculty of Economics & Business
dvuletic@efzg.hr

Abstract

Background: Rise of the artificial intelligence economy has brought about new regulatory challenges for Competition Law. The rise of AI produces both negative and positive effects on competition in general. Impact of the rise of AI in Competition Law should be viewed in general homogeneity of the field. AI regulatory challenges emerge through the Competition Law but there are areas affected more than others.

Objectives: To give a general overview of the regulatory challenges to Competition Law / Antitrust Law produced by the rise of artificial intelligence with the detection of major issues.

Methodology: Normative and comparative law method, interdisciplinary approach.

Findings: The paper detects algorithmic collusion, abuse of dominance and scope of liability as major fields where the rise of artificial intelligence affects Competition Law the most. General conclusion is that the rise of AI introduces numerous pro-competitive advantages including benefits for consumer welfare but in order to ensure effective competition and consumer protection technological development should be accompanied with dynamic regulatory adjustment in Competition Law.

Keywords: Artificial Intelligence, Competition Law, Algorithmic Collusion, Regulation

JEL classification: K2, L4, L1, K4

Introduction

Rise of the artificial intelligence economy has brought about new regulatory challenges for Competition Law. This paper will try to detect and categorise major challenges that the rise of artificial intelligence poses to Competition / Antitrust Law.

Introductory, we should conceptualise artificial intelligence (AI) itself. Unfortunately, there does not yet appear to be any widely accepted definition of artificial intelligence even among experts in the field, much less a useful working definition for the purposes of regulation (Scherer, 2016). Late Stanford University professor John McCarthy nicknamed 'the father of AI', defined the term as science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable (McCarthy, 2007). In his seminal paper pioneer in the field Alan Turing introduced what was later called the Touring test or imitation game at the time (Turing, 1950). Basically, the Touring test aims to establish the ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human.

Generative AI combines techniques which could be considered within computer science and statistics, at its core. It might be characterised as extremely effective statistical inference, using large models with many parameters derived from even larger datasets (OECD, 2024). In a regulatory sense maybe most usable is the broad definition of artificial intelligence systems from the European Union AI Act. In that context AI system means software that is developed with one or more of the following techniques and approaches:

- machine learning approaches, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning;
- logic and knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning and expert systems;
- statistical approaches, Bayesian estimation, search and optimization methods, and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with (Article 3 in relation to Annex I of the AI Act).

The European Union AI Act adopts categorisation of AI systems in risk-based regulatory approach as systems of unacceptable, high, medium and low risk. AI systems that use practices like subliminal techniques beyond a person's consciousness in order to materially

Table 1. Levels of Risks of AI Systems in Risk Based Approach

Level of risk of the AI system	Level of regulation
Unacceptable	Prohibited
High	Specific requirements and conformity assessments
Medium	Transparency and information obligations
Minimal or low risk	Permitted with no restrictions

Source: Author

distort a person's behaviour in a manner that causes or is likely to cause physical or psychological harm; exploitation of any of the vulnerabilities of a specific group of persons due to their age, physical or mental disability, in order to materially distort their behaviour; the evaluation or classification of the trustworthiness of natural persons by public authorities based on their social behaviour or personality characteristics are in general considered of unacceptable risk and prohibited by the EU AI Act. Exceptionally prohibited AI practices could be used if it is strictly necessary in: the targeted search for specific potential victims of crime, including missing children; the prevention of a specific, substantial and imminent threat to the life or physical safety of natural persons or of a terrorist attack; the detection, localisation, identification or prosecution of a perpetrator or suspects of a certain criminal offences (referred in the EU AI Act).

AI practices that are considered prohibited per se should not represent a particular regulatory challenge to the traditional Competition Law since the primary scope and competence for their regulation falls outside the field of competition authorities. Therefore, it seems optimal for any analysis of the AI impact on Competition Law to focus on AI practices that are not considered prohibited per se by the EU AI Act. Analysis should prioritise areas where rapid AI technological development produces challenges that fall within the standard subject matter and competence of competition authorities like Directorate-General (DG) for Competition of the European Commission, national competition authorities (NCA) of EU Member states, Federal Trade Commission of United States (FTC) and Competition and Markets Authority of the United Kingdom (CMA).

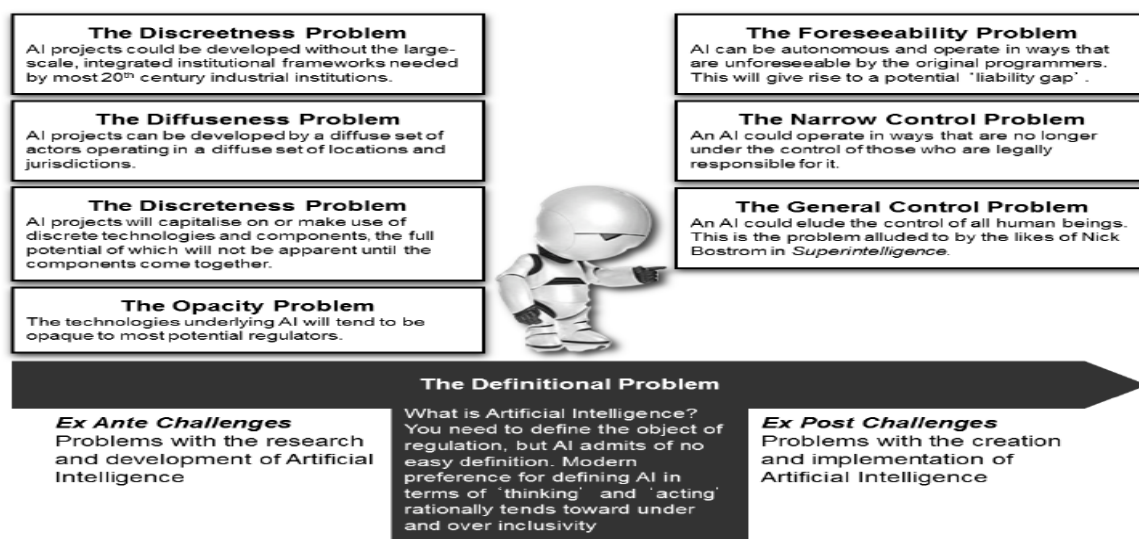
Methods

Impact of the rise of AI in Competition Law should be viewed in general homogeneity of the field. Therefore, effects can be manifested in all areas like regulation of cartels/collusion, merger control, abuse of dominance and state aid. Rapid development of AI has opened the space for emergence of a new field for academic research named Antitrust and AI (AAI). That being stated there are some Competition Law areas, like collusion, that can be reasonably expected to be affected more than others (in EU Competition Law collusion is defined as any form of agreement, concerted practice, or decision by associations of undertakings that distorts, restricts, or prevents competition within the Internal market). Article 101 of Treaty on Functioning of the European Union (TFEU) prohibits coordination between undertakings and defines three categories of unlawful collusion: agreements, decisions by associations of undertakings, and concerted practices (Beneke and

Mackenrodt, 2021). General prohibition of collusive practices can be found comparatively in all competition laws globally. This emphasis on collusion in the relevant AAI literature on collusion is particularly confirmed with development of argumentation on algorithmic collusion (e.g. Ezrachi and Stucke, 2016). Although we should note that there are some authors (Itto & Petit, 2017) that consider academic debate theoretical in nature and due to the lack of empirical evidence use the term algorithmic collusion conjecture. Thus, it seems that research of AI challenges to Competition Law should outline major general themes where the interplay of AI and Competition Law produces strongest effects. Primary, classical normative method and comparative legal method should be applied. Secondary, interdisciplinary approach, given the interdisciplinary nature of AI research in general itself and institutional analysis should be applied.

Scherer in a paper published in Harvard Journal of Law & Technology provides summarisation of AI regulatory challenges in general as shown in Figure 1. Scherer divides the regulatory challenges in two categories: ex ante and ex post. Among ex ante regulatory challenges he lists the problems of discreteness, diffuseness and opacity. Among ex post challenges he lists general control and narrow control problems and problem of foreseeability. If we would pinpoint Scherer summarization of AI regulatory problems that is general in nature, potentially immediate concern for Competition Law would be the hypothetical emergence of liability gap (the foreseeability problem) in the category of ex post challenges. Other categories of ex post challenges and definitional problems do not pose any specific regulatory challenge to Competition Law.

Figure 1. The Regulatory Problems of Artificial Intelligence



Source: Scherer, 2016, pp.359.

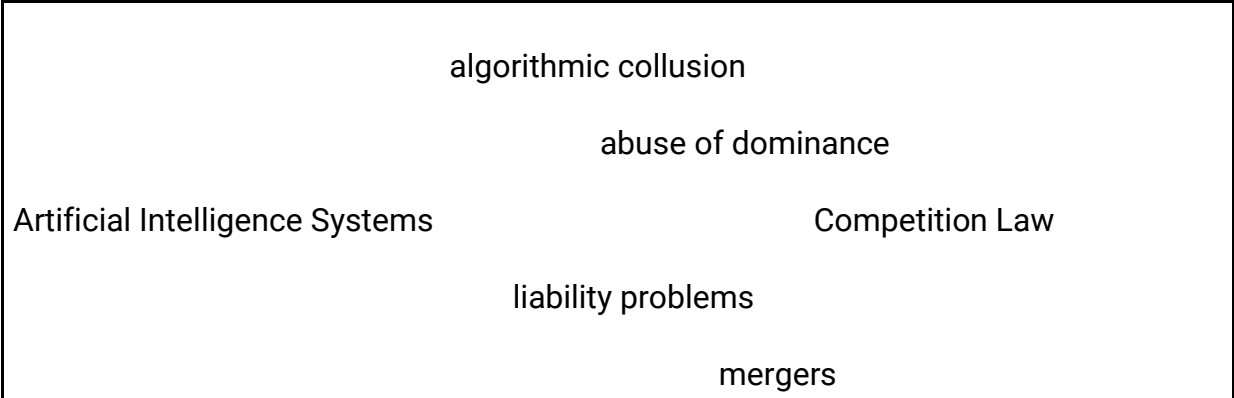
Results

The rise of AI produces both negative and positive effects on competition in general. The positive effects can generally be seen in optimisation, innovation and consumer-welfare benefits (e.g. Caforio, 2023). Use of AI systems can reduce costs, foster innovation and promote market efficiency. The interaction between competition and innovation is not straightforward, but there is broad acknowledgment of the importance of competition to promote innovation (OECD, 2024). This all can lead to price reduction for products and services. Dynamic personalised pricing strategies employed by AI systems can bring consumer welfare benefits. Research by McKinsey in June 2023 estimated that generative AI would add between USD 2.6 trillion to USD 4.4 trillion of value annually even just focussing on 63 specific use cases – an estimate that they consider could double if expanded to other cases (McKinsey, 2023).

In order that consumers and economies fully benefit from the technology it is necessary to achieve effective competition in the provision of AI services. First regulatory risk in the rise of AI is a temporal factor. The risk is that it may be too late if authorities are too slow in developing an understanding of the issues (OECD, 2024). Several major competition regulatory enforcement agencies already detected other inherent risks to the rise of AI systems. Concerns include the nature of the market and its structure, including whether it exhibits “winner takes most” dynamics and trends towards concentration (CMA, 2024). Certain parts of the digital economy have even been likened to natural monopolies, particularly online search and online marketplaces (Ducci, 2020). Economies of scale appear likely to vary at different stages of the AI value chain (OECD, 2024). Availability of data is one of the inherent anti-competitive risks of the rise of AI. Data volume is likely to be a key requirement for foundation models of AI. Corporations that have developed generative AI models are rarely transparent about their sources. There is uncertainty on the copyright implications for AI, both in terms of legal cases against AI developers and how they used data, as well as the legal status for outputs that firms create using generative AI (OECD, 2024). Disruptive potential of AI in trading comes from the use of AI techniques such as evolutionary computation, deep learning and probabilistic logic for the identification of trading strategies and their automated execution without human intervention. Although algorithmic trading has been around for some time, AI-powered algorithms add a layer of development and complexity to traditional algorithmic trading, evolving into fully automated, computer-programmed algorithms that learn from the data input used and rely less on human intervention (OECD, 2021).

Methodologically we have determined that research should focus on areas of Competition Law that are more affected by the rise of AI than others. This research produces the following categories where Competition Law is most affected by the rise of AI: algorithmic collusion, abuse of dominance and liability problems. Interplay between influence of the rise of AI systems and regulatory problems in Competition Law is shown in Figure 1.

Figure 1. Interplay Between Rise of AI and Regulatory Problems in Competition Law



Source: Author

Algorithms in general are sequences of operations that transform an input into an output. Wilson and Keil (1999) define the as an unambiguous, precise, list of simple operations applied mechanically and systematically to a set of tokens or objects where the initial state of the tokens is the input; the final state is the output. Algorithms that use AI are always computational algorithms. From the standpoint of Competition Law, the primary focus is pricing computational algorithms, that is algorithms that determine the price of a product or service. Algorithms can perform many different business functions, sometimes being used as tools to support humans in decision-making, other times completely replacing them (OECD, 2017). There is no doubt that algorithms – and, specifically, pricing algorithms produce pro-competitive effects. Employment of algorithmic pricing by firms triggers a virtuous circle of innovation throughout the market. However, antitrust scholars and policymakers are focusing increased attention on their anti-competitive outcomes, which include the risk that pricing algorithms may make collusion easier than ever. (Caforio, 2023). Despite such prevalence in AAI literature that elaborates algorithmic collusion some authors (Itto & Petit, 2017) in light of lack of empirical evidence consider the debate still hypothetical (they use the term algorithmic collusion conjecture). Algorithmic collusion can be defined as the use of algorithms by undertakings in a manner that harms competition on relevant markets. We can differentiate between explicit and tacit algorithmic collusion.

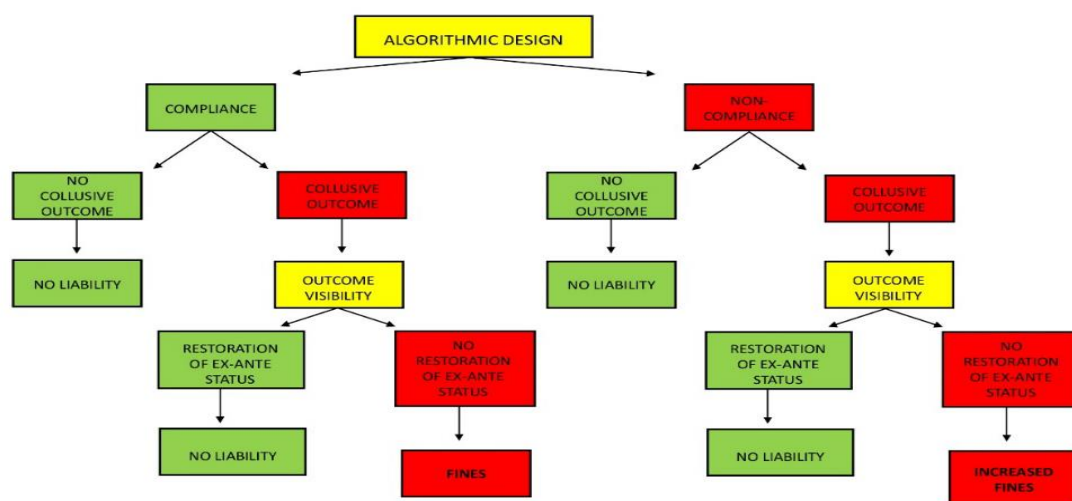
Explicit algorithmic collusion refers to the case where human beings use algorithmic pricing as a tool to implement, monitor and enforce a traditional price-fixing agreement (Ezrachi and Stucke, 2017). Explicit algorithmic collusion does not pose a particular problem to existing regulatory framework of Competition Law in general since it presupposes direct evidence of human behaviour behind the action of AI systems. Tacit algorithmic collusion can be defined as the capability of pricing algorithms to autonomously and unilaterally achieve – namely, without human intervention and without reciprocal interactions – a collusive outcome (Caforio, 2023).

From the standpoint of Competition Law tacit algorithmic collusion is a form of concerted action. In majority of jurisdictions, including EU Competition Law and US Antitrust Law, mere existence parallelism is not sufficient to prove concerted action (parallelism can occur as a natural effect of oligopolistic markets) and

communication-based determination is used. Aforementioned approach is difficult to utilise when it comes to algorithmic collusion since collusive outcomes can be reached without any communication between software used for determination of prices among different undertakings on the relevant market. In the EU Competition Law conscious parallelism must be proved. The case law of the Court of Justice of the European Union clearly developed doctrine stating that mere existence of parallel pricing behaviour per se cannot be sufficient proof of concerted practice since it naturally develops in oligopolistic markets. Intelligent adaptation to market conditions (without conscious parallelism) is allowed. Since tacit algorithmic collusion by definition is the action of an AI system performed without human knowledge it is more than clear that the existing regulatory framework requiring conscious parallelism is inadequate for such scenarios.

Caforio rightly elaborates that according to existing principles of EU Competition Law, algorithmic tacit collusion should be considered a licit behaviour (Caforio, 2023) as it qualifies as intelligent adaptation to market conditions that is, as a purely unilateral act which does not amount to an agreement or a concerted practice under Article 101 Treaty on Functioning of the European Union. Requirements of consciousness and communication based regulatory approach used to prove the existence of collusion thus represents a serious normative challenge to Competition Law in general. In order to deal with this regulatory challenge to Competition Law posed by tacit algorithmic collusion Caforio proposes an ex ante regulatory approach in imposing compliance obligations in the design of AI software as shown in Figure 3. Machine learning algorithms should not be left completely free to act but designers

Figure 3. Diagram of Regulatory Approach to Tacit Algorithmic Collusion



Source: Caforio, 2023, pp. 29.

should incorporate some constraints within their pricing formulas. In particular, these constraints could influence how pricing software reacts to certain external market conditions (Caforio, 2023). Under the condition that, despite compliance obligations in design of algorithmic software, collusion occurs, following regulatory level would be

as Caforio proposes the outcome visibility. The idea behind outcome visibility is to prevent firms from taking advantage of oligopolistic interdependence by imposing a duty on them to restore competition when it has been altered by intelligent software (Caforio, 2023) including enforcement by fines. Although the aforementioned proposed regulatory solution mitigates the problem it does not tackle the main issue - existence of requirement for conscious behaviour and communication-based approach in determination of tacit algorithmic collusion.

Abuse of dominant position on the relevant market can be enhanced using AI systems. Pricing algorithms, which we elaborated in previous paragraph, could be more prone to use strategies that lead to predatory pricing and margin squeeze. In general, these pricing strategies of dominant undertakings with anti-competitive outcomes may be more effective when implemented by AI (OECD, 2021). When AI is a part of the product offered to consumers, it is also likely to exhibit network effects, since greater user numbers can improve the quality of the algorithms involved. Thus, AI applications as well as the data flows and intangible assets used to operate them can be a source of competitive advantage, and barriers to entry, enabling the emergence of market power and potentially dominance (OECD, 2021). When it comes to AI systems that employ individualised pricing, the logical problem in implementation of such pricing strategies is discrimination in prices as a form of exploitative abuse of dominance.

In general, online markets and vertical integration of online service providers are of particular concern with risk of anti-competitive effects of gate keepers enhanced by the AI systems. Good example is Amazon. Amazon has a dual role as a platform. It runs a marketplace where independent sellers can sell products directly to consumers and at the same time, it sells products on its platform as a retailer, in competition with those independent sellers. As a result of this dual position, Amazon has access to large data sets about the independent sellers' activities on its platform, including non-public business data. The European Commission launched in 2019 an investigation against Amazon for abuse of dominant position in German, Italian and Spanish markets but the case was later settled (with specific obligations accepted by Amazon).

Problems of liability in scenarios when AI is used to produce anti-competitive effects can be categorised in two distinct areas. First, when an anticompetitive effect produced by an AI system is considered illegal under current legal framework. This will be cases for example of explicit collusion achieved by utilisation of AI systems. Legal responsibility for infringement could encompass not only undertakings or associations of undertakings directly involved in collusive behaviour but also external AI software providers and developers if they exist. Limits of liability for such violations of Competition law vary greatly so no universal regulatory answer to this issue is likely to be formed. In EU Competition Law for example, the issue is resolved by the case law. The Court of Justice of the EU has developed a doctrine starting from the case in *AC-Treuhand II* that liability encompasses all possible types of digital facilitators. Second problem with liability are the scenarios of utilisation of AI systems to produce anticompetitive effects in a manner that is not considered yet illegal under current legal framework. Tacit algorithmic collusion which is obviously allowed would be such an example where liability is simply not possible without general reform of Competition

Law in order to regulate such anti-competitive AI activity.

Discussion and conclusions

When it comes to algorithmic collusion generally the AAI literature makes three claims as summarised by Petit. First, algorithms will widen instances in which known forms of anticompetitive conduct occurs. The AAI scholarship conjectures that explicit and tacit collusion as well as almost perfect behavioural discrimination will be more common. Second, algorithmic markets will display new forms of anticompetitive conduct in non-price dimensions like data capture, extraction and co-opetition (between “super-platforms” and applications developers) which challenge established antitrust doctrine. Third, deception is a design feature of algorithmic markets. Behind the façade of competition, consumers are nudged in exploitative transactions (Petit, 2017). But how real is the risk of tacit collusion among algorithms? That is a difficult question to answer, both empirically and theoretically. On the empirical side, collusion is notoriously hard to detect from market outcomes, and firms typically do not disclose details of the pricing software they use. On the theoretical side, the interaction among reinforcement-learning algorithms in pricing games generates stochastic dynamic systems so complex that analytical results seem currently out of reach (Calvano et al., 2020). Some authors (Itto & Petit, 2017) have concluded that the focus of AAI literature on collusion is not yet supported by empirical evidence calling the term algorithmic collusion conjecture.

This research detects subject fields of algorithmic collusion, abuse of dominant position and liability as most affected areas of the Competition Law. Existence of substantial regulatory problems like limitations of application of existing legal doctrine of conscious parallelism and communication-based approach on AI pricing algorithms, which obviously are not capable of human consciousness, has dictated such a conclusion. Regulatory adaptation in these areas will be necessary globally. Regulatory adaptation can also come from case-law development through judicial activism. Interesting example is the *Eturas* case in EU Competition Law. The case concerned the information system intended to enable travel agencies to sell travel packages on their websites using a uniform booking method (E-TURAS). Eturas sent a message to travel agencies about a proposal to limit the discount rate applied to transactions on the platform and then to carry out additional technical steps after which they could apply a different discount. The Competition Council of Lithuania has found that such practice of coordinating prices by fixing a maximum discount is in breach of Article 101(1) Treaty on Functioning of the European Union. Interesting fact of the case is that the message was automated and generated within the technical update of the system. In its judgement in the case, the Court of Justice of the European Union has concluded that travel agencies receiving the messages via the platform and aware of the collusive practice can be presumed to be participating in the practice, unless they publicly distance themselves from the conduct or report it to authorities. Judicial argumentation that lacks of distancing from software collusive activity amounts to participation in collusive behaviour could be useful in further development of the case-law.

However regulatory challenges emerge throughout the Competition Law. For example, there are various challenges in mergers. Vertical and conglomerate mergers in the digital sector are especially exposed to the influences of development of AI systems. We have seen the parallel emergence of specific digital sector regulation, such as the EU new Digital Markets Act, although its scope is practically limited to globally largest corporations like Google. Investigative challenges to competition enforcement agencies will be present in all areas of Competition Law. Dynamic nature of advanced AI systems produces substantial enforcement challenges to competition authorities. Imposition of specific requirements to AI software providers and undertakings that serve as 'gatekeepers' will probably be necessary in the future regulatory development. Cooperation among competition authorities given the borderless nature of many digital markets, addressing concerns regarding AI will require close and ongoing coordination with other regulators, including consumer protection and data protection authorities as well as sector regulators (OECD, 2021). General conclusion can be that the rise of AI introduces numerous pro-competitive advantages including benefits for consumer welfare but to ensure effective competition and consumer protection technological development should be accompanied with dynamic regulatory adjustment in the Competition Law, especially in the areas of algorithmic collusion, abuse of dominance and scope of liability for breaches.

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IMPRESSION MANAGEMENT IN SUSTAINABILITY REPORTING IN THE CONTEXT OF THE EUROPEAN SUSTAINABILITY REPORTING STANDARDS

Katarzyna CZAJKOWSKA-KAWACKA
Poznań University of Economics and Business
Katarzyna.Czajkowska-Kawacka@ue.poznan.pl

Marek KAWACKI
Poznań University of Economics and Business
Marek.Kawacki@ue.poznan.pl

Abstract

Background: With the implementation of the new European Union directive regulating the preparing of sustainability reports, organizations are now required to disclose information in these reports following the obligatory ESRS standard. This article explores the potential application of impression management strategies in sustainability reports within this new environment, focusing on reports prepared according to the ESRS standard. The study examines selected reports from publicly traded companies in Poland that voluntarily prepared sustainability reports for 2023 based on the new ESRS standards.

Objectives: Identification of impression management strategies used in the analysed reports of publicly traded companies.

Methodology: The research methods used in this article include company report analysis and the deduction method. The study is based on reports from selected companies across various industries for the years 2022-2023. These were publicly traded companies with the highest market capitalization, which in 2023 voluntarily adopted the preparation of sustainability reports in compliance with ESRS standards.

Findings: The study identified nine areas where impression management strategies can be applied in sustainability reports and pinpointed specific sections of the reports where these strategies were implemented. In conclusion, the new ESRS standard does not prevent companies from employing impression management in any of the analysed areas.

Keywords: Sustainability Reporting, Integrated Reporting, Impression Management, Reporting Standards

JEL classification: M40, M48, M49

Introduction

There are many concepts of sustainable reporting that approach sustainability in different ways, including CSR (Corporate Social Responsibility), ESG (Environmental, Social, and Governance) reporting, integrated reporting, non-financial reporting, and others. These concepts often overlap, and their boundaries are not strictly defined – for example, whether governance is one of their components and other issues highlighted by sustainability rating agencies (Stolowy & Paugam, 2023, pp. 139-140).

In this article, sustainable development is understood according to the Brundtland Report of the World Commission on Environment and Development from 1987 as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Krasodomska, Zarzycka & Zieniuk, 2023, p. 1652).

Sustainability reporting, in turn, is defined according to the Association of Certified Chartered Accountants (2016) as the communication of information “relevant for understanding a company’s long-term economic value and contribution towards a sustainable global economy, taking account of the company’s economic, environmental, social and governance performance and impacts” (ACCA, 2016, as cited in Dinh, Hussman & Melloni, 2023, p. 2).

Sustainability reporting has been continuously evolving for over 50 years (Michala, Staszekiewicz & Waniak-Michalak, 2023, p. 2). The promise of sustainable finance in companies is attractive to investors due to its ability to address environmental and social issues while simultaneously increasing investment value (Stolowy & Paugam, 2023, pp. 139-140).

Until now, the standardization of sustainability reporting has primarily been driven by private organizations and institutions such as the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), the Sustainability Accounting Standards Board (SASB) (now merged into ISSB), the World Resources Institute, the World Business Council for Sustainable Development, and others. Even the United Nations has played a role. Recently, two other institutions have gained prominence in the market and are expected to play an increasingly significant role in the future: the European Commission (EC), in collaboration with the European Financial Reporting Advisory Group (EFRAG)—which started as a private non-profit organization in 2001 and has been financially supported by the EC since 2011 – and the International Financial Reporting Standards (IFRS) (Giner & Vilchez, 2022, pp. 1285-1287; Krasodomska et al., 2023, pp. 1652-1653; Stolowy & Paugam, 2023, p. 140).

The development of new sustainability reporting standards by EC/EFRAG aligns with the goals of the European Green Deal, encouraging companies to undertake proactive actions toward sustainable development. Over the past 40 years, the European Commission has taken similar actions, notably in the financial reporting domain, to harmonize practices among EU member states (Giner & Vilchez, 2022, pp. 1285-1287).

The EC's interest in sustainability issues dates back to 2001 with the publication of the EU Green Paper, which obligated Member States to actively develop social policies that would stimulate corporate social responsibility (CSR). However, it was only with the Directive 2014/95/EU of the European Parliament and the Council (referred to as NFRD – Non-Financial Reporting Directive) that changes were introduced to Directive 2013/34/EU, requiring the largest European companies to report on sustainable development, then referred to as "non-financial information." These reports have been mandatory since 2018 for companies in Member States (Krasodomska et al., 2023, p. 1653). However, as the EC itself noted in its report, the NFRD Directive did not significantly improve the quality of information disclosed by companies in their reports, leading to the emergence of an "accountability gap" (European Commission, 2021).

The latest revision of the NFRD by the EC, in the form of the Corporate Sustainability Reporting Directive (CSRD), has significantly expanded its scope compared to the NFRD, requiring compliance from all large organizations except microenterprises. Organizations previously covered by the NFRD will need to prepare reports based on the new regulations for the year 2024. Other categories of organizations will be required to comply by 2025, and starting in 2026, all small and medium-sized public interest entities will need to report sustainability according to the Directive (Michalak et al., 2023, pp. 2-3; Krasodomska et al., 2023, p. 1653; Pantazi, 2024, pp. 515-516; Stolowy & Paugam, 2023, p. 146).

The new Directive mandates companies to apply a uniform disclosure standard in the form of the European Sustainability Reporting Standards (ESRS), which, starting in 2025, must be used by companies subject to the Directive within the European Union to increase the uniformity and clarity of their reports. Under the new regulations, companies will be required to report information within a dedicated Management Report section, which is part of the annual report. Reports must be prepared in a single electronic reporting format and published no later than 12 months after the balance sheet date. Additionally, "limited assurance" of sustainability reports by external auditors will be required—meaning external auditors will need to assess the compliance of sustainability reports with the Directive and standards. These changes aim to enhance the credibility and comparability of reports (Korca, Costa & Bouten, 2023, pp. 815-817; Pantazi, 2024, pp. 517-519).

The pace of development in sustainability reporting within the European Union is very rapid, posing challenges for both reporting organizations and researchers analysing these reports. It remains difficult to predict the practical changes the new regulations and standards will bring to companies (Hummel & Jobst, 2024, p. 321).

Literature indicates that impression management was present in sustainability reports in the past (Hamza, Mezgani & Jarboui, 2023, pp. 1127-1128). The aim of this study is to identify strategies through which impression management may be applied in reports prepared based on the new ESRS standards. For comparative purposes, reports from the previous year, prepared under older regulations and other sustainability reporting standards (e.g., GRI), were also analysed.

Impression management strategies in sustainability reporting

Traditionally, impression management is understood as "one person's attempt to affect another person's perception of him/her." This definition has been widely used in sociology to describe the behavior of individuals aiming to create an ideal image in the eyes of others. In reporting practices, impression management is often employed to present a company's performance in a more favorable light (Szadziawska & Kujawski, 2022, p. 161) or, more specifically, as "deliberate attempts of managers to construct favorable corporate images and to build a positive organisational reputation" (Kanbaty, Hellmann, Ang & He, 2023, p. 977).

The literature suggests that impression management arises when the norms and values of an organization are inconsistent with those required by society and stakeholders. The tactics used in impression management aim to reduce stakeholders' negative reactions to information from companies and to promote a positive corporate image. This is, therefore, an interactive process involving negotiations between the organization and its stakeholders—a process that is crucial for gaining legitimacy for the organization's actions in the eyes of society (Martins, Gomes & Branco, 2021, pp. 2-4).

Various methods of impression management and their classifications are distinguished in the literature. One of the most popular categorizations was proposed by renowned researchers in the field of impression management in accounting, N.M. Brennan and D.M. Merkl-Davies (2013). They identified seven communicative techniques used for impression management in reporting:

- syntactical manipulation,
- rhetorical manipulation,
- thematic manipulation,
- visual manipulation,
- performance attribution,
- selectivity,
- performance comparison.

An alternative approach was taken by M. Sandberg and M. Holmlund (2015), who identified eight strategies for organisational impression management. This approach is particularly relevant to research on impression management in sustainability reporting, as the classification proposed by these authors is based on their study of sustainability reports. The first four strategies identified by Sandberg and Holmlund relate to presentation methods, while the remaining four pertain to writing style (Table 1).

Table 1: Organisational impression management strategies in sustainability reports

Area	Strategy	Strategy's description
Presentation	Description	<i>Describing the organisation's activities in a neutral way</i>
	Praise	<i>Presenting the organisation's activities in a highly favourable way</i>
	Admission	<i>Admitting to unfavourable events and situations concerning the organisation</i>
	Defence	<i>Justifying negative events and situations with external causes and shifting responsibility to others</i>
Style	Subjective style	<i>Writing from the point of view of the reporting unit, including opinions, especially positive ones</i>
	Positive style	<i>Writing mainly about positive aspects of the activity while omitting the negative ones</i>
	Vague style	<i>Presenting information in an unclear, less understandable and not very specific way</i>
	Emotional style	<i>A writing style aimed at evoking emotions in the recipients, mainly positive ones</i>

Source: Own elaboration based on Sandberg & Holmund, 2015

The literature also presents alternative categorizations of impression management strategies, such as those developed by Bolino, Kacmar, Turnley & Gilstrap (2008) and M. Clatworthy & M.J. Jones (2003). Most previous classification attempts focused on selective impression management strategies without considering the phenomenon in a comprehensive manner. A significant research gap exists in the area of a comprehensive classification of impression management strategies within sustainability reporting.

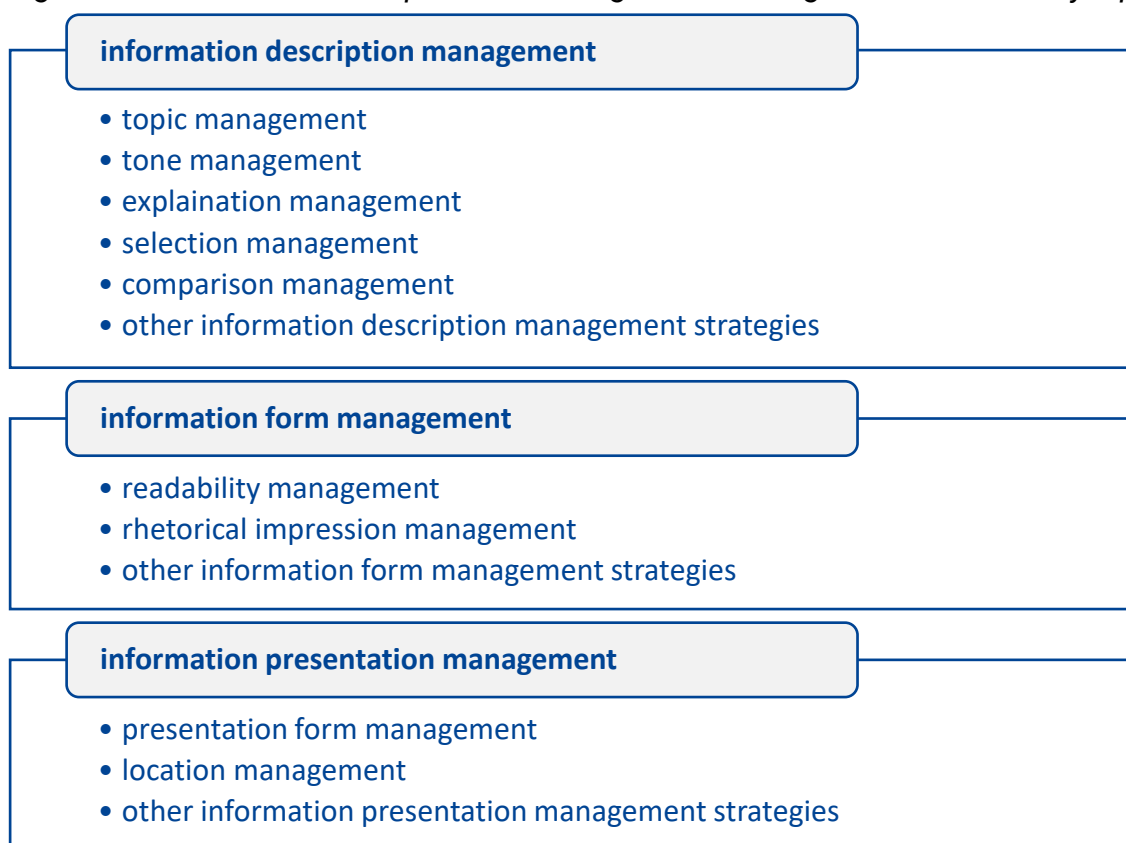
In response to the need for aggregating information on impression management in the context of sustainability reporting, the authors developed their own classification. This was based on a framework described in the literature as the classification of impression management strategies through narrative in reporting (Czajkowska, 2024). This approach was also inspired by the categorization proposed by N.M. Brennan and D.M. Merkl-Davies (2007) and the classification of impression management strategies in financial results descriptions (Czajkowska & Remlein, 2024). The developed classification has been adapted to the specifics of sustainability reporting information. The classification of impression management strategies in sustainability reporting is presented in Figure 1.

The proposed classification was developed by dividing strategies based on the subject of impression management. In this way, the strategies were grouped into three categories: information description management, information form management, and information presentation management. A total of nine impression management strategies were identified, with each group including an "other strategies" category to accommodate strategies not explicitly classified.

In the context of impression management within sustainability reporting, two main objectives for reporting entities can be identified, which may guide the use of impression management strategies. First, one objective could be to create a positive

impression of the entity as a socially responsible organization operating in alignment with the principles of sustainable development. Second, the opposite goal could be to mitigate negative impressions caused by, for example, activities with adverse environmental impacts.

Figure 1. Classification of impression management strategies in sustainability reporting



Source: Own elaboration

Impression management strategies can take various forms depending on the reporting entity's operations, events during a given period, or their impact on the natural environment or social surroundings. In cases of favourable sustainability-related events, the reporting entity may aim to enhance the positive impression of such occurrences. Conversely, in the case of unfavourable events, such as those that negatively impact the environment and contradict sustainable development goals, the entity may attempt to reduce negative impressions about itself.

Methods

The research method used in the article involved the analysis of sustainability reports and integrated reports of the companies selected for the study. The selection of companies was conducted as follows: among the companies with the highest market capitalization listed on the Warsaw Stock Exchange, those were chosen (starting from the largest) where it was identified that in 2023, they voluntarily implemented the new

ESRS standards in their sustainability reports. Through this process, three companies were selected for the study: one from the mining and extraction industry, another from the footwear industry (manufacturer and retailer of footwear), and the third from the construction industry.

The reports of these companies for 2023 were examined and compared with their reports for 2022 to identify impression management strategies applied in these reports. In the case of the mining and extraction company, its integrated report for 2022 and the non-financial information statement within the management commentary for 2023 were analysed. For the footwear company, its sustainability reports for 2022–2023 and 2023–2024 (covering the period from February to January of the following year) were examined. For the construction company, its two integrated reports for 2022 and 2023 were analysed.

All the companies followed GRI standards in 2022 and transitioned to ESRS standards starting in 2023. The data for the selected companies were anonymized.

Impression management strategies identified in the sustainability reports

The methods applied enabled the identification of impression management strategies within the analysed reports. Examples of report excerpts containing impression management strategies are presented in Table 2. Since the analysed reports were originally prepared in Polish, the excerpts presented in the table 2 were translated from Polish to English.

Table 2: Identified examples of impression management strategies in sustainability reports in 2022 and 2023 fiscal years

Impression management strategy name	Examples of use of strategy
Area 1.1: Topic Management	• Mining and Extraction Company's Report (2022 and 2023): Different sequencing of topics in the employee-related section: in the 2022 report, it begins with a section on organisational culture and communication, while in 2023, it starts with human rights issues. • Footwear Company's Report (2022 and 2023): In 2022, the environmental section began with information about the company's environmental policy. In 2023, this information was moved to a subsection titled <i>Climate Change</i> (showing a greater focus on climate change). • Building Company's Report (2022): The company introduced an additional European eco-management standard – the EMAS system – to enhance environmental management efficiency. • Building Company's Report (2023): To improve environmental performance, [Company Name] implemented an environmental management system based on the PN-EN ISO 14001:2015 standard.
Area 1.2: Tone Management	• Mining and Extraction Company's Report (2022): The energy management system also reduces costs associated with purchasing and consuming energy resources, including CO2 emission rights, by lowering greenhouse gas emissions.

Impression management strategy name	Examples of use of strategy
	• Mining and Extraction Company's Report (2023): Structural modifications to machinery aim to reduce operators' exposure to harmful environmental factors, improve visibility, and eliminate workers from high-risk zones, aligning with the company's circular economy initiatives. • Footwear Company's Report (2022): Growing necessity to adopt a circular economy model, emphasizing better resource utilization and extending the value of products throughout their lifecycle. • Footwear Company's Report (2023): This represents the next step in [Group Name]'s Sustainable Development Strategy, prioritizing an assessment of the entire supply chain by 2025 to enhance transparency. • Building Company's Report (2022): Report title: For People. For a Better Life. • Building Company's Report (2023): [Company Name] has been increasing its capacity for recycling construction waste year over year to minimize waste production.
Area 1.3: Explanation Management	• Mining and Extraction Company's Report (2022): Through the BATAs program, the arsenic emissions rate from metallurgical production decreased by 77% compared to 2018. • Mining and Extraction Company's Report (2023): Organized tours allowed the local community to familiarize themselves with the company, its employees, and operations. • Footwear Company's Report (2022): Data unavailable due to legal constraints preventing collection (on maternity leaves). • Footwear Company's Report (2023): Due to the lack of data on how consumers dispose of products post-lifecycle, it was assumed the waste is sent to landfills. • Building Company's Report (2022): Russia's February aggression against Ukraine caused a sharp increase in global commodity prices. • Building Company's Report (2023): Reduced waste disposal volumes were achieved through recycling development and identifying external waste management processes.
Area 1.4: Selection Management	• Mining/Footwear Companies' Reports: Voluntary switch from GRI to ESRS standards in 2023, omitting the GRI content index, potentially complicating indicator identification and year-to-year comparisons (especially for the mining company). • Building Company's Reports: Not reporting of the total energy consumption reduction indicator (GRI 302-4) in 2023, despite it being reported in 2022.
Area 1.5: Comparison Management	• Mining Company's Report (2022): [Company Name] reduced sulfur dioxide emissions per ton of copper by 78% compared to 2010. • Mining Company's Report (2023): Investments in renewable energy present market and image opportunities, aligning with climate change mitigation - an image and market opportunity within the industry, i.e., the perception of a company committed to environmental protection and striving to mitigate global climate change. • Footwear Company's Report (2022): Greenhouse gas emissions in Scopes 1+2 decreased by 35.9% compared to the 2019 baseline. • Footwear Company's Report (2023): In 2023, greenhouse gas emissions across Scopes 1, 2, and 3 were reduced by over 15% year-over-year. • Building Company's Report (2022): As of December 31, 2022, the company employed 7,022 people, a 1.2% increase from the previous year. • Building Company's Report (2023): The company aims to increase women in middle and senior management to 22% (up from 19% in 2022).
Area 2.1: Readability Management	• Mining Company's Report (2022): Defined terms in each section, e.g., <i>Credit risk</i> refers to the possibility of debtors failing to meet their obligations.

Impression management strategy name	Examples of use of strategy
	• Mining Company's Report (2023): [Company Name] identified employee impacts through key areas: safety and health, education and development, ethics and anti-corruption, and CSR. • Footwear Company's Reports (2022 and 2023): Lack of explanations for specialized terms: All CCC and MODIVO e-commerce bags and packaging are FSC-certified. • Building Company's Report (2022): The company is preparing for the implementation and certification of PN-EN ISO 14001:2015. • Building Company's Report (2023): The presence of illustrations enhancing the readability of content positive for the company.
Area 2.2: Rhetorical Impression Management	• Mining Company's Report (2022): [Company Name] identifies renewable energy investments as an opportunity to reduce production costs and greenhouse gas emissions while ensuring operational continuity. • Mining Company's Report (2023): Key actions for improving air quality included implementing the BATAs program, significantly reducing emissions through community consultation. • Footwear Company's Reports (2022 and 2023): Environmental strategy sets ambitious goals for reducing greenhouse gas emissions, waste, water resource protection, and biodiversity conservation. • Building Company's Report (2022): Ensuring occupational health and safety compliance is central to our company's responsibility toward employees and stakeholders. • Building Company's Report (2023): Our employees' knowledge, skills, and values reflecting our organisational culture are the foundation of our company's success.
Area 3.1: Presentation Form Management	• Mining Company's Reports (2022 and 2023): Bar chart showing dust emissions per ton of ore production with a highlighted trend (-73% in 2022 and -72%(!) in 2023 compared to 2010). • Footwear Company's Report (2022): Year Summary graphic emphasizes positive data, e.g., increased LWG-certified products and reduced greenhouse gas emissions. • Footwear Company's Report (2023): Similar Year Summary graphic highlights reduced greenhouse gas emissions and improved recycling practices. • Building Company's Reports (2022 and 2023): Graphics, charts, and emphasized text showcasing achievements in occupational health and safety (OHS).
Area 3.2: Location Management	• Mining Company's Report (2022): Environmental section begins with the significance of copper for energy transition. • Mining Company's Report (2023): Environmental section ends with text on eco-friendly investments and related costs. • Footwear Company's Reports (2022 and 2023): Key numerical data in environmental, social, and employee areas moved to the end of each section. • Building Company's Reports (2022 and 2023): Social responsibility achievements are highlighted at the beginning of each policy and CSR-related chapter.

Source: companies' sustainability reports

It should be noted that, while practically every impression management strategy was found to be applied in the studied reports, not all reports utilized them to the same extent. In our opinion, the reports from Footwear Company for the years 2022 and 2023 stood out among the other two companies, demonstrating very minimal use of

impression management – particularly in areas 1.1, 1.4, and 1.5. In our expert assessment, this report was the best prepared of all, highly informative, and almost entirely devoid of unnecessary narrative forms that could manipulate stakeholders' perception of the report. It should also be noted that this report was audited by an external institution. In the reports of the other two companies (Mining/Building), identifying examples of impression management was significantly easier (especially in Area 1).

In Area 2 (readability management and rhetorical impression management), impression management primarily pertained to the form of expression within the narrative. We were unable to identify any glossary of terms used in the reports that could be classified as an example of readability management.

In Area 3, the main form of impression management was the strategy from Area 3.2, location management. Companies are not obligated to follow a predetermined order in presenting descriptions of risks, policies, key performance indicators, or non-financial indicators within a specific section of the report. Each of the analysed companies could independently determine the sequence of presenting such information in their reports. We observed that important or specific information from a given section tended to appear either on the first page of that section or at its end. In the reports of Mining Company and Building Company, positive narrative elements tended to appear at the beginning of each numbered section of the report.

Discussion and Concluding Remarks

Within the analysed reports, all the impression management strategies described in this publication were successfully identified.

Previous studies and publications on impression management within sustainability reports and other sustainability report studies have focused solely on examining reports from before the introduction of the ESRS standards, primarily based on GRI standards (Kanbaty, Hellmann, Ang & He, 2023, p. 976; Kuberska & Kawacki, 2024; Usmani, Davison & Napier, 2020, pp. 1-2, 4-7). However, based on the results of this study, it can be observed that the shift from GRI to ESRS standards has not hindered the ability to use impression management strategies in corporate reports.

At this point, we are not yet able to assess how the new standards have impacted report quality, including their comparability, readability, and reliability. The database remains too limited – so far, only 17 publicly listed companies in Poland have voluntarily transitioned to ESRS standards, of which reports from three were included in this study. Whether the other reports will be of similar quality is currently unknown and will require further research once the standard becomes mandatory for all reporting entities within the European Union. The scope of the study and its limitation to just three publicly listed companies in Poland is the primary constraint of this research.

At this stage, it is evident that the transition from GRI to ESRS standards does not preclude the continued use of impression management strategies in corporate reports. Practically every report, except for the one from Footwear Company, contained clear examples of impression management, especially in narrative sections and visuals included in the reports.

As other studies indicate, impression management can be used in sustainability reporting as a strategic tool to influence public opinion (Miles & Ringham, 2019, p. 363). Companies may use sustainability reports to manage stakeholders' impressions and as a low-cost tool for covering up corporate scandals (Corazza & Truant, 2020, p. 1915), potentially resulting in a lack of transparency in sustainability reports (Gagné, Berthelot & Coulmont, 2021, p. 223).

Literature also highlights that the graphical elements of reports can be tools for employing impression management in sustainability reporting—these include photos, tables, and drawings featured in reports. Such graphical elements enhance the creation of a positive image of the company (Momin, Ahmed & Liu, 2022, pp. 187-190). In our selected examples, graphical elements were not as abundant as one might expect. Reports were, of course, filled with photos and graphics, and enlarged text sections and charts primarily conveyed information that cast the companies in a positive light. However, these elements were mostly placed at the beginning of the report or a specific section. The observation from previous research remains valid: "When an organization faces a crisis, it may use narrative and descriptive elements as forms of impression management to provide context for a given event or data" (Simunic & Colleoni, 2022, pp. 153-154).

Equally important and numerous as graphical elements are tone management elements in reports (Hamza & Jarboui, 2021, p. 612). In our assessment, tone management was the easiest and quickest to identify in the six analysed ESRS-based reports, given its widespread use in sections containing event descriptions and narratives.

In conclusion, the shift to ESRS standards does not hinder organizations from continuing to use well-established impression management strategies in sustainability reports. As long as reports include graphical elements and narrative descriptions, all the impression management strategies outlined in this article will remain applicable. At present, there is no indication that this will change in the future.

The considerations presented in this study and the conclusions drawn from the conducted research allow for the identification of directions for further studies. According to the authors, future research should be conducted on a larger sample. The studies could cover different periods characterized by varying guidelines and obligations related to sustainability reporting. It would also be important to identify additional impression management methods used in sustainability reports.

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ANALIZA ZASTUPLJENOSTI SADRŽAJA FINANCIJSKE PISMENOSTI U ODABRANIM STRUKOVNIM KURIKULUMIMA SEKTORA EKONOMIJA I TRGOVINA

Vedrana ŠIMUNIĆ ROD

Agencija za strukovno obrazovanje i obrazovanje odraslih
vedrana.simunic.rod@gmail.com; vedrana.simunic.rod@asoo.hr

Goran LAPAT

Učiteljski fakultet Sveučilišta u Zagrebu
goran.lapat@ufzg.hr

Sažetak

Predmet/ishodište rada: *Uslijed sve većih i ubrzanih tehnoloških i društvenih promjena, javila se potreba za promjenama u obrazovnom sustavu stavljajući sve veći naglasak na financijsku pismenost mladih. Razvojem inovativnih tehnologija koje omogućuju pristup informacijama, otvara se mogućnost za razvoj suvremenih trendova u obrazovanju. Suvremeni trenovi u obrazovanju odnose se na stavljanje učenika u središte aktivnosti nastavnoga procesa te svladavanje ishoda učenja kroz učenje temeljeno na radu i stjecanje kompetencija u obrazovanju. U kontekstu ovog rada, stavljen je naglasak na stjecanje financijske pismenosti, kao jedne od ključnih kompetencija.*

Ciljevi: *Cilj ovog istraživanja je analizirati i utvrditi zastupljenost financijske pismenosti u trenutno važećem strukovnom kurikulumu za stjecanje kvalifikacije ekonomist te usporediti s predloženim sadržajem novog strukovnog kurikuluma za stjecanje kvalifikacije referent za poslovnu ekonomiju koji je izrađen u sklopu ESF projekta Modernizacija sustava strukovnog obrazovanja i osposobljavanja.*

Metodologija: *U ovom istraživanju korištena je kvalitativna metoda analize sadržaja, odnosno analiza dokumenata kao objektivna i sistematična deskripcija, analiza za stolom (engl. desk-research) te komparativna metoda.*

Rezultati: *Dobiveni rezultati provedene komparativne analize strukovnih kurikuluma ukazuju na povećanje zastupljenosti sadržaja financijske pismenosti čime se utvrdilo da novi strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju ne samo da ima veći broj nastavnih sati koji se odnose na realizaciju sadržaja financijske pismenosti, već je povećanje u teorijskom dijelu kao i u učenju temeljenim na radu u cjelokupnoj kvalifikaciji.*

Ključne riječi: financijska pismenost, kurikulum, OECD, učenje temeljeno na radu

JEL klasifikacija: A21, G53, I21,

Uvod

Uslijed sve većih i ubrzanih tehnoloških i društvenih promjena, javila se potreba za većim opismenjavanjem mladih u kontekstu financijske pismenosti. Odnosno, financijska pismenost je postala ključna vještina današnjeg društva te kao takva postaje sve važnija tema današnjice (OECD, 2019). Razlog proizlazi iz demografskih promjena, promjena na financijskom tržištu kao i promjenama javnih politika u pogledu mirovinske zaštite i zaštite potrošača općenito (Vehovec, 2011). Obzirom na sve veći napredak cjelokupnog društva u pogledu tehnologija, izostao je napredak u financijskoj pismenosti. Navedeno se može potvrditi globalnom ekonomskom krizom 2008. godine koja je započela u Sjedinjenim Američkim Državama, a potaknula je pitanje za potrebom financijskog opismenjavanja građana, kako navode Barbić i Lučić (2018) u svojem radu, jer upravo manjak financijske pismenosti bio je jedan od uzroka krize (Chlouba i sur., 2011). Odnosno, potreba za financijskim obrazovanjem pojavila se ponajprije u visoko razvijenim zemljama svijeta, a zatim i u siromašnim zemljama, i to kao posljedica financijskih, demografskih, političkih, ekonomskih i tehnoloških promjena (Vehovec, 2011). Ljudi, kako bi realizirali svoje životne potrebe, suočavaju se s konkretnim problemima financijske prirode (Palac i sur., 2017), a odnose se na štednju, kredite te zdravstvena, mirovinska i životna osiguranja kao i osnivanje i vođenje vlastitih poduzeća. Zato se u današnje vrijeme stavlja sve veći naglasak na važnost donošenja optimalnih i kompleksnih financijskih odluka koje mogu biti kratkoročne i odnose se na zadovoljenje osnovnih životnih potreba, ili dugoročne koje su vezane uz osiguravanje mjesta stanovanja ili pripreme za odlazak u mirovinu (Hung i sur., 2009). Sam pojam financijske pismenosti češće se počeo upotrebljavati upravo nakon navedene krize.

U dosadašnjoj dostupnoj literaturi postoji veliki broj definicija financijske pismenosti te ne postoji jednoznačna i opće prihvaćena definicija. Među prvima su Mason i Wilson (2000) definirali financijsku pismenost kao sposobnost pojedinca za usvajanjem, razumijevanjem kao i vrednovanjem relevantnih informacija s ciljem donošenja svjesne odluke o vjerojatnosti financijskih posljedica. Barbić i Lučić (2018) smatraju da je financijska pismenost kombinacija stečenih vještina koje su potrebne za učinkovito upravljanje financijskim resursima kako bi se postigla dugoročna financijska sigurnost, dok Servon i Kaester (2008) podrazumijevaju financijsku pismenost kao vještinu pojedinca za shvaćanjem i razumijevanjem financijskih pojmova. Međutim, većina autora u svojim radovima navode i definiciju financijske pismenosti koju je ponudila International Network of Financial Education (2011), engl. INFE, dalje u tekstu OECD, definirajući financijsku pismenost kao kombinaciju svijesti, znanja, vještina, stavova i ponašanja potrebnih za donošenje razumnih financijskih odluka u svrhu postizanja individualnog financijskog blagostanja. U publikaciji izdanoj 2015. godine od strane OECD-a, navodi se kako je financijska pismenost kombinacija informiranosti, znanja, vještina, stavova i ponašanja potrebnih za donošenje ispravnih financijskih odluka za ostvarenje individualne dobrobiti. Iz navedenih definicija, može se primijetiti kako svi autori navode posjedovanje kompetencija iz područja financijske pismenosti za donošenje odluka. Tako su Chen i Volpe (2002) iznijeli jednostavnu definiciju prema kojoj je financijska pismenost vještina upravljanja osobnim financijama. Obzirom da se za financijsku pismenost može reći da je relativna i

kontinuirana, ne postoji pojedinac koji se može smatrati savršeno financijski pismenim, pošto se od pojedinca zahtjeva kontinuirano usvajanje novih financijskih znanja i vještina (Barbić i Lučić, 2018) tijekom svojeg života. Drugim riječima, donošenje pogrešnih financijskih odluka može imati krucijalne posljedice na kvalitetu života pojedinca (Hung i sur., 2009). Lončar i Golemac (2015) u svom radu navode kako financijski pismeni pojedinci često imaju viši raspoloživi dohodak u odnosu na financijski nepismene pojedince, kao i višu ušteđevinu te nisu skloni precjenjivanju svojih sposobnosti, objektivno se zadužuju te imaju realne financijske ciljeve kao i više financijskog samopouzdanja, tj. planiraju svoje financije s ciljem postizanja veće financijske učinkovitosti. Stoga se može reći kako je financijska pismenost postala ključna vještina u današnjem suvremenom društvu kako bi se što bolje znalo raspolagati vlastitim budžetom. Zato, obrazovni sustav ima važnu ulogu u razvoju financijske pismenosti te uvođenjem promjena u obrazovni sustav potrebno je staviti veći naglasak na financijsku pismenost.

Suvremeno društvo tj. okruženje u kojem živimo, nametnulo je kontinuirani razvoj tehnologije i njezino korištenje u obrazovnom sustavu, nove ciljeve, vrijednosti i izazove, pa slijedom toga i nove pristupe odgoja i obrazovanja. Republika Hrvatska se, kao i mnoge druge zemlje, opredijelila za kurikulumski pristup odgoju i obrazovanju u kojem se učenik i stjecanje njegovih kompetencija, stavlja u središte nastavnog procesa koji je ishodovno orijentiran (Nacionalni okvirni kurikulum, 2010). Kako bi se što uspješnije i kvalitetnije ostvarili postavljeni ciljevi suvremenog kurikuluma uz promjenu načina izvođenja nastave koja je usmjerena na učenika i učenje temeljeno na radu (Matijević i Radanović, 2011) te ostvarenje obrazovnih standarda (Strugar, 2012) kao i standarda zanimanja (Metodologija za izradu standarda zanimanja i skupova kompetencija, 2023), očekuje se visoka kompetentnost nositelja odgojno-obrazovnog rada te nužna promjena uloge i zadaće učitelja (Mijatović, 2003). Od učenika se očekuje razvoj kompetencija koje bi osigurale uspješnu prilagodbu suvremenom društvu, samome sebi (Coldron i Smith, 1999; Waters i Lawrence, 1993) ali i udovoljili zahtjevima tržišta rada. Odnosno, od učenika se očekuje razvoj kompetencija poput inovativnosti, kreativnosti, znanja o informacijsko-komunikacijskoj tehnologiji, timskom radu, kritičkom promišljanju ali i poduzetništvu (Nacionalni okvirni kurikulum, 2010) koje je usko vezano uz financijsku pismenost. Navedene kompetencije od pojedinca zahtijevaju cjeloživotno učenje, a temelje istih, najčešće se stječu formalnim obrazovanjem, u odgojno-obrazovnoj ustanovi. Zbog toga dolazi do standardizacije obrazovanja čime se želi postići kvalitetnije obrazovanje za sve (Baranović, 2006; Maharaj i Ramja, 2011). Previšić (2007) navodi da je izvorno značenje kurikuluma tijekom planiranog i programiranog događaja koji opisuje način dolaska do određenog cilja. Cindrić i sur. (2010) navode kako kurikulum u sebi sadrži ciljeve i svrhu učenja, nastavni plan, plan aktivnosti te očekivane rezultate s obzirom na promjene stavova i ponašanja kod učenika.

Može se reći kako kurikulum sistematizira bitna obilježja i potrebe društva kao i društvena očekivanja. Ovakav kurikulum nastoji bolje pripremiti učenike za stalne promjene ljudskog znanja razvijanjem prenosivih vještina, a ne samo sadržaja specifičnih za pojedini predmet. Učenik je u središtu, kao i njegova postignuća, a nastavnik ima ulogu facilitatora u procesu učenikovog učenja (Byrne i sur., 2013).

Važno je napomenuti kako za razliku od tradicionalnih kurikuluma koji su zatvoreni i propisani, suvremeni kurikulumi su otvoreni, fleksibilni te se prilagođavaju učenicima, roditeljima, nastavnicima i lokalnoj zajednici. Njegova pedagoška paradigma teži promicanju stavova, ponašanja i postupaka koji doprinose cjelovitom razvoju učenika uz partnerski odnos i suradnju. Umjesto transmisije znanja, orijentiran je na transakciju i transformaciju znanja, odnosno odražava one koncepcije prema kojima se znanje konstruira u procesu učenja, a koje vodi stalnim osobnim i socijalnim promjenama (transformiranjem) pojedinca (Slunjski, 2001). S obzirom na razine, postoje nacionalni, školski, nastavni, učenički i posebni kurikulum.

Nacionalni kurikulum je temeljni dokument na razini države, odnosno odgojno – obrazovnog sustava te se prema njemu izrađuju ostali dokumenti ili kurikulumi (Cindrić i sur. 2010). U kontekstu ovog rada, biti će ključan dokument Nacionalni kurikulum za strukovno obrazovanje (2018) te strukovni kurikulum za stjecanje kvalifikacije ekonomist (Narodne novine, 2017). Nacionalni kurikulum za strukovno obrazovanje (2018) propisuje postotni omjer općeobrazovnog i strukovnog dijela ovisno o razini kvalifikacije prema HKO-u (Zakon o hrvatskom kvalifikacijskom okviru, 2021) te propisuje potrebu suradnje škola, odnosno učenika s gospodarstvom kroz učenje temeljeno na radu. Kako Agencija za strukovno obrazovanje i obrazovanje odraslih kroz modernizaciju sustava strukovnog obrazovanja i osposobljavanja ima za cilj uvođenje suvremenih kurikuluma kojima je naglasak na učenje temeljeno na radu, stvorio se prostor ali i mogućnost, uvođenja sadržaja financijske pismenosti u strukovne kurikulume. Time bi se učenicima omogućilo stjecanje kompetencija i razumijevanje ekonomije u kontekstu financijske pismenosti i njezine primjene u svakodnevnome životu. Na taj način doprinosi se poboljšanju znanja, alata i tehnika kojima će mladi bolje ovladati sve složenijim financijskim tržištima. Kako bi učenici sve to stekli formalnim obrazovanjem, potrebno je napraviti analizu zastupljenosti sadržaja financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist koji je na snazi od 2017. godine te komparativnom analizom usporediti promijene i dopune u sadržaju financijske pismenosti u suvremenim kurikulumima koji imaju naglasak na učenje temeljeno na radu i stjecanje kompetencija koje su usko vezane uz vještine. Drugim riječima, stječu se kompetencije kojima učenici kroz praktične primjere osnažuju svoje financijsko ponašanje a samim time i odnos prema novcu. Suvremeni kurikulumi za stjecanje određene kvalifikacije iz različitih sektora u Republici Hrvatskoj, imaju naglasak na učenje temeljeno na radu, a izrađeni su u sklopu ESF projekta Modernizacija sustava strukovnog obrazovanja i osposobljavanja (Agencija za strukovno obrazovanje i obrazovanje odraslih, 2024) te su prošli postupak e-savjetovanja. Na taj način utjecalo bi se na poboljšanje budućih rezultata financijske pismenosti u budućim istraživanjima od strane OECD-a, jer Agencija za strukovno obrazovanje i obrazovanje odraslih kao članica Operativne radne grupe za praćenje provedbe mjera i aktivnosti sukladno Nacionalnom strateškom okviru financijske pismenost potrošača ne samo da može provoditi edukacije i stručne skupove s ciljem unaprjeđenja financijske pismenost (Ministarstvo financija, 2023) već može utjecati na financijsku pismenost mladih i kroz obrazovni sadržaj propisan strukovnim kurikulumom. Rezultati istraživanja razine financijske pismenosti u Republici Hrvatskoj koje je krajem 2019. godine provela OECD pokazuju blagi porast u odnosu na 2015. godinu. Prosječna ocjena financijske pismenosti građana Republike Hrvatske

iznosi 12,3 od ukupno 21 boda (59 %), u odnosu na 11,7 bodova (56 %) iz 2015. godine (Ministarstvo financija, 2020). Međunarodno koordinirano istraživanje provedeno tijekom 2022. i 2023. godine prema metodologiji OECD-a pokazuje kako je Republika Hrvatska ostvarila iznadprosječan rezultat ukupne financijske pismenosti i ostvarila ukupan rezultat od 62 boda od ukupno 100 mogućih bodova što iznosi 62 %, što je iznad prosjeka svih zemalja koje su sudjelovale u ovom ciklusu istraživanja (60 %), a blago ispod prosjeka financijske pismenosti zemalja OECD-a koji iznosi 63 % (Hrvatska narodna banka, 2023). Isto istraživanje pokazuje kako građani Republike Hrvatske imaju znanja iz područja financijske pismenosti, odnosno 70 %, što je iznad prosjeka ukupnih rezultata, ali u financijskom ponašanju i odnosu prema novcu smo ispod prosjeka prema provedenom istraživanju OECD-a (Ministarstvo financija, 2023).

U svijetu su provedena brojna istraživanja koja ukazuju na slične rezultate, a to je niska razina znanja iz područja financijske pismenosti koja ukazuje na nedostatnu formalnu obrazovanost mladih po pitanju financijske pismenosti (Lončar i Golemac, 2015; Lusardi i sur., 2010; Lusardi i Mitchell, 2011; Walstad i Rebeck, 2012). Dodatnim financijskim opismenjavanjem srednjoškolaca stvorili bi se pozitivni učinci na poboljšanje financijskog znanja i njezine primjene (Carlin i Robinson, 2012; Danes i sur., 2013; Gellman i Laux, 2011; Walstad i sur., 2010). Stoga, mnogi autori predlažu različite tehnike za poboljšanje financijske pismenosti u formalnom obrazovanju, a odnosi se na stavljanje učenika u središte nastavnog procesa, odnosno naglasak je na kurikulumskom pristupu. Predložene metode i oblici rada usko su vezani za učenje temeljeno na radu, iskustveno učenje, igru uloga, simulacija radnih procesa, grupni kao i timski rad, suradnju s gospodarstvom te mnogi drugi (Jarvis, 2002; Johnson i Sherraden, 2007; Tosey, 2002). Pregledom dosadašnje literature, sva istraživanja su uglavnom provedena kvantitativnom metodologijom utvrđujući razinu financijske pismenosti mladih ili u manjoj mjeri kvalitativnom metodologijom provođenjem intervjua na temu financijske pismenosti. Navedena istraživanja, uključujući i OECD-ovo istraživanje, ukazuje na nisku razinu financijske pismenosti koja upućuje na nužnost promjene strukovnog kurikuluma u obrazovnom sustavu.

Cilj, problemi i istraživačka pitanja

Obzirom da sva dosadašnja istraživanja pokazuju samo razinu znanja financijske pismenosti, a nije prikazan način stjecanja tog znanja kao i moguće unaprjeđenje, cilj ovog istraživanja je analizirati i utvrditi zastupljenost financijske pismenosti u trenutno važećem strukovnom kurikulumu za stjecanje kvalifikacije ekonomist (2017) te usporediti s predloženim sadržajem novog strukovnog kurikuluma za stjecanje kvalifikacije referent za poslovnu ekonomiju koji je izrađen u sklopu ESF projekta Modernizacija sustava strukovnog obrazovanja i osposobljavanja. Na temelju postavljenog cilja istraživanja formirani su sljedeći problemi istraživanja:

1. Analizirati zastupljenost sadržaja iz područja financijske pismenosti u strukovnim kurikulumima.
2. Analizirati godišnji broj nastavnih sati po nastavnim predmetima u kojima je zastupljen sadržaj financijske pismenosti u strukovnim kurikulumima.

3. Analizirati načine realizacije sadržaja financijske pismenosti u strukovnim kurikulumima.

Na temelju formiranih problema istraživanja, kreirana su istraživačka pitanja rada.

I₁ – Je li sadržaj financijske pismenosti zastupljeniji u strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju nego li u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist?

I₂ – Postoji li razlika u godišnjem broju nastavnih sati po nastavnim predmetima u kojima se realizira sadržaj financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist i strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju?

I₃ – Postoji li razlika u načinu realizacije sadržaja financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist i strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju?

Metode

U ovom istraživanju korištena je kvalitativna metoda analize sadržaja, odnosno analiza dokumenata kao objektivna i sistematična deskripcija (Mužić, 1982), analiza za stolom (desk-istraživanje) te komparativna metoda. Istraživanje je obuhvatilo dva strukovna kurikuluma, odnosno strukovni kurikulum za stjecanje kvalifikacije ekonomist i prijedlog novog strukovnog kurikuluma za stjecanje kvalifikacije referent za poslovnu ekonomiju koji se izvode u sektoru ekonomija i trgovina u srednjim strukovnim školama u Republici Hrvatskoj. Strukovni kurikulum za stjecanje kvalifikacije ekonomist je jedini kurikulum u sektoru ekonomija i trgovina razine 4.2 HKO-a koji se izvodi od 2017. godine u formi kurikuluma, a ne nastavnog plana i programa. Obzirom da se modernizacijom sustava strukovnog obrazovanja i osposobljavanja obrazovnom sustavu želi ponuditi moderni kurikulum koji imaju naglasak na učenje temeljeno na radu, izrađen je novi strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju. Učenici upisom oba navedena kurikuluma stječu kompetencije ekonomiste. Drugim riječima, strukovni kurikulum koji je na snazi od 2017. godine mijenja naziv u strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju. Osnovna razlika je u tome što strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju uz obvezni strukovni dio sadrži i izborni dio koji je vezan uz standarde zanimanja, pa upisom u jednu specifičnu izbornost, učenik stječe specifične kompetencije jedne od grana ekonomije.

Stupanjem na snagu strukovnog kurikuluma za stjecanje kvalifikacije referent za poslovnu ekonomiju, strukovni kurikulum za stjecanje kvalifikacije ekonomist prestaje važiti. Predloženi strukovni kurikulum je inovativan i kao takav potencijalno odgovor na postavljene probleme koji su iskazani u ranije navedenim istraživanjima. Uvidom u strukovne kurikulume analiziraju se podaci o zastupljenosti sadržaja i godišnjem broju nastavnih sati kojima se realizira financijska pismenost po nastavnim predmetima ili modulima te načinu stjecanja kompetencija iz područja financijske pismenosti. Metoda prikupljanja podataka uključuju pretraživanje službenih dokumenata (strukovnih kurikuluma) koji su dostupni na mrežnoj stranici Ministarstva znanosti, obrazovanja i mladih te mrežnoj stranici narodnih novina. Metoda analize sadržaja

odnosi se na detaljnu analizu sadržaja odnosno nastavnih predmeta i modula oba strukovna kurikulumu temeljem čega se procjenjuje udio sadržaja financijske pismenosti u nastavnim predmetima i modulima kao i vremenu i načinu realizacije. Na kraju je provedena komparativna analiza kojom je utvrđena razlika između zastupljenosti sadržaja financijske pismenosti, vremenu kao i načinu realizacije u oba strukovna kurikulumu.

Rezultati

Strukovni kurikulum za stjecanje kvalifikacije ekonomist (2017) na snazi je od 2017. godine. Navedeni dokument je jedan od rijetkih dokumenata koji je u obrazovnom sustavu u formi kurikuluskog dokumenta a ne nastavnog plana i programa. U kojoj mjeri je zastupljen sadržaj financijske pismenosti vidljivo je u tablici 1.

Tablica 1: Zastupljenost financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist

R. br.	Nastavni predmet (O/I)	1. razred				2. razred				3. razred				4. razred			
		godi- šnje	T	V	B	godi- šnje	T	V	B	godi- šnje	T	V	B	godi- šnje	T	V	B
1.	Osnove ekonomije (O)	70	70		4	70	70		4	70	70		4	64	64		3
		FP	20		1	FP	70		4	FP	54		3	FP	42		2
2.	Statistika (O)									70	35	35	3				
										FP	35	35	3				
3.	Osnove računovodstva (O)	70	35	35	4												
		FP	35	35	4												
4.	Računovodstvo troškova i imovine (O)					105	70	35	6								
						FP	70	35	6								
5.	Računovodstvo proizvodnje i trgovine (O)									105	70	35	6				
										FP	70	35	6				
6.	Poduzetničko računovodstvo (O)													128	32	96	8
														FP	32	96	8
7.	Bankarstvo i osiguranje (O)									105	70	35	5,5	64		64	3,5
										FP	70	35	5,5	FP		64	3,5
8.	Tržište kapitala (O)													64	64		3
														FP	64		3
9.	Poduzetništvo (O)	70	35	35	3,5	105	70	35	6								
		FP	20	20	2	FP	35	18	3								

10.	Vježbenička tvrtka (O)									70		70	4,5	64		64	3,5
										FP		50	3	FP		64	3,5
11.	Pravno okruženje poslovanja (O)													64	64		3
														FP	32		1,5
12.	Obiteljski posao (I)	70	35	35	3												
		FP	17	17	1,5												
13.	Globalno poslovno okruženje (I)	70	70		3												
		FP	35		1,5												
14.	Računovodstvo neprofitnih organizacija (I)									70	35	35	3				
										FP	35	35	3				
15.	Analiza financijskih izvještaja (I)													64	32	32	3
														FP	32	32	3

Izvor: autor prema strukovnom kurikulumu za stjecanje kvalifikacije ekonomist (2017)

Kazalo:

Nastavni predmet (O) – obvezni nastavni predmet, Nastavni predmet (I) – izborni nastavni predmet, godišnje – godišnji broj nastavnih sati u strukovnom kurikulumu, T – teorija, V – vježbe, B – krediti bodovi (CSVET bodovi – opterećenje učenika u kvalifikaciji, tj. obujam stečene kvalifikacije), FP – financijska pismenost, odnosno broj nastavnih sati koji se odnose na sadržaj kojim se realizira financijska pismenost unutar određenog nastavnog predmeta.

Uvidom u strukovni kurikulum za stjecanje kvalifikacije ekonomist (2017) uočava se kako je kvalifikacija na razini 4.2 HKO-a, odnosno kvalifikacija kojom se obrazuju učenici srednjih strukovnih škola četverogodišnjeg zanimanja. Nadalje, udio općeobrazovnih predmeta u strukovnom kurikulumu u 1. razredu je 63 %, u 2. razredu je 50 %, a u 3. i 4. razredu je 44 %, dok udio strukovnih predmeta (obvezni i izborni nastavni predmeti) u 1. razredu iznosi 37 %, u 2. razredu 50 %, a u 3. i 4. razredu 56 %. Po pitanju nastavnih predmeta u strukovnom dijelu, strukovni kurikulum ima 25 obveznih nastavnih predmeta koji se izvode u 1., 2., 3. i 4. razredu te 8 mogućih izbornih nastavnih predmeta koji se izvode u 1., 2., 3. i 4. razredu. Provedena analiza zastupljenosti financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist vidljiva je u tablici 1, a pokazuje kako je financijska pismenost zastupljena u 21 nastavnih predmeta od čega je u 12 nastavnih predmeta u potpunosti zastupljen sadržaj financijske pismenosti. U 1. razredu financijska pismenost zastupljena je u sljedećim nastavnim predmetima: Osnove ekonomije u teorijskom dijelu 28 %, Osnove računovodstva u teorijskom dijelu kao i u vježbama 100 %, Poduzetništvo u teorijskom dijelu te u vježbama 57 %, Obiteljski posao u teorijskom dijelu i u vježbama 48 % te Globalno poslovno okruženje u teorijskom dijelu 50 %. U 2. razredu financijska pismenost zastupljena je u sljedećim nastavnim predmetima: Osnove ekonomije u teorijskom dijelu 100 %, Računovodstvo troškova i imovine u teorijskom dijelu kao i u vježbama 100 % te u Poduzetništvu u teorijskom dijelu 50 %, a u vježbama 51 %. U 3. razredu financijska pismenost zastupljena je u sljedećim nastavnim predmetima: Osnove ekonomije u teorijskom dijelu 77 %, Statistika, Računovodstvo proizvodnje i trgovine, Bankarstvo i osiguranje te Računovodstvo neprofitnih organizacija u teorijskom dijelu i u vježbama 100 % te Vježbenička tvrtka 71 % u dijelu vježbi. U 4. razredu financijska pismenost zastupljena je u sljedećim nastavnim predmetima: Osnove ekonomije u teorijskom dijelu 65 %, Poduzetničko računovodstvo i Analiza financijskih izvještaja u teorijskom dijelu kao i u vježbama 100 %, Tržište kapitala u teorijskom dijelu 100 %, Bankarstvo i osiguranje i Vježbenička tvrtka u dijelu vježbi 100 % te Pravno okruženje poslovanja u teorijskom dijelu 50 %. U strukovnom kurikulumu za stjecanje kvalifikacije ekonomist, učenici obvezne nastavne predmete slušaju kao obavezne, dok izborne nastavne predmete odabiru ovisno o svojim preferencijama.

Dalje u tekstu, a tablicom 2, prikazana je zastupljenost financijske pismenosti u novom predloženom strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju koji je izradila Agencija za strukovno obrazovanje i obrazovanje odraslih u sklopu ESF projekta Modernizacija sustava strukovnog obrazovanja i obrazovanja odraslih a vodeći se činjenicom povećanja financijske pismenosti u navedenom kurikulumu.

Tablica 2: Zastupljenost financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju

R.broj	Modul (O/I)	Razred	Σ VPUP	Σ UTR	Σ Bodovi
			VPUP _{FP}	UTR _{FP}	Bodovi _{FP}
1.	Uvod u poduzetništvo (O)	1.	40	30	4
			10	8	1
2.	Osnove računovodstva (O)	1.	45	25	4
			45	25	4
3.	Uvod u osobne financije (O)	1.	30	30	3
			30	30	3
4.	Planiranje poduzetničke aktivnosti (O)	2.	35	35	4
			9	9	1
5.	Računovodstvo imovine i obveza (O)	2.	50	55	6
			50	55	6
6.	Mikroekonomija (O)	2.	50	20	4
			25	10	2
7.	Novčano poslovanje (O)	2.	40	30	4
			40	30	4
8.	Poslovi osiguranja (I)	2.	35	35	4
			35	35	4
9.	Računovodstvo fizičkih osoba (I)	2.	30	40	4
			30	40	4
10.	Osnove projektnog upravljanja (I)	2.	30	40	4
			7	10	1
11.	Baze podataka i poslovni informacijski sustavi (O)	3.	20	50	4
			5	12	1
12.	Računovodstvo proizvodnje i trgovine (O)	3.	35	70	6
			35	70	6
13.	Osnove ekonomije (O)	3.	35	35	4
			35	35	4
14.	Pokretanje vježbeničke tvrtke (O)	3.	20	50	4
			5	12	1
15.	Međunarodna ekonomija (I)	3.	55	50	6
			45	41	5
16.	Bankarski poslovi (I)	3.	35	70	6
			35	70	6
17.	Analitičke evidencije (I)	3.	30	40	4
			30	40	4
18.	Računovodstvo vanjske trgovine (I)	3.	10	25	2
			10	25	2
19.	Priprema, vođenje i evaluacija projekta (I)	3.	55	50	6
			27	25	3
20.	Poduzetničko računovodstvo (O)	4.	30	60	5
			30	60	5

R.broj	Modul (O/I)	Razred	Σ VPUP	Σ UTR	Σ Bodovi
			VPUP _{FP}	UTR _{FP}	Bodovi _{FP}
21.	Makroekonomija (O)	4.	50	20	4
			40	15	3
22.	Statistika u poslovanju (O)	4.	45	45	5
			45	45	5
23.	Poslovanje vježbeničke tvrtke (O)	4.	30	60	5
			30	60	5
24.	Pravo i političko okruženje poslovanja (O)	4.	70	20	5
			14	4	1
25.	Javna nabava u poslovanju (I)	4.	20	40	3
			6	14	1
26.	Tržište kapitala (I)	4.	40	30	4
			40	30	4
27.	Kredit i linearni modeli proizvodnje (I)	4.	20	40	3
			20	40	3
28.	Godišnji financijski izvještaji mikro i malih poduzetnika (I)	4.	35	90	7
			35	90	7
29.	Upravljanje ljudskim potencijalima (I)	4.	30	30	3
			10	10	1
30.	Radno pravo (I)	4.	35	35	4
			17	17	2
31.	Projektno upravljanje – EU fondovi (I)	4.	30	40	4
			15	20	2

Izvor: autor prema strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju (2024)

Kazalo:

Modul (O) – obvezni modul, modul (I) – izborni modul, modul - smisleno povezani skupovi ishoda učenja (SIU) iz standarda kvalifikacije koji su detaljno razrađeni u strukovnom kurikulumu, Σ VPUP – ukupan broj nastavnih sati koji se realiziraju vođenim procesom učenja i poučavanja (odnosno teorijskim putem), VPUP_{FP} – broj nastavnih sati vođenog procesa učenja i poučavanja koji se odnose na realizaciju sadržaja financijske pismenosti, Σ UTR – ukupan broj nastavnih sati koji se realiziraju učenjem temeljenim na radu (praktičnim putem), UTR_{FP} – broj nastavnih sati koji se realiziraju učenjem temeljenim na radu a odnose se na realizaciju sadržaja financijske pismenosti, Σ Bodovi – ukupan broj kreditnih bodova (CSVET bodovi) po modulima u određenoj kvalifikaciji, Bodovi_{FP} – kreditni bodovi (CSVET bodovi) po modulima koji se odnose na realizaciju sadržaja financijske pismenosti.

Uvidom u strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju (2024) uočava se kako je navedeni strukovni kurikulum proizašao iz strukovnog kurikuluma za stjecanje kvalifikacije ekonomist (2017) te kao takav je također kvalifikacije na razini 4.2 HKO-a. Udio općeobrazovnih predmeta u strukovnom kurikulumu u 1. i 2. razredu je 41 %, u 3. razredu je 44 %, dok je u 4. razredu 43 %.

Strukovni moduli (obvezni i izborni moduli) u 1. i 2. razredu su u postotnom udjelu od 59 %, u 3. razredu su 56 %, dok u 4. razredu su 57 %. Navedeni postoci u skladu su s preporukama Nacionalnog kurikuluma za strukovno obrazovanje (2018). Po pitanju strukovnih modula u strukovnom dijelu kvalifikacije, strukovni kurikulum ima 27 obveznih strukovnih modula koji se izvode u 1., 2., 3. i 4. razredu te 23 moguća izborna strukovna modula koji se izvode u 2., 3. i 4. razredu. Provedena analiza zastupljenosti financijske pismenosti u strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju vidljiva je u tablici 2, a pokazuje kako je financijska pismenost zastupljena u 31 strukovnom modulu od čega je u 17 strukovnih modula u potpunosti zastupljen sadržaj financijske pismenosti. U 1. razredu financijska pismenost zastupljena je u sljedećim strukovnim modulima: Uvod u poduzetništvo u 25 % teorijskog dijela (vođeni proces učenja i poučavanja – VPUP) i 25 % učenja temeljenog na radu, Osnove računovodstva i Uvod u osobne financije u 100 % strukovnom modulu. U 2. razredu financijska pismenost zastupljena je u sljedećim strukovnim modulima: Planiranje poduzetničke aktivnosti i Osnove projektnog upravljanja u 25 % teorijskog dijela ali i učenja temeljenog na radu, Mikroekonomija u 50 % teorijskog dijela i učenja temeljenog na radu, dok Računovodstvo imovine i obveza, Novčano poslovanje, Poslovi osiguranja, i računovodstvo fizičkih osoba u 100 % strukovnom modulu. U 3. razredu financijska pismenost zastupljena je u sljedećim strukovnim modulima: Baze podataka i poslovni informacijski sustavi i Pokretanje vježbeničke tvrtke u 25 % teorijskog dijela i učenja temeljenog na radu, Priprema, vođenje i evaluacija projekta u 50 % teorijskog dijela i učenja temeljenog na radu, Međunarodna ekonomija u 80 % teorijskog dijela i učenja temeljenog na radu te Računovodstvo proizvodnje i trgovine, Osnove ekonomije, Bankarski poslovi, Analitičke evidencije i Računovodstvo vanjske trgovine u 100 % strukovnom modulu. U 4. razredu financijska pismenost zastupljena je u sljedećim strukovnim modulima: Pravo i političko okruženje poslovanja u 20 % teorijskog dijela i učenja temeljenog na radu, Javna nabava i Upravljanje ljudskim potencijalima u poslovanju u 30 % teorijskog dijela i učenja temeljenog na radu, Radno pravo i Projektno upravljanje – EU fondovi u 50 % teorijskog dijela i učenja temeljenog na radu, Makroekonomija u 80 % teorijskog dijela i učenja temeljenog na radu te Poduzetničko računovodstvo, Statistika u poslovanju, Poslovanje vježbeničke tvrtke, Tržište kapitala, Krediti i linearni modeli proizvodnje i Godišnji financijski izvještaji mikro i malih poduzetnika u 100 % strukovnom modulu. U strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju, učenici obvezne strukovne module slušaju kao obvezne, dok izborne strukovne module odabiru ovisno o specifičnoj izbornosti koja je vezana uz standarde zanimanja. Drugim riječima, učenici mogu izabrati specifičnu izbornost te steći dodatne kompetencije standarda zanimanja ekonomski referent, asistent u marketingu, asistent za upravljanje projektima, knjigovođa, asistent za ljudske potencijale i referent u bankarstvu i osiguranju (Hrvatski kvalifikacijski okvir, 2024). Obveznim strukovnim modulima učenici stječu kompetencije ekonomiste, odnosno referenta za poslovnu ekonomiju koji je na razini 4.2 HKO-a a specifičnom izbornošću učenici se usavršavaju u području (grani ekonomije) koja ih potencijalno zanima. Time su učenici spremniji za tržište rada, a predloženi strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju odgovorio je na potrebe tržišta rada (gospodarstva) i lokalne zajednice.

Rasprava

Kako bi se odgovorilo na probleme istraživanja temeljem kojih su postavljena istraživačka pitanja rada, komparativnom analizom uspoređeni su podaci zastupljenosti sadržaja financijske pismenosti, kao i vrijeme realizacije i način izvođenja nastave u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist i strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju, a rezultati su vidljivi u tablici 3.

Tablica 3: Komparativna analiza zastupljenosti financijske pismenosti u strukovnim kurikulumima

	<i>Ekonomist</i>								<i>Referent za poslovnu ekonomiju</i>							
<i>Razred</i>	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.
<i>Broj nastavnih predmeta / strukovnih modula</i>	5	3	6	7	3	7	9	12	3	7	9	12	3	7	9	12
<i>Način izvođenja nastave T/V(UTR)</i>	<i>T</i>	<i>V</i>	<i>T</i>	<i>V</i>	<i>T</i>	<i>V</i>	<i>T</i>	<i>V</i>	<i>VPUP</i>	<i>UTR</i>	<i>VPUP</i>	<i>UTR</i>	<i>VPUP</i>	<i>UTR</i>	<i>VPUP</i>	<i>UTR</i>
	127	72	175	53	201	190	202	256	85	63	196	189	227	330	302	405
<i>Bodovi</i>	10	13	23,5	24,5	8	22	32	39	8	22	32	39	8	22	32	39

Izvor: autor prema dobivenim rezultatima analize

Ključno istraživanje koje je provela OECD 2015. i 2019. godine te zadnje objavljeni rezultati istraživanja za 2022. i 2023. godinu, a za Republiku Hrvatsku je rezultate objavilo Ministarstvo financija (2023), bilo je temelj za provedbu komparativne analize strukovnih kurikuluma. Sva provedena istraživanja ukazuju na razinu financijske pismenosti, ali ne i na način stjecanja iste. Odnosno, može li i kako, obrazovni sustav kroz strukovne kurikule pozitivno utjecati na financijsku pismenost mladih. Kako bi se došlo do navedenog odgovora, potrebno je napraviti analizu dokumenata te procijeniti je li predloženi novi sadržaj dostatan, kako bi se poboljšala razina financijske pismenosti. Rezultati OECD-a ukazuju na to kako znanje iz područja financijske pismenosti raste iz godine u godinu što se može potvrditi i provedenom analizom.

Strukovni kurikulum za stjecanje kvalifikacije ekonomist (2017) u strukovnom dijelu sadrži 21 nastavni predmet koji u sebi u većoj ili manjoj mjeri objedinjuje sadržaj financijske pismenosti, dok u strukovnom kurikulumu referent za poslovnu ekonomiju je predložen 31 modul sa sadržajem financijske pismenosti. Uzmemo li se u obzir i kreditni bodovi, vidljivo je povećanje u predloženom strukovnom kurikulumu sa 71 kreditni bod na 101 kreditni bod. Samim time može se doći do odgovora na prvo istraživačko pitanje „Je li sadržaj financijske pismenosti zastupljeniji u strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju nego li u strukovnom kurikulumu za stjecanje kvalifikacije ekonomist?“ koji je potvrđan. Iako je Republika Hrvatska prema zadnjem OECD-ovom istraživanju pokazala iznimne rezultate u teorijskom znanju financijske pismenosti (70 %), dobiveni rezultati kvalitativnom metodologijom idu tome u prilog, kao i činjenica kako obrazovni sustav, odnosno Agencija za strukovno obrazovanje i obrazovanje odraslih kao obrazovna institucija koja je u nadležnosti strukovnih kurikuluma, pokazuje brigu za financijskim opismenjavanjem mladih srednjoškolaca. Analizom zastupljenosti financijske pismenosti u strukovnom kurikulumu, provjerio se i godišnji broj nastavnih sati koje je utrošeno u obrazovanje, a to je 705 sati teorijskog dijela i 571 sat vježbi, što bi u konačnici bilo ukupno 1276 sati u kojima su učenici koji se obrazuju za stjecanje kvalifikacije ekonomist, proveli svladavajući sadržaj financijske pismenosti u svojem četverogodišnjem obrazovanju. Obzirom da je Nacionalnim strateškim okvirom (Ministarstvo financija, 2021) propisano promicanje financijske pismenosti mladih, predloženim strukovnim kurikulumom za stjecanje kvalifikacije referent za poslovnu ekonomiju vidljivo je povećanje broja sati obrazovanja iz područja financijske pismenosti. Predloženim kurikulumom u dijelu vođenog procesa učenja i poučavanja, odnosno u teorijskom dijelu, zatupljeno je 810 sati financijske pismenosti, dok u dijelu učenja temeljenog na radu (odnosno prema strukovnom kurikulumu za stjecanje kvalifikacije ekonomist, vježbe) 987 sati, što u ukupnom zbroju čini 1797 sati financijske pismenosti, što je povećanje za 40,83 %. Gledaju li se pojedinačno rezultati udjela financijske pismenosti ovisno o načinu izvođenja nastave, predloženim strukovnim kurikulumom za stjecanje kvalifikacije referent za poslovnu ekonomiju, teorijski dio sadrži uvećanje od 14,89 %, a učenje temeljeno na radu (odnosno dio koji se odnosi na vježbe) iznosi 72,85 %. Time se odgovara na 2. i 3. postavljeno istraživačko pitanje, odnosno godišnji broj nastavnih sati kojima se realizira sadržaj financijske pismenosti kao i povećani naglasak učenja temeljeno na radu je veće u strukovnom kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju.

Detaljnim uvidom u trenutno važeći dokument kao i novi predloženi dokument, omogućio je uvid u smjer u kojem će financijska pismenost ići u budućem razdoblju. Obzirom da je broj škola koji pripadaju sektoru ekonomija i trgovina među brojnijim, odnosno postoji veliki broj učenika koji se obrazuju za zanimanje iz sektora ekonomija i trgovina (ŠeR, 2024), dobiveni rezultati mogu ukazati na povećanje ne samo znanja iz područja financijske pismenosti već i financijskog ponašanja te odnosa prema novcu. Iz navedenih područja, prema OECD-ovim rezultatima, Republika Hrvatska nema povoljne rezultate. Novim, predloženim strukovnim kurikulumom za stjecanje kvalifikacije referent za poslovnu ekonomiju, i povećanjem broja nastavnih sati koji se odnose na učenje temeljeno na radu za 72.85 %, rezultati mogu biti puno povoljniji za Republiku Hrvatsku. Razlog tome proizlazi iz novih strukovnih kurikulumu kojima je koncept izučavanja otvoreniji, te je stavljen naglasak na učenika, suradnju s gospodarstvom, tržištem rada, lokalnom zajednicom, aktivnostima za učenike, timskim radom, projektnim aktivnostima, situacijskim učenjem i stručnom praksom što je sve dio učenja temeljenog na radu.

Zaključak

Financijska pismenost kao kombinacija svijesti, znanja, vještina i ponašanja, postaje sve važnija u gospodarstvima svih zemalja pa tako i Republike Hrvatske. Zbog digitalizacije, stalnih promjena u gospodarstvima, napretka društva te sve većim mogućnostima u poslovnom ali i privatnom svijetu koji se prvenstveno odnose na financijsku pismenost, javila se potreba za promjenama u obrazovnom sustavu. Odnosno, javila se potreba za stavljanjem većeg naglaska na financijsku pismenost mladih. Rezultati istraživanja koje je provela OECD ukazuju na smanjenu razinu financijske pismenosti mladih. Kako bi se odgovorilo na postavljena istraživačka pitanja, provedena je analiza strukovnog kurikulumu za stjecanje kvalifikacije ekonomist i strukovnog kurikulumu za stjecanje kvalifikacije referent za poslovnu ekonomiju. Dobiveni rezultati provedene komparativne analize strukovnih kurikulumu ukazuju na povećanje zastupljenosti sadržaja financijske pismenosti čime se utvrdilo da novi strukovni kurikulum za stjecanje kvalifikacije referent za poslovnu ekonomiju ne samo da ima veći broj nastavnih sati koji se odnose na realizaciju sadržaja financijske pismenosti, već je povećanje u teorijskom dijelu kao i u učenju temeljenim na radu u cjelokupnoj kvalifikaciji. Obzirom da učenici stječu kompetencije iz područja financijske pismenosti u velikoj mjeri kroz učenje temeljeno na radu, praktične primjere i simulacijsko učenje, može se očekivati u budućem razdoblju povećanje financijske pismenosti mladih (srednjoškolaca) ne samo u području znanja, već i u području financijskog ponašanja i odnosa prema novcu. Iskustvenim učenjem, učenici će naučiti kako se odgovorno financijski ponašati te kakav odnos prema novcu trebaju imati. Simulirajući stvarne živote situacije, uz korištenje digitalnih tehnologija, učenici će rješavati probleme te na vlastitim greškama učiti kako iste ne bi ponovili u budućem poslovnom i privatnom svijetu nakon stjecanja strukovne kvalifikacije.

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STRUČNO USAVRŠAVANJE NASTAVNIKA STRUKOVNIH PREDMETA ZA POTREBE DIGITALNE I ZELENE TRANZICIJE

Tanja OREMUŠ
Prva ekonomska škola
tanja.oremus@skole.hr

Sara KULIĆ
Prva ekonomska škola
sara.kulic1@skole.hr

Romana RUSEK
Prva ekonomska škola
romana.rusek@skole.hr

Zorica HRGOVČIĆ
Prva ekonomska škola
zorica.hrgovic@skole.hr

Sažetak

Predmet/ishodište rada: S obzirom na viziju Hrvatske kao konkurentne i održive zemlje do 2030. godine, javlja se potreba za pripremom mladih za tržište rada koje sve više zahtijeva zelene i digitalne kompetencije. U tom kontekstu, rad istražuje mogućnosti stručnog usavršavanja nastavnika strukovnih predmeta kako bi se osigurale kompetencije nužne za doprinos zelenoj i digitalnoj tranziciji u obrazovnom sustavu.

Ciljevi: Analizirati aktualne probleme u stručnom usavršavanju nastavnika, predstaviti programe profesionalnog razvoja koji omogućuju nastavnicima stjecanje potrebnih zelenih i digitalnih vještina te primjere dobre prakse iz drugih zemalja koje mogu poslužiti kao smjernice za unapređenje domaćih programa obrazovanja nastavnika za potrebe digitalne i zelene tranzicije.

Metodologija: Kroz pregled relevantnih obrazovnih politika, programa stručnog usavršavanja i primjera dobre prakse unutar Hrvatske i Europske unije, istražene su trenutno dostupne mogućnosti i njihove praktične primjene.

Rezultati: Analizom su identificirane nedostatne kompetencije za integraciju održivosti i digitalnih tehnologija u obrazovni proces. Iako većina zemalja u svoje kurikule uvodi teme održivog razvoja, primjena u praksi često izostaje zbog nedovoljne obučenosti nastavnika za poučavanje kompleksnih aspekata održivosti. Rad naglašava da Hrvatska nudi niz programa usmjerenih na stručno usavršavanje u ovom području, uključujući tečajeve i module pod okriljem Agencije za strukovno obrazovanje i osposobljavanje te projekte sufinancirane iz EU fondova poput Erasmus+ programa. Primjeri sufinanciranih projekata su "Solidary Europe for Inclusive Society" (EUsolis) i "Challenges and Practices of Teaching Economic Disciplines in the Era of Digitalization" (DIGI4Teach). Projekt EUsolis jača kapacitete nastavnika i knjižničara strukovnih škola za prenošenje znanja o EU temama te priprema učenike za sudjelovanje u održivom i digitalno naprednom društvu. Projekt DIGI4Teach osnažuje nastavnike za korištenje digitalnih

tehnologija u nastavi, s ciljem unapređenja obrazovnih metoda, povećanja angažmana učenika i poboljšanja kvalitete nastave. Putem digitalnih platformi kao što su EMA, edu.asoo.hr i CARNET, nastavnici imaju pristup edukativnim materijalima i alatima za poboljšanje svojih digitalnih i zelenih vještina. Nadalje, programi vaučera Hrvatskog zavoda za zapošljavanje omogućuju financiranje dodatnih edukacija u ovim područjima, dok specifični projekti poput EduSTA, TAP-TS i CLIMADEMY ciljaju na unapređenje kompetencija za održivost i klimatsku edukaciju. Međutim, potrebna je sustavna podrška u vidu dodatnog usavršavanja nastavnika strukovnih predmeta te veća integracija praktičnih i interdisciplinarnih pristupa u obrazovne programe kako bi nastavnici adekvatnim poučavanjem osposobili učenike za digitalnu i zelenu tranziciju.

Ključne riječi: zelena tranzicija, digitalna tranzicija, stručno usavršavanje, nastavnici strukovnih predmeta, održivi razvoj

JEL klasifikacija: A29, I21, I29, O44

Uvod

Vizija Hrvatske kao konkurentne, inovativne i sigurne zemlje s visokim životnim standardom, jednakim prilikama za sve te očuvanim resursima može se ostvariti samo kroz maksimalno iskorištavanje nacionalnih potencijala, sanaciju gospodarskih i društvenih posljedica globalnih kriza te kroz ubrzani oporavak (Nacionalna razvojna strategija Republike Hrvatske do 2030. godine, 2021). Prema *Preporukama Vijeća od 16. lipnja 2022. o učenju za zelenu tranziciju i održivi razvoj 2022/C 243/01*, odgojno-obrazovne ustanove trebale bi pripremiti mlade generacije za zelenu tranziciju, osigurati im potrebna znanja i vještine, omogućiti im sudjelovanje u donošenju odluka te pripremiti nastavnike za poučavanje kompetencija koje su nužne za prilagodbu tržištu rada u uvjetima zelene tranzicije. *Deklaracijom iz Osnabrücka 2020.* dogovorene su mjere za potporu digitalne i zelene tranzicije, uključujući i obvezu država članica EU da podrže nastavnike, predavače i mentore kroz razvoj njihovih digitalnih vještina. Primjena digitalnog obrazovanja zahtijeva od strukovnih nastavnika nove metode i pristupe, uz poticanje razmjene iskustava i najboljih praksi među nastavnicima. Ova suradnja omogućila bi jačanje zajedničkog učenja i vrednovanja na jednakim osnovama te razvoj vještina za zeleno gospodarstvo, čime bi se nastavnička profesija učinila privlačnijom i otvorila mogućnost uključivanja stručnjaka iz poslovnog sektora u obrazovni sustav (Europska komisija, Glavna uprava za zapošljavanje, socijalna pitanja i uključivanje, 2021).

Uloga nastavnika strukovnih predmeta u procesu digitalne i zelene tranzicije

Europska unija planira do 2030. smanjiti emisije stakleničkih plinova za najmanje 55 % u odnosu na 1990. te povećati udio obnovljivih izvora energije (Europska komisija, b.d.). Prema *Preporukama Vijeća od 16. lipnja 2022. o učenju za zelenu tranziciju i održivi razvoj 2022/C 243/01*, zelena tranzicija uključuje ne samo smanjenje

negativnog utjecaja na okoliš nego i promicanje održivih gospodarskih praksi i smanjenje socijalnih nejednakosti. Dualna tranzicija, zelena i digitalna, trebala bi pridonijeti razvoju pravednijeg, otpornijeg i održivijeg europskog gospodarstva (Europska komisija, Glavna uprava za zapošljavanje, socijalna pitanja i uključivanje, 2022).

Dijalog EU-a s mladima 2018. okupio je preko 50.000 mladih iz cijele Europe, uključujući više od 2.500 iz Hrvatske, koji su naglasili potrebu za promjenama koje bi bolje reflektirale njihove interese. Ciljevi za mlade, iako neobvezujući, trebali bi biti integrirani u nacionalne politike kako bi se u potpunosti ostvarili. Mlade generacije očekuju da obrazovni djelatnici budu digitalno i medijski pismeni te pouzdani izvori informacija (Vijeće Europske unije, 2018, kako je navedeno u Dumančić, Rep i Šimunović, 2023., str. 19).

U Republici Hrvatskoj stručno usavršavanje nastavnika nije obvezno u smislu propisanog broja sati na godišnjoj razini, osim u slučaju napredovanja u zvanje. Za razliku od Hrvatske, neke zemlje EU-a, poput Cipra, Švedske, Rumunjske i Francuske, provode obvezne ili izborne edukacije za ravnatelje i nastavnike s ciljem jačanja održivosti u obrazovanju i povezivanja s digitalnim inovacijama. Na primjer, na Cipru ravnatelji škola sudjeluju u dva obvezna petosatna modula. Prvi se bavi integracijom održivosti u rad školskog osoblja, dok je drugi usmjeren na prevladavanje prepreka u provedbi održivih praksi. U Švedskoj su obvezni tečajevi za ravnatelje škola usmjereni na povezivanje održivosti s digitalnim inovacijama i pitanjima kulturne raznolikosti. U Rumunjskoj obrazovne ustanove za učitelje i nastavnike nude izborne kolegije kao podršku ravnateljima u području održivosti, dok su u Portugalu dostupni besplatni webinar na istu temu. U Francuskoj su tečajevi obvezni za nastavno osoblje i ravnatelje tijekom početne obuke, a izborni u okviru njihovog kontinuiranog stručnog usavršavanja (Europska komisija, Glavna uprava za obrazovanje, mlade, sport i kulturu, 2023a).

Problemi u provedbi zelenog i digitalnog obrazovanja

Izvešće o ciljevima održivog razvoja za 2024. predstavlja jedini službeni dokument Ujedinjenih naroda koji prati globalni napredak u ostvarivanju ciljeva Agende održivog razvoja do 2030. godine (United Nations, 2024) i u njemu je zaključeno da, iako većina zemalja formalno uključuje teme održivog razvoja i globalnog građanstva u svoje obrazovne sustave, njihova primjena nije dosljedna. Polovica nastavnika priznaje da te teme ne obrađuje, unatoč formalnom uključivanju u kurikulum. Iako mnoge zemlje planiraju revidirati svoje kurikulume kako bi naglasile klimatske promjene i održivost, uspjeh tih napora ovisi o osposobljenosti i motiviranosti nastavnika za poučavanje tih tema. Zbog toga je nužna suradnja škola, zajednice i vlade kako bi se nastavnicima pružila sustavna podrška u poučavanju o održivosti.

Istraživanje provedeno u Poljskoj (Mróz et al., 2018) ukazuje na to da nastavnici nemaju dovoljno znanja o principima i ciljevima održivog razvoja. Osobito je zabrinjavajuće što mnogi nastavnici održivi razvoj poistovjećuju isključivo s

obrazovanjem za okoliš, zanemarujući društvene i ekonomske aspekte održivosti. Nastavnici humanističkih i društvenih znanosti, kao i jezika, postižu bolje rezultate u testovima znanja o održivom razvoju u odnosu na nastavnike prirodnih znanosti, poput biologije, geografije, fizike i kemije, koji često usmjeravaju fokus isključivo na zaštitu okoliša. Nastavnici s duljim radnim iskustvom pokazuju veće znanje o održivom razvoju, što se može povezati s njihovom dugoročnom posvećenošću održavanju visoke kvalitete rada i interesom za nove obrazovne koncepte. Glavni izvori znanja o održivom razvoju su internet, knjige i stručni časopisi, dok su moderni digitalni mediji, poput e-knjiga, *podcasta* i *online* foruma, među nastavnicima manje popularni.

U Hrvatskoj se također uočavaju značajni nedostaci u osposobljavanju učitelja i nastavnika za integraciju održivog razvoja u obrazovanje. Premda postoji svijest o važnosti obrazovanja za održivi razvoj, učitelji i nastavnici često nemaju dovoljno kompetencija stečenih kroz inicijalno obrazovanje, a profesionalno usavršavanje rijetko pokriva praktične izazove s kojima se susreću u nastavi. Nedostatak vremena za provedbu inovacija te nedosljednost u primjeni novih metoda dodatno otežavaju uspješnu implementaciju održivih praksi u obrazovni sustav. Stručna usavršavanja su često teorijska i nedovoljno povezana s praktičnim izazovima koje učitelji i nastavnici susreću u svakodnevnom radu, što dodatno otežava integraciju inovativnih metoda u nastavni proces (Kostović-Vranješ, 2016).

Kako bi se osigurala primjena održivih i digitalnih praksi u obrazovanju, nastavnicima i učenicima potreban je pristup koji koristi primjere dobre prakse. Za učinkovito i angažirano poučavanje o održivom razvoju, nastavnicima su potrebna znanja o raznovrsnim metodama, kao što su uključivanje praktičnih aktivnosti, projekata, radionica i volonterskih aktivnosti koje potiču kritičko razmišljanje i angažman učenika. Demonstracija održivih praksi kroz ponašanje nastavnika te uključivanje roditelja i lokalne zajednice u obrazovne aktivnosti nužni su za stvaranje šire podrške održivim inicijativama (Bubić i Jukić, 2017).

Mogućnosti stručnog usavršavanja nastavnika strukovnih predmeta

Zainteresiranim nastavnicima strukovnih predmeta dostupne su razne mogućnosti za unapređenje njihovih profesionalnih kompetencija. Agencija za strukovno obrazovanje i obrazovanje odraslih (ASOO) nudi širok spektar programa stručnog usavršavanja za nastavnike strukovnih predmeta, uključujući predavanja, radionice, e-učenje, webinare i studijske posjete. Programi poput ERASMUS+ i ESF+ dodatno podupiru razmjenu iskustava i usvajanje novih kompetencija kroz međunarodne studijske posjete i projekte. Digitalne i zelene kompetencije također su prioritet, s modulima koji pokrivaju teme poput digitalnog marketinga, održivog razvoja i primjene informacijsko-komunikacijskih tehnologija u nastavi (ASOO, b.d.a). Programi stručnog usavršavanja Agencije za strukovno obrazovanje i obrazovanje odraslih uključuju temeljne i izborne module iz pedagogije, didaktike i obrazovnog menadžmenta, ali i interdisciplinarne teme kao što su psihologija obrazovanja, metodika te informacijsko-komunikacijske znanosti (ASOO, b.d.c). Moduli su oblikovani kroz predavanja, vježbe,

konzultacije i samostalni rad, a završavaju evaluacijom, nakon koje sudionici dobivaju potvrdu. Specijalizirani sadržaji obuhvaćaju teme relevantne za digitalnu i zelenu tranziciju (tablica 1), omogućujući nastavnicima izbor iz modula usmjerenih na razvijanje kompetencija potrebnih za suvremeno obrazovanje (ASOO, b.d.b).

Tablica 1: Primjeri temeljnih i izbornih modula za nadogradnju digitalnih i zelenih kompetencija

Naziv modula	Ishodi učenja za modul
MT12 (S3): Unaprjeđenje digitalne kompetencije	➤ kritički prosuditi (vlastitu) digitalnu kompetenciju i praksu primjene digitalnih tehnologija ➤ odabrati (obrazovne) izvore i načine za aktivni razvoj (vlastite) digitalne kompetencije, u online okruženju ili uživo ➤ planirati unaprjeđenje (vlastite) digitalne kompetencije ➤ provesti unaprjeđenje (vlastite) digitalne kompetencije ➤ organizirati razmjenu znanja i iskustva pomoću digitalnih tehnologija ➤ poduprijeti razvoj digitalne kompetencije učenika i suradnika/drugih nastavnika
MI5 (S1): Primjena IKT- a u učenju i podučavanju strukovnih predmeta	➤ objasniti pedagoške specifičnosti i principe korištenja IKT-a u učenju i podučavanju ➤ identificirati različite digitalne alate i okruženja te analizirati njihove karakteristike i mogućnosti primjene u nastavi ➤ primjenjivati IKT u vlastitoj pedagoškoj praksi za unaprjeđenje procesa učenja i podučavanja u skladu sa suvremenim pristupima učenju i podučavanju
MI7 (S3): Načela uključivog društveno odgovornog poduzetništva i poslovanja	➤ objasniti koncept društveno odgovornog poslovanja ➤ objasniti koncept socijalnog/društvenog poduzetništva ➤ osmisli aktivnosti za praktičnu primjenu principa društveno odgovornog poslovanja ➤ osmisli aktivnosti za mogućnosti praktične primjene socijalnog/društvenog poduzetništva ➤ promovirati koncepte društveno odgovornog poslovanja i socijalnog poduzetništva kod mentora/poslodavaca i učenika u ulozi budućih zaposlenika, poduzetnika i poslodavaca
MI12 (S3): Kibernetička sigurnost	➤ raspraviti o ključnim konceptima kibernetičke sigurnosti i načelu njihova rada ➤ nabrojiti korake za izradu sustava upravljanja pristupom ➤ opisati životni ciklus razvoja softvera ➤ razlikovati uloge i odgovornosti povezane s kibernetičkom sigurnošću ➤ opisati razlike između oporavka od katastrofe i kontinuiteta poslovanja nakon katastrofe ➤ opisati najbolje prakse koje olakšavaju implementaciju oporavka od katastrofe ➤ objasniti osnove kriptografije te suvremene tehnike enkripcije podataka ➤ analizirati hardver, softver, komponente mreže i njihove međusobne odnose s ciljem postizanja sigurnosti sustava ➤ opisati različite sigurnosne modele te rješenja za umrežavanje i otklanjanje sigurnosnih problema

Izvor: Izrada autora prema ASOO, 2022., str. 36, 49, 51, 56

Prema Godišnjem izvješću ASOO-a (b.d.a) za 2023. održane su edukacije o općim i stručnim temama. Najviše nastavnika (njih 1608) koji su sudjelovali na stručnim temama dolazi iz sektora Ekonomije, trgovine i poslovne administracije. S obzirom na specifične potrebe digitalne i zelene tranzicije, obrađene su teme kao što su: *Učenje uz primjenu digitalne tehnologije, Digitalna tehnologija i digitalna pismenost: Tik Tok u suvremenom nastavnom procesu, Networking, Nastava i nastavnik u digitalnom okruženju, Digitalni sadržaji za rad s učenicima s poteškoćama, Osnove izrade videolekcije, Digitalni marketing i izazovi digitalnog poslovanja, Inovativna tehnologija u nastavi kompjutorske daktilografije, Informacijska pismenost učenika u strukovnim školama, Digitalni alati za rad s učenicima s teškoćama, Koncepti održivog razvoja na otocima šibenskog arhipelaga, Utjecaj digitalnih medija na ponašanje mladih, Gospodarenje energijom u društvu, Digitalne tehnologije po mjeri učenika s posebnim odgojno-obrazovnim potrebama, Digitalni alat MindMeister za izradu umne mape, Gospodarenje biootpadom (projekt), Projekt Vibes - rad u virtualnom okruženju, Medijsko obrazovanje, samo stisni PLAY - videomaterijali o nekim (vrlo aktualnim) temama iz medijske pismenosti, Razvoj digitalnih kompetencija za rad u digitalnom okruženju stečenih u provedbi projekta Vibes, Digitalni marketing – prilike i izazov, Društveno poduzetništvo- poduzetništvom do rješavanja društvenih problema, Padlet u nastavi strukovnih predmeta, Medijska pismenost, Primjer dobre prakse u nastavi Društveno odgovornog poslovanja - Projektna nastava: Ljudski utjecaj na moj okoliš, Održivi razvoj i primjeri implementacije u nastavi, Profil digitalnog marketera, Zaštita podataka na internetu, Phishing, Pravo na zdrav život i okoliš te utjecaj klimatskih promjena kao i brojne druge teme. Uvidom u sve teme primjetno je da su zelene vještine još uvijek manje zastupljene u ponuđenim edukacijama.*

Kroz četiri ciklusa stručne prakse, organiziranih u suradnji Agencije za strukovno obrazovanje i obrazovanje odraslih s Advantage Austria (vanjskotrgovinske organizacije Austrijske gospodarske komore) pod nazivom "Nastavnici u poduzeća - praksa za nastavnike", nastavnicima je omogućen uvid u kompetencije potrebne na tržištu rada, što je doprinos prijenosu znanja u nastavni proces. Međutim, ovu je priliku iskoristilo svega 90 nastavnika u 2023. (ASOO, b.d.a), što pokazuje ograničeni interes ili pristup ovoj vrsti stručne prakse.

EMA platforma omogućuje nastavnicima osnovnih i srednjih škola prijavu na stručna usavršavanja koje organiziraju CARNET, Agencija za strukovno obrazovanje i obrazovanje odraslih (ASOO), Agencija za mobilnost i programe Europske unije (AMPEU), Nacionalni centar za vanjsko vrednovanje obrazovanja (NCVVO) i Ministarstvo znanosti, obrazovanja i mladih (MZOM) dok portal edu.asoo.hr pruža dodatnu podršku i pristup edukativnim materijalima.

Hrvatski zavod za zapošljavanje (b.d.a) omogućuje stjecanje novih vještina putem vaučera za edukaciju, usmjerenih na digitalne i zelene kompetencije. Vaučeri pokrivaju troškove odabranih programa, a korisnici mogu sami birati program i pružatelja usluge. Na primjer, nastavnici ekonomske grupe predmeta imaju mogućnost prijave na program „Društveno odgovorno poslovanje“ iz kategorije zelenih programa, dok su u kategoriji digitalnih programa dostupni sljedeći programi: „Internetski marketing i brendiranje“, „Uporaba informacijskih tehnologija i multimedije u uredskom

poslovanju" te „Izrada multimedijskog sadržaja u poslovanju“ (Hrvatski zavod za zapošljavanje, b.d.b).

CARNET, kao potpora razvoju digitalnih kompetencija nastavnika, organizira različite tečajeve i omogućuje pristup digitalnim sadržajima poput *EduBlica*, u trajanju do 10 minuta, i *Meduze*, edukativnim videosadržajima, te nudi e-tečajeve za samostalno učenje i razvoj digitalnih kompetencija kroz sustav *Loomen*. *Edutorij*, digitalni repozitorij obrazovnih materijala, omogućava pristup i razmjenu edukativnih sadržaja, dok portal *e-Laboratorij* nudi informacije o alatima za e-učenje.

SELFIE je besplatan alat koji podržava proces digitalizacije škola, uključujući one usmjerene na strukovno obrazovanje i osposobljavanje. Prilagodba ovog alata omogućava obrazovnim institucijama bolji uvid u razinu integracije digitalnih tehnologija u nastavni proces. Alat prikuplja anonimne povratne informacije učenika, nastavnika i ravnatelja putem strukturiranog upitnika o korištenju tehnologije u školi, nakon čega generira izvješće koje identificira ključne prednosti i područja za poboljšanje (Europska komisija, Glavna uprava za zapošljavanje, socijalna pitanja i uključivanje, 2022).

Na *Europskoj platformi za školsko obrazovanje* mogu se pronaći razni online tečajevi za razvoj digitalnih kompetencija i kompetencija za održivost. Važno je naglasiti da se digitalne vještine ne odnose samo na poznavanje tehnologije, već i na to da nastavnici mogu koristiti tu tehnologiju za unapređenje svoje profesionalne prakse, osnaživanje učenika i postizanje boljih obrazovnih rezultata.

Program *Erasmus+* pruža financijsku podršku, edukaciju i mogućnosti suradnje za pojedince i organizacije svih generacija, potičući mobilnost, održivi razvoj, digitalnu transformaciju i jednakost u obrazovanju, osposobljavanju, mladima i sportu (AMPEU, b.d.). Primjeri projekata ostvarenih u okviru *Erasmus+ programa* su „Solidary Europe for Inclusive Society (EUsolis)“ i „Challenges and practices of teaching economic disciplines in era of digitalization“ (DIGI4Teach).

EUsolis je pokrenut s ciljem jačanja edukacijskih kapaciteta nastavnika i knjižničara strukovnih škola u prenošenju znanja o Europskoj uniji njihovim učenicima. Edukacija je organizirana kroz četiri tematska modula: „Solidarna Europa“, „Mladi i aktivno društvo EU“, „Različitosti“, i „Održivi gradovi“. Svaki modul slijedi strukturiranu metodologiju koja obuhvaća pregled relevantne literature i praktične edukacije nastavnika, uz podršku profesora Ekonomskog fakulteta Sveučilišta u Zagrebu, čija stručnost u EU temama dodatno obogaćuje projekt (EUsolis, b.d.). U sklopu pojedinih modula, nastavnici strukovnih škola sudjelovali su u radionicama na kojima su, između ostalog, usavršavali digitalne i zelene vještine. Zelena tranzicija obrađena je kroz modul „Održivi gradovi“, koji uključuje teme kao što su održivi razvoj, klimatska neutralnost i urbani ekološki pristupi, poput koncepta "pametnih" gradova. Ovaj modul usmjerava nastavnike i knjižničare na teme očuvanja okoliša, kružnog gospodarstva, održivih zajednica i ekologije. Digitalna tranzicija integrirana je kroz razvoj digitalnih vještina nastavnika u kontekstu edukacija o temama Europske unije, ali i kroz same metodološke pristupe projekta. Digitalne vještine nastavnika unapređuju se kroz

edukacije i radionice, čime se omogućava učinkovitija primjena digitalnih alata u obrazovnom procesu i bolja priprema učenika za digitalno tržište rada.

Ciljevi projekta *DIGI4Teach* su unaprijediti nastavne vještine kroz dijeljenje dobrih praksi, poticanje digitalizacije u odgojno-obrazovnim ustanovama te povećati zadovoljstvo učenika stečenim znanjima i vještinama za razvoj poduzetničkih ideja i lakšu integraciju na tržištu rada (*DIGI4Teach*, b.d.). Tijekom projekta provedena je analiza postojećih nastavnih alata i praksi, kao i razmjena ideja za razvoj novih inovativnih alata, uzimajući u obzir digitalizaciju u području strukovnog obrazovanja. Rezultati projekta objavljeni su u obliku priručnika koji sadrži rezultate istraživanja o primjeni digitalnih alata u poučavanju ekonomskih predmeta te studije slučaja iz područja računovodstva, financija, marketinga, turizma i trgovine za razvoj digitalnih vještina.

Tri akademije za stručno usavršavanje učitelja i nastavnika osnovane su u okviru programa *Erasmus+* 2022. godine s trogodišnjim trajanjem i primarnim fokusom na razvoj kompetencija za održivost. Program *EduSTA* podržava učitelje i nastavnike u stjecanju znanja i vještina za obrazovanje o održivom razvoju. Projekt *TAP-TS* usmjeren je na izradu, ispitivanje i validaciju nastavnih materijala povezanih s temama održivosti, namijenjenih školama i stručnom usavršavanju nastavnika. Projekt *CLIMADEMY* omogućava nastavnicima bolje razumijevanje uzroka i posljedica klimatskih promjena te identificira mogućnosti za njihovo ublažavanje (Europska komisija, Europski prostor obrazovanja, b.d.).

U Španjolskoj nastavnici imaju pristup specijaliziranom osposobljavanju i resursima za uvođenje tzv. "situacija učenja" u kurikule, čime se potiče rješavanje kompleksnih zadataka te razvoj kreativnog i kritičkog mišljenja kod učenika. Na podregionalnoj razini redovito se održavaju sastanci radi razmjene iskustava o implementaciji ekoškola, čime se nastoji kontinuirano unapređivati praksa kroz međusobno učenje (Europska komisija, Glavna uprava za obrazovanje, mlade, sport i kulturu, 2023b). U Hrvatskoj, status Ekoškole i Ekofakulteta trenutno ima 306 odgojno-obrazovnih ustanova, uključujući 87 dječjih vrtića, 170 osnovnih škola, 6 centara za odgoj i obrazovanje (COOR), 39 srednjih škola, 2 učenička doma i 2 visokoobrazovne ustanove (Udruga Lijepa Naša, 2024). S obzirom na to da je na području Republike Hrvatske na kraju školske godine 2022./2023. djelovala 441 srednja škola (Državni zavod za statistiku, 2024., 11. srpnja), status Ekoškole ima manje od 10% srednjih škola.

Zaključak

Od današnjih nastavnika očekuje se da budu nositelji promjena koji su osposobljeni za inovativne metode poučavanja koje integriraju digitalne tehnologije i principe održivosti. Njihova uloga u razvoju kompetencija potrebnih na dinamičnom tržištu rada, koje se sve više temelji na digitalnim inovacijama i očuvanju okoliša, zahtijeva kontinuiranu i sustavnu podršku obrazovnog sustava. Primjeri iz europskih zemalja, kao što su obvezni programi stručnog usavršavanja, pokazuju prednosti ulaganja u

kontinuiranu edukaciju nastavnika u razvoju vještina za zelenu i digitalnu tranziciju. Iako u Hrvatskoj postoje inicijative za stručno usavršavanje nastavnika putem *Agencije za strukovno obrazovanje i obrazovanje odraslih*, *CARNET-a*, platforme *EMA*, programa *ERASMUS+* i *ESF+*, vaučera *Hrvatskog zavoda za zapošljavanje* i drugih relevantnih subjekata, zelene kompetencije još uvijek nisu dostatno zastupljene.

Projekti *EUsolis* i *DIGI4Teach* uspješni su primjeri jačanja kompetencija nastavnika strukovnih predmeta za poučavanje digitalnih i zelenih vještina. Potrebno je provoditi više sličnih projekata koji promiču suradnju između visokoškolskih i srednjoškolskih ustanova, omogućujući sustavan razvoj kompetencija potrebnih za suočavanje s izazovima modernog društva.

Razvoj obrazovnih programa koji promiču održivost, jačaju praktične digitalne vještine i potiču uključivo obrazovanje osigurao bi nastavnicima alate potrebne za vođenje promjena u obrazovnom sustavu te za pripremu mladih generacija za izazove suvremenog društva i ekonomije. Daljnje unapređenje obrazovnih politika i inicijativa usmjerenih na jačanje digitalnih i zelenih kompetencija kod nastavnika strukovnih predmeta može doprinijeti stvaranju obrazovnog okruženja usklađenog s potrebama tržišta rada i strateškim ciljevima Europske unije.

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ISPITIVANJE UČENIČKOG RAZUMIJEVANJA EUROPSKIH TEMA POMOĆU DIGITALNIH ALATA ZA IZRADU SLIKA UTEMELJENIH NA UMJETNOJ INTELIGENCIJI

Ljiljana BLUM

Turističko-ugostiteljska i prehrambena škola Bjelovar
ljiljana.blum@skole.hr

Dunja VASIĆ

Turističko-ugostiteljska i prehrambena škola Bjelovar
dunjicav@gmail.com

Sažetak

Predmet/ishodište rada: Iako Europska unija posljednjih godina sve više uključuje mlade ljude u političko djelovanje, učenici hrvatskih strukovnih škola o europskim temama ne znaju puno. Prepoznavši problem, profesorice Ekonomskog fakulteta Sveučilišta u Zagrebu osmislile su i realizirale projekt Solidarna Europa za uključivo društvo (Solidary Europe for Inclusive Society, EUsolis) s ciljem unaprjeđivanje znanja i vještina srednjoškolskih nastavnika i djelatnika knjižnica o EU temama kako bi stečena znanja i vještine mogli prenijeti svojim učenicima. Aktivnosti projekta provodile su se u četiri modula: Mladi i aktivno društvo EU-a, Raznolikost, Solidarna Europa i Održivi gradovi.

Ciljevi: Cilj istraživanja je bio ispitati razumijevanje pojmova održivog grada i raznolikosti u skladu s vrijednostima Europske unije, istovremeno poticati učenike na korištenje digitalnih alata u svrhu jačanja digitalnih kompetencija te ih usmjeravati na kritičko promišljanje o dobivenim rezultatima.

Metodologija: Sukladno osnovnom cilju projekta, a na temelju priručnika projekta i stečenih znanja, učenicima Turističko-ugostiteljske i prehrambene škole Bjelovar prezentirani su osnovni pojmovi iz dvaju modula: Raznolikost i Održivi gradovi nakon čega su učenici razumijevanje prezentiranoga trebali prikazati u slikama koristeći alate umjetne inteligencije za stvaranje slika. Za potrebe ovoga rada korišteno je pet odabranih besplatnih i online AI alata u koje su učenici unosili pisane upute te stvorene slike stavljali na zajedničku platformu.

Rezultati: Analizom radova može se zaključiti da su učenici razumjeli prezentirane sadržaje istovremeno razvijajući digitalne vještine i kritičko promišljanje. Isto tako, zaključak je da pojam održivih gradova u najvećoj mjeri povezuju sa stanovanjem, zelenim površinama, prijevozom i aktivnostima koje se odnose na zaštitu okoliša dok raznolikosti najviše percipiraju kao dobne i rasne razlike, seksualnu orijentaciju te socio-ekonomski i zdravstveni status osoba.

Ključne riječi: raznolikost, održivi gradovi, umjetna inteligencija, digitalni alati

JEL klasifikacija: I290, I300, M14, O440

Uvod

Europska unija posljednjih godina sve više uključuje mlade u svoje političko djelovanje preko raznih programa poput Europske snage solidarnosti, projekata DiscoverEu, Erasmus+ i sl. Iako je Republika Hrvatska punopravna članica Europske unije od 2013. godine, postojeća istraživanja pokazuju da učenici hrvatskih strukovnih škola ne znaju puno o prednostima i mogućnostima koje EU pruža mladima.

Projekt Solidarna Europa za uključivo društvo (Solidary Europe for Inclusive Society, EUsolis), koji su osmislile i realizirale profesorice s Ekonomskog fakulteta Sveučilišta u Zagrebu, upravo ima za cilj unaprijediti znanja i vještine srednjoškolskih nastavnika i knjižničara, koje će oni koristiti u poučavanju učenika o mogućnostima koje mladima pružaju programi EU-a.

Sam projekt se sastojao od četiri modula: Mladi i aktivno društvo EU, Raznolikost, Solidarna Europa i Održivi gradovi. Učenicima Turističko-ugostiteljske i prehrambene škole Bjelovar, škole koja je također sudjelovala u projektu, prezentirana su dva modula: Raznolikost i Održivi gradovi.

Moto EU-a je „Ujedinjeni u različitosti“, što bi značilo da ljudi različite dobi, porijekla, rase, spola, osobnih karakteristika grade suživot zajedno.

Zbog činjenice da se vršnjačko nasilje događa u srednjim školama i u lokalnoj zajednici, važno je aktivno promovirati prihvaćanje svih vrsta različitosti i upoznati učenike s ovim modulom te ih općenito informirati o zaštiti ljudskih prava (Ustav RH, članak 14).

Pojam „održivi razvoj“ i „održivi gradovi“ su posebno aktualni u posljednje vrijeme jer su povezani s ekološkom, društvenim i gospodarskim područjem. Klimatske promjene su sve jače i utječu na život stanovnika u raznim oblicima. Europska komisija je prema Programu Ujedinjenih naroda do 2030. (Ujedinjeni narodi, 2015) uvrstila Zeleni plan kao dio strategije za provedbu ovog Programa kako bi provela ciljeve održivog razvoja (Europska komisija, 2019).

Stoga je jako bitno upoznati mlade srednjoškolskog uzrasta s pojmom i važnosti održivog razvoja i održivih gradova kako bi odmah i u budućnosti mogli sudjelovati u ostvarivanju spomenutih ciljeva.

Budući da je Parlament donio Rezoluciju o novoj europskoj strategiji za bolji internet za djecu (BIK+) (2024., 11. svibnja) u kojoj je naglašena važnost digitalnog obrazovanja, potaknuli smo učenike da uz pomoć različitih digitalnih alata, uključujući i umjetnu inteligenciju, pokažu razumijevanje prezentiranog sadržaja iz ove dvije teme u kontekstu svoje lokalne zajednice, ali i globalno.

Metodologija

Cilj istraživanja bio je provjeriti učeničko razumijevanje pojmova održivog grada i različitosti među ljudima, a u skladu s vrijednostima Europske unije. Dodatni ciljevi su bili unaprijediti digitalne vještine učenika korištenjem digitalnih alata temeljenih na umjetnoj inteligenciji i navesti ih da kritično promišljaju o dobivenim uradcima.

Istraživanje u okviru teme Održivi gradovi je provedeno na uzorku od 70 učenika Turističko- ugostiteljske i prehrambene škole Bjelovar (44 učenika trogodišnjih programa i 26 četverogodišnjih programa).

Uzorak u istraživanju teme Raznolikosti obuhvatio je 49 učenika Turističko- ugostiteljske i prehrambene škole Bjelovar (22 učenika trogodišnjih programa i 27 učenika četverogodišnjih programa).

U Tablici 1 prikazan je broj učenika koji su sudjelovali u istraživanju, po temi i po duljini programa koji pohađaju.

Tablica 1: Broj učenika u istraživanju Ispitivanje učeničkog razumijevanja europskih tema pomoću digitalnih alata za izradu slika utemeljenih na umjetnoj inteligenciji

Tema	Trogodišnji programi	Četverogodišnji programi	Ukupan broj učenika
Održivi gradovi	44	26	70
Raznolikosti	22	27	49

Izvor: Izrada autorica

Prikupljanje podataka za ovo istraživanje provedeno je korištenjem digitalnih alata, i to alata koji pomoću umjetne inteligencije, a na temelju pisanih uputa učenika, stvaraju slike na zadane teme. Generirane slike učenici su predstavili na zajedničkoj platformi.

Korišteni alati za stvaranje slika iz teksta bili su <https://hotpot.ai/art-generator>, <https://replicate.com/>, <https://pollinations.ai/>, <https://diffusionart.co/> i <https://app.prodia.com/> dok je platforma za prikaz učeničkih radova bila <https://wakelet.com/>. Svi korišteni digitalni alati bili su dostupni online i besplatni te se za njih učenici nisu morali registrirati.

Učenički radovi nalaze se na poveznicama

https://wakelet.com/@ODRZIVI_GRADOVI i <https://wakelet.com/@RAZLICITOSTI>.

Pri provedbi istraživanja poštivane su etičke smjernice o upotrebi umjetne inteligencije u obrazovanju. Etičke smjernice je objavila Europska komisija u publikaciji pod nazivom Etičke smjernice namijenjene nastavnom osoblju za upotrebu umjetne inteligencije i podataka u poučavanju i učenju (Europska komisija, 2020). Spomenute su smjernice dio Akcijskog plana za digitalno obrazovanje (2021.-2027.), političke inicijative Europske unije za potporu sustavima obrazovanja. Njihova je uloga pomoći nastavnicima u razumijevanju potencijala primjene umjetne inteligencije u

obrazovanju kako bi ih mogli iskoristiti u najvećoj mjeri uz istovremeno razumijevanje rizika i izbjegavanje štetnih posljedica.

Održivi gradovi

Jedanaesti od sedamnaest ciljeva održivog razvoja, Održivi gradovi, u sinergiji sa svojim podciljevima (UN, 2015) odnosi se na aktivnosti koje bi gradove učinile uključivima, sigurnima, prilagodljivima i održivima. Takve aktivnosti podrazumijevaju postizanje ravnoteže između ekonomskih, društvenih i ekoloških zahtjeva bez ugroze za budućnost stanovništva. Podciljevi koji se navode jesu pristup odgovarajućem, sigurnom i jeftinom smještaju, pristup sigurnom i održivom transportnom sustavu uz prilagodbu prema ranjivim kategorijama stanovnika, održivo planiranje naselja i upravljanje njima, očuvanje svjetske kulturne i prirodne baštine, smanjiti nejednakosti i broj ugroženih osoba, smanjiti negativan utjecaj gradova na okoliš (gospodarenje otpadom), pristup zelenim i javnim površinama osobito za ranjive skupine društva.

Održivi grad je onaj u kojem ima dovoljno mjesta za stanovanje, u kojem je moguće javnim prijevozom ili biciklom sigurno doći na posao, gdje su parkovi dobro raspoređeni između zgrada i poslovnih prostora te svi ljudi imaju nesmetan pristup javnim ustanovama i prostorima. U njemu su dostupne i kulturne, društvene i druge usluge te je takav grad prilagodljiv i otporan na klimatske promjene, a ljudi različitih struka rade zajedno za boljitak zajednice (Romanelli, 2017).

Učenici su dobili zadatak da, na temelju dobivenih informacija i kratke rasprave te ove definicije održivog grada kao polazišne točke, prema pisanim uputama generiraju slike održivih gradova u alatima umjetne inteligencije te ih postavljaju na zajedničku platformu.

Raznolikosti

Predrasude, stereotipi i diskriminacija kao prijetnje različitostima po bilo kojoj osnovi, problem su u svim društvima, pa tako i u hrvatskom. Kako bi se utjecaj tih pojava umanjio ili spriječio, Europska unija svojim motom Ujedinjeni u raznolikosti promiče poštivanje razlika među ljudima te stvaranje okruženja za ravnopravan suživot u svim područjima privatnog i poslovnog života.

Razlike se najčešće dijele na površinske i dubinske. Površinske razlike su vidljive, a odnose se na spol, dob, rasu, etnicitet te fizičke i neuro karakteristike. Dubinske se, naočigled nevidljive, razlike odnose na stavove i vrijednosti, nacionalnost, seksualnu orijentaciju, vjeroispovijest, socio-ekonomski status, lokaciju, jezik, zdravstveni status, bračni status te političku pripadnost.

Učenici su dobili zadatak da, na temelju dobivenih informacija i kratke rasprave te ove podjele različitosti kao polazišne točke, prema pisanim uputama generiraju slike u alatima umjetne inteligencije te ih postavljaju na zajedničku platformu.

Rezultati

Održivi gradovi

Na temu Održivi gradovi učenici su u predloženim digitalnim alatima stvorili 595 slika što po učeniku iznosi 8,5 slika (učenici trogodišnjih programa stvorili su prosječno 8,09 slika a učenici četverogodišnjih 9,19 slika).

Predložena obilježja održivog grada su bila: dovoljno mjesta za stanovanje, gospodarske djelatnosti, prijevoz do radnog mjesta (javnim prijevozom, biciklom, pješice), zelene i rekreacijske površine, jednaka dostupnost javnim uslugama (obrazovanje, zdravstvene usluge), obilježja vezana za okoliš (gospodarenje otpadom, zelene energije, čišćenje i održavanje javnih površina, prosvjedi u vezi s klimatskim promjenama), smanjenje nejednakosti (siromaštvo, invaliditet i potpora jednakosti među ljudima) te dostupnost hrane i pitke vode.

Slike su analizirane u suradnji s učenicima a sukladno s definicijom održivog grada i podciljevima jedanaestog cilja održivog razvoja Ujedinjenih naroda.

U Tablici 2 prikazan je broj stvorenih slika po jednom ili po dva obilježja te broj slika koje se nisu mogle povezati ni s jednim od obilježja održivog grada.

Tablica 2: Broj stvorenih slika po broju obilježja održivog grada

	Broj slika	%
Jedno obilježje održivog grada	471	79,16%
Dva obilježja održivog grada	91	15,29%
Bez obilježja održivog grada	33	5,55%
	595	

Izvor: Izrada autorica

Detaljniji prikaz analize slika prema obilježjima održivog rada nalazi se u Tablici 3.

Tablica 3: Broj stvorenih slika prema obilježjima održivog grada

Obilježja održivog grada			Broj slika	%
Jedno obilježje	Stanovanje		63	10,59%
	Gospodarstvo		15	2,52%
	Prijevoz	Bicikli	44	7,39%
		Javni prijevoz	25	4,20%
		Pješaci	20	3,36%
	Površine	Zelene površine, parkovi	113	18,99%
		Rekreacijske	7	1,18%
	Jednaka dostupnost javnim uslugama	Obrazovanje	11	1,85%
		Zdravlje	14	2,35%

Obilježja održivog grada			Broj slika	%
	Okoliš	Gospodarenje otpadom	25	4,20%
		Zelene energije	34	5,71%
		Čišćenje javnih površina	9	1,51%
		Prosvjedi	8	1,34%
	Smanjenje nejednakosti	Siromaštvo	19	3,19%
		Invaliditet	15	2,52%
		Jednakost među ljudima	13	2,18%
	Dostupnost	Hrana	21	3,53%
		Pitka voda	15	2,52%
Dva obilježja	Zelene površine, invaliditet		11	1,85%
	Rekreacijske površine, invaliditet		5	0,84%
	Zelene površine, čišćenje		2	0,34%
	Zelene površine, stanovanje		60	10,08%
	Zelene površine, bicikli		11	1,85%
	Javni prijevoz, invaliditet		2	0,34%
Ne može se dovesti u vezu ni s jednim od navedenih obilježja			33	5,55%

Izvor: Izrada autorica

Najčešća odabrana obilježja održivog grada na stvorenim slikama odnosila su se na zelene površine, stanovanje, prijevoz i obilježja vezana uz očuvanje okoliša. Učenici su zelene i rekreacijske površine kao motiv na slikama održivih gradova samostalno koristili 120 puta i 89 puta u kombinaciji s nekim drugim obilježjem održivog grada. Motivi vezani uz dostatnost mjesta za stanovanje pojavljuju se samostalno na 63 slike i na 60 slika u kombinaciji s motivima zelenih površina. Prijevoz u održivim gradovima bio je prikazan na 89 slika i na dvije slike u kombinaciji. Na 76 slika su bila prikazana obilježja održivih gradova vezana za očuvanje okoliša, i to pretežito s motivima zelenih energija (34 slike) te gospodarenja otpadom (25 slika).

Nešto je manje slika bilo stvoreno s obilježjima smanjivanja nejednakosti među ljudima (47 slika samostalno i 18 u kombinaciji s nekim drugim obilježjem). Najmanje zastupljena obilježja bila su vezana uz gospodarske djelatnosti (15 slika) te jednake dostupnosti javnim uslugama (25 slika), hrani i pitkoj vodi (36 slika).

33 slike nisu se mogle dovesti u vezu ni s jednim obilježjem održivog grada.

Učenici trogodišnjih programa stvorili su na temu Održivih gradova 356 slika (8,09 po učeniku) a učenici četverogodišnjih 239 slika (9,19 po učeniku) što je prikazano u Tablici 4.

Tablica 4: Broj stvorenih slika održivog grada prema programu obrazovanja

	Trogodišnji programi	Četverogodišnji programi	Ukupan broj učenika
Broj učenika	44	26	70
Broj slika	356	239	595
Prosječan broj slika po učeniku	8,09	9,19	8,5

Izvor: Izrada autorica

Raznolikosti

Na temu Raznolikosti učenici su u predloženim digitalnim alatima stvorili 321 sliku (6,55 slika po učeniku).

Učenicima su prezentirane površinske razlike (spol, dob i generacije, rasa, etnicitet, fizičke razlike i neuro-karakteristike pojedinaca) te dubinske (stavovi i vrijednosti, nacionalnost, seksualna orijentacija, vjeroispovijest, socio-ekonomski status, lokacija, jezik, zdravstveni status, bračni status i politička pripadnost).

Slike su analizirane u suradnji s učenicima a sukladno s osnovnom podjelom različitosti na površinsku i dubinsku.

U Tablici 5 prikazan je broj stvorenih slika po jednom ili po dva obilježja te broj slika koje se nisu mogle povezati ni s jednom od razlika.

Tablica 5: Broj stvorenih slika prema vrsti i broju razlika

Razlike	Broj slika	%
Površinske	152	47,35%
Dubinske	132	41,12%
Dvije razlike	23	7,17%
Bez povezanosti	14	4,36%
	321	100,00%

Izvor: Izrada autorica

Detaljniji prikaz analize slika prema vrsti različitosti nalazi se u Tablici 6.

Tablica 6: Broj stvorenih slika prema vrsti različitosti

Različitosti		Broj slika	%
POVRŠINSKE	Spol	7	2,18%
	Dob i generacije	59	18,38%
	Rasa	53	16,51%
	Etnicitet	13	4,05%
	Fizičke i neuro karakteristike	20	6,23%
DUBINSKE	Stavovi i vrijednosti	13	4,05%
	Nacionalnost	9	2,80%
	Seksualna orijentacija	38	11,84%
	Vjeroispovijest	9	2,80%
	Socio-ekonomski status	32	9,97%
	Lokacija	0	0,00%
	Jezik	0	0,00%
	Zdravstveni status	18	5,61%
	Bračni status	4	1,25%
	Politička pripadnost	9	2,80%
Rasa, spol		12	3,74%
Zdravstveni status, dob		8	2,49%
Rasa, dob		2	0,62%
Zdravstveni status, rasa		1	0,31%
Ne može se dovesti u vezu ni s jednom od različitosti		14	4,36%

Izvor: Izrada autorica

Od ukupnog broja stvorenih slika s jednim obilježjem na temu Raznolikosti, 152 slike su prikazivale površinske a 132 slike dubinske razlike.

Najčešće površinske razlike koje su učenici primjenjivali u stvaranju slika odnosile su se na dob (59 slika) i na rasu (53 slike). Od dubinskih razlika, najzastupljenije su bile slike s motivima seksualne orijentacije (38 slika), socio-ekonomskog (32 slike) i zdravstvenog statusa (18 slika). Razlike vezane za lokaciju i jezik nisu se našle ni na jednoj slici.

Učenici trogodišnjih programa stvorili su na temu Raznolikosti 127 slika (5,77 po učeniku) a učenici četverogodišnjih 194 slike (7,18 po učeniku) što je prikazano u Tablici 7.

Tablica 7: Broj stvorenih slika na temu Raznolikosti prema programu obrazovanja

	Trogodišnji programi	Četverogodišnji programi	Ukupan broj učenika
Broj učenika	22	27	49
Broj slika	127	194	321
Prosječan broj slika po učeniku	5,77	7,18	6,55

Izvor: Izrada autorica

Rasprava i zaključak

Može se zaključiti da su učenici dobro razumjeli teme koje smo obrađivali i naučeno korektno primijenili na zadanu aktivnost. Usporedbom prosječnog broja stvorenih slika po učeniku, (8,5 na temu Održivi gradovi i 6,55 na temu Raznolikosti) moguće je zaključiti da im je zanimljivija (ili bliskija) bila tema vezana uz održive gradove. Isto tako, a prema broju stvorenih slika, može se zaključiti da je motivacija za obavljanje zadatka na zadane teme bila zadovoljavajuća. Ipak, bitno je istaknuti da su učenici trogodišnjih programa na teme Održivi gradovi i Raznolikosti izradili u prosjeku manje slika od učenika četverogodišnjih programa. Tako su na temu Održivi gradovi učenici trogodišnjih programa izradili prosječno 8,09 slika, a učenici četverogodišnjih programa 9,19 slika dok su na temu Raznolikosti učenici trogodišnjih programa izradili prosječno 5,77, a učenici četverogodišnjih programa 7,18 slika.

Kako se iz navedenih rezultata može vidjeti da su najčešći motivi slika na temu održivih gradova bili stanovanje, prijevoz, zelene površine i okoliš, to se može zaključiti da spomenuti motivi predstavljaju najčešću učeničku percepciju održivog grada. Nasuprot tome, učenici mogu slabije osvijestiti pojam održivih gradova kao onih u kojima su javne usluge svima jednako dostupne i onih koji zagovaraju smanjenje nejednakosti među svojim stanovnicima te onih koji im omogućuju jednaku dostupnost hrane i pitke vode.

Na temu Raznolikosti učenici su najviše su stvarali slike u kojima su od površinskih razlika najčešće prikazane dobne i rasne razlike. Od dubinskih razlika na slikama se značajno ističu razlike u seksualnoj orijentaciji i zdravstvenom statusu.

Razlike koje se odnose na lokaciju i jezik nisu bile zastupljene ni na jednoj slici prema čemu se može pretpostaviti da učeničke upute digitalnom alatu nisu bile dovoljno jasno napisane ili da su učenici namjerno ili slučajno izostavili spomenute razlike.

Alati koji su se koristili za stvaranje slika bili su jednostavni i besplatni online alati koji nisu zahtijevali registraciju od učenika. Što zbog jednostavnosti alata, što zbog nedovoljno jasnih i preciznih uputa ali i neozbiljnosti učenika, neke slike nisu dale željeni rezultat. Tako su na temu Održivih gradova nastale 33 slike (5,55% od ukupnog broja) a na temu Raznolikosti nastalo je 14 slika (4,36% od ukupnog broja) koje se nisu mogle povezati ni s jednim obilježjem zadane teme. Isto tako, bilo je slika s izobličanim ljudima te nelogičnostima koje su učenici sa zanimanjem naglas komentirali. Objašnjeno im je da su to manjkavosti umjetne inteligencije koja ne

razumije emocije niti društvene odnose, koja je pristrana i koja se može zloupotrebljavati i neetično koristiti. Uz nedostatke istaknute su im i prednosti stvaranja slika alatima umjetne inteligencije kao što su brzina, jednostavnost, kreativnost, inovativnost, interaktivnost, ekonomičnost i sl.

Na temelju iznesenih podataka može se zaključiti da je cilj ispitivanja razumijevanja europskih tema iz domena Raznolikosti i Održivi gradovi postignut i to na način koji je učenicima bio zanimljiv. Korištenje digitalnih alata utemeljenih na umjetnoj inteligenciji bilo im je nešto novo a obavljanje zadataka nisu shvaćali kao provjeru znanja. Dobiveni rezultati potvrdili su razumijevanje tema, a učenici su usto razvijali svoje digitalne vještine a i kritički komentirali vlastite i uratke drugih učenika.

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STAVOVI UČENIKA SREDNJE ŠKOLE NOVI MAROF O TEMELJNIM VRIJEDNOSTIMA EUROPSKE UNIJE

Ines KLOPOTAN
Srednja škola Novi Marof
ines.klopotan@skole.hr

Danica KRBOT
Srednja škola Novi Marof
danica.krbot@skole.hr

Anita POJE
Srednja škola Novi Marof
anita.poje@skole.hr

Sažetak

Predmet/ishodište rada: *Ishodište ovog rada temelji se na pretpostavci da učenici Srednje škole Novi Marof tek djelomično poznaju temeljne vrijednosti Europske unije, da nisu dovoljno upoznati s istima te da se temeljne vrijednosti EU nedovoljno promoviraju od strane EU i Škole pa stoga postoji potreba da se sadržaji i aktivnosti o temeljnim vrijednostima EU integriraju kao izvannastavna, izborna/fakultativna nastavu u kurikulum Srednje škole Novi Marof.*

Ciljevi: *Istražiti razinu razumijevanja temeljnih vrijednosti Europske unije među učenicima Srednje škole Novi Marof, procijeniti važnost temeljnih vrijednosti u društvu iz perspektive učenika, analizirati percepciju uspješnosti EU-a u promicanju temeljnih vrijednosti putem medija i digitalnih platformi, ispitati ulogu školskog programa u informiranju i edukaciji o temeljnim vrijednostima, procijeniti koliko Škola uspješno potiče iste među učenicima, ispitati koliko su učenici motivirani za uključivanje u programe usmjerene na temeljne vrijednosti te njihovu spremnost da doprinesu jačanju svijesti o njima u okruženju.*

Metodologija: *Kao instrument istraživanja koristio se e-anketni upitnik s 20 pitanja. Istraživanje je provedeno tijekom rujna 2024. putem mobilnih telefona uz prisutnost istraživača i odabranog profesora u Srednjoj školi Novi Marof. U istraživanju je sudjelovalo 100 ispitanika, 63 učenika smjera ekonomist (63%) i 37 učenika smjera opća gimnazija (37%).*

Rezultati: *Postoji potreba integracije dodatnih sadržaja o EU vrijednostima u kurikulum škole kroz izvannastavne aktivnosti, izbornu ili fakultativnu nastavu kako bi se poboljšalo znanje i motivacija učenika za sudjelovanje u promicanju istih.*

Ključne riječi: *temeljne vrijednosti Europske unije, stavovi učenika, Srednja škola Novi Marof*

JEL klasifikacija: F5, I21, I28

Uvod

Ovaj rad ispituje stavove učenika Srednje škole Novi Marof o temeljnim vrijednostima Europske unije. Tema je Školi važna zbog utvrđivanja potrebe za ugrađivanjem ove teme u formi izvannastavne aktivnosti i/ili fakultativnog predmeta u kurikulum Škole, a sve kako bi učenike poučavali o temeljnim vrijednostima EU i potaknuli ih da njeguju te vrijednosti i promiču ih u Školi i zajednici te da tako postanu aktivni europski građani.

Naglasak istraživanja je stavljen na analizu navedenoga prema smjeru ekonomist i opća gimnazija. S obzirom da je istraživanje provedeno početkom školske godine 2024./2025., posebno su analizirani stavovi učenika 2. i 4. razreda navedenih smjerova za pitanja koja su definirana kao ključna: informira li ih i educira školski program dovoljno o temeljnim vrijednostima te radi li škola dovoljno na poštivanju temeljnih vrijednosti kod učenika.

Ljudsko dostojanstvo, sloboda, demokracija, jednakost, vladavina prava i poštivanje ljudskih prava, uključujući prava pripadnika manjina, zajedničke su i temeljne vrijednosti država članica Europske unije. Vrijednosti EU-a utvrđene su u članku 2. Ugovora iz Lisabona i Povelji EU-a o temeljnim pravima (Europska unija). Navedene temeljne vrijednosti EU sadržane su i u Ustavu Republike Hrvatske.

Iz članka 3. Ugovora o Europskoj uniji proizlazi da je cilj Europske unije podržavati i promicati svoje vrijednosti. U Pariškoj deklaraciji, koju su 2015. godine donijeli europski ministri obrazovanja, utvrđena je između ostalog i predanost država članica promicanju zajedničkih vrijednosti. Dana 22. svibnja 2018. godine Vijeće Europske unije donosi Preporuke Vijeća Europske unije o zajedničkim vrijednostima, uključivom obrazovanju i europskoj dimenziji poučavanja čija je svrha kod građana pobuditi osjećaj pripadnosti školi, zajednici, zemlji i europskoj obitelji prenošenjem zajedničkih vrijednosti osiguravanjem uključivog obrazovanja te poučavanjem o Europi i njezinim državama članicama. U navedenim Preporukama je, između ostalog, istaknuto da obrazovanje na svim razinama i od najranije dobi ima ključnu ulogu u promicanju zajedničkih vrijednosti, da se obrazovanjem građanima pruža mogućnost da postanu aktivni i kritički osviješteni te se produbljuje razumijevanje europskog identiteta. Povelja Vijeća Europe o obrazovanju za demokratsko građanstvo i ljudska prava iz 2010. godine navodi da obrazovanje ima važnu ulogu u promociji ključnih vrijednosti Vijeća Europe: demokracije, ljudskih prava i vladavine prava te u sprječavanju kršenja ljudskih prava.

Srednja škola Novi Marof najmlađa je javna srednjoškolska ustanova Varaždinske županije. Škola djeluje od 2013. godine i danas broji 147 učenika u tri obrazovna programa: opća gimnazija, ekonomist i tehničar za računalstvo. U strukovnom kurikulumu za stjecanje kvalifikacije ekonomist iz 2017. godine sadržaji o Europskoj uniji svode se na nastavne predmete povijest, geografiju i ekonomiju, a u nastavnom planu za program opće gimnazije iz 2019. godine na geografiju, povijest te politiku i gospodarstvo. Ministarstvo znanosti i obrazovanja 2019. godine donijelo je kurikulum međupredmetne teme Građanski odgoj i obrazovanje za osnovne i srednje škole u

Republici Hrvatskoj. Građanski odgoj kao međupredmetna tema, između ostalog, obuhvaća ljudska prava, obilježja demokratske zajednice, razvoj temeljnih vrijednosti poput slobode, jednakosti i etičnosti te razvoj vještina kritičkog mišljenja. Iz navedenog proizlazi da postoji potreba i treba stvoriti prostor za promicanje i podučavanje sadržaja o Europskoj uniji u školama, a time i sadržaja koji se odnose na temeljne europske vrijednosti.

Dosadašnja istraživanja o vrijednostima Europske unije istražuju stavove o odabranim europskim vrijednostima, odnosno onim vrijednostima koje autori drže bitnima ili pak istražuju o vrijednostima općenito, a najčešće se ispituju stavovi nastavnika. Piršl i Vican ispitivale su 2004. stavove srednjoškolaca, njihovih roditelja i učitelja o europskim vrijednostima s obzirom na spol, dob, vrstu srednje škole, školsku spremu roditelja, regionalnu i nacionalnu pripadnost ispitanika. Međutim, i ovo istraživanje ispituje stavove o odabranim (demokratskim) vrijednostima.

Teme o vrijednostima Europske unije ne mogu se u cijelosti uklopiti u redovne nastavne predmete u Srednjoj školi Novi Marof, već kao izvannastavne aktivnosti, izborna ili fakultativna nastava. Poučavanje i promicanje europskih vrijednosti dodatni je zahtjev Školi i nastavnicima jer je važno osmisliti aktivnosti koje će biti bliske i uvjerljive srednjoškolcima.

Razrada

U radu je korištena primarna kvantitativna metoda te su rezultati istraživanja prikupljeni e-anketnim upitnikom (Microsoft Forms) s 20 pitanja zatvorenog tipa i skala Likertovog tipa. Anketa je elektroničkim putem poslana učenicima. Istraživanje je provedeno tijekom rujna 2024. godine putem mobilnih telefona uz prisutnost istraživača i odabranog profesora u Srednjoj školi Novi Marof. Cilj istraživanja je utvrditi stavove ispitanika o temeljnim vrijednostima EU i ispitati interes za učenje o tim vrijednostima i uključivanje u promicanje istih u okruženju.

Tablica 1: Karakteristike ispitanika u uzorku

Karakteristike ispitanika		Broj učenika	Postotak
Spol	Muški	18	18
	Ženski	82	82
Dob	14 – 15	39	39
	16 – 17	46	46
	18 -19	15	15
Razred	1.	30	30
	2.	22	22
	3.	27	27
	4.	21	21
Smjer	Opća gimnazija	37	37
	Ekonomist	63	63

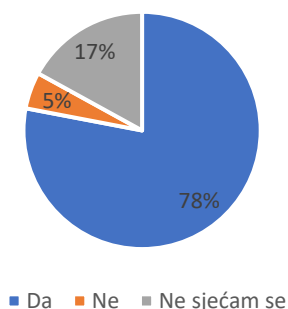
Izvor: Izrada autora

U istraživanju je sudjelovalo 100 ispitanika, 18 učenika (18,00%) i 82 učenice (82,00%). Anketni upitnik bio je namijenjen trima dobnim skupinama. U anketi je zastupljeno

39,00% učenika starosti od 14 do 15 godina, 46,00% učenika starosti 16 do 17 godina, a najmanji udio zastupljenih, 15,00% čine učenici od 18 do 19 godina.

Anketirano je 30 učenika prvog razreda (30,00%), 22 učenika drugog razreda (22,00%), 27 učenika trećeg razreda (27,00%) i 21 učenik četvrtog razreda (21,00%). Anketom je obuhvaćeno više učenika smjera ekonomist, njih 63 što čini 63,00%. Anketu je ispunilo 37 učenika smjera opća gimnazija (37,00%).

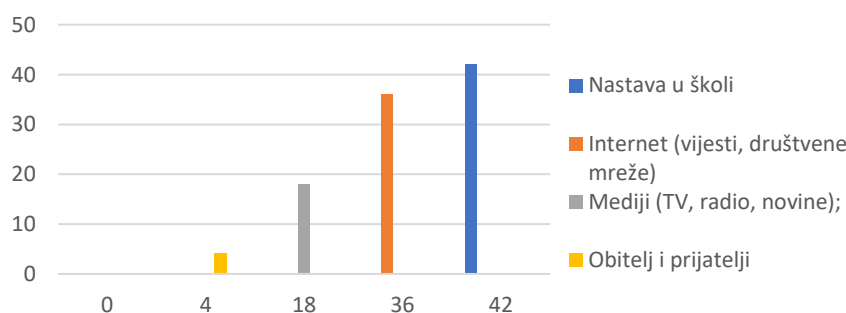
Grafikon 1: Jesi li učio/la o Europskoj uniji u školi?



Izvor: Izrada autora

Najveći dio učenika, njih 78 ukupno (78,00%) izjašnjava se da je učio/la o EU u školi. 17 ispitanih učenika (17,00%) se ne sjeća je li učio/la, a tek 5,00% učenika tvrdi da nije učio/la o EU i u školi. 12 učenika, odnosno 40,00% prvih razreda tvrdi da se ne sjeća ili da nije učilo u školi o EU. Gotovo svi učenici 4. razreda, njih ukupno 20 (95,24%) tvrdi da su o EU učili u školi.

Grafikon 2: Iz kojih izvora dobivaš najviše informacija o Europskoj uniji?



Izvor: Izrada autora

Najviše je učenika (42,00%) kao prvi izvor informacija o EU označilo nastavu u školi. Internet (vijesti, društvene mreže) kao prvi izvor informacija o EU istaknulo je 36,00% učenika, a medije (TV, radio, novine) kao prvi izvor informacija koristi 18,00% učenika. Samo 4,00% učenika najviše informacija dobiva unutar obitelji i prijatelja dok niti jedan učenik kao prvi izvor ne ističe projekte i razmjene. Učenici prvih razreda (46,67%) češće koriste internet za informacije, učenici viših razreda u većem postotku navode školu kao primarni izvor znanja (48,57%).

Za analizu podataka iz tablica br. 2. - 7. koristit će se podaci dobiveni anketnim

upitnikom, prilagođenom Likertovom skalom radi bolje preglednosti podataka u tablici (uopće/uglavnom se ne slažem; niti se slažem, niti se ne slažem; uglavnom/u potpunosti se slažem).

Tablica 2: Stavovi učenika o jednakosti kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uopće/Uglavnom se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom/U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam jednakosti u kontekstu EU	5	5,00%	30	30,00%	65	65,00%
Jednakost u društvu mi je vrlo važna	3	3,00%	11	31,00%	86	86,00%
EU uspješno promiče jednakost putem medija, interneta i društvenih mreža	11	11,00%	49	49,00%	40	40,00%
Školski program dovoljno me informira i educira o jednakosti	10	10,00%	37	37,00%	53	53,00%
Škola potiče jednakost među učenicima	10	10,00%	22	22,00%	68	68,00%

Izvor: Izrada autora

Iz tablice 2. vidljivo je da 65,00% učenika tvrdi da dobro razumije pojam jednakosti. 86,00% učenika tvrdi da im je jednakost u društvu vrlo važna, što ukazuje na visoku razinu svijesti o ovoj vrijednosti. Ali čak 49,00% učenika nije sigurno da EU uspješno promiče jednakost. 53,00% učenika tvrdi da ih školski program dovoljno informira i educira o jednakost, dok 68,00% učenika smatra da škola potiče istu među učenicima.

Prilikom izračunavanja moda i aritmetičke sredine kod svih proučavanih temeljnih vrijednosti u nastavku rada, a radi boljeg razumijevanja korišteni su dobiveni originalni podaci koji Likertovom skalom na sljedeći način prikazuju: 1 označava da se učenici ne slažu, 2 da se uglavnom ne slažu, 3 da se niti slažu niti ne slažu, 4 da se uglavnom slažu i 5 da se u potpunosti slažu s navedenom tvrdnjom u upitniku.

Najčešći stavovi u vezi razumijevanja pojma jednakosti su sljedeći: većina (52 učenika) smatra da uglavnom dobro razumiju ovaj koncept, a 55 učenika ističe da im je jednakost u društvu vrlo važna. Učenici nisu sigurni da EU uspješno promiče jednakost putem medija (49 učenika). Školski program učenike uglavnom dovoljno informira i educira o jednakosti (40 učenika) te škola uglavnom dovoljno potiče jednakost među učenicima (40 učenika).

Prosječni stav učenika ukazuje na to da uglavnom dobro razumiju pojam jednakosti (3,73), da ih školski program adekvatno informira i educira o jednakosti (3,54), da škola potiče jednakost među njima (3,84) i da je jednakost u društvu vrlo važna

(4,37). Međutim, nisu sigurni da EU uspješno promiče jednakost (3,33).

Prosječno odstupanje od aritmetičke sredine kod stavova učenika o tome koliko dobro poznaju pojam jednakosti je 0,75, od stava koliko je učenicima jednakost u društvu bitna 0,83, koliko uspješno EU promiče jednakost 0,84, da ih školski program dovoljno informira i educira o jednakosti 0,90 te da škola potiče jednakost među učenicima za 1,00. Manje prosječno odstupanje od aritmetičke sredine kod poznavanja pojma jednakosti sugerira veću suglasnost među učenicima, a veća odstupanja u ostalim pitanjima ukazuju na raznolike stavove i percepcije učenika, posebno u pogledu učinkovitosti EU i poticanja jednakosti u školi.

Tablica 3: Stavovi učenika o ljudskim pravima kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uopće/Uglavnom se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom/U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam ljudskih prava u kontekstu EU	4	4,00%	20	20,00%	76	76,00%
Poštivanje ljudskih prava smatram vrlo važnim	2	2,00%	8	8,00%	90	90,00%
EU uspješno promiče ljudska prava putem medija, interneta i društvenih mreža	20	20,00%	44	44,00%	36	36,00%
Školski program dovoljno me informira i educira o ljudskim pravima	7	7,00%	28	28,00%	65	65,00%
Škola dovoljno radi na zaštiti ljudskih prava među učenicima	5	5,00%	29	29,00%	66	66,00%

Izvor: Izrada autora

Iz tablice 3. vidljivo je da 76,00% učenika tvrdi da dobro razumije pojam ljudskih prava. 90,00% učenika tvrdi da im je poštivanje ljudskih prava vrlo važno. Njih 44,00% nije sigurno da EU uspješno promiče ljudska prava. 65,00% učenika tvrdi da ih školski program dovoljno informira i educira o ljudskim pravima dok 66,00% učenika smatra da škola dovoljno radi na zaštiti ljudskih prava među učenicima.

Analizom moda i aritmetičke sredine podataka iz ankete o stavovima učenika o ljudskim pravima proizlazi da je najčešći stav koji učenici zauzimaju oko razumijevanja ovog pojma da uglavnom dobro razumiju pojam (52 učenika) te da im je poštivanje ljudskih prava vrlo važno (71 učenik). Školski program ih uglavnom dovoljno informira i educira (45 učenika) te škola uglavnom dovoljno potiče ljudska prava među učenicima (42 učenika). Međutim, 44 učenika izražava da nisu sigurni u pogledu uspješnosti EU u promicanju ljudskih prava putem medija.

Prosječni stav učenika oko ljudskih prava u društvu je da uglavnom dobro razumiju pojam ljudskih prava (3,96), školski program dovoljno ih informira i educira o ljudskim pravima (3,77), škola dovoljno radi na zaštiti ljudskih prava među učenicima (3,84) te je poštivanje ljudskih prava u društvu vrlo važno (4,59). Stav učenika prema tvrdnji da EU uspješno promiče ljudska prava u društvu je neutralan (3,18).

Prosječno odstupanje od aritmetičke sredine kod stavova učenika o tome koliko dobro poznaju pojam ljudskih prava je 0,78, od stava koliko su učenicima ljudska prava važna 0,73, koliko uspješno EU promiče ljudska prava 0,88, školski program ih dovoljno informira i educira o ljudskim pravima 0,87 te Škola dovoljno radi na zaštiti ljudskih prava među učenicima 0,87. Iako učenici u velikoj mjeri dijele stavove o važnosti i poznavanju ljudskih prava, nešto su više podijeljeni kad je riječ o percepciji aktivnosti EU i uloge škole u promicanju i zaštiti ljudskih prava.

Tablica 4: Stavovi učenika o slobodi kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uglavnom /Uopće se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom /U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam slobode u kontekstu EU	2	2,00%	23	23,00%	75	75,00%
Poštivanje slobode u školi i zajednici smatram vrlo važnim	1	1,00%	9	9,00%	90	90,00%
EU uspješno promiče slobodu kretanja i slobodu mišljenja putem medija, interneta i društvenih mreža	6	6,00%	39	39,00%	55	55,00%
Školski program dovoljno me informira i educira o slobodi kretanja u EU, slobodi govora i mišljenja	7	7,00%	34	34,00%	59	59,00%
Škola dovoljno radi na poticanju učenika na slobodno izražavanje mišljenja i stavova	7	7,00%	28	28,00%	65	65,00%

Izvor: Izrada autora

Iz tablice 4. vidljivo je da 75,00% učenika tvrdi da dobro razumije pojam slobode. 90,00% učenika tvrdi da im je poštivanje slobode vrlo važno. Njih 55,00% smatra da EU uspješno promiče slobodu kretanja i slobodu mišljenja. 59,00% učenika tvrdi da ih školski program dovoljno informira i educira o slobodi kretanja u EU, slobodi govora i mišljenja, kao i 65,00% učenika da škola radi na poticanju učenika na isto.

Analizom moda i aritmetičke sredine podataka iz ankete o stavovima učenika o slobodi proizlazi da je najčešći stav koji učenici zauzimaju je da pojam uglavnom

dobro razumiju (50 učenika), školski ih program uglavnom dovoljno informira i educira o slobodi kretanja u EU, slobodi govora i mišljenja (43 učenika) te škola dovoljno radi na poticanju učenika na slobodno izražavanje svojih mišljenja i stavova (36 učenika). Poštivanje slobode u školi i zajednici im je vrlo važno (59 učenika), a 39 učenika izražava neodlučnost oko uspješnosti EU u promicanju ljudskih prava.

Prosječni stavovi učenika o slobodi u društvu pokazuju općenito pozitivan odnos učenika s obzirom da su se izjasnili da dobro razumiju pojam (3,97). Poštivanje slobode im je vrlo važno (4,48), školski program dovoljno informira i educira o slobodi kretanja u EU (3,66), EU uspješno promiče slobodu kretanja i mišljenja (3,65), a škola potiče na slobodno izražavanje mišljenja i stavova (3,85).

Prosječno odstupanje od aritmetičke sredine kod stavova o poznavanju pojma slobode je 0,78, od stava koliko je učenicima poštivanje slobode u školi i zajednici važno 0,70, koliko uspješno EU promiče slobodu kretanja i mišljenja 0,86, školski program dovoljno informira i educira o slobodi kretanja, slobodi govora i mišljenja 0,88 te da Škola dovoljno radi na poticanju učenika na slobodu izražavanja mišljenja i stavova 0,97. Manja odstupanja, posebno kod važnosti slobode, pokazuju visok stupanj slaganja učenika, dok veća odstupanja kod promicanja slobode i ulozi škole, ukazuju na širi raspon percepcija.

Tablica 5: Stavovi učenika o demokraciji kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uglavnom /Uopće se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom /U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam demokracije u kontekstu EU	6	6,00%	35	35,00%	59	59,00%
Demokracija u društvu mi je vrlo važna	2	2,00%	34	34,00%	64	64,00%
EU uspješno promiče demokraciju putem medija, interneta i društvenih mreža	3	3,00%	44	44,00%	53	53,00%
Školski program dovoljno me informira i educira o demokraciji	7	7,00%	40	40,00%	53	53,00%
Škola uključuje učenika u donošenje odluka i potiče demokraciju	8	8,00%	35	35,00%	57	57,00%

Izvor: Izrada autora

Iz tablice 5. vidljivo je da 59,00% učenika tvrdi da dobro razumije pojam demokracije. 64,00% učenika tvrdi da im je demokracija vrlo važna. Njih 53,00% misli da EU uspješno promiče demokraciju. 53,00% učenika tvrdi da ih školski program dovoljno informira i educira o demokraciji dok 57,00% učenika smatra da škola uključuje učenike u donošenje odluka i potiče demokraciju.

Analizirajući mod i aritmetičku sredinu podataka iz ankete o stavovima učenika o demokraciji proizlazi da je najčešći stav koji učenici zauzimaju oko razumijevanja pojma je da ga učenici uglavnom dobro razumiju (43 učenika), smatraju da je demokracija u društvu uglavnom važna (38 učenika) te da EU uglavnom uspješno promiče demokraciju (46 učenika). Nisu sigurni da ih školski program dovoljno informira i educira o demokraciji (40 učenika), niti da škola uključuje učenike u donošenje odluka i potiče demokraciju (35 učenika).

Prosječni stav učenika o demokraciji u društvu je uglavnom pozitivan jer tvrde da dobro razumiju pojam (3,67), da EU uspješno promiče demokraciju (3,56), školski program ih dovoljno informira i educira (3,59) i škola dovoljno uključuje učenike u donošenje odluka (3,69). Prosječni stav učenika je da je poštivanje demokracije u društvu vrlo važno (3,87).

Prosječno odstupanje od aritmetičke sredine kod stavova učenika o tome koliko dobro poznaju pojam demokracija je 0,87, od stava koliko je učenicima demokracija u društvu važna 0,85, koliko uspješno EU promiče demokraciju 0,70, školski program dovoljno informira i educira o demokraciji 0,84. Najviše prosječno odstupanje od 0,98 je za tvrdnju da škola uključuje učenike u donošenje odluka i potiče demokraciju pa ovaj rezultat ukazuje na najveću raznolikost stavova.

Tablica 6: Stavovi učenika o vladavini prava kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uopće/Uglavnom se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom/U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam vladavine prava u kontekstu EU	13	13,00%	39	39,00%	48	48,00%
Vladavina prava u društvu mi je vrlo važna	4	4,00%	47	47,00%	49	49,00%
EU uspješno promiče vladavinu prava putem medija, interneta i društvenih mreža	6	6,00%	55	55,00%	39	39,00%
Školski program dovoljno me informira i educira o vladavini prava	10	10,00%	50	50,00%	40	40,00%
Škola promiče vladavinu prava među učenicima	5	5,00%	34	34,00%	61	61,00%

Izvor: Izrada autora

Iz tablice 6. vidljivo je da 48,00% učenika tvrdi da dobro razumije pojam vladavine prava. 49,00% učenika tvrdi da im je vladavina prava u društvu vrlo važna. Ali njih 55,00% nije sigurno promiče li ju EU uspješno. 50,00% učenika nije sigurno da ih

školski program dovoljno informira i educira, a 61,00% smatra da škola promiče vladavinu prava.

Analizom moda i aritmetičke sredine podataka iz ankete o stavovima učenika o vladavini prava, izjednačeni su stavovi učenika o svim tvrdnjama. Učenici uglavnom nisu sigurni: oko razumijevanja pojma (39 učenika), koliko im je važna vladavina prava u društvu (47 učenika), koliko ju EU uspješno promiče (55 učenika), koliko ih školski program informira i educira (50 učenika) i koliko škola promiče vladavinu prava među učenicima (34 učenika).

Prosječni stav učenika oko vladavine prava u društvu je uglavnom neutralan oko razumijevanja pojma vladavine prava (3,42), da EU uspješno promiče vladavinu prava (3,40) te da školski program dovoljno informira i educira o vladavini prava (3,33). Prosječan stav učenika je pozitivan oko stava da je vladavina prava u društvu vrlo važna (3,54) te da škola potiče istu među učenicima (3,85).

Prosječno odstupanje od aritmetičke sredine kod stavova učenika o tome koliko dobro poznaju pojam vladavine prava je 0,94 što ukazuje na relativno veću raznolikost stavova učenika o vlastitom poznavanju pojma. Prosječno odstupanje od stava koliko je učenicima vladavina prava u društvu važna je 0,80, koliko uspješno EU promiče vladavinu prava 0,75, da školski program dovoljno informira i educira o vladavini prava 0,78. Najveće prosječno odstupanje od 0,97 je za tvrdnju koliko škola promiče vladavinu prava među učenicima, što ukazuje na najveću raznolikost stavova učenika.

Tablica 7: Stavovi učenika o ljudskom dostojanstvu kao temeljnoj vrijednosti Europske unije

Pitanje	Odabrane tvrdnje					
	Uopće/Uglavnom se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom/U potpunosti se slažem	
	broj učenika	postotak učenika	broj učenika	postotak učenika	broj učenika	postotak učenika
Dobro razumijem pojam ljudskog dostojanstva u kontekstu EU	5	5,00%	26	26,00%	69	69,00%
Ljudsko dostojanstvo mi je vrlo važno	2	2,00%	17	17,00%	81	81,00%
EU uspješno promiče važnost poštivanja ljudskog dostojanstva putem medija, interneta i društvenih mreža	4	4,00%	52	52,00%	44	44,00%
Školski program dovoljno me informira i educira o ljudskom dostojanstvu	7	7,00%	41	41,00%	52	52,00%
Škola dovoljno brine o promicanju ljudskog dostojanstva među učenicima	4	4,00%	44	44,00%	52	52,00%

Izvor: Izrada autora

Iz tablice 7. vidljivo je da 69,00% učenika tvrdi da dobro razumije pojam ljudskog dostojanstva. 81,00% učenika tvrdi da im je isto vrlo važno. Ali njih 52,00% nije sigurno promiče li EU uspješno ljudsko dostojanstvo. 52,00% učenika tvrdi da ih školski program dovoljno informira i educira dok 52,00% učenika smatra da škola dovoljno brine o promicanju ljudskog dostojanstva među učenicima.

Analizom moda i aritmetičke sredine podataka iz ankete o stavovima učenika o ljudskom dostojanstvu proizlazi da je najčešći stav koji učenici zauzimaju oko razumijevanja pojma je da ga učenici uglavnom dobro razumiju (47 učenika), ljudsko dostojanstvo im je uglavnom vrlo važno (42 učenika), nisu sigurni oko tvrdnje da EU uspješno promiče važnost poštivanja ljudskog dostojanstva (52 učenika), da školski program dovoljno informira i educira o istom (41 učenik) i da škola dovoljno brine o promicanju istog među učenicima (44 učenika).

Prosječni stav učenika o ljudskom dostojanstvu je uglavnom pozitivan jer je prosječna tvrdnja učenika da uglavnom ili u potpunosti razumiju pojam (3,85), škola dovoljno brine o promicanju ljudskog dostojanstva među učenicima (3,67) te da je dostojanstvo vrlo važno (4,17). Pozitivan stav učenik ima oko tvrdnje da školski program dovoljno informira i educira o ljudskom dostojanstvu (3,63). Stav učenika da EU uspješno promiče poštivanje ljudskog dostojanstva je neutralan (3,48).

Prosječno odstupanje od aritmetičke sredine kod stavova učenika o tome koliko dobro poznaju pojam je 0,85, od stava koliko je učenicima isto važno 0,70, koliko uspješno EU promiče važnost poštivanja ljudskog dostojanstva 0,87, školski program dovoljno informira i educira o ljudskom dostojanstvu 0,82, škola dovoljno brine o promicanju ljudskog dostojanstva među učenicima 0,90. Stav učenika najviše je usklađen kada je riječ o važnosti ljudskog dostojanstva u društvu, dok su percepcije o ulozi škole i EU u promicanju te vrijednosti najrazličitije.

Tablica 8: Stavovi učenika 2. i 4. razreda o tvrdnji: Školski program dovoljno me informira i educira

Školski program dovoljno me informira i educira o:	Odabrane tvrdnje					
	Uglavnom /Uopće se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom /U potpunosti se slažem	
	2 razred %	4 razred %	2 razred %	4 razred %	2 razred %	4 razred %
Jednakosti	9,09	14,29	22,73	33,33	68,18	52,38
Ljudskim pravima	9,09	9,52	27,27	23,81	63,04	66,67
Slobodi	9,09	4,76	27,27	38,09	63,64	57,15
Demokraciji	13,64	9,52	36,36	33,33	50,00	57,15
Vladavini prava	13,64	4,76	40,91	52,38	45,45	42,86
Ljudskom dostojanstvu	9,09	4,76	27,27	33,33	63,64	61,91

Izvor: Izrada autora

Tablicom 8. prikazani su podatci o stavovima učenika iz različitih razreda (2. i 4.) o tome koliko ih školski program informira i educira o temeljnim vrijednostima. O većini temeljnih vrijednosti (jednakost, sloboda, vladavina prava i ljudsko dostojanstvo) učenici 2. razreda imaju bolji stav u odnosu na učenike 4. razreda. Za ljudska prava i demokraciju stavovi su očekivano bolji u višim razredima. Većina učenika, neovisno o razredu, pokazuje stavove koji ukazuju na pozitivnu percepciju informiranosti o ljudskim pravima, slobodi, demokraciji i ljudskom dostojanstvu.

Tablica 9: Stavovi učenika 2. i 4. razreda o tvrdnji: Škola dovoljno brine o promicanju među učenicima

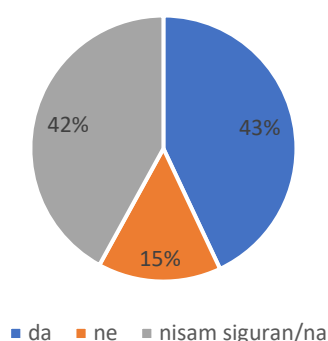
Škola dovoljno brine o promicanju među učenicima:	Odabrane tvrdnje					
	Uglavnom /Uopće se ne slažem		Niti se slažem, niti se ne slažem		Uglavnom /U potpunosti se slažem	
	2 razred %	4 razred %	2 razred %	4 razred %	2 razred %	4 razred %
Jednakosti	13,64	14,29	9,09	9,52	77,27	76,19
Ljudskih pravima	4,55	4,76	22,73	19,05	72,72	76,19
Slobode	9,09	4,76	13,64	23,81	77,27	71,43
Demokracije	0	14,29	36,36	28,57	63,64	57,14
Vladavine prava	9,09	4,76	22,73	33,33	68,18	61,91
Ljudskog dostojanstva	0	4,76	31,82	33,33	68,18	61,91

Izvor: Izrada autora

Tablicom 9. prikazani su podatci o stavovima učenika iz različitih razreda (2. i 4.) o tome koliko škola brine o promicanju temeljnih vrijednosti među učenicima. O većini temeljnih vrijednosti (jednakost, ljudska prava, sloboda) učenici 2. i 4. razreda imaju podjednaki stav što znači da većina učenika bez obzira na razred smatra da škola dobro promiče te vrijednosti. Taj visoki postotak ukazuje na snažan konsenzus među učenicima o ulozi škole u promicanju vrijednosti.

Učenici 4. razreda pokazuju nižu razinu slaganja u vezi s demokracijom, ljudskim pravima i ljudskim dostojanstvom. Učenici općenito imaju vrlo pozitivne stavove o ulozi škole u promicanju različitih vrijednosti, a učenici 2. razreda pokazuju veći stupanj slaganja u odnosu na učenike 4. razreda

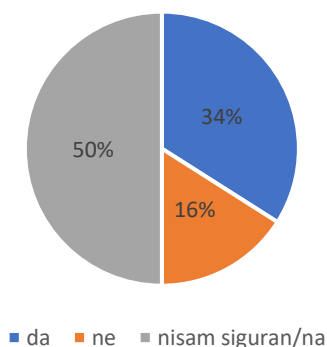
Grafikon 4: Volio/ljela bih više naučiti o temeljnim vrijednostima Europske unije



Izvor: Izrada autora

Iz grafikona broj 4. vidljivo je kako bi 43,00% učenika voljelo više naučiti o temeljnim vrijednostima EU. 42,00% učenika nije sigurno želi li učiti, a 15,00% učenika nije zainteresirano za učenje o temeljnim vrijednostima EU.

Grafikon 5: Volio/ljela bih doprinijeti školi i/ili zajednici promicanjem temeljnih vrijednosti Europske unije.



Izvor: Izrada autora

Iz grafikona broj 5. proizlazi da najveći dio učenika, njih 50,00% nije sigurno želi li doprinijeti školi i/ili zajednici promicanjem temeljnih vrijednosti EU. 34% učenika želi sudjelovati u promicanju temeljnih vrijednosti EU, a 16% učenika ne želi.

Zaključak

Istraživanjem provedenim na uzorku od sto učenika Srednje škole Novi Marof smjera ekonomist i opća gimnazija analizirali su se osobni stavovi o šest temeljnih vrijednosti Europske unije (EU) kroz pet pitanja kojima se: utvrdilo razumijevanje pojma odabrane vrijednosti, procjena stava o važnosti odabrane vrijednosti u društvu, uspješnost EU u promicanju temeljnih vrijednosti putem različitih medija, interneta i društvenih mreža, ocjena koliko učenici smatraju da ih školski program adekvatno informira i educira o vrijednostima te ocjena o tome potiče li škola dovoljno temeljne vrijednosti među učenicima.

Većina ispitanih učenika, osobito iz 4. razreda (95,24%) izjavljuje da je učila o EU u školi, ali iznenađuje da značajan dio učenika prvih razreda (40%) nije siguran ili se ne sjeća tog sadržaja. Najviše učenika navodi školu kao primarni izvor informacija o EU (42%). Učenici prvih razreda češće koriste internet (46,67%), a učenici viših razreda navode nastavu u školi kao dominantan izvor znanja (48,57%). Škola bi trebala pojačati sadržaje vezane uz EU u nastavi prvih razreda, kako bi se osiguralo da učenici stječu osnovna znanja na samom početku srednjoškolskog obrazovanja. Ovo je moguće stvaranjem poticajne okoline za učenje o EU kroz projekte, izvannastavne aktivnosti, fakultativnu ili izbornu nastavu.

Istraživanje pokazuje da većina učenika ima stav da dobro razumiju pojmove jednakost, ljudska prava, slobode, demokracije i ljudskog dostojanstva te smatraju ove vrijednosti važnima. Međutim, stavovi o vladavini prava su pretežno neutralni što sugerira potrebu za pružanjem teoretskog, ali i praktičnog znanja u školi.

Učenici generalno imaju pozitivan stav da ih školski program adekvatno informira i educira o temeljnim vrijednostima EU, ali postoji određena neizvjesnost u vezi s efikasnošću škole u informiranju i edukaciji o demokraciji. Istraživanje potvrđuje da postoji određena nesigurnost učenika u pogledu uspješnosti EU u promicanju temeljnih vrijednosti putem medija i digitalnih platformi. Navedeno upućuje na potrebu za dodatnim naporima u angažmanu učenika i promociji svih vrijednosti i potrebu za integracijom ove teme u kurikulum.

Analiza stavova učenika 2. i 4. razreda o informiranosti i edukaciji kroz školski program pokazuje da učenici 2. razreda imaju pozitivniji stav prema programu u kontekstu jednakosti, slobode i vladavine prava, dok učenici 4. razreda često zauzimaju neutralne stavove, posebno o vladavini prava. Unatoč razlikama, većina učenika iz oba razreda smatra da su dobro informirani o vrijednostima, što ukazuje na općenito pozitivan stav o školskom programu, ali i potrebu za daljnjim unaprjeđenjem edukacije, osobito među starijim učenicima.

Analiza stavova učenika o ulozi škole u promicanju važnih društvenih vrijednosti pokazuje da su učenici većinom pozitivno orijentirani prema aktivnostima škole u promicanju temeljnih vrijednosti. Međutim, učenici 2. razreda iskazuju veću razinu povjerenja i zadovoljstva u vezi s tim pitanjima u odnosu na učenike 4. razreda. Ova razlika sugerira da bi se mogla razmotriti prilagodba edukativnih sadržaja i pristupa

za starije učenike kako bi se poboljšalo njihovo iskustvo i stavovi u vezi s promicanjem ovih ključnih vrijednosti unutar školskog okruženja. Visok postotak suglasnosti među učenicima o ulozi škole ukazuje na važnost nastavka i unaprjeđenja obrazovnih programa koji se fokusiraju na demokratske vrijednosti.

Analizom iskaza učenika o interesu za učenjem o ovoj temi utvrđeno je da čak 43,00% učenika ima želju za dodatnim učenjem, a analizom stava učenika prema doprinosu školi i zajednici u promicanju temeljnih vrijednosti EU utvrđeno je da 34,00% učenika pokazuje jasnu želju za sudjelovanjem. Osobito je interesantno da njih 42,00% nije sigurno želi li dodatno učiti, a 15,00% nije zainteresirano. Značajan postotak učenika, čak 50,00% izražava neodlučnost u vezi s time žele li doprinijeti promicanju temeljnih vrijednosti EU, a 16,00% učenika izjavljuje da ne želi sudjelovati. Ova neodlučnost se može protumačiti kao nedostatak informacija o temi jer dio učenika ne prepoznaje relevantnost ovih sadržaja, ali sasvim je sigurno da je ova skupina otvorena za učenje. Potrebno je objasniti zašto je ova tema važna i kroz unaprijeđeni kurikulum škole utjecati na motivaciju učenika za uključivanje u izvannastavne aktivnosti, izbornu ili fakultativnu nastavu.

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VOLONTIRANJE KAO IZRAZ SOLIDARNOSTI MEĐU UČENICIMA SREDNJIH ŠKOLA

Ana KARLOVIĆ
Druga ekonomska škola Zagreb
ana.karlovic1@skole.hr

Ivana MARIĆ
Ekonomski fakultet Zagreb
imaric8@efzg.hr

Jelena KOVAČ
Ekonomski fakultet Zagreb
jkovac@efzg.hr

Sažetak

Predmet/ishodište rada: Volontiranje je fenomen vezan za dobrovoljno darivanje vremena, talenata, ali i vještina te znanja pojedinaca organizacijama čije vrijednosti smatraju važnima za izgradnju društva. Danas mladi rado i često pristupaju volontiranju te na taj način razvijaju svoje socijalne vještine, empatiju, pronalaze nove prijatelje te razvijaju kreativnost i samopouzdanje. Posebno je period pandemije COVID-19 iznjedrio nove situacije gdje se pokazalo kako su mladi ljudi potrebni druženja te kako se na njihovo mentalno zdravlje negativno odrazila dulja socijalna distanciranost i otuđenost. Upravo jednim od načina za prevenciju anksioznosti i depresije koje su danas među mladima vrlo raširene jest volontiranje baš kao i boravak u prirodi, ali i usvajanje novih znanja i vještina čime stječu nove prijatelje i pomiču vlastite granice razvoja. Volontiranje može poslužiti kao izvrsna platforma za promicanje građanske solidarnosti među učenicima, pogotovo u najosjetljivijem periodu njihova odrastanja, a odnosi se na srednjoškolsko obrazovanje. Osjetljivost i ranjivost dobi srednjoškolskih učenika zahtjeva posebnu pozornost kada je riječ o njihovu uključivanju u volonterske aktivnosti koje trebaju biti vješto vođene. Potrebno je uskladiti djelovanje napora svih uključenih tako da svi procesi idu u smjeru ispunjenja organizacijske misije kako škole tako i organizacija u koju su uključeni kao volonteri.

Ciljevi: Ukazati na važnost prakse volontiranja, ali i senzibiliziranje javnosti te konkretno uključivanje učenika i škola u volontiranje te poticanje suradnje s organizacijama civilnog društva.

Metodologija: Provedeni su intervjui otvorenog tipa s učenicima Druge ekonomske škole koji su ujedno i članovi Volonterskog kluba.

Rezultati: Volonteri uključeni u istraživanje opisivali su vlastito iskustvo volontiranja i učinke volontiranja koje su pritom doživjeli. Analizom iskustava volontiranja članova Volonterskog kluba moguće je zaključiti da je na sve njih iskustvo volontiranja izrazito pozitivno utjecalo. Kao najznačajnije istaknuli su razvoj empatije, druženje s ostalim volonterima i korisnicima udruga, te uključenost škole u poticanje učenika u aktivnosti volontiranja.

Ključne riječi: volontiranje, solidarnost, neprofitne organizacije, srednjoškolska solidarnost

JEL klasifikacija: A21, A22, I23, L3, L31

Uvod

Neprofitne organizacije imaju vrlo važnu ulogu u društvu jer svojim djelovanjem ispunjavaju i rješavaju društvene potrebe koje država i tržište ne mogu ispuniti/riješiti. Neprofitne organizacije usmjerene su na zajednicu i rješavanje problema u zajednici, za razliku od profitnih organizacija koje su usmjerene na stvaranje profita odnosno ekonomske ciljeve.

Različiti su načini definiranja i određenja neprofitnih organizacija s obzirom elemente koji se pritom uzimaju u obzir. Primjerice Vašiček i Vašiček (2016) definiraju neprofitne organizacije kao pravne osobe koje se osnivaju radi ostvarivanja određenog javnog, općeg ili zajedničkog interesa pojedinaca, grupe građana ili šire zajednice, pri čemu ne djeluju radi ostvarivanja profita niti na tržišnoj osnovi. Nadalje, Marić (2018) ističe da se neprofitni ili treći sektor pojavljuje kako bi se prebrodio jaz između države i tržišta, odnosno kako bi riješio probleme u društvu koji nisu obuhvaćeni javnim i privatnim djelovanjem. Također, neprofitni sektor obuhvaća organizacije koje ne djeluju radi ostvarivanja profita, već one kako naglašava Pavičić (2003) pomažu da društvo postane zajednica odgovornih pojedinaca usmjerenih prema osobnom/obiteljskom napretku, ali i napretku zajednice kojoj pripadaju.

Povezujući prethodno navedene definicije neprofitnog sektora i neprofitnih organizacija vidljivo je da je njihovo djelovanje između ostalog usmjereno poticanju aktivnog uključivanja građana u izgradnju lokalnih i širih zajednica. Uključivanje u djelovanje neprofitnih organizacija moguće je na dva načina: a) zapošljavanjem ili b) volontiranje u neprofitnim organizacijama. U fokusu ovog rada biti će drugi oblik djelovanja u neprofitnim organizacijama, odnosno volontiranje. Također jedan je od ciljeva održivog razvoja predložen od strane Ujedinjenih naroda, a potiče se kroz djelovanje različitih programa i institucija Europske unije primjerice inicijative EU Snage solidarnosti.

Stoga je za neprofitne organizacije karakteristično da nisu orijentirane na akumuliranje profita. Dakle, svrha im nije usmjerenost nekoj gospodarskoj aktivnosti koja bi generirala dobit, već su orijentirani dobrobiti lokalne zajednice.

Da je riječ o zaista složenom području svjedoči i Međunarodna klasifikacija neprofitnih i organizacija trećeg sektora (Einarsson i Wijkström, 2019) koja ih smješta unutar dvanaest skupina. Navedene skupine predstavljaju dominantno područje djelovanja pojedine neprofitne organizacije, te mogu biti: a) kultura i rekreacija, b) obrazovanje i istraživanje, c) zdravlje, d) socijalne usluge, e) okoliš, f) razvoj i stanovanje, g) pravo, zagovaranje i politika, h) filantropski posrednici i promicanje volontiranja, i)

međunarodne neprofitne organizacije, j) religija, k) poslovne i strukovne udruge, sindikati i l) ostalo.

Prije određivanja ključnog pojma ovog rada, odnosno volontiranja potrebno je istaknuti razlike u djelovanju profitnih i neprofitnih organizacija. U tablici 1. su prikazane temeljne razlike između profitnih i neprofitnih organizacija koje je potrebno razumjeti kako bi bila jasna logika i važnost volontera za rad neprofitnih organizacija.

Tablica 1. Razlike neprofitnih i profitnih organizacija prema temeljnim dimenzijama

Dimenzija	Neprofitne organizacije	Profitne organizacije
Polazište	opće javno dobro	profit
Usmjerenost	građaninu	potrošaču
Koncept	socijalni	ekonomski
Arena djelovanja	društvo	tržište
Rezultati	društveni/nemjerljivi/kvalitativni	ekonomski/mjerljivi/kvantitativni

Izvor: Marić, I., 2018.

Specifičnosti volontiranja

Polazeći od svrhe djelovanja neprofitnih organizacija i njihove usmjerenosti na društvene ciljeve moguće je razumjeti posebnosti volonterskog rada. Na tragu distinkcije profitnih i neprofitnih organizacija po pitanju izvrsnosti, gdje neprofitno ne znači manje kvalitetno, tako i volonteri naspram zaposlenika nisu manje značajni. Štoviše, s obzirom na njihovu brojnost često imaju i veći značaj za djelovanje neprofitnih organizacija. Upravo su zbog toga posljednjih godina teme volontiranja i volontera izrazito popularne u različitim područjima.

Prisutnost pojmova u različitim područjima obično za sobom povlači i jaz u poimanju istih, te ih je potrebno definirati. Riječ volonter dolazi iz francuske riječi „*volontare*“ koja označava osobu koja je spremna besplatno obavljati neku službu. Općenito, Anheier (2022) definira volonterski rad kao rad bez novčane naknade ili zakonske obveze predviđene za organizacije ili osobe. Begović (2006) ga opisuje kao način i stil života, usko vezan uz sustav vrijednosti pojedinca. Pregledom tablice 2. vidljivo je da Cnaan i sur. (1996) prepoznaju četiri ključne dimenzije volontiranja. Prije svega naglašene su važnost slobodnog izbora i izostanak naknade. Nadalje, kada je riječ o strukturi, odnosno načinu na koji je volontiranje organizirano razlikuju formalno i neformalno volontiranje. Pritom je neformalno volontiranje uvijek u prednosti jer je ponekad izazovno zabilježiti sve sate rada volontera čiji rad nije formalno evidentiran i praćen. Posljednju dimenziju volontiranja predstavljaju korisnici određene neprofitne organizacije, što različiti autori (Anheier 2022, Grönlund i sur. 2011, Wilson 2000) povezuju s motivacijom za volontiranje.

Tablica 2. Dimenzije volontiranja

Dimenzija	Karakteristike
Slobodan izbor	- slobodna volja - neusiljenost - obveza volontiranja

Dimenzija	Karakteristike
Naknada	- nikakva - ništa se ne očekuje - nadoknađuju se troškovi - stipendija
Struktura	- formalno - neformalno
Predviđeni korisnici	- nepoznate osobe - prijatelji, poznanici - sam volonter

Izvor: Cnaan i sur., 1996.

Važnost volontiranja i reguliranja rada volontera prepoznati su i na nacionalnoj razini što se ogleda u zakonodavnoj brizi sažetoj u Zakonu o volonterstvu koji je stupio na snagu 2007. godine. Te je sukladno promjenama volonterskog rada od uvođenja izmijenjen dva puta; prvi put 2013. i drugi put 2021. godine.

Da država smatra volonterski rad izuzetno dragocjenim pokazala je dodjelom državne nagrade za volontiranje, što predstavlja najveće priznanje što ga Republika Hrvatska dodjeljuje za volontiranje, doprinos promicanju volonterstva i druge volonterske aktivnosti. Nagrada *Volonterski Oskar* uspostavljena je Zakonom o volonterstvu iz 2007. godine, a dodjeljuje se jednom godišnje. Prepoznatost i poticanje volontiranja na nacionalnoj i međunarodnoj razini dobro je prihvaćena što pokazuje i porast interesa za volontiranje vidljiv u tablici 3. Posebno je zanimljiv period prikazan u tablici 3. koji prati podatke o organiziranom volontiranju neposredno prije, tijekom i nakon COVID-19 pandemije. Podaci ukazuju na to da su unatoč izazovnim okolnostima prepoznati važnost, uloga i benefiti volontiranja pa je umjesto pada, zabilježen porast broja volonterskih sati.

Tablica 3. Podaci o organiziranom volontiranju u razdoblju od 2019. - 2021. godine

Dimenzija	2019. godina	2020. godina	2021. godina
Broj zaprimljenih izvješća o organiziranom volontiranju	1.502	1.574	1.607
Broj volontera/ki	64.280	48.386	59.161
Broj volonterskih sati	3.043.954	2.819.655	3.181.557
Troškovi volontiranja	16.121.311,91 kn	11.324.342,78 kn	16.278.830,37 kn

Izvor: izrada autorica prema statističkim podacima Ministarstva rada, mirovinskog sustava, obitelji i socijalne politike

Moguće se zapitati kako je to moguće s obzirom na različite obavezne mjere distanciranja tijekom i neposredno nakon COVID-19 pandemije. Ono što se tijekom tog razdoblja promijenilo bio je uglavnom način na koji su se pojedinci uključivali u aktivnosti volontiranja. Tako je posebnu pozornost dobio oblik volontiranja nastao još 1990.-ih godina, a to je digitalno ili *online* volontiranje. *Online* oblik volontiranja odnosi se na volontiranje putem pametne tehnologije i aplikacija društvenih medija (Paylor, 2012.). Ujedinjeni narodi (2004) definiraju termin online volontiranje kao zadatke koje pojedinac izvršava, u cijelosti ili djelomično, putem interneta s računala kod kuće, na poslu, na sveučilištu, iz kibernetičkog kafića ili telecentra. Na ovaj način kreiran je prostor za uključivanje volontera koji zbog dislociranost nisu bili u mogućnosti

volontirati uživo u nekoj neprofitnoj organizaciji.

Prepoznatost volontiranja kao važne aktivnosti koja pomaže pojedincima i zajednicama poboljšati postojeća znanja i vještine te razvoj novih potiče različite institucije, od međunarodnih do lokalnih, da promoviraju uključivanje u programe volontiranja sve dobne skupine od najranije dobi. Stoga su u nastavku ovog rada opisani uloga i pozitivni učinci volontiranja srednjoškolskih učenika, te uloga škole u poticanju uključivanja u volonterske aktivnosti.

Škola kao nositelj volonterskih aktivnosti

Druga ekonomska škola četverogodišnja je strukovna škola koja bilježi izrazito dugu tradiciju od čak 140 godina obrazovanja srednjoškolskih učenika. Školu godišnje pohađa otprilike 524 učenika raspoređenih u 20 razreda. Osim bogatog obrazovnog programa koji učenicima omogućuje stjecanje znanja potrebnih za upis fakulteta ili zaposlenja nakon srednje škole, škola nudi i raznovrstan program dodatnih aktivnosti. Potaknuti motom škole koji glasi: „Učimo biti kreativni, poduzetni, odgovorni i uspješni.“, učenici Druge ekonomske škole se aktivno uključuju u rad udruga koje djeluju pri školi.

Jedna od popularnijih udruga je Volonterski klub. Riječ je o udruzi koja u sklopu škole djeluje već više od deset godina. Ideju pokretanja Volonterskog kluba predložila je pedagoginja škole, Silvija Glavočić koja je ujedno i voditeljica udruge. Razdoblje života srednjoškolskih učenika posebno je izazovno za mlade, pogotovo posljednjih godina kada se uzmu u obzir različiti utjecaji iz okoline koji mogu u velikoj mjeri oblikovati njihovo ponašanje. Stoga je inicijativa osnivanja Volonterskog kluba usmjerena poticanju angažiranja učenika kako bi što kvalitetnije i sadržajnije iskoristili svoje slobodno vrijeme. Pritom učenici na raspolaganju imaju različita područja djelovanja s obzirom na svoje specifične interese. Neka od područja djelovanja su: pružanje pomoći djeci i odraslima, briga za životinje i okoliš, te akcije kojima je cilj pomoći onima koji nemaju za dostojanstven život.

Volonterski klub je tijekom više od deset godina djelovanja provodio različite aktivnosti koje su prikazane u tablici 4.

Tablica 4. Pregled aktivnosti Volonterskog kluba Druge ekonomske škole Zagreb

Naziv aktivnosti	Opis
Božićni sajam u školi	Prikupljenim sredstvima kupljene su didaktičke igračke za Dječji onkološki odjel na Rebru te društvene igre za umirovljenike u Domu za starije i nemoćne Sveti Josip.
Akcije prikupljanja pomoći	Prikupljanje pomoći u hrani i odjeći za stradale u velikim poplavama u istočnoj Hrvatskoj 2014. godine.

Izvor: izrada autorica

Tablica 5. Partneri Volonterskog kluba Druge ekonomske škole Zagreb

Partneri	Opis zajedničkih aktivnosti
Arka- zajednica osoba s intelektualnim teškoćama i osoba bez njih	Arka - Korablja je aktivni član lokalne zajednice. Kroz oblike društvenog poduzetništva kroz koji i financira

Partneri	Opis zajedničkih aktivnosti
	svoj rad (Arkin sajam rabljenih stvari, slikovnica Priča o Vedranu, M'arka) te Susrete na mostu, ovo je zajednica koja u jednakoj mjeri i daje i prima, svjesna svoje odgovornosti za svaku pojedinu osobu.
Čisteći medvjedići	Učenici se uključuju u akcije čišćenja okoliša u svojoj blizini, te na taj način uče o važnosti brige za okoliš te koliko svojim djelovanjem doprinose čistoći okoliša za buduće generacije.
Domovi Karmelićanki BSI za (ne)zbrinutu djecu	Druga ekonomska škola surađuje s Domovima od 2014. godine. Članovi volonterskog kluba pomažu na način da provode vrijeme u igri s djecom smještenom u domu kako bi pomogli njihovoj socijalizaciji i emocionalnom razvoju.
Humanitarna udruga Savao	Volonterski klub započeo je svoje djelovanje unutar Udruge u ožujku 2023 godine. Volonterska akcija sastoji se od pripremanja sendviča i paketa hrane u Kranjčevićевой ulici (u sjedištu Udruge), a zatim i odlazak na Glavni kolodvor (kod stare lokomotive) gdje se volonteri susreću s oko 170 redovitih korisnika.
Igračkom do dječjeg osmijeha	Druga ekonomska škola do sada je, na poticaj Volonterskog kluba u ovoj akciji sudjelovala jedanput. Prikupljenu donaciju KBC-u predale su profesorice Jelena Beroš i Ana Karlović.
Pučka kuhinja	Volonterska akcija sastoji se od okupljanja volontera u 11:00 sati pred Domom svetog Antuna, sortiranje namirnica te njihova podjela kao i podjela gotovog obroka prisutnim korisnicima. Podjela završava oko 13:30 sati.
Udruga oboljelih od leukemije i limfoma	Učenici su se aktivno uključili u akciju Plastičnim čepovima do skupih lijekova, pokrenutu 2014. godine, u kojoj sudjeluju i danas.

Izvor: izrada autorica

Pregledom tablice 5. moguće je vidjeti da su članovi Volonterskog kluba izrazito aktivni i zainteresirani sudjelovati u radu različitih organizacija civilnog društva. U desnom dijelu tablice 5. detaljno su opisane aktivnosti koje svjedoče o aktivnoj i zauzetoj suradnji organizacija (škole i Udruga). Svaki učenik i djelatnik Škole pozvan je pridružiti se Volonterskom klubu i doživjeti iskustvo koje obogaćuje i mijenja iz temelja. Kako i sam logo Kluba ističe smisao volontiranja u nesebičnom davanju, neizrecivo je ono što se prima u susretu s potrebitima.

Metodologija

U ovom radu promatrana je praksa volontiranja srednjoškolskih učenika kroz tri organizacije (Arka Korablja, Dom za nezbrinutu djecu - Časne sestre Karmelićanke i Udruga Savao) te iskustva desetak volontera u istim organizacijama. Na temelju teorijskih spoznaja provedeni su intervjui s pitanjima otvorenog tipa na prigodnom uzorku učenika Udruge Volonterskog kluba srednje strukovne škole - Druga ekonomska škola Zagreb u razdoblju od ožujka do lipnja 2023. godine. U sljedećem dijelu detaljno su opisana iskustva pojedinih volontera koji su zabilježili zanimljivosti

volontiranja kroz njihovo djelovanje unutar Udruge Volonterskog kluba. Učenici su spremno sudjelovali u intervjuima i s radošću podijelili svoje priče te iskazali veliko zadovoljstvo što su proširili svoja iskustva i susreli se s izazovnim i drugačijim životnim prilikama.

Volonterske priče

1) Studija slučaja Udruga Savao

Udruga Savao je humanitarna udruga čiji rad je usmjeren pružanju pomoći i radu s beskućnicima. Volonterska akcija sastoji se od pripremanja sendviča i paketa hrane u Kranjčevićevoj ulici (u sjedištu Udruge), utorkom i petkom, a zatim i odlazak na Glavni kolodvor (kod stare lokomotive) gdje se volonteri susreću s oko 180 redovitih korisnika kojima dijele pakete.

„U udruzi Savao volontiram 3 godine. Udrugu sam slučajno upoznao preko prijatelja, a ostao sam već pune 3 godine jer me privuklo to služenje potrebitima i razgovor s njima. Ono što mi se najviše sviđa u udruzi je obiteljska atmosfera između nas volontera i korisnika kojima služimo. Na mene je najviše utjecalo to da počnem cijeniti svoje stvari i da budem zadovoljan onim što imam i dobio sam mnogo darova od volontiranja, a najveći od njih je poniznost (N.M.).“

„U udruzi sam pune dvije godine, a u školi sam saznala za udrugu i mogućnost volontiranja u njoj. U svojoj prošloj župi sam volontirala i volim pomagati ljudima. Bog mi je dao mogućnost i želim mu se tako odužiti. U Udruzi se napunim pozitivom i to nastojimo prenijeti naše korisnike, te sam u Udruzi stekla i jako dobre prijatelje. Kroz Udrugu učim, sazrijevam i duhovno rastem (M.B.).“

„Volontiranje u udruzi Savao se ne da opisati riječima. Za udrugu sam saznala u Volonterskom klubu i u njoj počela volontirati prije godinu dana. Članovi i korisnici udruge odmah su me oduševili svojom pristupačnošću i jednostavnošću. U udruzi se osjeti prijateljska atmosfera, a susret s korisnicima se ne da riječima opisati. (I.M.).“

2) Studija slučaja Arka Korablja

Arka - Korablja je zajednica osoba sa i bez intelektualnih teškoća koja djeluje na istočnom dijelu grada Zagreba. Iako je lokalnog karaktera, ona ima međunarodnu važnost jer postoji kao dio velike međunarodne federacije L'Arche International. Ova zajednica vjeruje u jedinstvenu ljepotu svakog pojedinog čovjeka te njegovu potrebu za pripadanjem što je i razlog zbog kojeg u njoj svoje mjesto može pronaći baš svaka osoba. Zajednica Arka u Hrvatskoj već više od 15 godina odgovara na potrebe osoba s intelektualnim teškoćama.

„U rad volonterskog kluba uključen sam od samog početka školovanja u Drugoj

ekonomskoj školi. Imali smo priliku volontirati za udrugu „Arka” i ja sam se prijavio jer volim pomagati ljudima u potrebi. Ljudima koji nažalost žive u lošim životnim uvjetima jako puno znači kad naiđu na pomoć i obzir drugih (F.M).“

„Član sam Vka jer mogu pomoći onima u potrebi i posebno pamtim posjet udruge Arka našoj školi zbog toga što sam shvatio kako su ljudi s invaliditetom ili nekim drugim zdravstvenim problemom spretni i pametni. Vidio sam kako izrađuju ukrase, pišu pjesme i kako se iskreno ponašaju prema svima. Osim što neke stvari rade i bolje od ljudi koji nemaju zdravstvenih problema od njih se može naučiti puno toga, a najviše kako biti iskren (S.J.).“

„Volontirala sam na Arkinom sajmu jer sam imala slobodnog vremena tada i htjela sam iskoristiti to vrijeme pomažući. Mene volontiranje čini produktivnijom zahvalnijom, svjesnom što sve imam u životu i. Jako mi je drago i zahvalna sam što mogu pomoći nekom (S.P).“

3) Studija slučaja - Dom za nezbrinutu djecu Časnih sestara Karmelićanki

U Hrvatskoj postoje dvije kuće (u Hrvatskom Leskovcu i na Vrhovcu), Kuća sv. Josipa i Kuća sv. Terezije od Malog Isusa za nezbrinutu djecu, u kojima časne, uz pomoć stručnih suradnika, brinu o djeci te im pružaju pravi obiteljski dom. Časne sestre su prepoznale važnosti i dobrobit volontiranja stoga njeguju volonterski angažman.

„U kući na zagrebačkom Vrhovcu volontiram unazad dvije godine i to je neprocjenjivo životno iskustvo, raduje me igra i druženje sa djecom i časnim sestrama. Nakon svako volontiranja doma dođem sretnija i zahvalnija. Uistinu sam sretna što malim doprinosom mogu djeci staviti osmijeh na lice i veselim se svakom susretu (K.B).“

„Prvi put sam krenula volontirati u srednjoj školi sa svojom profesoricom. Profesorica nas je vodila u dječji dom na Vrhovcu. Djeca su već na prvi pogled probudila u meni razne emocije i osjećaj empatije. Volontiranje je moj hobi te tako ne samo da usrećujem druge ljude kojima pomažem, već i sebe. Nakon bilo kojeg dobrog djela osjećam se bolje te puna elana za život i njegove izazove. Svako bih svima koji teže ljepšem i boljem preporučila volontiranje u bilo kojem području. Garantiram da će te shvatiti da vam je sve ono što u životu imate i više nego dovoljno (M.M.).“

Diskusija

Na temelju analize dobivenih odgovora volontera može se zaključiti da su ih navedena iskustva volontiranja značajno obogatila te ispunila zadovoljstvom da čine dobro i pomažu lokalnoj zajednici. Posebno ističu da im je upravo članstvo u Volonterskom klubu tj. specifične izvannastavne aktivnosti Druge ekonomske škole omogućile i dale priliku da se susretnu s ranjivim skupinama (osobe s intelektualnim i fizičkim poteškoćama, beskućnici i djeca s neodgovarajućom roditeljskom skrbi. Učenici / volonteri ističu da im je posebice mnogo značilo vodstvo i motiviranje od strane

profesora uključenih u program, a najviše ih je dojmila prijateljska atmosfera i prihvaćanje korisnika čitavog programa volontera. Učenici naglašavaju važnost ovakvih iskustava kao jedinstvenu priliku da sretnu nove ljude i steknu nova znanja i vještine koje će mi svakako koristiti u životu. Poticanje prijateljstva te razvijanje empatije kao i sudjelovanje u dobrobiti zajednici predstavljaju glavne motive za uključivanje, ali ujedno i pozitivne učinke iskustva volontiranja. Ovakva praksa izvrstan je primjer suradnje između škola, učenika i različitih organizacija civilnog društva koji promiču vrednote solidarnosti, obrazovanja, humanosti i uključenosti.

Zaključak

Volontiranje je iznimno važan društveni i građanski fenomen usko povezan sa civilnim društvom i neprofitnim organizacijama. Naime, odnosi se na dobrovoljno darivanje vremena, svojih talenata, ali i znanja različitim organizacijama čije vrednote smatramo važnima za izgradnju društva. Posebno su mladi oni koji mnogo volontiraju te se na taj način razvijaju i obogaćuju kroz nova iskustva, dok u isto vrijeme doprinose pozitivnim promjenama u društvu. Volontiranje treba biti stručno vođeno potpomognuto iskusnim voditeljima koji usmjeravaju energiju i dobru volju mladih prema ispunjavanju ciljeva. *Stoga je potreban ozbiljan i sustavan pristup volontiranju kao i promicanju vrednota civilnog društva.* U ovom radu su ispričana neka volonterska iskustva mladih koji su iskazali što donosi volontiranje te koji su benefiti, ali i izazovi s kojima su se sreli prilikom prakse volontiranja. Svakako potrebno je istaknuti značaj koji sama škola kao nositelj volonterskih aktivnosti ima u cijelom procesu promicanja volontiranja. Naime, sve volonterske aktivnosti provodi volonterska udruga Druge ekonomske škole koja djeluje više od 10 godina te kroz desetak projekata kontinuirano pomaže i sudjeluje u volonterskom radu različitih organizacija civilnog društva. Ovaj primjer pokazuje dobru praksu koju bi trebale usvojiti i druge škole u Hrvatskoj te prenijeti u svoje izvannastavne programe kako bi živjeli u društvu koje njeguje solidarnost, humanost i pravednost.

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ZASIĆENOST INFORMACIJAMA I EFIKASNOST UČENJA

Lada TABAK
Treća ekonomska škola
lada.lovrinic@gmail.com

Sažetak

Predmet/ishodište rada: U ovom radu testira se model predikcije znanja učenika, u kojem je model ovisan o količini informacija za koju se traži od učenika da je savlada. Motivacija modela uključuje primjenu eksponencijalne funkcije (s negativnom potencijom) prigušenja, s obzirom da se dotični oblik funkcije često javlja u modelima prirodnih pojava kao što su amplituda titranja njihala, intenzitet vjetrova, intenzitet plime i oseke i sl. Svrha istraživanja je pokazati, primjenom modela s prigušenjem, da veća količina informacija prezentirana učenicima neće nužno pridonijeti i većem znanju učenika.

Ciljevi: Cilj je provjeriti hipotezu da je kvaliteta pamćenja informacija u populaciji učenika 3. razreda opisiva vjerojatnosnim modelom koji uključuje padajuću eksponencijalnu funkciju. Sami model u hipotezi je motiviran teorijom prigušenja za mehanička titranja. Cilj ovog istraživanja je i prikazati da su promjene u obrazovanju nužne, u smislu formiranja količina informacija koje se nude učenicima tijekom obrazovnog procesa. Cilj je i senzibilizirati odgojno – obrazovni sustav za određene promjene u načinu obrazovanja i metodama rada te pokazati kako se kvalitetno i efikasno obrazovanje ne postiže kvantitetom (većom količinom prezentiranog sadržaja) već upravo kvalitetnim pristupom i metodama rada. Cilj je usmjeren prvenstveno na količinu informacija koje profesor prezentira tijekom nastavnog procesa, ali i na količinu onih informacija koje se nalaze u udžbenicima.

Metodologija: Metoda istraživanja je provođenje kratkog testa u Excelu. U testu su učenicima prikazani brojevi u stupcima (pri čemu je svaki stupac vidljiv na ekranu u vremenskom trajanju od 15 sekundi). Nakon svakog prikazanog stupca, učenici na papiru zapisuju brojeve u nizu, po sjećanju. Niz brojeva povećava se za jedan broj u svakom novom stupcu. Prvi stupac sadrži 1 broj u nizu, a posljednji 16 brojeva u nizu. Istraživanje je provedeno na uzorku od 103 učenika, tijekom jednog nastavnog sata za svaki razred (3.a, 3.b, 3.c, 3.d i 3.e), sveukupno u periodu od sedam radnih dana. Učenici pohađaju srednju Ekonomsku školu, usmjerenje Ekonomist,

Ključne riječi: nastavni sadržaj, zasićenost gradivom, efikasnost učenja.

JEL klasifikacija: A20, A29, I20, I26, I80

Motivacija i definicije

Svjedoci smo prevelike količine informacija kojima smo svi izloženi. Internet, vijesti, društvene mreže i sl. nude obilje informacija koje korisnici žele ili trebaju procesirati. Opći je dojam da je prisutno veliko zasićenje u prijemu informacija.

Ta pojava veliki je izazov naročito u obrazovnom sustavu. Količina informacija kontinuirano raste i u obrazovanju. Pred učenike se postavlja sve teži zadatak - upijanja i reproduciranja činjenica, bez poticanja i razvijanja njihove logičke inteligencije. Zbog svega navedenog, teorija i praksa u procesu učenja sve su veći izazov pedagoško - psihološkoj struci. Mnogi se stručni i znanstveni radovi bave upravo tom tematikom - kako učenicima u današnjem svijetu, prezasićenom informacijama, olakšati način učenja, pamćenja i razumijevanja.

“Želi li učenik kvalitetan proces učenja, želi li steći kvalitetno, potpuno jasno i trajno znanje, mora uložiti napor kako bi proveo dubinsku obradu podataka. Drugim riječima, mora se potruditi da sebi potpuno objasni gradivo, poveže ga s prijašnjim znanjem, potraži primjere za ilustraciju i primijeni stečeno znanje u drugim područjima, zadacima ili situacijama.” (Andrilović i Čudina-Obradović, 1996, str.149).

“Poznajemo različite načine za poboljšanje pamćenja. U nastavku predstavljam aktivnu obradu gradiva, vježbu prisjećanja, učenje u djelovima i korištenje metamemorije.” (Obermajer P., 2023., str. 2 - 4). Autor navodi načine i tehnike poboljšanja pamćenja kod učenika.

U ovom radu pokušat ćemo egzaktno pokazati egzistenciju točke zasićenja, pri čemu pod točkom zasićenja smatramo trenutak u kojem učenik počinje pogrešno pamtit i zadane brojeve u nizu.

Naš model analizira jednostavan eksperiment u kojem učenik treba zapamtiti niz brojeva. Informacija je prezentirana kao niz brojeva:

$$x = x_1 x_2 \dots x_n$$

gdje je x_i i-ti broj u nizu. Dalje, definiramo vjerojatnost

$$P(x_i)$$

kao vjerojatnost da je učenik dobro zapamtio i-tu informaciju. Dalje, definiramo vjerojatnost točnog pamćenja cjelokupnog niza kao:

$$P(x) = P(x_1)P(x_2) \dots P(x_n).$$

Uočimo da smo iskoristili (možda naivnu) pretpostavku da su podaci međusobno neovisni, što možda nije slučaj u dijelu obrazovnog procesa, ali u našem pojednostavljenom modelu je uzet u obzir. Međusobna neovisnost informacija implicira da se vjerojatnost cijelog događaja računa kao umnožak pojedinačnih vjerojatnosti.

Glavni cilj ovog rada je dati procjenu za vjerojatnost točnosti prihvatanja informacije.

Model prigušenja i statistička analiza uzorka

Temeljna ideja modela je da se primarno pojednostavi niz informacija

$$x = x_1 x_2 \dots x_n$$

s jedinstvenim brojem X , pri čemu taj broj predstavlja mjeru duljine informacije. Konkretno, za gore navedeni slučaj informacije, definirat ćemo

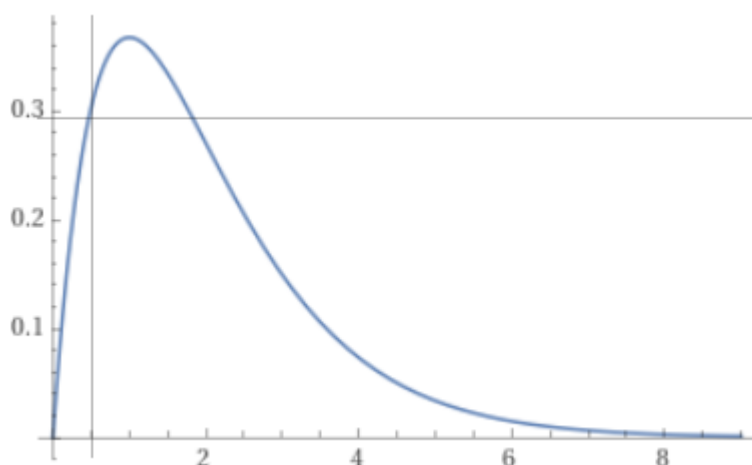
$$X = n.$$

Motivirani teorijom prigušenja iz teorije titranja postavljamo hipotezu da je vjerojatnost pravilnog razumijevanja informacija dana s

$$P(X) \sim cX e^{-bx}$$

gdje su c, b konstante, dok je e^{-bx} eksponencijalna funkcija. Graf funkcije $P(X)$ izgleda kao

Grafikon 1: Graf funkcije $P(X)$



Izvor: Izrada autora

Uzorak koji se koristi formiran je iz skupa od 103 učenika (dob učenika je 17 godina, učenici trećih razreda Ekonomske škole).

Podaci su prikupljeni kroz igru u kojoj je učenicima prikazana Excel tablica s brojevima koji su poredani u stupcima. Tablica se sastoji od 16 stupaca (nizova), gdje prvi niz sadrži samo jedan broj, a svaki sljedeći, jedan broj više.

Učenicima je, na projektoru, pojedinačno prikazan svaki stupac u trajanju od 15 sekundi, a nakon svakog prikazanog stupca učenici na papir zapisuju brojeve u nizu, po sjećanju.

Ono što nas zanima u istraživanju je otkriti u kojem nizu (na kojoj količini podataka/brojeva) će učenici učiniti pogrešku. Međutim, dodatni je cilj utvrditi dublju prirodu pojave na način da odredimo konstante c, b , tako da funkcija $P(X)$ dobro reprezentira razdiobu točnih odgovora.

Podaci su podijeljeni u tablici na sljedeći način.

Tablica 1: Primjer rasporeda podataka

X	1	2	3	4	...	n
f_i	f_1	f_2	f_3	f_4		f_n

Izvor: Izrada autora

Tablica sadrži varijablu X koja definira duljinu niza u kojem se dogodila greška, dok je f_i broj učenika koji su napravili grešku, na dotičnoj duljini niza. Dalje, veličina uzorka dana je s

$$N = \sum_{i=1}^n f_i$$

Sada uključujemo model na način da računamo teorijske frekvencije pomoću izraza

$$e(X) = P(X)N = NcXe^{-bX}.$$

Nakon toga analiziramo

$$\chi^2 = \sum_X \frac{(e(X) - f(X))^2}{e(X)}, e(X) = NcXe^{-bX}, X = i, i = 1, 2, \dots, n.$$

Uočimo da je $\chi^2 = \chi^2(c, b)$, što ustvari znači da χ^2 ovisi o parametrima c, b . Primjenom Excela minimizirat ćemo funkciju po parametrima c, b , dakle, želimo postići

$$\chi^2 \rightarrow \min.$$

ime namjeravamo pokazati valjanost modela za prethodno proračunate parametre c, b .

Rezultati izvedeni iz uzorka

Podaci iz uzorka od 103 učenika dani su u sljedećoj tablici:

Tablica 2: Rezultati iz uzorka ($n=103$)

X	1	2	3	4	5	6	7	8	9	10	11	12
f_i	8	11	14	15	13	11	10	8	5	4	2	2

Izvor: Izrada autora

U sljedećoj iteraciji modela koristimo pretpostavljenu formulu

$$P(X) = cxe^{-bx}.$$

Želimo da je zbroj svih vjerojatnosti u modelu jednak jedan, stoga definiramo normirani niz vjerojatnosti na sljedeći način:

$$P_{norm}(X_i) = P(x_i) / \sum_{j=1}^n P(X_j).$$

Nakon optimizacije uz pomoć Excela, uzimamo koeficijente

$$c = 1, b = 0,34.$$

Normirane vjerojatnosti dane su u sljedećoj tablici, zajedno s podacima iz uzorka i očekivanim frekvencijama (baziranim na predstavljenom modelu).

Tablica 3: H_i - kvadrat (χ^2) analiza uzorka

X_i	f_i	$P(x)$	$P(x)_{nor}$	e_i	$(f_i - e_i)^2 / e_i$
1	8	0.71177	0.089849	9.2545	0.170061
2	11	1.01323	0.127904	13.174	0.358817
3	14	1.08178	0.136558	14.066	0.000305
4	15	1.02664	0.129597	13.349	0.204314
5	13	0.91341	0.115304	11.876	0.106306
6	11	0.78017	0.098484	10.144	0.072251
7	10	0.64785	0.081781	8.4235	0.295057
8	8	0.52699	0.066525	6.8521	0.192303
9	5	0.42198	0.053269	5.4868	0.043182
10	4	0.33373	0.042128	4.3392	0.026520
11	2	0.26129	0.032984	3.3974	0.574766
12	2	0.20289	0.025611	2.638	0.154298
			1		2.19818

Izvor: Izrada autora

Dobivena vrijednost u χ^2 - testu je 2.19818, gdje je stupanj slobode razdiobe jednak 11 (imamo 12 redaka). Iz tablica vjerojatnosnih razdioba nalazimo da je granična vrijednost testa za odbijanje hipoteze jednaka 17.27 (na signifikantnosti od 10 %). Obzirom da je $2.19 < 17.27$, hipoteza se prihvaća. Drugim riječima, uočavamo da je P-

vrijednost sigurno veća od 10 % (u našem uzorku P-vrijednost je veća od 90%). Stoga imamo jake indicije da uvedeni vjerojatnosni model dobro opisuje promatranu pojavu.

Zaključak

Ovaj rad započet je s pretpostavkom da veća količina informacija neće nužno pridonijeti i boljem znanju učenika. Cilj rada bio je, primijenjenom metodom istraživanja, dokazati kako povećana količina informacija neminovno dovodi do zasićenja i pada koncentracije učenika.

Rezultati istraživanja (krivulja grafa 1) jasno pokazuju intenzitet koncentracije koju učenici imaju tijekom nastavnog sata, tijekom jedne aktivnosti. U početku učenici pokazuju fokus, koncentraciju i spremnost na izazov. Kako količina informacija raste, rastu i njihov entuzijizam i suradnja, ali do određene točke. Nazovimo ju "točka zasićenja".

Za potrebe ovog članka, primijenjena je metoda istraživanja na učenicima, u razredu i primijećen je zanimljiv "fenomen". Zanimljivo je da, nakon "točke zasićenja", učenici ne samo da ne mogu zapamtiti nove podatke, već se i ne trude učiniti isto. Kada im vizualno ponudimo veliku količinu informacija, nastaje zamor. Gube motivaciju i želju za procesiranje učenog/pročitano. Očito je da njihova sposobnost pamćenja pada, kako raste količina podataka koju je potrebno zapamtiti.

Svrha ovog istraživanja bila je ukazati na metode rada u procesu obrazovanja, pri čemu udžbenici sadrže ogromnu količinu informacija, a znanje se, moguće, usvaja i vrednuje na razini reproduciranja te definiranja informacija i pojmova.

Nastavnog je sadržaja previše u odnosu na, kurikulumom propisan, fond sati tijekom nastavne godine. Sve navedeno stvara ogroman pritisak, kako na učenike tako i na profesore. Za kvalitetan sustav obrazovanja, promjene su nužne. Okrenimo se pristupu logičkog i kritičkog razmišljanja te formiranja vlastitih stavova. Sustav traži promjene, učenici i profesori također.

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ŠKOLSKE KNJIŽNICE KAO PROMICATELJI HRVATSKE KULTURNE BAŠTINE U EUROPSKOM KONTEKSTU

Alica BAČEKOVIĆ PAVELIĆ
Ekonomska i birotehnička škola Bjelovar
knjiznica.ebb@gmail.com

Tanja NAĐ
Osnovna škola Ivanska
knjiznica.ivanska@gmail.com

Sažetak

Predmet/ishodište rada: Rad prikazuje ulogu školske knjižnice u formiranju kulturnoga identiteta učenika te promicanju odgoja i obrazovanja koji pridonosi razumijevanju korijena vlastite nacionalne kulture, čuvanju i promicanju kulturne baštine kao dijelu nacionalnoga, kulturnoga pa tako i europskoga identiteta. Spoznavajući svoj vlastiti identitet, učenik određuje pripadnost određenom društvu te spoznaje da identitet ovisi o društvenome i povijesnome kontekstu u kojem se razvija. Važan dio njegova identiteta jest kulturna baština. Razumijevanje i očuvanje kulturne baštine preduvjeti su za održanje kulturne zajednice, zajedničkih vrijednosti i identiteta.

Ciljevi: U radu su prikazane aktivnosti knjižnice Osnovne škole Ivanska te Ekonomske i birotehničke škole Bjelovar koje su imale za cilj razvijati svijest o važnosti očuvanja kulturne baštine, izgrađivati i razvijati kod učenika svijest o vlastitome identitetu te karakteristikama okoline, kao i pripadnosti široj zajednici u nacionalnome i europskome kontekstu.

Rezultati: Školske knjižnice imaju značajnu ulogu u promicanju hrvatske kulturne baštine jer su mjesta obrazovanja, kulture, informacija i društvenoga povezivanja. Planiranim aktivnostima knjižnice podupiru razvoj osobnoga, grupnoga, nacionalnoga i europskoga identiteta učenika. Kao čuvar kulturne baštine, promicatelj održivosti i mjesto koje širi svijest o europskome identitetu, knjižnica potiče učenike na razmišljanje o važnosti očuvanja prošlosti i stvaranja održive budućnosti. Integracijom ovih vrijednosti u svakodnevni rad, školske knjižnice pridonose jačanju kulturne svijesti i promicanju zajedničkoga europskoga naslijeđa među mladima.

Ključne riječi: školska knjižnica, kulturna baština, identitet, Osnovna škola Ivanska, Ekonomska i birotehnička škola Bjelovar

JEL klasifikacija: I21, I28, Z1

Uvod

Kulturna baština svake zemlje temelj je identiteta i kolektivne svijesti njezinih građana. Uloga škola i školskih knjižnica u očuvanju i promicanju toga naslijeđa postaje sve važnija, posebno u doba globalizacije i sve snažnije europske integracije. Školske knjižnice, kao obrazovne institucije, povezuju mlade naraštaje s bogatom povijesnom, umjetničkom i književnom tradicijom Hrvatske, dok istovremeno potiču interkulturalni dijalog unutar širega europskoga okvira.

Uspješno promoviranje kulturne baštine putem školskih knjižnica ne odnosi se samo na čuvanje povijesnih dokumenata ili organiziranje izložbi, već i na aktivno sudjelovanje u programima koji promiču kulturnu razmjenu i europske vrijednosti. Inicijative poput Europske godine kulturne baštine i projekti unutar programa Erasmus+ omogućuju mladima u Hrvatskoj da razumiju ulogu svoje kulturne baštine kao dijela širega europskoga naslijeđa, što je ključno za razvijanje osjećaja pripadnosti i zajedničkoga identiteta. Povezivanjem lokalne i nacionalne baštine s europskim naslijeđem školske knjižnice ne samo da obogaćuju znanja učenika, već i potiču osjećaj pripadnosti europskome kulturnom prostoru, čime pridonose jačanju kulturne raznolikosti i razumijevanja unutar Europe.

Prema istraživanju Eurobarometra iz 2017. godine, 88 % europskih građana slaže se da se o europskoj kulturnoj baštini treba poučavati u školama jer nam govori o našoj povijesti i kulturi. (Cultural Heritage, 2017, str. 5). Kako bi to podržala, Europska komisija podiže svijest o europskoj kulturnoj baštini putem različitih inicijativa i izvora usmjerenih na poučavanje kulturne baštine u školi.

Školske knjižnice u Hrvatskoj svojim aktivnostima nastoje pratiti razne inicijative Europske unije, organizirajući programe, naročito tijekom Europskih godina, koji se fokusiraju na različite teme od posebnoga značaja za države članice i njihove građane.

Osnovna škola Ivanska i Ekonomska i birotehnička škola Bjelovar u okviru kulturne i javne djelatnosti svojih školskih knjižnica imaju za cilj razvijati svijest o važnosti očuvanja kulturne baštine te poticati učenike na njegovanje vlastitih nacionalnih vrijednosti, uz istovremeno razvijanje europskoga identiteta.

Neposrednim odgojno-obrazovnim radom s učenicima prepoznata je potreba rada na spoznavanju vlastitoga identiteta i karakteristika okoline te pripadnosti široj zajednici u nacionalnome i europskome kontekstu. U tu svrhu provedeno je istraživanje anketiranjem učenika Osnovne škole Ivanska u dobi od 10 do 15 godina. Anketnim se upitnikom željelo ispitati znaju li učenici što je identitet, prepoznaju li osobni identitet i pripadnost određenoj grupi, uočavaju li odrednice hrvatskoga kulturnoga i nacionalnoga identiteta, simbola zemlje i naroda, znaju li po čemu je prepoznatljiva njihova škola i zemlja u kojoj žive te na koji način bi najbolje učili o kulturnome identitetu svoje zemlje i naroda. Rezultati su pokazali da nedovoljan broj učenika definira identitet, da polovina ispitanih određuje osobni identitet, no ne određuje pripadnost određenoj grupi, djelomično prepoznaju odrednice hrvatskoga kulturnoga i nacionalnoga identiteta, simbola zemlje i naroda, nedovoljno opažaju po čemu je

njihova škola prepoznatljiva, dok veći broj učenika uočava prepoznatljiva obilježja svoje zemlje i naroda. Većina ispitanih smatra da bi istraživački način rada, prilikom kojeg bi nastali vrijedni i trajni proizvodi, doprinio boljem razumijevanju identiteta.

U radu će biti prikazani primjeri promicanja odgoja koji pridonosi razumijevanju korijena vlastite nacionalne kulture te načini promicanja kulturne baštine, kao dijela nacionalnoga i kulturnoga identiteta.

Uloga školskih knjižnica u očuvanju kulturne baštine

Školske knjižnice pružaju učenicima i nastavnicima neprocjenjiv pristup raznovrsnim resursima koji čuvaju znanja, priče i običaje koji čine kulturnu baštinu Hrvatske. One ne služe samo kao prostor za formalno obrazovanje, već i za neformalno učenje o povijesti, jeziku, običajima i umjetnosti. Očuvanje baštine ne podrazumijeva samo arhiviranje povijesnih knjiga i dokumenata, već uključuje aktivno sudjelovanje učenika i zajednice u prenošenju tih vrijednosti.

Jedna od djelatnosti školske knjižnice je kulturna i javna djelatnost. Ona je dio odgojno-obrazovnog i knjižničnog sustava i izravno je uključena u nastavni proces te učenje. U okviru ove djelatnosti školski knjižničari provode aktivnosti kojima pridonose izgradnji kulturnoga identiteta učenika te promicanju kulturne baštine.

Aktivnosti školske knjižnice propisane su i Zakonom o odgoju i obrazovanju u osnovnoj i srednjoj školi, čl. 4., st. 3., koji ističe da je škola dužna:

Osigurati sustavan način poučavanja učenika, poticati i unapređivati njihov intelektualni, tjelesni, estetski, društveni, moralni i duhovni razvoj u skladu s njihovim sposobnostima i sklonostima; razvijati učenicima svijest o nacionalnoj pripadnosti, očuvanju povijesno-kulturne baštine i nacionalnog identiteta.

Nacionalni okvirni kurikulum ističe:

Odgoj i obrazovanje pridonose izgradnji osobnoga, kulturnog i nacionalnog identiteta pojedinca. Danas u doba globalizacije, u kojem je na djelu snažno miješanje različitih kultura, svjetonazora i religija, čovjek treba postati građaninom svijeta, a pritom sačuvati svoj nacionalni identitet, svoju kulturnu, društvenu, moralnu i duhovnu baštinu.

Prema Zakonu o knjižnicama i knjižničnoj djelatnosti te Pravilniku o obveznom primjerku školske knjižnice dužne su Nacionalnoj i sveučilišnoj knjižnici u Zagrebu dostaviti obvezni primjerak publikacija koje objavljuju te time čine sastavni dio nacionalne zbirke knjižnične građe.

Kulturna baština, prema definiciji UNESCO-a, uključuje nematerijalne aspekte poput jezika, običaja, vještina i znanja. Surađujući na projektima s ostalim baštinskim ustanovama (muzejima, arhivima, knjižnicama, kulturnim udrugama), školske knjižnice mogu biti važni promotori ovog šireg pogleda na baštinu. One, međutim, nemaju osigurana financijska sredstva iz državnoga proračuna koja bi namjenski mogla koristiti za programe kulturne i javne djelatnosti te se njihove aktivnosti, u većini slučajeva, provode zahvaljujući entuzijazmu i snalažljivosti samih školskih knjižničara.

Zavičajna zbirka školske knjižnice

Školska knjižnica mjesto je na kojemu se njeguje i čuva kulturna baština. Simbol je koji čuva tradiciju kraja, prenosi sjećanja, vjerovanja i znanje te na taj način postaje dio nacionalne i europske baštine. Njegujući zavičajnu građu, školska knjižnica izgrađuje Zavičajnu zbirku u kojoj se prikupljaju publikacije objavljene u zavičaju, publikacije autora zavičajnika, sve što je objavljeno o zavičaju ili o njegovu pučanstvu, bez obzira na mjesto objavljivanja. Zavičajne zbirke omogućuju učenicima da bolje i cjelovitije shvate život ljudi, njihovu prošlost i sadašnjost te služi za daljnja istraživanja.

„Školska zavičajna zbirka je skup zavičajnog materijala što su ga sakupili i priredili učenici i učitelji u školi radi potpunijeg ostvarivanja odgojno-obrazovnih zadaća škole” (Kranjčev, 1985, str. 7).

Zavičajne zbirke imaju veliku važnost u očuvanju i promicanju kulturne baštine. Sakupljena građa iz zavičaja prikazana na zanimljiv način obogaćuje znanje o zavičaju. Upoznavajući bogatstvo i raznolikost izložene građe u zbirci, u korisnika se pobuđuje prisniji odnos i razvija ljubav prema baštini. Uređena zavičajna zbirka doprinos je kulturnoj i javnoj djelatnosti svake knjižnice.

Neke su školske knjižnice posebnu pozornost posvetile vlastitoj izdavačkoj djelatnosti te objavljivanju djela zavičajnih autora. Na taj se način fond Zavičajne zbirke popunjava i obogaćuje informacijama i sadržajima o zavičaju, ljudima i događajima, a istovremeno se radi na očuvanju baštine i kulturnoga identiteta. U mnogim školama knjižničari i učenici skupljaju raznovrstan materijal iz zavičaja. Tako prikupljeni materijal iz prošlosti i suvremenoga učenikova okružja upotrebljavaju kao izvornu stvarnost ili dijelove te stvarnosti u ostvarivanju odgojno-obrazovnih ciljeva prilikom upoznavanja zavičaja.

U zavičajnim zbirkama školske knjižnice nalaze se predmeti i dokumentacijska građa koja prikazuje: prirodu, povijesni, gospodarski i kulturni razvoj zavičaja. Građu iz zbirke knjižničari i učitelji/učiteljice rabe u nastavi, povezuju školu sa životom i ostvaruju načelo zavičajnosti. Zadaća svakog školskog knjižničara je da u učenika/učenice pobuđuje zanimanje za spoznavanje i otkrivanje ljepote njegova zavičaja u svrhu otkrivanja gospodarskih, kulturnih i duhovnih vrijednosti svoga naroda, pa tako i domovine.

Međutim, knjižničari moraju posjedovati određene kompetencije, kao što su poznavanje zakonskih propisa koji omogućuju slobodno korištenje Zavičajne zbirke. Moraju znati pod kojim uvjetom smiju koristiti zaštićena djela autorskim pravom, propise o zaštiti osobnih podataka, kao i zakonske propise koji uređuju postupanje s kulturnim dobrom (obvezni primjerak kao cjelina smatra se kulturnim dobrom.) Upravo stoga „izuzetno značajnu ulogu u stvaranju i izgradnji zavičajne zbirke ima zavičajni knjižničar koji nije puki sakupljač građe, nego i njezin istraživač, interpretator i promotor, što podrazumijeva multidisciplinarna znanja i kompetencije, a u konačnici se odražava na stanje fonda, njegovu (široku) dostupnost, popularizaciju, uz nužnu kontekstualizaciju svake jedinice građe.” (Krpán Smiljanec, 2017, str. 53)

Projekti i istraživački radovi u školskoj knjižnici

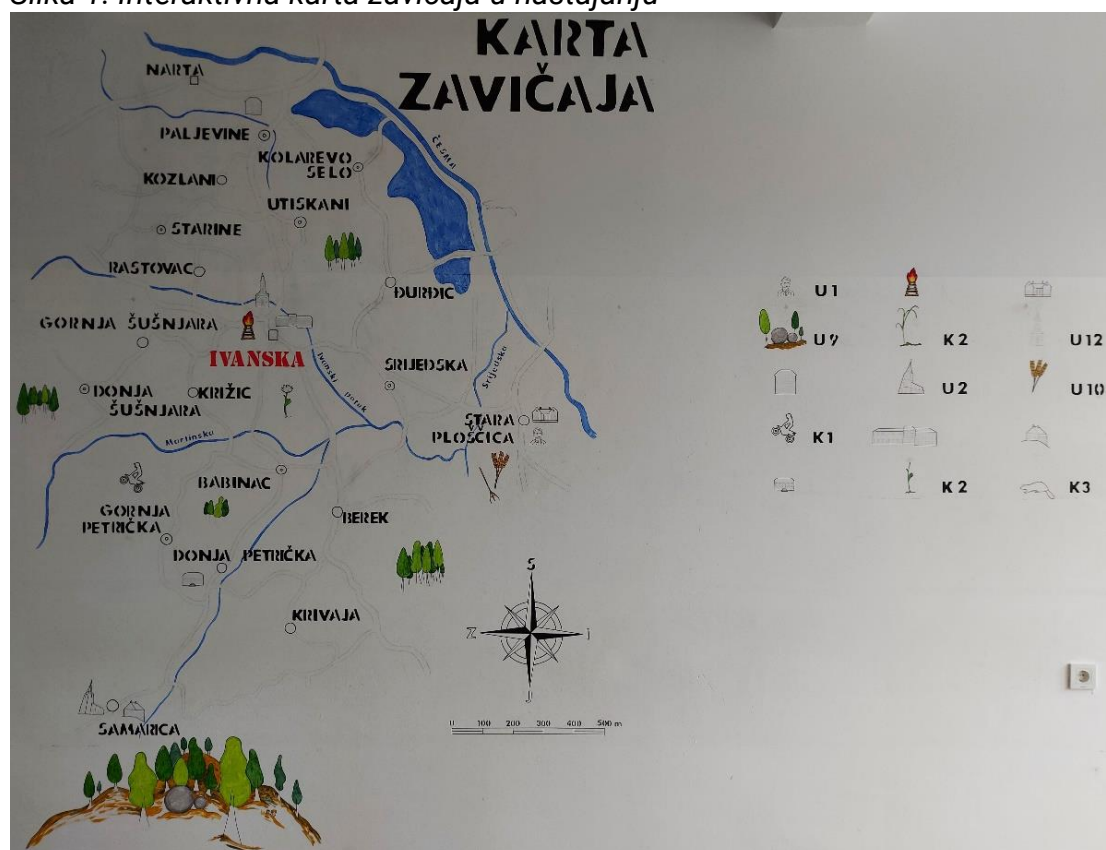
Svaka osoba trebala bi imati razvijenu svijest o vlastitom identitetu te znati kojoj kulturi pripada. Identitet se razvija od rođenja, no on se tijekom života mijenja. U razvoju identiteta veliku ulogu ima školska knjižnica koja projektima i istraživačkim radovima učenicima može pružiti osjećaj jedinstvenosti i individualnosti te ih na taj način potaknuti na razmišljanje o tome što nasljeđuju iz prošlosti. Jedan od takvih projekata je projekt knjižnice OŠ Ivanska pod nazivom „Pozdrav iz Ivanske!” financiran sredstvima Erasmus+ akreditacije.

Knjižnica je važno mjesto svake lokalne zajednice, pa i čitavoga društva. Ona je čuvar duhovnih postignuća čovječanstva.

Tijekom provođenja projektnih aktivnosti učenici su osvijestili da osobine koje članove obitelji čine drugačijima, prepoznatljivima, jedinstvenima i drugačijima zapravo čine njihov identitet. Spoznali su da se identitet razvija od rođenja pod utjecajem mnogih čimbenika. Zaključili su da ih iskustva koja su stekli na određenom prostoru oblikuju kao osobe i pratit će ih tijekom cijelog života. Učenici su imali zadatak osmisлити kako pomoći svojim vršnjacima i budućim generacijama da razviju svijest o vlastitome i zavičajnome identitetu te ih potaknuti na razmišljanje o očuvanju kulturne baštine. Odlučili su interpretacijom baštine omogućiti ostalim učenicima, budućim generacijama i široj lokalnoj zajednici, što cjelovitiji uvid u široki spektar kulturnoga blaga zavičaja te na taj način osvijestiti da ono čini njihov identitet. Cilj je također bio povećati svijest o raznolikosti i bogatstvu kulturne baštine zavičaja i njezinim vrijednostima te o potrebi njezina očuvanja.

Učenici su izradili interaktivnu kartu zavičaja koja korisnike vodi na određena mjesta u školi i upoznaje ih s kulturnom baštinom zavičaja. Na karti su označeni simboli građevina, običaja, znamenitih osoba, zaštićenih biljaka i životinja, manifestacija, Regionalnog parka prirode Moslavačka gora, itd. Učenici i ostali korisnici kartom se služe pomoću tumača znakova koji ih upućuje na kojem mjestu u školi mogu saznati nešto više o pojedinoj temi. Tako npr. bista zavičajnog pisca Đure Sudete u Staroj Ploščici vodi do dvije učionice hrvatskoga jezika koje spaja veliko rodoslovno stablo obitelji Sudeta. Slika kamenih kugli u Samarici vodi do učionice geografije na čijem zidu je oslikana Moslavačka gora i lokalitet Kamene kugle, itd. Svaki mural popraćen je tekstom koji ga pobliže opisuje.

Slika 1: Interaktivna karta zavičaja u nastajanju



Izvor: Izrada autora, 2024.

Na ovaj su način učenici i učitelji Osnovne škole Ivanska stvorili javni prostor koji pruža interpretaciju zavičajne baštine. Pružili su korisnicima znanje i potaknuli emocionalne veze s područjem na način koji je svima dostupan.

Izložbe u školskoj knjižnici u funkciji promocije kulturne baštine

Školske knjižnice raznim programima i aktivnostima pomažu učenicima razumjeti kako hrvatska kulturna baština pridonosi bogatstvu europske kulture. Knjižničnim programima poput izložbi, radionica ili predavanja, učenici se potiču na razvijanje europskog identiteta, uz istovremeno njegovanje vlastitih nacionalnih vrijednosti. „Jedan od načina osvješćivanja i buđenja ljubavi za nacionalnu baštinu leži i u izložbenome djelovanju. Postavljanjem knjižničnih informacijskih izložaba posvećenih temama hrvatskoga baštinjenog materijalnoga i duhovnoga blaga, stvara važan promidžbeni medij o hrvatskim prirodnim ljepotama, nacionalnom blagu i kulturnoj baštini.” (Tica, 2017, str. 54).

Izložbe su dio kulturne i javne djelatnosti školske knjižnice te bitno komunikacijsko sredstvo. Postavljanje izložbe u prostorima školskih knjižnica izazovan je i složen proces jer zahtijeva određen prostor i vrijeme, ali i kompetencije njezina autora/knjižničara. Unatoč tome, izložbe na učenike mogu pozitivno djelovati jer ih

obogaćuju, proširuju vidike, razvijaju kreativno mišljenje, povezuju ih s lokalnom zajednicom, omogućavaju estetski doživljaj, itd.

Knjižnični prostor školske knjižnice Ekonomske i birotehničke škole Bjelovar reprezentativan je izložbeni prostor. Dije ga četiri srednje škole (Ekonomska i birotehnička škola, Komercijalna i trgovačka, Turističko-ugostiteljska i prehrambena te Medicinska škola Bjelovar) koje uspješno i intenzivno surađuju u svim područjima, a naročito u području kulturne i javne djelatnosti, pa tako i planiranju izložbi. Prednosti zajedničkoga prostora u ovom su području knjižnične djelatnosti naročito vidljive jer svaka škola organizira minimalno jednu izložbu godišnje, koju mogu posjetiti učenici svih četiriju škola, ali i šira javnost.

Zadnjih petnaestak godina knjižnica Ekonomske i birotehničke škole Bjelovar organizirala je nekoliko značajnih izložbi kojima je tema nacionalna i kulturna baština, a u nastavku rada bit će predstavljene one koje su bile najuspješnije te koje su zainteresirale najveći broj posjetitelja.

S Ivanom Vinkovićem, mladim zaljubljenikom u zavičajnu baštinu, knjižnica Ekonomske i birotehničke škole Bjelovar uspješno surađuje posljednjih desetak godina te se ustalila praksa predstavljanja različitih tema iz naše folklorne baštine. U razdoblju od 2013. do 2022. godine zajedničkom su suradnjom ostvarene četiri velike i značajne izložbe.

Tijekom školske godine 2013./2014. postavljene su dvije izložbe: izložba zidnjaka ili kuharica (rujan 2013.) te izložba pod nazivom „Od lana do platna“ (siječanj 2014.). Autor izložaba te vlasnik izloženih predmeta je Ivan Vinković, tada učenik 3. b razreda Ekonomske i birotehničke škole, koji je posebno senzibiliziran za očuvanje baštine bilogorskoga kraja i koji s ljubavlju čuva ostavštinu koju su mu ostavili njegovi bake i djedovi.

Zidnjaci ili kuharice nekada su ukrašavali zidove radnog, svakodnevnoga prostora domaćice, a danas, već pomalo zaboravljeni, predstavljaju dragocjen izvor saznanja o svakodnevnomu životu i običajima jednoga vremena. Na njima su se često nalazili natpisi duhovitoga ili poučnoga karaktera, zahvaljujući kojima se moglo iščitati raspoloženje domaćice, njezine namjere ili neka skrivena poruka, poput *Gdje su pune zdjele, gosti se vesele; Hladna voda svakom prija, umi se ti pa ću i ja; Hrvat goste rado prima, šnjime dijeli sve što ima* i sl.

Izložba „Od lana do platna“ tekstom i fotografijama prikazala je proces proizvodnje lana i lanenog platna, uz koju je oblikovan i Pojmovnik u kojemu su na jednomu mjestu okupljeni zavičajni – bilogorski leksemi koji su vezani uz proces obrade lana i konoplje. Kako većinu leksema navedenih u Pojmovniku više ne razumijemo, njegova je nakana bila podastrijeti njihov gramatički opis i značenje kako bismo ih shvatili i oteli zaboravu. Izložba je nakon školske knjižnice postavljena na studijskom odjelu Narodne knjižnice „Petar Preradović“ u Bjelovaru, a predstavljena je kao dio programa pod nazivom „Tradicijsko tekstilno rukotvorstvo“.

Izložba pod nazivom „Iz Ivanove škrinje: narodno ruho iz privatne zbirke Ivana Vinkovića“ postavljena je 2018. godine, a na njoj je izloženo osam kompleta svečanih

nošnji iz bilogorskoga, moslavačkoga, podravskoga te prigorskoga kraja. Nošnje su samo djelić Vinkovićeve privatne zbirke koja obuhvaća oko 1000 tekstilnih predmeta koje prikuplja na terenu ili samostalno izrađuje njihovu repliku. Intencija izložbe bila je upoznati učenike s hrvatskom tradicijskom kulturom te ih potaknuti na njezino očuvanje, što je jedan od glavnih ciljeva Europske godine kulturne baštine, kojom je proglašena 2018. godina.

U Europskoj godini mladih 2022. godine postavljena je izložba „Higijenske navike naših predaka“. Tema izložbe je, nakon dvije godine kako se pojavila bolest COVID-19, bila jako dobro prihvaćena jer se o higijenskim navikama naših predaka u nastavi vrlo rijetko govori. Izložba je prikazala uporabne predmete za održavanje osobne higijene, od domaćeg sapuna od loja do drvenog umivaonika s laborom gdje se umivalo lice te ostali dijelovi tijela. Ova je izložba uspjela privući veliki broj posjetitelja različitih dobnih skupina (od vrtićke dobi do srednjoškolaca) te zainteresirati i inozemne goste za hrvatsku kulturnu tradiciju jer su je razgledali i učenici i nastavnici koji su susjednu školu posjetili u okviru Erasmus+ projekta.

Književnost zavičajnih pisaca

Jedna od odrednica kulturnoga identiteta jest književnost. Zavičajna književnost iznjedrila je u učenicima OŠ Ivanska saznanje da je povijest mjesta Ivanska još uvijek nedovoljno istražena, a zavičajni pisac Đuro Sudeta pomogao im je da bolje upoznaju sebe i svoje podrijetlo. U posljednjih nekoliko godina rodila se ideja da zavičajnu baštinu aktivnostima u knjižnici približe sebi i drugima, da ispričaju priču o osobi i mjestu koristeći različite medije, da interpretiraju baštinu, a uz to sve potaknu ostale na razmišljanje o njezinu očuvanju.

Projektom Sudetinim stazama OŠ Ivanska se, u povodu obilježavanja Europske godine kulturne baštine, na lokalnoj razini priključila europskoj proslavi sa zajedničkim ciljem podizanja svijesti o važnosti i značenju kulturne baštine.

Život i djelo zavičajnoga pisca potaknuo je učenike i učitelje na stvaralaštvo pa su tijekom godine stvarali riječju, slikom i glazbom.

U proznim djelima Sudeta donosi motive iz narodnih priča, prenosi vjerovanja i na taj način ih čuva od zaborava. To je bio i jedan od razloga za izradu i objavljivanje strip-slikovnice *Vuci* koja na suvremen način prikazuje isječak iz života jednoga lika koji se prisjeća svoga djetinjstva, opisujući pritom običaj pripreme i dočekivanja blagdana u Moslavini.

Na poticaj školske knjižničarke učenici su prepričavali Sudetinu nedovršenu novelu *Vuci* i pisali završetak. Najoriginalniji završetak je nagrađen i poslužio je za izradu istoimene strip-slikovnice. Učenica Melina Rudelić izradila je ilustracije i dijelove stripa na temelju dovršene novele, a Dea Stevanović napisala je pjesmu posvećenu piscu. Pjesmu je uglazbila učiteljica Glazbene kulture, a pod mentorstvom učiteljice Engleskoga jezika učenici su strip-slikovnicu preveli na engleski jezik. U povodu 115.

obljetnice rođenja zavičajnog pisca Đure Sudete tiskana je dvojezična knjiga, čije zadnje korice krase note uglazbljene pjesme. Pjesmu učenici izvode na manifestaciji Dani Đure Sudete, koja se svake godine obilježava u travnju, pod pokroviteljstvom Općine Ivanska. Ovom inicijativom ostvarili su suradnju i razmjenu knjiga s knjižnicama i školama u europskim zemljama (Zespół Szkół w Łękawicy, Poljska; Gümüldür Emine Yazlalı Ortaokulu, Turska; OŠ Elvire Vatovec Prade, Slovenija; Salesianos Los Boscos, Španjolska).

Dvojezična strip-slikovnica obogaćuje Zavičajnu zbirku školske knjižnice, dio je fonda Zavičajne zbirke Bjelovariana Narodne knjižnice "Petar Preradović" u Bjelovaru, a obveznim primjerkom učenici su pridonijeli stvaranju nacionalne zbirke knjižnične građe kao kulturnoga dobra.

Održivo upravljanje kulturnom baštinom ne odnosi se samo na fizičko očuvanje materijala, već uključuje i edukaciju novih generacija o važnosti očuvanja tih resursa. Digitalizacija kulturnih materijala jedan je od ključnih alata koji knjižnice mogu koristiti, što bi budućim generacijama osiguralo trajnu dostupnost kulturnoga naslijeđa. Korištenje digitalnih alata, poput virtualnih izložbi i interaktivnih sadržaja, može pomoći u prijenosu baštine na održiv način, čime se baština prilagođava suvremenim obrazovnim potrebama.

Primjer održivoga načina prezentiranja književnoga stvaralaštva je mrežna stranica pod nazivom *Razlistane riječi Katice Kovrlije*. Posvećena je profesorici i književnici Katici Kovrlji, koja je tridesetak godina radila u Ekonomskoj i birotehničkoj školi Bjelovar, a nastala je u povodu Mjeseca hrvatske knjige 2020., kada su se, uz brojna ograničenja i epidemiološke mjere mnogi kulturno-umjetnički programi održavali virtualno. Mrežna stranica napravljena je uz pomoć Google Sites servisa, a uz životopis donosi pregled pedagoško-književnog stvaralaštva profesorice Kovrlije, kratke osvrte na njezino književno stvaralaštvo preuzete iz njezinih objavljenih djela, interpretacije odabranih pjesama te ulomke neobjavljenih djela.

Izradom mrežne stranice školska se knjižnica Ekonomske i birotehničke škole Bjelovar nastojala prilagoditi novim izazovima i promjenama nastalim uslijed pandemije prouzročene koronavirusom, ali je i objedinila te na održiv način sačuvala vrijedne podatke o zavičajnoj autorici.

Obljetnice znamenitih osoba

Značajne obljetnice rođenja ili smrti znamenitih osoba često su povod za detaljnije proučavanje te za istraživanje njihova života i rada, naročito ako se radi o osobi iz zavičajne baštine.

U povodu 120. obljetnice rođenja književnika Đure Sudete učenici OŠ Ivanska su, uz podršku učiteljice Hrvatskoga jezika te knjižničarke, snimili dokumentarni film Sudetinim stazama. Đuro Sudeta umro je jedva navršivši 24 godine, ali je stvorio vrijedan i prepoznatljiv literarni opus. Istraživačkim radom u školskoj knjižnici učenici

su upoznali život i djelo pisca, izdvojili mjesta na kojima je boravio tijekom svoga života i napisali knjigu snimanja, scenarij te napravili plan snimanja. Zajedno s voditeljicama učenici su posjetili mnoge institucije, pregledali dokumentaciju, prikupili fotodokumentaciju te snimili brojne priloge. Produkcija je bila vrlo zahtjevna.

Posljednji korak bila je postprodukcija tijekom koje su snimljene scene voditeljice s učenicima montirale na računalu uz pomoć programa za montažu. Filmu su dodali i posebne vizualne i zvučne efekte. Izradili su plakate i sve pozvali na premijeru dokumentarnog filma „Sudetinim stazama“.

Održane su tri premijere. Prilog o dokumentarcu emitiran je i u HRT-ovoj emisiji Dobro jutro, Hrvatska. Dokumentarni film učitelji koriste u nastavi kao obrazovno sredstvo prilikom obrade fantastične pripovijesti Mor Ćure Sudete, djela za cjelovito čitanje u osmom razredu. Film je izazvao i velik interes kod djelatnika u slovenskom lječilištu Topolšica, u kojemu se Sudeta tijekom života liječio. Učenici su saznali da se ondje čuva njegova liječnička dokumentacija i ostvarili su suradnju u svrhu daljnjeg istraživanja.

Slika 2: Idejno rješenje za dokumentarni film Sudetinim stazama



Izvor: Izrada autora, 2024.

Tijekom 2017. godine u Ekonomskoj i birotehničkoj školi Bjelovar različitim je aktivnostima obilježena četrdeseta obljetnica smrti Krste Špoljara. Premda je za života ovaj književnik strastveno i marljivo radio, a iza sebe ostavio golemi književni opus, Špoljar se nezasluženo rijetko spominje u književnim priručnicima i leksikonima, a bilješke o njemu često su nepotpune, površne i književno-povijesno nepouzdanе.

Rođen je 1930. u Bjelovaru, a nakon završene osnovne i srednje škole odlazi u Zagreb te upisuje Filozofski fakultet na kojemu je 1954. diplomirao studij jugoslavenske književnosti i hrvatski jezik. Njegovo bogato književno stvaralaštvo obuhvaća čak

sedam romana, tri zbirke pjesama, dramu, pripovijesti i novele, a isticao se i kao vrstan urednik i književni kritičar. Godinama je radio kao ravnatelj uspješne i ugledne izdavačke kuće „Zora“, a kao urednik je pripremio dvije antologije hrvatske lirike i niz djela u ediciji Pet stoljeća hrvatske književnosti.

Špoljar se ne spominje u nastavnim programima Hrvatskoga jezika pa su učenici imali zadatke za samostalno istraživanje njegove književne baštine te su čitali i interpretirali njegovu poeziju i ulomke iz romana.

U školskoj knjižnici održano je predavanje profesora i knjižničara Ilije Pejića pod nazivom „Propješačene pustinje – kratka povijest identiteta : u povodu 40. godišnjice smrti Krste Špoljara“ te postavljena izložba *Ja svakidašnji : sjećanje na Krstu Špoljara (1977. - 2017.)*. Naročito su bile interesantne izložene knjige koje je Špoljar vlastoručno potpisao i posvetio svojoj sestri Sanki i majci Elzi, a koje je za izložbu ustupio njegov nećak i tadašnji ravnatelj Ekonomske i birotehničke škole Bjelovar, Vojislav Kranželić. Prvi su se puta mogle vidjeti i neke književnikove obiteljske fotografije, koje su za potrebe izložbe digitalizirane, a neke od njih su nastale 50-ih godina 20. stoljeća na poznatim mjestima u gradu Bjelovaru (groblje sv. Andrije, bjelovarski korzo, sajmište).

Različitim aktivnostima, koje su objedinjene i na posteru, obilježena je obljetnica te je ostvaren cilj - približiti učenicima život i književno stvaralaštvo zanemarenoga pisca čije je djelovanje i angažman u promicanju slobode izražavanja bilo snažno i vrijedno u nepogodnim i teškim vremenima.

Hrvatski jezik kao kulturna baština

Jedna od odrednica hrvatskoga kulturnog i nacionalnog identiteta te simbol naše kulture i naroda jest glagoljica. S pojmom glagoljice učenici se prvi put susreću u 4. razredu osnovne škole u tekstovima iz Hrvatskoga jezika i sadržajima iz predmeta Priroda i društvo. To su počeci njihova učenja o povijesnim i kulturnim znamenitostima te osobama koje su nekoć bile graditelji pozitivnih promjena u društvu. Glagoljica je obilježila i djetinjstvo učenika OŠ Ivanska. Upravo iz tog razloga učiteljica Hrvatskoga jezika i knjižničarka odlučile su radost učenja, igre i stvaranja podijeliti s drugima, sa svima onima koji vole pisanu riječ i stvaralaštvo.

Godina 2021. proglašena je Godinom čitanja. Bio je to pravi trenutak da čitaju svi zajedno, i to na glagoljici. U prosincu 2020. godine iz tiska je izašla knjiga Mala glagoljska početnica koju su autorice predstavile u povodu obilježavanja Godine čitanja. Tisak su financirali Bjelovarsko-bilogorska županija i Općina Ivanska. Budući da je trajalo razdoblje pandemije i nije bilo dozvoljeno okupljanje, autorice su o knjizi, zajedno s učenicima, snimile film pod nazivom Putevima glagoljice. Film govori o tome kako je nastalo staroslavensko pismo, što tisak danas znači, što je značio izum tiskarskoga stroja nekad, u kakvoj su vezi glagoljica i Ivanska, ali i kakvu joj budućnost predviđaju. Mala glagoljska početnica sastavljena je od pet cjelina: Mali leksikon hrvatske glagoljice, Mala glagoljska krasnopisanka, Zagonetna glagoljica, Kreativna glagoljica i Razigrana glagoljica.

Slika 3: Naslovnica knjige Mala glagoljska početnica



Izvor: Izrada autora, 2024.

U povodu obilježavanja Dana europske baštine učenici i učitelji Škole svake godine provode Azbukijadu, natjecateljske igre u društvu s glagoljičkim slovima, nastale po uzoru na Malu glagoljsku početnicu. Ove natjecateljske igre provode se i prilikom posjeta učenika iz drugih škola, kako iz naše zemlje, tako i iz zemalja članica EU, kada učenici predstavljaju i promoviraju staroslavensko pismo.

Suvenir kao alat za promociju i očuvanje baštine

Simboli lokalnoga i nacionalnoga identiteta te promotori kulturne baštine su i školski suveniri.

Suvenir je predmet koji sadrži spomen na određeni događaj, mjesto ili osobu i obično se kupuje prilikom posjeta nekom kraju ili kulturno-povijesnoj znamenitosti. Dolazi od francuske riječi 'souvenir', što znači sjećanje. Suveniri su dio materijalne baštine te identitetskih obilježja određenoga lokaliteta. Njihova uloga je višestruka. Oni su pripovjedači, prenose sjećanja i čuvaju priče lokalne kulture, a njihovom izradom pridonosi se održivosti kulturne baštine. Osim toga, potencijal suvenira krije se i u njegovoj mogućnosti komuniciranja sa širom javnošću jer omogućuje i povećava vidljivost ustanove u kojoj je nastao.

Na kreativnim radionicama u školskoj knjižnici učenici osmišljavaju školske suvenire koji predstavljaju lokalni i nacionalni identitet. Ciljevi aktivnosti su poticanje poduzetničke kulture u društvu, razvoj pozitivnoga odnosa prema identitetu naroda te privrženost kulturnoj baštini. Poticaj za osmišljavanje školskoga suvenira pronađen je u jednom od najpoznatijih nacionalnih simbola, glagoljici.

Učenici OŠ Ivanska izradili su dva suvenira, glagoljski kalendar i magnet - glagoljsko slovo. Prilikom izrade kalendara koristili su se motivima i informacijama iz knjižničnoga fonda i baštine. Kalendar obuhvaća tablicu hrvatske glagoljice, mjesečne

kalendare, natuknice, aktivnosti nakon čitanja natuknica, poveznice na interaktivne sadržaje i rješenja zadataka. Oblikovan je na način da svaka stranica predstavlja jedan mjesec u godini.

Uz pomoć natuknica na stranicama kalendara korisnici se upoznaju s najvažnijim pojmovima glagoljske baštine. U kategoriji Saznaj više proširuju svoje znanje dodatnim sadržajem, do kojeg dolaze skeniranjem QR koda. Rješavajući zagonetke, korisnici imaju priliku otkrivati glagoljična slova i njihove nazive te upoznati brojnu vrijednost. Kalendar nudi i ideje za izradu glagoljskih ukrasa, a do uputa se također dolazi skeniranjem QR koda. Kalendar sadrži tablični te numerički prikaz koji se nalazi na marginama, i to na glagoljici. Na taj način korisnici ujedno uče kako se pišu brojevi na glagoljici.

Glagoljski kalendar kao suvenir učenici su predstavili na međunarodnom Milenijskom natjecanju iz kreativne industrije koje je održano u prosincu 2024. godine na Ekonomskom fakultetu u Osijeku. Riječ je o natjecanju usmjerenom na inovacije u obrazovanju i kulturi unutar europskog okvira.

Slika 4: Stranica iz kalendara za mjesec lipanj

Lipanj

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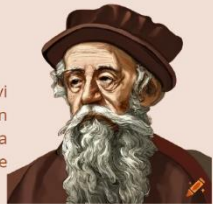
Johannes Gutenberg oko 1450. g. izumio je vlastiti tiskarski stroj i proizveo prve otiske pomičnim slovima. Njegov je izum promijenio povijest.

Saznaj više!



Johannes Gutenberg

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PON	UTO	SRI	ČET	PET	SUB	NED
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30



Zagonetna glagoljica

Slovo sam koje znači je ili jest. Slično sam slovu E iz našeg, latiničnog, pisma, osim što sam okrenut u suprotnu stranu. Ja sam _____.

Kreativna glagoljica



Izvor: Izrada autora, 2024.

Magnet – glagoljsko slovo učenici su izradili od glinamola, a potom ga oblikovali ravnalom. Kada se osušio, obradili su ga brusnim papirom i obojili bojom po želji. Na poleđinu su pričvrstili magneti.

Školski suvenir OŠ Ivanska dio su preventivnog projekta „Pričama pomažemo djeci“ financiranog od strane Ministarstva znanosti, obrazovanja i mladih.

U Ekonomskoj i birotehničkoj školi Bjelovar glagoljica se, kao važna sastavnica hrvatskog identiteta, također našla na školskom suveniru. U veljači se, u povodu Dana hrvatske glagoljice i glagoljaštva, organiziraju radionice na kojima učenici uče glagoljska slova te njima ispisuju kraticu škole. Kratica se utiskuje u glinamol, a nakon obrade, bojanja i lijepljenja magneta nastaje školski suvenir.

Suveniri naših dviju škola obavezan su poklon svima onima koji nam dolaze u posjet, ali i onima koje posjećujemo. Članovi naših Erasmus+ timova suvenire su nosili na mobilnosti pa su tako, putujući Europom, promovirali glagoljicu.

Slika 5: Glagoljski magnetić OŠ Ivanska



Izvor: Izrada autora, 2024.

Slika 6: Školski suvenir Ekonomske i birotehničke škole Bjelovar



Izvor: Izrada autora, 2024.

Zaključak

Školske knjižnice imaju značajnu ulogu u promicanju hrvatske kulturne baštine jer su mjesta obrazovanja, kulture, informacija i društvenoga povezivanja. One ne služe samo kao čuvari knjiga, već kao aktivni promicatelji hrvatske kulturne baštine u širem europskom kontekstu. Njihova uloga je ključna u obrazovanju mladih generacija o vrijednostima i značaju kulturnoga naslijeđa, kako bi ga mogli prenijeti i razvijati u budućnosti, unutar europskoga i globalnoga kulturnoga okvira.

Planiranim aktivnostima knjižnice podupiru razvoj osobnoga, grupnoga, nacionalnoga i europskoga identiteta učenika. Pri planiranju aktivnosti knjižničari vode brigu o tome da koriste sadržaje koji su od lokalnoga značaja, prate događaje i važne obljetnice, znamenite osobe hrvatske i europske povijesti, kulture te znanosti. Provođenjem aktivnosti školski knjižničari razvijaju kod učenika svijest o identitetu i važnosti očuvanja kulturne baštine, upoznaju učenike s kulturnom i prirodnom baštinom, sa znamenitim osobama koje su doprinijele razvoju i napretku te vrijednosti kulturnoga identiteta širile izvan granica svoje domovine.

Kao čuvar kulturne baštine, promicatelj održivosti i mjesto koje širi svijest o europskome identitetu, knjižnica potiče učenike na razmišljanje o važnosti očuvanja prošlosti i stvaranja održive budućnosti. Integracijom ovih vrijednosti u svakodnevni rad, školske knjižnice pridonose jačanju kulturne svijesti i promicanju zajedničkoga europskoga naslijeđa među mladima.

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POUČAVANJE TEMELJNIH VRIJEDNOSTI EUROPSKE UNIJE U PRVOJ RIJEČKOJ HRVATSKOJ GIMNAZIJI

Helena DE KARINA
Prva riječka hrvatska gimnazija, Rijeka
helenadekarina@gmail.com

Sandra VIDOVIĆ
Prva riječka hrvatska gimnazija, Rijeka
svidov34@gmail.com

Sažetak

Predmet/ishodište rada: U članku se naglašava važnost temeljnih vrijednosti Europske unije u obrazovnom kontekstu i ističe ključna uloga škole u njihovoj integraciji u društvo. Iako obvezni obrazovni programi imaju zadatak osigurati razumijevanje tih vrijednosti, često ne uspijevaju u potpunosti, što se pokušava nadoknaditi uvođenjem građanskog odgoja koji se u Hrvatskoj od 2019. godine provodi kao međupredmetna tema. Posebno se naglašava uloga izvannastavnih aktivnosti u promicanju europskih vrijednosti među učenicima na primjerima iz Prve riječke hrvatske gimnazije: Književni program Rijeka riječi, školski list Kult te fakultativne predmete Kreativno čitanje i pisanje i Škola i zajednica. Sudjelovanjem u radu navedenih izvannastavnih aktivnosti i fakultativnih predmeta učenici su usvojili i internalizirali vrijednosti poput dostojanstva, slobode, jednakosti i ljudskih prava čitajući suvremenu književnost, razgovarajući o istoj s autoricama i autorima, pišući za školski list Kult ili aktivno doprinoseći vidljivosti određenoga problema u lokalnoj zajednici i šire tijekom pohađanja Škole i zajednice, tj. ŠIZ-a.

Ciljevi: Cilj je ovoga rada analizirati i prikazati kako se temeljne vrijednosti Europske unije mogu učinkovito integrirati u obrazovni proces kroz formalne i neformalne obrazovne aktivnosti. Rad istražuje izazove u implementaciji ovih vrijednosti unutar formalnog obrazovnog sustava, posebno kroz književnost, te nudi prijedloge za poboljšanje postojećih obrazovnih praksi.

Metodologija: Metodologija se temelji na kvalitativnoj analizi obrazovnih programa, aktivnosti i inicijativa u Prvoj riječkoj hrvatskoj gimnaziji koje su usmjerene na promicanje europskih vrijednosti. Istraživanje se provodi kroz nekoliko ključnih koraka:

1. Analiza dokumentacije
2. Kvalitativna analiza sadržaja
3. Intervjui i ankete
4. Komparativna analiza
5. Kritička refleksija

Rezultati: Prva riječka hrvatska gimnazija uspješno koristi različite obrazovne i izvannastavne aktivnosti za promicanje temeljnih vrijednosti Europske unije. Iako su postignuti značajni uspjesi, identificirana su i područja koja zahtijevaju daljnji razvoj kako bi se osigurala sveobuhvatna i inkluzivna integracija europskih vrijednosti u obrazovni sustav.

Ključne riječi: europske vrijednosti, građanski odgoj i obrazovanje, izvannastavne aktivnosti, formalno obrazovanje, demokratsko društvo

Uvod

Dostojanstvo, sloboda, demokracija, jednakost, vladavina prava, ljudska prava temeljne su vrijednosti Europske unije, no one nisu samo pravni i politički ciljevi, već su i moralni standardi koji oblikuju zajednički europski identitet, ali ujedno predstavljaju i moralne standarde univerzalne vrijednosti na kojima bi trebalo počivati globalno obrazovanje 21. stoljeća. Škole, kao formalne i temeljne obrazovne institucije, odgovorne su za integraciju tih vrijednosti u obrazovni proces. Iako bi obvezni obrazovni programi trebali omogućiti učenicima razumijevanje građanskih vrijednosti, često u tome ne uspijevaju u potpunosti. To se pokušava nadoknaditi uvođenjem građanskog odgoja i obrazovanja u formalni obrazovni sustav. U nekim državama Europske unije učenike se obrazuje za aktivno građanstvo u okviru samostalnih nastavnih predmeta, a u Republici Hrvatskoj toj se problematici pristupa kao međupredmetnoj temi. Međupredmetna tema građanskog odgoja i obrazovanja regulirana je donošenjem *Nacionalnog kurikulum za međupredmetnu temu građanski odgoj i obrazovanje za osnovne i srednje škole* 2019. godine. Međupredmetne teme ostvaruju se međusobnim povezivanjem odgojno-obrazovnih područja i nastavnih tema svih nastavnih predmeta. Donošenje kurikuluma utemeljeno je na Europskom referentnom okviru u kojem se navodi da građanske kompetencije usvojene tijekom obveznog obrazovanja nisu vezane za određeni predmet već se odnose na šire međupredmetne ciljeve i predstavljaju poveznicu od poučavanja prema cjeloživotnom učenju. U tom kontekstu podrazumijeva se da je riječ o temi, odnosno temama koje imaju mnoge dodirne točke s različitim sadržajima i predmetima te da je u okviru redovne nastave moguće poučavati i građanski odgoj i obrazovanje, a time i temeljne vrijednosti EU. Međutim, u praksi to često nije tako jednostavno, najčešće zbog opterećenosti specifičnim sadržajima određenog nastavnog predmeta. U tom kontekstu izvannastavne aktivnosti i fakultativni predmeti mogu odigrati ključnu ulogu, nudeći učenicima praktične prilike za internalizaciju i primjenu ovih vrijednosti u radu i svakodnevnom životu. U ovome će se članku prikazati kako izvannastavne aktivnosti mogu djelovati kao moćni alati za promicanje europskih vrijednosti među učenicima, ali i šire. Analizirat će se konkretni primjeri iz Prve riječke hrvatske gimnazije, izvannastavne aktivnosti Književni program *Rijeka riječi* i školski list *Kult* te fakultativni predmet Kreativno čitanje i pisanje u Škola i zajednica.

U prvom dijelu članka fokus će biti na ulozi književnih programa i važnosti čitanja u promicanju europskih vrijednosti. Drugi će se dio usredotočiti na ulogu školskog lista s posebnim naglaskom na pristup kontroverznim temama u obrazovanju. Treći se dio odnosi na inovativni predmet građanskog odgoja i obrazovanja *Škola i zajednica* u čijem je stvaranju i implementaciji u srednje škole Republike Hrvatske sudjelovala i Prva riječka hrvatska gimnazija, odnosno nastavnice Helena de Karina i Laura Angelovski, predvođene ravnateljicom Jane Sclaunich.

Razrada

Književni program Rijeka riječi

U Prvoj riječkoj hrvatskoj gimnaziji 2017. godine, povodom obilježavanja 390. obljetnice Škole, osmišljen je i pokrenut *Književni program Rijeka riječi*, zamišljen kao niz književnih radionica i susreta s reprezentativnim suvremenim spisateljicama i piscima koji djeluju u Rijeci ili okolici okupljenim oko neformalne književne skupine RiLit. Kako je u školi postojao velik interes za druženja s književnicima, tako je program prerastao u međugeneracijski fakultativni predmet *Kreativno čitanje i pisanje* za učenike 3. i 4. razreda općeg gimnazijskog smjera. Iako je predmetni kurikulum i festivalski program inicijalno zamišljen i usmjeren na razvijanje jezičnih djelatnosti čitanja, pisanja, slušanja i govorenja s ciljem približavanja suvremenog književnog stvaralaštva mladima, prvenstveno čitanjem, istovremeno je i afirmirao europske vrijednosti kod polaznica i polaznika. Naime, odabir književnih djela, nastavne metode i aktivnosti, gostujući književnici, ali i gostujuće škole iz raznih dijelova Hrvatske, kao i susjednih zemalja, značajno su doprinijeli povezivanju učenika koji dolaze iz različitih sredina i kulturološkog okruženja te je time dodatno olakšano razumijevanje važnosti poštovanja ljudskog dostojanstva, slobode, demokracije, jednakosti, vladavine prava i ljudskih prava. No, ono što je još važnije od razumijevanja jest činjenica da su iste vrijednosti tim aktivnostima ujedno i posredno implementirane u život škole, učenica i nastavnica.

Teorijsko polazište za pokretanje književnog programa, ali i školskog lista *Kult*, o kojemu će kasnije biti riječi, može se naći već u ideji koju u prošleme stoljeću zastupaju Jean Paul Sartre i Hannah Arendt. Sartre vidi književnost kao angažman u stvarnosti, odnos prema stvarnosti, emancipatorsko oruđe, međutim u obrazovanju ne vidi potencijalne saveznike jer obrazovni sustav doživljava kao sustav obojan ideologijama i dogmama. U kontekstu poučavanja europskih vrijednosti unutar obrazovnog procesa važno je naglasiti da te vrijednosti nisu ideologija – od koje u obrazovanju zazire Jean-Paul Sartre (1981) – već predstavljaju temeljne ljudske vrijednosti čiji bi smisao trebao biti upravo suprotan ideološkim isključivostima, jer služe zaštiti različitosti. Sartreova filozofija naglašava važnost individualne slobode i izbora, što se izravno može povezati s obrazovnim procesom. Prepoznajući da egzistencija prethodi esenciji (1997), obrazovni djelatnici mogu stvoriti okruženje u kojem učenici nisu samo pasivni primatelji znanja već aktivni sudionici u oblikovanju svog razumijevanja. Međutim, Sartre je smatrao da obrazovni sustav kakav jest ne može to posredovati jer je njegova primarna zadaća reproducirati postojeće društvene odnose te je na taj način u službi ideologije. Naime, da bi se neke vrijednosti nazivale temeljima, moraju biti zasnovane na filozofskim, moralnim, pravnim i kulturnim osnovama koje su oblikovale ljudsko društvo kroz povijest, a prepoznate su kao univerzalne.

Hannah Arendt (1958) pak ističe da nastavnik mora razumjeti okolnosti u kojima radi svoj posao. Školu doživljava kao privremeno mjesto koje se nalazi između djeteta i svijeta. Ona ima dvije zadaće: mora naučiti dijete kako preživjeti u svijetu, a istovremeno ga mora naučiti kako očuvati svijet. Škola bi po Hanni Arendt trebala

osigurati prijelaz, tj. razvoj djeteta od zaštićene osobe do osobe koja će štiti druge i zajednicu. U tom se razmišljanju nameće pitanje odgovornosti obrazovnog sustava prema djeci koja su povjerena učiteljima u procesu obrazovanja. Od škole se očekuje simulacija stvarnog svijeta kako bi djeca naučila kako se u nj uključiti i o njemu brinuti. Misao o simulaciji svijeta kao pripremi za stvarni život u kontekstu obrazovanja danas razvija suvremena američka filozofkinja Martha Nussbaum (2005). Ona u svome radu analizira ulogu književnosti kao svojevrsnog poligona života. To razmišljanje potkrepljuje tvrdnjom o emocijama koje čitanjem doživljavamo. Smatra da te emocije mogu biti duboke i stvarne, ali istovremeno ne rezultiraju stvarnim posljedicama. To im daje karakter simulacije, vježbe, eksperimenta i čini odgovarajućim odgovarajućim nastavnim sredstvom. Prema Marthi Nussbaum to su neki od najvažnijih razloga zašto književnost treba čitati u školi. Cilj čitanja je razvoj kritičkog mišljenja i empatije, vježbanje moralnog prosuđivanja, a ne poučavanje književnost kao estetske vrijednosti i elitistički shvaćene kulture. Za očekivati je da će svako vježbanje moralnog prosuđivanja dovesti do temeljnih vrijednosti Europske unije koje u tom procesu postaju i osobne, intrinzične vrijednosti onoga koji prosuđuje s obzirom na to da mu nisu nametnute izvana već su samostalno izvedene čitanjem i prosuđivanjem o onome što se čita.

Međutim, nameće se pitanje kako poučavati književnost tako da ona postane oruđe emancipacije temeljnih ljudskih vrijednosti? Najčešći problem u ostvarenju toga cilja je ranije spomenuta usmjerenost nastave književnosti na književnu teoriju i povijest književnosti. Suzanne S. Choo (2021), kako je navedeno u Veličković (2024), ističe kako estetičkom i socijalnom u poučavanju književnosti, kao i književnoj kritici, nedostaje etičko. Kritizira zanemarivanje konteksta, najčešće etičkog u odnosu na društvo i odnose o kojemu tekst govori što dovodi do toga da učenici ne nauče čitati književnost kao oblik autorovog etičkog angažmana, a time ostaju zakinuti za cjelovitost čitateljskog doživljaja, ali i razvijanje građanskih kompetencija. Osim usmjerenosti na književnu teoriju i tekst kao takav, za poučavanje književnosti, a posebice za poticanje čitanja i razvoj cjelokupne ličnosti, posebno je važno pitanje što tekst kazuje o nama u našem svijetu. Jednako je tako važno i što ne govori o nama.

U redovnoj nastavi, odnosno u Kurikulu, kada su u pitanju navedeni ciljevi, nejasno je što se nastavom književnosti želi postići, stvaranje književnoteorijski potkovanih čitatelja koji ne vole čitati ili poticanje čitanja i stvaranje čitateljske publike. Upravo ta nejasnoća omogućuje prijepore i neujednačenost u poučavanju. Naime, Kurikulum kao dokument za nastavu hrvatskoga jezika utemeljen je u lošem kompromisu između tih dvaju ciljeva što omogućava da se nastavi pristupa neujednačeno. Ta je neujednačenost gotovo neminovna s obzirom na preporučene lektirne naslove koje karakterizira anakronost u odnosu na one kojima su namijenjeni, a to su učenici. Na tekstovima koji ne korespondiraju s čitateljima, ili to čine slabo, ne može se razvijati čitateljska publika. Istovremeno se u toj situaciji ne može stvoriti ni educirani čitatelj jer se književna teorija uči na tekstovima koje učenici često ne razumiju već na razini jezika, ne samo tematike pa im i nisu zanimljivi. U toj situaciji učenje se svodi na ono što se na svakom koraku ističe kao negativno i neučinkovito u razvijanju kognitivnih i emocionalnih potencijala učenika, a to je reproduciranje sadržaja bez vještine primjene.

Inicijalno je predmetni kurikulum bio zamišljen mnogo otvorenije, što bi nastavnicima omogućavalo veću slobodu i autonomiju izbora lektirnih i drugih književnih naslova, no nakon burne javne rasprave ta je autonomija dijelom sužena preporučenim lektirnim popisom koji se uvelike odmiče od temeljnih ljudskih vrijednosti Europske unije. Naime, najmlađi naslovi na tom popisu nastali su sredinom prošloga stoljeća. Već sama ta činjenica utječe na mogućnost poučavanja i promoviranja temeljnih ljudskih vrijednosti EU u odnosu na aktualne europske i globalne probleme. Zbog vremena nastanka preporučenih književnih djela, suvremene etičke dvojbe i pitanja, koja recentna književnost istražuje, ostaju zanemarena. No, upravo su te teme iznimno važne za obrazovanje novih generacija jer ih pripremaju za suočavanje s izazovima današnjice i budućnosti, što posredno doprinosi i njihovoj konkurentnosti na tržištu rada. Naime, s obzirom na starost preporučenih književnih djela dolazi do razmjernog zanemarivanja suvremenih etičkih dvojbi i pitanja koja se u recentnom književnom stvaralaštvu problematiziraju, a koja su iznimno važna za obrazovanje novih generacija jer ih osposobljavaju za nošenje s izazovima današnjice i budućnosti što posredno utječe i na njihovu konkurentnost na tržištu rada. Najeksplicitniji argument u prilog činjenici da je u hrvatskom formalnom obrazovanju otežano poučavanje temeljnih ljudskih vrijednosti Europske unije u okviru nastave književnosti jest činjenica da se na preporučenoj listi lektirnih naslova, koja broji više od stotinjak autora, nalaze svega tri ženske spisateljice: Virginia Woolf, Sylvia Plath i Vesna Parun. Ta brojka sama za sebe dovoljno govori o položaju temeljnih europskih vrijednosti u nastavi hrvatskoga jezika. Nezastupljenošću žena u lektiri ugrožene su jednakost, ravnopravnost, dostojanstvo i ženska prava kao dio ljudskih prava. Srećom, preporučeni popis nije i obveza što se dodatno jamči sljedećim objašnjenjem: *Pri izboru književnoga teksta za čitanje učitelju i nastavniku preporučuje se odabir suvremenih tekstova za poticanje literarnoga čitanja prema načelima: od poznatoga prema nepoznatome, od bliskoga prema udaljenome; tj. učenik se s temom ili žanrom upoznaje na suvremenim tekstovima, a potom produbljuje spoznaje i vještine na tekstovima iz književnopovijesnih i stilskih razdoblja. (Odluka o donošenju kurikuluma za nastavni predmet Hrvatski jezik za osnovne škole i gimnazije u Republici Hrvatskoj, NN10/2019)*

U tom je kontekstu moguće i proširiti mogućnosti za poučavanje temeljnih ljudskih vrijednosti Europske unije na reprezentativnim suvremenim književnim tekstovima. Dakle, da ne postoji nekoliko rečenica koje osiguravaju autonomiju nastavnika i slobodu izbora suvremenih tekstova iz hrvatske i svjetske književnosti u okviru formalnog poučavanja hrvatskog jezika, obrazovni bi sustav u određenoj mjeri zakinuo učenike za adekvatno obrazovanje u globalnom svijetu, ne samo u odnosu na temeljne vrijednosti Europske unije već i šire. Iako su izvannastavne aktivnosti dio formalnog sustava, ipak pružaju mnogo veće mogućnosti za poučavanje „izvan okvira“ zbog nepostojanja obveze sumativnog vrednovanja ovladanosti ishodima koje uvjetuje daljnje obrazovne mogućnosti učenika.

U nastavku slijedi popis dijela gostujućih autorica i autora čija su djela tematski vezana uz temeljne ljudske vrijednosti na kojima počiva Europska unija, a koje su čitali učenici Prve riječke hrvatske gimnazije na nastavi fakultativnog predmeta *Kreativno čitanje i pisanje*, a isti su učenici i sudjelovali u radu izvannastavne aktivnosti,

Književnog programa *Rijeka riječi*. Ta je izvannastavna aktivnost zamišljena kao nastavak fakultativnog predmeta. Na nastavi su učenici razgovarali o pročitanoj primjenjujući i teoretska znanja, a potom su u sklopu izvannastavnih aktivnosti imali priliku družiti se s autoricama i autorima čija su djela čitali i uživo razgovarati o pročitanoj uz poseban naglasak na vrijednosti koje se u njima promoviraju.

Čitanjem i analizom književnih djela, potom razgovorom s autoricama i autorima učenici razvijaju kritičko mišljenje i kulturu dijaloga što su ključni aspekti demokratskog društva. Upoznaju se s konceptom pravde i solidarnosti čitajući djela koja kroz likove i radnje apostrofiraju vrijednosna pitanja i teme. Osim toga, čitajući, učenici shvaćaju važnost kulturne raznolikosti i poštovanja prema različitim identitetima.

Ove aktivnosti ne samo da su obogatile školski život, već su i značajno doprinijele razvoju građanskog obrazovanja i svjesnosti o europskim vrijednostima. Učenicima je pružena prilika da se uključe u različite društvene i kulturne projekte, što također potiče razumijevanje i primjenu temeljnih vrijednosti Europske unije.

Školski list Kult

Mediji su ključni u obrazovanju i promicanju temeljnih vrijednosti EU jer pružaju informacije, omogućuju dijalog, povezuju aktualne događaje s vrijednostima, obogaćuju kulturno razumijevanje, potiču građanski angažman i pružaju obrazovne mogućnosti i materijale za mlade. Pomoću raznih medijskih formata i platformi, građani mogu bolje razumjeti, cijeniti i primjenjivati temeljne vrijednosti Europske unije u svakodnevnom životu. Upravo zbog svega navedenoga iznimno je važno poticati i razvijati medijsku pismenost kod mladih. U Prvoj riječkoj hrvatskoj gimnaziji sedam se godina stvara i objavljuje školski list *Kult*. *Kult* je izdanak lista koji su početkom osamdesetih godina prošloga stoljeća u školi pokrenuli Edi Jurković i Dragan Ogurlić, danas obojica renomirani novinari. List je bio tiskan u crno-bijeloj tehnici i formatu A5, a istu je formu zadržao i današnji list. *Kult* je svojedobno obilježio kulturni identitet škole, ali i Rijeke u cjelini, svojim oštrim i kritičkim tekstovima, sklonim ironiji i satiri, iz redova *Kulta* brojni su se učenici kasnije otisnuli u novinarske i kulturne profesije te su danas značajna imena hrvatske kulture i umjetnosti. *Kult* je nakon tridesetak godina stanke ponovno započeo s izlaženjem istim povodom zbog kojeg je pokrenut i Književni program *Rijeka riječi*, u sklopu obilježavanja 390. rođendana Škole. Zamišljen je kao platforma za slobodno iznošenje mišljenja učenika Prve riječke hrvatske gimnazije, za propitivanje društvenih pojava, nepravdi i pravdi te za bilježenje dobrog i lošeg iz učionica i hodnika škole. Karakterizira ga kritički pristup društvenim i kulturnim temama koje nisu usmjerene isključivo na školu. List je prepoznatljiv po satiričnom tonu i odstupanju od standardnih obilježja školskog lista s obzirom na jezik i tematiku. Učenici imaju zajamčenu slobodu izražavanja, ali uz obvezno poštovanje tuđih prava i promicanje jednakosti. Time se u izvannastavnoj aktivnosti stvaranja školskog lista ostvaruje ideja demokracije. Nastavnička uloga je mentorska i facilitatorska.

Od samog početka izlaženja „novi“ je *Kult* zapažen na natjecanjima, ali i od struke, te je do 2023. godine redovito bio među najboljim srednjoškolskim listovima na državnoj razini smotre LiDraNo. Međutim, 2023. godine list nije pozvan na državnu smotru. Razloge za tu odluku treba tražiti u kontroverznosti broja koji je tematski posvećen vulgarizmima u jeziku i pravu na pogrešku. Naime, već su 2022. godine dvije članice prosudbenog povjerenstva za školske listove državne Smotre LiDraNo negativno komentirale tematsku usmjerenost i jezik lista upućujući tadašnju urednicu na praćenje školskih aktivnosti umjesto društveno-političkih aktualnosti. Osim toga, snažna je kritika upućena listu i zbog korištenja žargona i vulgarizama. Upravo zbog tih je razloga uredništvo kao temu sljedećeg broja izabralo vulgarizme i pravo na pogrešku. No, očito su zamjerke iz 2022. godine eskalirale s novim brojem koji je obilovao tekstovima na zadanu temu broja, ne štedeći pritom jezik pa zbog toga i nije bio pozvan na državnu Smotru unatoč brojnim pohvalama i podršci stručne javnosti. U tom se kontekstu otvara mnoštvo dvojbi i za raspravu poticajnih pitanja. Ako se učenici u školama ne smiju baviti kontroverznim temama, pa čak i u neobveznim izvannastavnim aktivnostima, onda su vrijednosti takve škole suprotne idealu demokracije. Takva škola obrazuje i odgaja intelektualno inferiorne građane, a njezina uloga postaje indoktrinirajuća. Zabranom kontroverznih tema nameće se samo jedan ispravan sustav vrijednosti i vjerovanja što je odlika indoktrinacije. Rezultati indoktrinacije u praksi se najčešće manifestiraju kao inzistiranje na određenim uvjerenjima bez obzira na istinu, razloge i argumente onih koji misle suprotno. To sigurno ne smije biti cilj obrazovanja, osobito ne onoga koje se eksplicitno zalaže za kritičko mišljenje i razvoj empatije te poučavanje u skladu s vrijednostima Europske unije. Takvo bi obrazovanje trebalo djelovati posve suprotno – preispitivati sustave vjerovanja, dovoditi do promjena u osobi samoj, a posljedično i u društvu. Cilj izvannastavne aktivnosti stvaranja školskog lista je naučiti učenike kritički misliti, osvijestiti misaoni i radni proces, put kojim se do spoznaje dolazi, a time im dati alate kako to postići u bilo kojoj pa i izvanobrazovnoj situaciji. Sustav koji ne indoktrinira je sustav koji počiva na sumnji, preispitivanju, dokazivanju, uključuje i uvažava različite perspektive, slobodu i ljudska prava, dok je indoktrinacija utemeljena u fragmentiranom pristupu koji od činjenica i dokaza u procese mišljenja uključuje samo ono što joj odgovara i na temelju toga se stvaraju zaključci. Pritom se, prema Nenadu Veličkoviću (2024), pojavljuje konzervativizam kao negacija vrline. Vrlina se svodi na vokabular. Nadalje, kaže kako je u tom kontekstu seksualnost nešto prljavo, jezik nešto čisto, a to dvoje zajedno dobitna su cenzorska kombinacija. Time se rasprava sa suštine prebacuje na nevažno pa se kompleksnost umjetničkog djela ili poruke zanemaruje, a u prvi se plan dovode zamjerke, najčešće na osobnoj razini ili na razini određenog zatvorenog kolektiviteta, izdvajaju se i analiziraju riječi koje se u školi ne smiju čuti, u ovom slučaju vulgarizmi, bez obzira na to što je riječ o njihovoj funkcionalnoj ulozi, a ne bezrazložnom i besmislenom psovanju. No, unatoč neostvarenom plasmanu na državnu razinu Smotre Lidrano, učenici koji su sudjelovali u stvaranju školskog lista za 2023. iskazali su iznimno zadovoljstvo zbog očuvanja vlastitog integriteta, u odnosu na indoktrinaciju i oduzimanje sloboda, odlukom da cijeli broj posvete „zabranjenoj temi“ uz jasnu svijest o mogućim posljedicama. Tu su vlastitu odluku doživjeli, prema njihovim riječima, kao pobjedu demokracije, pravde i slobode. Dakle, rad na školskom listu učinio ih je zagovornicima, štoviše borcima za temeljne vrijednosti Europske unije.

Škola i zajednica

Fakultativni predmet *Škola i zajednica* (ŠIZ) osmišljen je u suradnji Sveučilišta u Rijeci, Prve riječke hrvatske gimnazije, Centra za kulturu dijaloga i Instituta za društvena istraživanja u Zagrebu. Od školske godine 2022./2023, provodi se u trima hrvatskim županijama, Gradu Zagrebu, Primorsko-goranskoj županiji i Krapinsko-zagorskoj županiji. ŠIZ se temelji na postavci da je za ostvarivanje osobne i društvene dobrobiti kod učenika nužno razvijati znanja, vještine i stavove o važnosti povezanosti u zajednici i aktivnog djelovanja pojedinaca. Predmet je utemeljen na pristupima aktivnog poučavanja i učenja. To su prije svega učenje zalaganjem u zajednici, projektno te istraživačko poučavanje i učenje. Korištenjem metoda suradničkoga i iskustvenoga učenja osigurava se demokratsko okružje u kojem učenici sami prepoznaju i analiziraju pojave važne za njihov život. Analizom pojava učenici zajednički identificiraju probleme vezane za pojave u zajednici te temeljem istraživanja i osobnog iskustva predlažu moguća rješenja problema u zajednici. Ovim pristupima demokratizira se proces poučavanja i učenja, a provedbom istraživanja i boravkom u okružju, u kojem se prepoznati problem odvija, učenici stječu cjelovito iskustvo aktivnog građanstva.

Učenici Prve riječke hrvatske gimnazije su se u školskoj godini 2022./2023. bavili temom migranata jer je u trenutku kada su izabirali problem kojim će se baviti na nastavi ŠIZ-a Rijeka postala migrantski tranzitni punk. Ljudi su spavali na riječkom kolodvoru bez krova nad glavom, gladni i bez mogućnosti da zadovolje osnovne higijenske potrebe. To je istovremeno predstavljalo i rizik za javno zdravstvo grada. Humanitarno pitanje postalo je javno kad se na kolodvoru pojavila aktivistkinja i humanitarka Tinka Ines Kalajžić koja je počela pomagati migrantima, a potom i pozivati na solidarnost. Taj su poziv i potrebu prepoznali učenici Prve riječke hrvatske gimnazije osjetivši su da je riječ o nepravdi i da je potrebno djelovati. Razgovarali su s Centrom za mirovne studije u Zagrebu koji im je dao zakonske okvire prema kojima je Hrvatska dužna postupati s ljudima u tranzitu. Potom su razgovarali i s lokalnom vlašću i organizirali humanitarnu božićnu akciju prikupljanja nužnih potrepština. Kontaktirali su i Hrvatske željeznice (HŽ) te s njima održali sastanak o tome kako HŽ postupa prema ljudima koji borave na kolodvoru. Učenici su temu istražili i razgovarajući sa stanarima u okolnim zgradama, ispitivali su ugostitelje te trgovce, intervjuirali taksiste koji prevoze migrante. Sakupljeni rezultati pokazali su da su strahovi utemeljeni u predrasudama, a da su ljudi u izravnom doticaju svoje predrasude izgubili. Istražujući temu istovremeno su brojnim razgovorima i senzibilizirali sugrađane o problemu. Nastava fakultativnog predmeta *Škola i zajednica* u potpunosti je utemeljena u vrijednostima Europske unije što je u konačnici primijetila i šira javnost pa osim što su aktivnosti učenika Prve riječke hrvatske gimnazije vezane uz migrantsko pitanje prepoznali mediji, učenici su i nagrađeni za svoj rad nagradom *Nada Dimić*. Gimnazijalke i gimnazijalci iz Rijeke najmlađi su dosadašnji dobitnici nagrade *Nada Dimić* koja se dodjeljuje onima koji su svojim djelom i javnim angažmanom ostavili važan trag u javnom, kulturnom i društvenom djelovanju, a čije su originalne, inovativne i provokativne prakse motivirane kritikom vladajućih odnosa u društvu i doprinosom promjenama ekonomskih, socijalnih i političkih odnosa u prostoru u kojem djeluju. Nagradom se odaje priznanje onima koji

se odupiru sve snažnijem sužavanju građanskih sloboda. Osim ove nagrade, Prva riječka hrvatska gimnazija dobila i nagradu *Krunoslav Sukić* za mirotvornu školu. U obrazloženju nagrade navodi se kako je PRHG otvorena i hrabra učeća zajednica za mir, a svi navedeni primjeri pokazuju mogućnosti, ali i prepreke za aktivno poučavanje, promoviranje i implementaciju temeljnih vrijednosti Europske unije u škole i obrazovni sustav.

Zaključak

Književni program *Rijeka riječi* i školski list *Kult* predstavljaju primjere kako obrazovanje može postati platforma za promicanje europskih vrijednosti, demokratskih principa i kritičkog mišljenja. Ovi programi pokazuju da književnost nije samo umjetnički izraz nego i moćan alat za poticanje dijaloga o društvenim i kulturnim temama, razvijanje empatije i osnaživanje mladih da prepoznaju i suoče se s izazovima suvremenog svijeta.

Ipak, ograničenja poput nedostatka suvremenih tema u službenom kurikulumu te povremeni pokušaji ograničavanja slobode izražavanja ukazuju na potrebu za sustavnim promjenama u obrazovnim praksama. Inicijative poput *Kulta* i *Rijeka riječi* ukazuju na mogućnost povezivanja formalnog obrazovanja s aktualnim društvenim pitanjima, ali također otkrivaju koliko je važno poticati nastavničku kreativnost i autonomiju.

Uz podršku nastavnika i škola, ovi programi ne samo da promiču građansko obrazovanje već i osnažuju mlade za aktivno sudjelovanje u društvu, potičući ih na kritičko preispitivanje stereotipa, razumijevanje različitosti i djelovanje u skladu s demokratskim vrijednostima. Oni pridonose oblikovanju generacije koja će biti sposobna preuzeti odgovornost za vlastitu budućnost, promicati pravdu i ravnopravnost te činiti temelje održivih i solidarnijih zajednica.

Kako bi obrazovni sustav ispunio svoj puni potencijal, važno je osigurati da ovakvi programi ne ostanu izolirani primjeri, već postanu integralni dio školskog sustava. To zahtijeva suradnju svih dionika – od nastavnika i učenika do obrazovnih institucija i donositelja politika – kako bi škole postale prostor slobodnog izražavanja, stvaralaštva i autentičnog učenja. Tako obrazovanje nije samo prijenos znanja, već i proces osnaživanja pojedinaca za doprinos boljem i pravednijem društvu.

Rad ističe važnost integracije europskih vrijednosti poput dostojanstva, slobode, demokracije, jednakosti, vladavine prava i ljudskih prava u obrazovni proces. Prikazom različitih aktivnosti iz Prve riječke hrvatske gimnazije pokazano je kako škola može postati platforma za promicanje ovih vrijednosti na način koji nadilazi formalni kurikulum. Radom je ukazano na to da, iako je formalni obrazovni sustav u Hrvatskoj suočen s izazovima u poučavanju temeljnih europskih vrijednosti, postoji značajan potencijal u izvannastavnim aktivnostima i fakultativnim predmetima. Oni ne samo da dopunjuju formalni kurikulum, već često i nadmašuju njegova ograničenja, omogućavajući učenicima da internaliziraju i primijene vrijednosti koje će ih voditi kroz

život. Na taj način škole mogu postati istinski prostori za razvoj ne samo obrazovanih, već i odgovornih, kritički osviještenih građana Europske unije.

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VRIJEDNOSTI MLADIH I SUDJELOVANJE MLADIH U DRUŠTVU

Maja KASAPOVIĆ
Strukovna škola Virovitica
majapecek@gmail.com

Gordana KOVAČ
Strukovna škola Virovitica
gordana.kovac2@skole.hr

Antonio RISOVIĆ
Strukovna škola Virovitica
antonio.risovic@gmail.com

Sažetak

Predmet/ishodište rada: Mladi su vrlo zanimljiva skupina za istraživanje preko koje se mogu dobiti različiti uvidi za razumijevanje postojećeg društva. Isto tako, oni mogu biti i vrlo dobar indikator za razumijevanje u kojem će se smjeru društvo kretati. Socijalizacija, i primarna i sekundarna, pojavljuje se kao relevantni proces prilikom kojeg mladi oblikuju svoj sustav vrijednosti. Autori su istraživanje usmjerili na analizu srednjoškolaca i njihovih obrazaca socijalizacije, vrijednosti, korištenja slobodnog vremena te sudjelovanja u društvu.

Ciljevi: Glavni ciljevi istraživanja uključuju razumijevanje kako mladi ljudi u srednjoj školi oblikuju svoje vrijednosti, na koje načine provode slobodno vrijeme i koliko su aktivni u društvenim i zajedničkim aktivnostima.

Metodologija: Autori su se u ovom istraživanju najvećim dijelom koristili već postojećim upitnikom kojeg su proveli istraživači Instituta za društvena istraživanja u Zagrebu i Filozofskog fakulteta Sveučilišta u Zagrebu (Ilišin i Spajić, 2015, str. 156-193). Korišten je upitnik s pitanjima zatvorenog i otvorenog tipa, a sastojao se od šest skupina pitanja. Istraživanje je provedeno na populaciji učenika Strukovne škole Virovitica u dobi od 14 do 19 godina. Uzorak je uključio 238 učenika, od kojih su obuhvaćeni svi smjerovi od prvog do četvrtog razreda srednje Strukovne škole 2024./2025. školske godine.

Rezultati: Prema dobivenim podacima vidljivo je da su još uvijek prisutne tradicionalne vrijednosti u obiteljskom okruženju. Interes za trenutnim i daljnjim školovanjem kod učenika opada. U svim ispitivanim segmentima vidljiva je slaba zainteresiranost mladih za politiku i politička zbivanja te vrlo slaba zainteresiranost za sudjelovanje u bilo kakvim civilnim udrugama ili organizacijama. Najvažniji problemi kojima su mladi danas okupirani su ovisnosti te način provođenja slobodnog vremena i zabava gdje odgovornost prvenstveno pripisuju roditeljima, a najmanje institucijama. Ovo istraživanje pruža uvid u socijalnu dinamiku srednjoškolaca Strukovne škole Virovitica te može poslužiti kao temelj za razvoj politika i programa koji će podržati njihovo pozitivno socijalno, kulturno i građansko uključivanje te može poslužiti u budućnosti za kronološku analizu i usporedbu dobivenih podataka.

Ključne riječi: mladi, mladi kao aktivno društvo EU-a, vrijednosti, slobodno vrijeme, socijalizacija

JEL klasifikacija: A13, J17, R20

Uvod

U prirodi čovjeka je da promišlja o onome što je dobro i ispravno te o onome što nas čini sretnima. O vrijednostima se raspravljalo od doba antičke Grčke. Sokrat, jedan od najistaknutijih filozofa toga doba govorio je o vrlinama koje je usko povezivao s vrijednostima. Smatrao je da su vrline smisao života. Nadalje, Platon je smatrao da su najvažnije vrline umjerenost, mudrost i pravednost. Za Aristotela je razboritost bila najvažnija vrлина. Brojni su se znanstvenici pridružili grčkim filozofima koji su započeli rasprave o vrlinama i vrijednostima. Predmet interesa su istraživanja društvenih i humanističkih znanosti od kojih psihologija ima veliku ulogu od sredine 20. stoljeća. Psiholog G. Allport navodi da su vrijednosti krajnji ciljevi ljudske motivacije koji se mogu izravno pripisati ili proizlaze iz pojedinčevih osnovnih potreba ili instinkata, (...) a opskrbljuju pojedinca dominantnim životnim ciljem, interesnom orijentacijom ili svrhom koja njegov život čini smislenim (Allport, 1960, kako je navedeno u Ferić, 2009). Psiholog Rokeach definirao je vrijednosti kao trajna vjerovanja da su određeni načini ponašanja ili krajnja stanja postojanja, osobno ili društveno poželjniji od oprečnih ili suprotnih načina ponašanja ili stanja (Rokeach, 1973, kako je navedeno u Ferić, 2009). Nadalje, psiholog Schwartz smatra da su vrijednosti poželjni ciljevi, različite važnosti, koji nadilaze specifične situacije, a djeluju kao usmjeravajuća načela u čovjekovu životu (Schwartz, 1992, kako je navedeno u Ferić, 2009). Autorica Meg Rohan naglašava da svi autori, bez obzira na stavove koje zastupaju, većinom podržavaju istu pretpostavku: postoji konačan broj „univerzalnih vrijednosti“, odnosno svi ljudi posjeduju iste vrijednosti, a razlike postoje samo s obzirom na hijerarhiju tih vrijednosti, odnosno relativnu važnost koju im pojedinci pridaju (Rohan, 2000, kako je navedeno u Ferić, 2009). Stoga bismo vrijednosti mogli definirati kao poželjne ciljeve koji služe kao vodeća načela u životu, a razlikuju se po važnosti i u konačnici tvore hijerarhiju vrijednosti.

Iz navedenog proizlazi zaključak kako su vrijednosti od krucijalne važnosti za razumijevanje i objašnjenje ponašanja pojedinaca i skupina, u ovom radu srednjoškolaca, a isto tako i predviđanja njihovog budućeg ponašanja. Same vrijednosti nisu nešto nepromjenjivo, već su podložne promjenama. S tim su promjenama u vrijednosnom sustavu povezane i društvene promjene. Primjerice, istraživanje vrijednosti adolescenata prije i za vrijeme Domovinskog rata pokazalo je da je tijekom rata kod mladih došlo do porasta važnosti obiteljske sigurnosti i slobode, u odnosu na predratno razdoblje, dok je istovremeno uzbudljiv život postao značajno manje važan (Dević, 2022, kako je navedeno u Franc, Sučić, Šakić, 2008, 137). U istraživačkom izvještaju Ilišin i Spajić Vrkaš navode u zaključku kako uz opći pad isticanja gotovo svih vrijednosti njihova je hijerarhija u odnosu na prošla istraživanja uglavnom stabilna, pa su vrijednosti koje konstituiraju privatnu sferu i dalje znatno više prihvaćene od onih koje pripadaju javnoj sferi. Ipak, indikativno je da među mladima

raste važnost obitelji i rada, a opada zaokupljenost zabavom i razonodom (Ilišin i Spajić Vrkaš, 2015, str. 136).

Vrijednosti pojedinca nastaju kao rezultat socijalizacije pod utjecajem individualnog iskustva i društvenih čimbenika (Schwartz i Bilsky, 1994, kako je navedeno u Dević, 2022). Svaki pojedinac od najranije dobi prolazi kroz spomenuti složeni cjeloživotni proces učenja tijekom kojega usvaja znanja, stavove, norme i vrijednosti. Socijalizacija podrazumijeva i razvoj socijalnih i emocionalnih vještina u interakciji s drugima. Te su vještine prijeko potrebne kako bi osoba sudjelovala u životu društva. Tijekom primarne socijalizacije obitelj je ta koja igra ključnu ulogu u oblikovanju osobe i daje osnovu za daljnji razvoj i integraciju u društvo. Obitelj kao institucija je univerzalna, no kroz povijest se i obitelj mijenjala sukladno društvenim promjenama. Tako se danas kroz literaturu spominju i brojni alternativni stilovi života odnosno drugačiji načini obiteljskog života koji su utjecali na promjenu tradicionalne obiteljske zajednice koja se temelji na braku. Promjena u shvaćanju definicije obitelji kao institucije utječe i na sustav vrijednosti pojedinaca. Sekundarna socijalizacija započinje u kasnijem djetinjstvu kada osoba dolazi u kontakt s drugim osobama izvan obitelji te s drugim institucijama kao što su vrtić, škola, fakultet, radno mjesto, klubovi, udruge, političke organizacije i sl. Ovaj tip socijalizacije je permanentan, odvija se tijekom cijeloga života.

Slobodno vrijeme igra značajnu ulogu u izgradnji identiteta, sustava vrijednosti pojedinaca, posebno tijekom razvoja u djetinjstvu i adolescenciji. Kako mladi koriste svoje slobodno vrijeme, koje aktivnosti odabiru i s kim provode te trenutke može u velikoj mjeri utjecati na njihovu percepciju svijeta, osobne interese, stavove i vrijednosti. Slobodno vrijeme fenomen je nastao u industrijskoj civilizaciji kada dolazi do ubrzanog tehnološkog razvoja i masovnog zapošljavanja, a paralelno s tim i do skraćanja radnog vremena (Martinić, 1977, kako je navedeno u Ilišin i Radin, 2002). Slobodno se vrijeme u svakodnevnom životu i u sociološkoj znanosti prije svega promatra u relaciji spram društveno obveznog rada. Pritom se smatra da karakter rada u znatnoj mjeri određuje ponašanje pojedinca u njegovom slobodnom vremenu, ali i pretpostavlja da način korištenja slobodnog vremena može utjecati na karakter rada (Burns, 1973, Parker, 1975, Božović, 1979, kako je navedeno u Ilišin i Radin, 2002). No, kako je slobodno vrijeme postalo masovna pojava i kako se, uvjetno rečeno, osamostalilo kao zasebna sfera svakodnevnog života, raste i njegova važnost u toj mjeri da neki autori sugeriraju da u suvremenom životu izbor profesije može ovisiti i o poželjnom obrascu slobodnog vremena (Rapaport & Rapaport, 1974, Parker, 1975, kako je navedeno u Ilišin i Radin, 2002). Teorijska promišljanja i empirijski uvidi pokazali su da način provođenja slobodnog vremena, osim o značajkama društveno obveznog, odnosno profesionalnog rada ovisi i o drugim vrlo važnim elementima, kao što su socioklasna pripadnost, obrazovanje, mjesto stanovanja, spol, dob, bračni status itd. (Roberts, 2004, Rojek, 2005, Rojek, Shaw, Veal, 2006, kako je navedeno u Ilišin i Spajić Vrkaš, 2015).

U istraživačkom izvješću koje su provele Ilišin i Spajić Vrkaš pokazalo se da 73% mladih ima više od 3 sata slobodnog vremena dnevno. Okosnicu njihova slobodnog vremena čini druženje s prijateljima, ponajviše u kafićima te sjedenje pred računalom

i televizorom. Slično je bilo i ranijih desetljeća, s tim da je na mjesto radija i rock glazbe stupilo računalo s internetom kao novim medijem. U većini ostalih aktivnosti mladi najviše sudjeluju ponekad, i pomoću njih se najbolje mogu identificirati razlike u stilovima života raznih podskupina mladih. No, homogenizaciji mladih u načinu provođenja slobodnog vremena pridonosi i trajno većinsko nesudjelovanje u aktivnostima poput bavljenja političkim, volonterskim, humanitarnim ili honorarnim radom. Također su rijetki odlasci u kazalište, na umjetničke izložbe i javne tribine kao i slušanje klasične glazbe, ali i igranje igara na sreću. Pokazuje se da je "tipično" slobodno vrijeme mladih popunjeno druženjima i medijskim sadržajima te uglavnom ispražnjeno od javnog djelovanja i sadržaja tzv. elitne kulture (Ilišin i Spajić Vrkaš, 2015., str. 128-129).

Metodologija

Autori su se u ovom istraživanju najvećim dijelom koristili već postojećim upitnikom kojeg su proveli istraživači Instituta za društvena istraživanja u Zagrebu i Filozofskog fakulteta Sveučilišta u Zagrebu (Ilišin i Spajić, 2015, str. 156-193). Istraživanje je provedeno na populaciji učenika srednje Strukovne škole Virovitica u dobi od 14 do 19 godina. Uzorak je uključio 238 učenika, od kojih su obuhvaćeni svi smjerovi od prvog do četvrtog razreda srednje Strukovne škole 2024./2025. školske godine.

Kao instrument za prikupljanje podataka korišten je upitnik s pitanjima zatvorenog i otvorenog tipa. Sastojao se od šest skupina pitanja koja su se odnosila na socio-demografska obilježja, vrijednosti mladih, problemi mladih i aktivno sudjelovanje u društvu, aktivno pravo glasa, stav prema Europskoj uniji i slobodno vrijeme.

Upitnik je napravljen u aplikaciji Forms te podijeljen učenicima na satu razrednika na početku školske godine 2024./2025. Ispunjavanje upitnika trajalo je 20 minuta. Za izračun, sažimanje i analizu podataka te kako bi se napravile usporedbe, vidjeli uzorci i trendovi podataka korištene su zaokretne tablice programa Excel .

Rezultati

Socio-demografska obilježja ispitanika

U ovoj tablici prikazana je struktura uzorka mladih koji su u Strukovnoj školi Virovitica popunili upitnik i podaci koji će biti temelj naše analize.

Tablica 1: Struktura uzorka mladih, 9. rujna 2024. godine

Obilježja	%
Spol	
Muški	25%
Ženski	75%
Razred	
1. razred trogodišnjeg usmjerenja	4,20%

1. razred četverogodišnjeg usmjerenja	19,33%
2. razred četverogodišnjeg usmjerenja	21,01%
2. razred trogodišnjeg usmjerenja	3,78%
3. razred četverogodišnjeg usmjerenja	21,43%
3. razred trogodišnjeg usmjerenja	5,46%
4. razred četverogodišnjeg usmjerenja	24,79%
Stalno mjesto boravka	
Grad (Virovitica, Slatina)	33,61
Selo i prigradska naselja	66,39
Stupanj obrazovanja oca	
(Ne)završena osnovna škola	4,20%
Četverogodišnja srednja škola	21,01%
VŠS, VSS i više	19,33%
Stupanj obrazovanja majke	
(Ne)završena osnovna škola	23,95%
Četverogodišnja srednja škola	66,81%
VŠS, VSS i više	9,24%

Izvor: Izrada autora

Promatrano područje istraživanja je Strukovna škola Virovitica koja obrazuje učenike u dva sektorska područja: ekonomija i trgovina te turizam i ugostiteljstvo. Većina učenika je uobičajeno ženskog roda. Konkretno, ovaj upitnik ispunilo je 25% učenika i 75% učenica. No, ovo istraživanje više će se bazirati na uzrast učenika i razlike u njihovom načinu razmišljanja, stavovima i vrijednostima. U promatranom uzorku najmlađi su učenici prvih razreda koji većinom imaju 14 godina, a najstariji učenici četvrtih razreda gdje neki imaju i 19 godina.

Većina učenika stanuje u ruralnim naseljima, njih 66%, a 34% u gradovima Virovitica i Slatina. Za razumijevanje socijalnog statusa naših učenika važno je primijetiti da 23,4% roditelja ispitanika ima (ne)završenu osnovnu školu, od čega 93% živi u ruralnim naseljima. Ukupno 67,3% roditelja završilo je srednju školu, a 9,3% ima završenu višu ili visoku školu.

Od ukupnog broja ispitanih učenika 27% ima nezaposlenu majku, a 14% nezaposlenog oca. Većina očeva i majki privređuje izvan obiteljskog doma osiguravajući stalne prihode od rada ili mirovine, ukupno očeva 86%, a majki 63%. Dvije trećine naših učenika (67%) živi s oba roditelja koji su u bračnoj zajednici, njih 6% je kod samohranih roditelja, u izvanbračnoj zajednici živi 5%, 21% živi s razvedenim roditeljima, a 1% u skrbničkoj obitelji.

Vrijednosti mladih

Prof. Ilišin u svom radu navodi da je za razumijevanje stavova i obrazaca ponašanja mladih nužan uvid u njihov sustav vrijednosti, posebice ako se pod utjecajem

promijenjenih društvenih okolnosti zbivaju transformacije vrijednosti koje zahtijevaju preispitivanje društvenih aktera zaduženih za odgoj, obrazovanje i socijalizaciju mladih. U skladu s navedenim analizirat će se vrijednosti te poželjnosti određenih životnih okolnosti mladih kako bi se moglo zaključiti koliki utjecaj na njih imaju dob, obiteljsko okruženje te mjesto stanovanja.

Učenicima se postavilo pitanje koliko im je osobno poželjna svaka od navedenih okolnosti te su dobiveni ovakvi odgovori: 88% učenika smatra potpuno poželjnim ili uglavnom poželjnim živjeti mirno u krugu obitelji, a 65% smatra poželjnim živjeti u skladu s učenjem svoje vjere. Od ukupnog broja učenika njih 82% želi biti svoj gospodar i baviti se onim što želi, i to uglavnom učenici četverogodišnjih usmjerenja, 72% smatra poželjnim imati ugledan društveni položaj, dok 62% priželjkuje doći na rukovodeći položaj. No, za školovanje i obrazovanje velik interes ima samo 42% učenika, dok 49% ima osrednji interes. Također, 53% učenika izražava velik interes prema radu i poslu, a njih 41,1% osrednji interes. Najveći interes za rad iskazuju učenici četvrtih razreda, a najmanji učenici prvih razreda.

Jednako tako učenicima je važno razonoditi se i zabavljati po volji, što njih 66% smatra potpuno i uglavnom poželjnim te iskazuje u tom smjeru velik interes. Najveći interes za zabavu iskazuju učenici četvrtih razreda, a najmanji učenici prvih razreda. S druge strane, 30% učenika smatra uglavnom nepoželjnim ili potpuno nepoželjnim potvrditi se u radu političkih stranaka i institucijama, 48% politiku ne smatra ni poželjnom ni nepoželjnom, a 61% navodi da nema nikakav interes za politiku i politička zbivanja. Polovina njih su učenici trećih i četvrtih razreda. Od onih koje politika jako zanima, ukupno 4,6%, polovina njih su učenici drugih razreda.

60% učenika izražava osrednji interes za naciju i nacionalizam, a 26,4% velik interes. Najveći postotak, jedna polovina, otpada na učenike drugog razreda četverogodišnjih usmjerenja, a ostatak čine učenici trećih i četvrtih razreda. Učenici trećeg razreda trogodišnjih usmjerenja uglavnom ne iskazuju nikakav interes za nacionalizam. Učenika koji iskazuju velik interes za nacionalizam ima tek 4%, a obuhvaća ravnomjerno učenike prvih, drugih i četvrtih razreda.

Čak 86% nema nikakav ili ima osrednji interes za vojsku. U tome prednjače prvi i treći razredi, dok se kod drugih i četvrtih razreda ističe 14% velikog interesa. 25% učenika nema nikakav interes za sport, a osrednji interes za sport ima 50% učenika svih razreda i smjerova. Također, 78% ne iskazuje nikakav ili ima osrednji interes za umjetnost i kulturu, a 80% nema nikakav ili ima osrednji interes za znanost i znanstvena dostignuća. S obzirom na mjesto boravka za navedene vrijednosti nije uočena značajna razlika u zainteresiranosti, odnosno učenici i sa sela i iz grada podjednako su nezainteresirani za navedeno.

Nadalje, učenici su upitani koliko im je važna svaka od sljedećih vrijednosti društvenog i političkog poretka: za 93,7% ispitanih najvažnija vrijednost je poštivanje ljudskih prava. Sloboda, jednakost, nacionalna ravnopravnost i očuvanje prirode su za 80% uglavnom ili u potpunosti važni. U usporedbi s navedenim, najmanji postotak njih odabrao je vladavinu prava (63%) te demokratski i višestranački sustav (50,5%) kao

nešto važno u njihovom životu. Od 8-10% učenika misli da su im te vrijednosti u potpunosti ili uglavnom nevažne, a tih učenika ima podjednako u svim usmjerenjima i razredima.

Između ostalog, učenike se pitalo koliko je u hrvatskom društvu za uspjeh u životu važno ono oku "skriveno". Ukupno 84% misli da su za napredak uglavnom ili izrazito važni poštenje, pravednost i korektan odnos prema drugima. Na drugom mjestu po izrazitoj važnosti im je imati sreće (80,7%), zatim profesionalna odgovornost i zalaganje na poslu (80,2%) te stečena znanja i sposobnosti (78,7%). Na petom mjestu su osobne ili obiteljske veze i poznanstva (72,7%), a na šestom lukavost i snalažljivost (68,9%). Podmićivanje utjecajnih osoba, pripadnost većinskoj naciji ili religijskoj zajednici za 30 do 38% učenika čini se važnim faktorom za uspjeh u životu, dok 42% ne može procijeniti važnost.

Na pitanje koliko vjeruju svakoj od sljedećih institucija u državi najveći postotak učenika uglavnom ili potpuno vjeruje crkvi (65,6%), zatim vojsci (61,7%) te policiji (53,3%), a ostali učenici su neodlučni po tom pitanju. Vezano uz ostale institucije u društvu, od 50 do 61% učenika neodlučno je po pitanju povjerenja sindikatima, javnim službama, velikim tvrtkama, organizacijama civilnog društva, pravosuđu, lokalnim vlastima i političkim strankama. Uočen je kritičniji stav prema Hrvatskom saboru, Vladi RH, Predsjedniku RH i medijima jer od 30 do 35% ispitanih učenika tim institucijama uopće ili uglavnom ne vjeruje, dok je od 44 do 48% neodlučno.

Broj učenika koji dijele isto mišljenje podjednak je u sve četiri generacije. Pretpostavlja se da je uzrok tome nedostatak informacija o spomenutim institucijama što može biti poticaj nastavnicima da se više posvete tom području u radu s učenicima.

Problemi mladih i aktivno sudjelovanje u društvu

Naime, 42% učenika smatra da su najvažniji problemi mladih danas ovisnosti (alkoholizam, narkomanija). Za 31% to su prevelika okupiranost zabavom i potrošnjom, a za 25% nasilje, vandalizam, nizak životni standard te nedostatak životne perspektive. Potpuno ili uglavnom nevažnim problemom smatraju važnost "veza" za uspjeh u životu (43%). Za 36% učenika nezaposlenost je najmanje važan problem, a za 25% to je manjak interesa za društvena i politička zbivanja.

Kao odgovor na pitanje što bi trebalo učiniti da se problemi mladih u društvu počnu djelotvornije rješavati na prvo mjesto su stavili kako treba osigurati sudjelovanje mladih u procesu odlučivanja na svim razinama (51%). Sljedeće je po redu da treba osigurati jednake šanse u obrazovanju i zapošljavanju za sve (39%). Više od 30% učenika smatra da treba uvesti stroge kazne za dilere droga, ograničiti prodaju alkohola te zakonom ograničiti i nadzirati sastajališta mladih.

Za 61% učenika najodgovorniji za rješavanje problema mladih u društvu su roditelji. Na drugom i trećem mjestu su organizacije mladih te organizacije civilnog društva, a na začelju vjerske ustanove (40%), Vlada (38%) i mediji (33%).

Kada je riječ o uključenosti učenika u različitim organizacijama ili skupinama, najveći broj njih, čak 68% nije član niti jedne organizacije. Najveći postotak onih koji jesu uključeni članovi su sportskih klubova (18,5%), zatim vjerskih organizacija (11,3%), volonterskih organizacija (8,4%) ili kulturnih udruga (7,6%). Mali postotak učenika, od 3 do 5%, članovi su neke političke stranke, mirotvorne udruge, udruge za zaštitu okoliša ili za zaštitu ljudskih prava. Najčešća motivacija za članstvo u nekoj od organizacija je za 57,6% učenika potreba da rade nešto korisno. Za 55,9% učenika to je želja za druženjem i upoznavanjem novih ljudi te stjecanjem novih znanja i vještina. Zbog pripadnosti organizaciji ili udruzi, 53,8% uključenih učenika ima osjećaj da u suradnji s drugima može mijenjati stvari na bolje, 49,6% kroz članstvo ostvaruje svoje potrebe i interese, a 38% smatra da je to prilika da se njihov glas čuje. Najveći postotak uključenih učenika je iz četverogodišnjih usmjerenja gdje prednjače četvrti i treći razredi.

65% učenika navodi da uglavnom ili u potpunosti sudjeluje u odlukama na razini vlastite obitelji. Među svojim prijateljima to uspijeva 67,9% učenika, a u školi 50,9% učenika. Većina, od 50-53%, smatra da na razini države i županije uglavnom ili u potpunosti nema utjecaj na važne odluke. Zanimljivo je primijetiti da podjednak postotak učenika ima osjećaj da može utjecati na odluke u lokalnoj zajednici, 28%, naspram 34% koji tvrde da uglavnom ili uopće to ne mogu. Pozitivno mišljenje imaju učenici trećih razreda, a potom učenici četvrtih razreda. Najveći poticaj na aktivno sudjelovanje u društvu daju im prijatelji (69,8%) i obitelj (65,2%), zatim poznate javne osobe, internetski forumi, portali te obrazovni sustav (44%). Što se tiče vjerskih organizacija, organizacija mladih i civilnog društva te političkih stranaka oko 50% učenika bilo je neodlučno.

Najveći interes za sudjelovanje u aktivnostima s ciljem rješavanja problema u društvu učenici su iskazali za glasovanje na izborima (36,5%) te akcijama za prikupljanje sredstava za rješenje nekog problema (33,6%). S druge strane, 45% uopće ili uglavnom nije spremno sudjelovati u uličnim prosvjedima niti se uključiti u rad političkih stranaka. Ipak, 11,8% je uglavnom ili potpuno spremno uključiti se u rad političkih stranaka, a 14,3% sudjelovalo bi u uličnim prosvjedima. Oba tipa učenika može se naći u četverogodišnjim usmjerenjima gdje prednjače četvrti razredi.

Aktivno pravo glasa

Učenici Strukovne škole Virovitica s obzirom na prijedlog da mladi s navršениh 16 godina dobiju aktivno pravo glasa su se u 103 slučaja s njim složili, 68 ih smatra da prijedlog nije dobar, a 67 ne zna. Dok je 45% učenika prvih razreda suglasno s ovim prijedlogom, 22,61% se protivi prijedlogu, a 32,39% ne zna bi li ovaj prijedlog bio dobar. U drugim razredima 54,78% učenika suglasno je s prijedlogom, 18,11% mu se protivi, a 27,11% je neodlučno. Kod učenika trećih razreda 34,92% podržava prijedlog, 40,72% ga ne podržava, dok se 24,36% ne može odlučiti. Među učenicima četvrtih razreda ovaj prijedlog podržava 38,98% učenika, 42,37% ga ne podržava, a 18,64% ne zna bi li ovaj prijedlog bio dobar ili ne. Uočava se da su učenici prvih i drugih razreda u velikom postotku suglasni za uvođenje prava glasa mlađima od 16 godina, ali su u isto vrijeme

i najneodlučniji, dok je kod učenika trećih i četvrtih razreda distribucija odgovora ujednačena, s pretežno negativnim mišljenjem oko ovog prijedloga.

Stav mladih prema Europskoj uniji

Promatrajući ukupan broj učenika Strukovne škole Virovitica, 12,18% učenika ima negativan ili izrazito negativan stav prema EU, 55,04% je ravnodušno, a 32,77% učenika ima pozitivan ili izrazito pozitivan stav. Analiza stava prema EU učenika Strukovne škole Virovitica napravljena po dobnoj/razrednoj strukturi pokazuje da od 23,52% učenika prvih razreda njih 3,36% ima izrazito negativan ili negativan stav prema EU, 13,86% je ravnodušno, a 6,3% ima izrazito pozitivan ili pozitivan stav. Učenika drugih razreda je 24,78% i njih 3,36% ima izrazito negativan ili negativan stav prema EU, 13,86% učenika je ravnodušno, a 7,56% ima izrazito pozitivan ili pozitivan stav. Postotak učenika trećih razreda koji je sudjelovao u ispitivanju iznosi 26,88% i njihovi odgovori na pitanje o stavu prema EU pokazuju da 3,78% učenika ima izrazito negativan ili negativan stav, 14,70% je ravnodušno, a 8,40% učenika ima izrazito pozitivan ili pozitivan stav. U ispitivanju je sudjelovalo 24,79% učenika četvrtih razreda i njih 1,68% ima izrazito negativan ili negativan stav prema EU, 12,61% je ravnodušno, a 10,5% učenika ima izrazito pozitivan ili pozitivan stav.

Tablica 2: Općeniti stav učenika Strukovne škole Virovitica prema Europskoj uniji prema razredima i usmjerenjima, 9. rujna 2024. godine

	Izrazito negativan	Negativan	Niti negativan niti pozitivan	Pozitivan	Izrazito pozitivan	Ukupno
1. razred trogodišnjeg usmjerenja	0,00%	1,26%	1,68%	0,84%	0,42%	4,20%
1. razred četverogodišnjeg usmjerenja	0,42%	1,68%	12,18%	4,20%	0,84%	19,33%
2. razred trogodišnjeg usmjerenja	0,00%	0,42%	1,68%	1,68%	0,00%	3,78%
2. razred četverogodišnjeg usmjerenja	1,26%	0,42%	12,18%	5,46%	0,42%	21,01%
3. razred trogodišnjeg usmjerenja	0,00%	1,68%	2,94%	0,84%	0,00%	5,46%
3. razred četverogodišnjeg usmjerenja	0,84%	1,26%	11,76%	7,56%	0,00%	21,43%
4. razred četverogodišnjeg usmjerenja	0,84%	0,84%	12,61%	9,24%	1,26%	24,79%
Ukupni zbroj	3,36%	8,82%	55,04%	29,83%	2,94%	100,00 %

Izvor: Podatci iz anketnog ispitivanja učenika Strukovne škole, 9. rujna 2024. godine

Podatci su pokazali da su učenici trećih razreda u najvećem postotku imali izrazito negativan i negativan stav prema EU (3,78%), u nešto nižem postotku ujednačeno su takav stav imali učenici prvih i drugih razreda (3,36%), dok su najmanje izrazito negativan ili negativan stav prema EU imali učenici četvrtih razreda (1,68%). Identična situacija je i s onima kojima nemaju ni negativan ni pozitivan stav prema EU. Učenici trećih razreda u najvećem su postotku (14,70%) ravnodušni prema ovom pitanju. Učenici prvih i drugih razreda imaju ujednačen postotak (13,86%) ravnodušnosti prema EU. Učenici četvrtih razreda ponovno imaju najmanji postotak odgovora kojima nemaju niti pozitivan niti negativan stav prema EU (12,61%).

Zanimljiv je podatak da 50,7% učenika ne može procijeniti utjecaj članstva u EU za dobrobit društva. Mogući razlozi povezani su s podacima iz istraživanja prema kojem 61% učenika nema nikakav interes za politiku i politička zbivanja, a 34,9% nema povjerenje u političke stranke. Isti postotak (34,9%) nema povjerenje u Hrvatski Sabor, 32,4% nema povjerenje u Vladu RH, a 33,6% ne vjeruje medijima. Također, 32,7% učenika smatra da političke stranke uglavnom ili uopće ne potiču mlade na aktivno sudjelovanje u društvu.

Od pozitivnih utjecaja EU na društvo čak 51,3% učenika vidi pozitivne promjene u slobodi kretanja. 41,6% učenika smatra da EU donosi bolju budućnost za mlade, a 38,7% vidi pozitivan doprinos EU u osiguranju mira na kontinentu.

Slobodno vrijeme

Učenika koji uopće nemaju slobodnog vremena je prosječno 5,88% (u strukturi prema razredima 4,35% su učenici prvog razreda, 9,56% učenici drugih razreda, 1,96% je prosječno učenika trećih razreda i 10,17% otpada na učenike četvrtih razreda). Do dva sata slobodnog vremena dnevno ima prosječno 13,45% učenika. Tri do četiri sata slobodnog vremena dnevno u prosjeku ima 41,18% učenika, a više od četiri sata 39,50% učenika.

U nastavku su dvije tablice s prikazom učestalosti bavljenja odabranim aktivnostima kojima se učenici bave tijekom slobodnog vremena.

Tablica 3: Aktivnosti kojima se tijekom slobodnog vremena bave učenici Strukovne škole, Virovitica 9. rujna 2024. godine

	Nikada	Ponekad	Često
Posjećujem sportske priredbe	48,3%	40,3%	11,3%
Posjećujem disco klubove	30,7%	47,9%	21,4%
Slušam rock i sl. glazbu	49,2%	32,4%	18,5%
Slušam narodnu glazbu	18,1%	36,6%	45,4%
Slušam klasičnu glazbu	51,7%	33,2%	15,1%
Idem na koncerte	21,0%	61,8%	17,2%
Idem u kazalište	73,5%	24,8%	1,7%
Idem u kino	35,3%	54,2%	10,5%

	Nikada	Ponekad	Često
Idem na tulum i sl.	23,9%	50,0%	26,1%
Idem u kafiće	7,6%	37,4%	55,0%
Gledam TV	20,2%	52,1%	27,7%
Čitam knjige	48,7%	42,0%	9,2%
Sudjelujem u igrama na sreću	74,4%	18,9%	6,7%
Idem na izlete i šetnje	11,3%	66,8%	21,8%
Posjećujem javne tribine	61,3%	31,5%	7,1%
Posjećujem umjetničke izložbe	76,5%	20,6%	2,9%
Spavam ili se izležavam	5,0%	35,7%	59,2%
Aktivno se bavim sportom	42,4%	42,4%	15,1%
Družim se s prijateljima	2,5%	28,2%	69,3%
Družim se s rodbinom	6,7%	47,1%	46,2%

Izvor: Podatci iz anketnog ispitivanja učenika Strukovne škole, 9. rujna 2024. godine

Tablica 3: Aktivnosti kojima se tijekom slobodnog vremena bave učenici Strukovne škole, Virovitica 9. rujna 2024. godine

	Nikada	Ponekad	Često
Čitam dnevne/tjedne novine	72,7%	24,4%	2,9%
Idem u crkvu	28,6%	60,1%	11,3%
Provodim vrijeme za računalom	24,8%	51,3%	23,9%
Bavim se političkim aktivnostima	83,6%	13,9%	2,5%
Bavim se volonterskim i humanitarnim radom	66,8%	29,4%	3,8%
Obavljam kućne i obiteljske poslove	4,2%	40,8%	55,0%
Bavim se honorarnim poslom	73,9%	22,7%	3,4%
Idem u kupovinu	6,7%	61,3%	31,9%
Bavim se hobbijem	21,4%	45,8%	32,8%

Izvor: Podatci iz anketnog ispitivanja učenika Strukovne škole, 9. rujna 2024. godine

Učenici Strukovne škole izjasnili su da njih 23,9% često provodi vrijeme za računalom, 51,3% ponekad, a 24,8% nikada ne provodi vrijeme za računalom. U odgovoru na pitanje koliko često koriste računalu u određene svrhe pokazuje se da nikada ili gotovo nikada u najvećem postotku računalu ne upotrebljavaju za pisanje bloga, programiranje, čitanje knjiga, crtanje i izradu grafika te skidanje sadržaja (download). Povremena upotreba računala najviše je zastupljena kod učenja, pretraživanja interneta i igranja igrice. Najčešće učenici računalu upotrebljavaju za slušanje glazbe, korištenje društvenih mreža, dopisivanje i razgovore, gledanje filmova i serija te za učenje i igranje igrice.

Zaključak

Svjesni smo činjenice da obitelj predstavlja temeljnu društvenu strukturu koja ima veliki utjecaj na oblikovanje fizičkih, psihičkih i socijalnih potreba mladih te na njihovu socijalizaciju i prilagodbu široj zajednici, stoga nismo zanemarili utjecaj kvalitete

obiteljskog okruženja u kojemu mlada osoba odrasta. Prema dobivenim podacima vidljivo je da je još uvijek prisutan tradicionalizam iako je tendencija povećanja broja učenika koji žive u razvedenim obiteljima. Većina učenika živi u ruralnim područjima, roditelji privređuju kod kuće, dio njih nema završenu srednju školu, ali primjetan je pozitivan utjecaj na vrijednosti kod njihove djece (poštenje, pravda, korektan odnos prema drugima, odgovornost prema radu).

S druge strane, interes za trenutnim i daljnjim školovanjem kod učenika opada, no istovremeno se može uočiti i porast njihova interesa za društvenim ugledom. Ne može se reći da je obrazovanje za njih sigurno sredstvo za ostvarivanje privatnih, profesionalnih, društvenih i političkih potreba i interesa pojedinca.

Veliki dio učenika uopće ne iskazuje interes za politiku i politička zbivanja. Podatci o aktivnom sudjelovanju mladih u društvu su poražavajući. Vidljiva je opća nezainteresiranost za politiku i više od polovice mladih ne podržava niti jednu političku stranku. Na neki je način to cjelokupan odraz društva u kojem živimo. Na to nam ukazuje i vrlo mali postotak izlaznosti građana na izbore. Isto tako, učenici najviše vjeruju Crkvi kao instituciji, a najmanje institucijama državne vlasti. Postavlja se pitanje ima li to veze sa obrazovanjem roditelja i s time što većina učenika živi u ruralnim i nerazvijenim područjima.

Najvažniji problemi kojima su mladi danas okupirani su ovisnosti i način provođenja slobodnog vremena i zabava. Odgovornost u rješavanju tih problema prvenstveno pripisuju roditeljima, a najmanje institucijama. To se može povezati sa sve "slobodnijim" načinom odgoja djece u kojem nisu postavljena pravila te nema odgovornosti. Učenici gotovo uopće ne pokazuju interes za uključivanje u bilo kakve organizacije ili skupine na lokalnoj razini što nije dobar pokazatelj za cjelokupno društvo.

Učenici su nedovoljno informirani i ne pokazuju interes za spuštanje dobne granice na 16 godina za pravo glasa odnosno za izlazak na izbore. Poprilično neutralan stav učenika prema Europskoj uniji ukazuje nam na potrebu kvalitetnijeg obrazovanja i uključivanje što više sadržaja i predmeta u odgojno-obrazovne institucije kako bi se osvijestila važnost djelovanja kako Europske unije tako i demokratskih procesa u društvu u kojem živimo.

Slobodnog vremena učenici u prosjeku imaju oko četiri sata dnevno, a najčešće ga provode družeći se s prijateljima, izležavaju se ili spavaju, odlaze u kafiće, slušaju glazbu i obavljaju kućanske poslove.

Zanimljivo je primijetiti da prema podacima Državnog zavoda za statistiku najveći BDP po stanovniku 2020. godine imao je Grad Zagreb s 21.829 €, a od županija prva je bila Primorsko-goranska (13.336). Virovitičko-podravska županija bila je na posljednjem mjestu sa 7.514 € /stanovniku. Iz toga bi se dalo zaključiti da su naši učenici skromni i zadovoljni svojim životom. U skladu s ovom analizom, 57% učenika misli da ne živi ni bolje ni lošije od većine drugih, dok 32% misli da živi nešto bolje od većine drugih. Samo 4% ispitanih učenika vjeruje da živi nešto ili puno lošije od drugih.

U budućim istraživanjima predlaže se povećanje uzoraka ispitanika na učenike iz cijele Virovitičko-podravske županije, odnosno potrebno je uključiti sve srednje škole na spomenutom području kako bi se napravila detaljnija analiza navedene problematike.

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JEZIK POSLOVNIH ČASOPISA I NOVINA

Mirta KOVAČ
Srednja škola Dalj
mirta.kovac@skole.hr

Nataša SERŠIĆ
Srednja škola Dalj
natasas.brkic@skole.hr

Sažetak

Predmet/ishodište rada: Rad se bavi razvojem i funkcijama tiskanih medija, s posebnim naglaskom na časopise i novinarsko-publicistički stil. Uvodno se ističe povijesna važnost izuma tiskarskog stroja što je označilo početak masovnih medija. Tiskani mediji, kao što su knjige, časopisi imaju ključnu ulogu u širenju informacija, no suočavaju se s izazovima u digitalnoj eri.

Ciljevi: analizirati karakteristike časopisa kao tiskanih medija te njihovu povezanost s novinarsko-publicističkim stilom. Časopisi se definiraju kao periodične publikacije koje obrađuju teme iz različitih područja, poput kulture, sporta i politike uz bogat ilustrativni dio. Unatoč smanjenju broja čitatelja zbog pojavljivanja interneta, časopisi se bore zadržati publiku, često prelazeći u digitalne formate.

Rezultati: Novinarsko-publicistički stil ima funkciju informiranja, promocije, popularizacije stručnih tema putem naslova koji se odlikuju upotrebnom stranih riječi u naslovima časopisa. Rad predlaže pravila za normiranje jezika u tiskom novinarstvu kako bi se očuvala jasnoća i dosljednost unutar hrvatskog jezičnog standarda.

Ključne riječi: mediji, časopisi, tisak, novinarsko-publicistički stil, naslovi

JEL klasifikacija: M14, M20, M21, M29, M31

Uvod

Časopis je vrsta serijske publikacije koja izlazi u redovitim razmacima. Područje interesa je usko i usmjereno je na užu krug čitatelja. Časopis su nastali iz almanaha, kalendara i pisama koja su razmjenjivali znanstvenici. Pojavili su se u 17. stoljeću u Engleskoj i Francuskoj. Suvremeni časopis objavljuju pažljivo smišljene priloge, sadrže pregršt oglasa, promotivnih tekstova i privlače čitatelje svojim naslovom. Naslov časopisa igra veliku ulogu u oblikovanju čitateljevog očekivanja. S obzirom na to da engleski jezik dominira u poslovnom okruženju, mnogi izrazi preuzeti su iz njega i koriste se u hrvatskom jeziku bez prijevoda. Na primjer, termini poput „leadership“, „benchmarking“ postali su uobičajeni izrazi u hrvatskom jeziku. Poslovni novinari često koriste žargonske izraze i anglicizme, što dodatno doprinosi internacionalizaciji jezika. Međutim teško je danas procijeniti točan broj čitatelja časopisa budući da ih kupac često dijeli s članovima obitelji i prijateljima za čitanje. Također, časopise

karakterizira mogućnost javnog pregledavanja, kao što su liječničke čekaonice, saloni za uljepšavanje, što otežava točnu procjenu broja čitatelja.

Razvoj i uloga tiskanih medija u eri digitalne informacije

U današnje vrijeme sve su nam informacije nadohvat ruke. Pored interneta, informacije su nam dostupne i kroz razne tiskovine. Za početak masovnih medija zaslužan je nijemac Johannes Gutenberg kada je 1455. godine izumio tiskarski stroj s pokretnim slovima i tiskao prvu knjigu. Tisak su proizvodi nastali umnožavanjem teksta i ilustracija namijenjeni javnom komuniciranju. Tisak je skupno ime za novine, časopise i druga povremena izdanja koja izlaze u razmacima od najviše šest mjeseci u nakladi većoj od 500 primjeraka (Zakon o medijima, Narodne novine broj. 163/2003, članak 2.). Tiskaju se s tiskarskim strojem u tiskari. Tekst se tiska određenim pismom i jezikom, a slike mogu biti crteži i fotografije. Tiskanim medijima zajedničko je što se umnožavaju na tiskarskom stroju. U tiskane medije ili tisak ubrajaju se knjige, novine, časopisi, stripovi, letci, plakati i dr.

Časopis je periodična publikacija koja izlazi u pravilnim vremenskim intervalima, izvještavaju i informiraju o temama od općeg interesa koji su aktualni (ISBD(CR), 2002., str.14). Hrvatska enciklopedija pojam časopisa definira kao serijsku publikaciju koja izlazi u redovitim razmacima, kraćim od godine, a dužim od petnaest dana (Hrvatska enciklopedija, 1999.-2009. str.653). Obje definicije opisuju časopis kao periodičnu publikaciju, ističući da časopis izlazi u određenim vremenskim razmacima. Ako usporedimo novine i časopis, uočava se tematska i sadržajna razlika. Novine su namijenjene širokoj publici, dok su časopisi unaprijed usmjereni skupini čitatelja koje povezuje interes za određeno znanstveno ili stručno područje, književnost, umjetnost, zdravlje, sport i slično. Sadržaji su u časopisima popraćeni bogatim slikovnim materijalom. Šireg su opsega, opširnije obrađuju teme, sadrže intervjue, reportaže, popularne i stručne članke. Tekstovi su u časopisima najčešće predloženi slikovnim materijalom u obliku fotografija u boji. Tiskani su najčešće na sjajnom papiru. Unatoč dobrom glasu koji ih prati novine danas imaju sve manje čitatelja. Smanjuje se broj promotivnih oglasa u njima kao i broj pretplatnika. Konkurencija je postala veća među medijima: najprije je radio imao ulogu primarnog medija, zatim televizija, a na kraju internet. Kod mladih su danas posljednja dva medija glavni izvor informiranja. Zbog toga brojne novine i časopisi pokušavaju prodrijeti u te medije – bilo kao online izdanja ili kao televizijski magazini.

Komunikacija između proizvođača sadržaja i čitatelja u časopisima je neizravna, što znači da nema neposredne interakcije, već se komunikacija ostvaruje kroz sadržaj koji dopire do široke publike, čineći časopis važnim medijem masovne komunikacije.

Stilovi hrvatskog standardnog jezika

Tradicionalna literatura dijeli funkcionalne stilove hrvatskog standardnog jezika na pet skupina, svaki od tih stilova ima i svoje podvrste. Iako postoji različitost u nazivlju

pojednog stila govori se o znanstvenom stilu, razgovornom stilu, književnoumjetničkom, administrativno-poslovnom i novinarsko-publicističkom stilu. Obilježja znanstvenog stila su objektivnost, logična organizacija misli, racionalnost, argumentiranost, jednoznačnost i točnost. Njim se pišu znanstveni radovi pa su uz njega vezani stručni termini koji se zbog velike brzine razvoja tehnologije isto tako brzo mijenjaju. Znanstveni se termini često uzimaju iz stranih jezika, ponajprije iz engleskoga i vrlo teško im je pronaći istoznačnice u hrvatskom jeziku. Razgovorni stil je stil svakodnevne komunikacije, najčešće usmene dok se u novije vrijeme često koristi kao način komunikacije porukama s pomoću mobilnih uređaja, nekada se koristio u pismima, osobnim bilješkama itd. On je neusiljen, nepripremljen, neslužben, familijaran, jednostavan (Silić, Pranjeković, 2007., str. 387). Krase ga mimike, geste, odstupa od hrvatskog standardnog jezika. Unutar njega se pojavljuju žargonizmi, kolokvijalizmi, poštapalice, vulgarizmi i barbarizmi. Književnoumjetnički stil ima najveću slobodu izražavanja. Unutar njega javljaju se stilska izražajna sredstva, prenesena značenja, individualna uporaba jezika, zastarjelice, arhaizmi, poetizmi. Podstilovi su mu pjesnički, prozni i dramski. Administrativno-poslovni stil je stil u kojem su pisani pravni tekstovi, poslovni tekstovi, službeni dopisi i pisani zakoni. Njegova obilježja su jasnoća, ustaljeni izrazi, jednoznačne riječi, preciznost, točnost i objektivnost. Kod ovoga se stila često pojavljuje i odstupanje od jezične norme. Upravo stoga se, a unatoč odstupanju od norme standardnog jezika, takvi tekstovi ne smatraju pogrešnima, a lektoriraju se samo ako to želi njegov autor i u opsegu u kojem on to želi. (Silić, 2006., str.107.)

Novinarsko-publicistički stil

Ovaj će se rad najviše baviti novinarsko-publicističkim stilom. Novinarsko-publicistički stilom pišu se izvješća, obavijesti, feljtoni, žurnalizmi. Najsloženiji je funkcionalni stil jer se pojavljuje i u pisanim i u govornim medijima. Stil javne komunikacije koji se ostvaruje u govornome i pisanome mediju i njime se služe novinari i publicisti pišući tekstove za dnevne novine časopise i ostale tiskovine te vodeći emisije na radiju i televiziji (Gojević, 2009., str.23). Novinarsko-publicistički stil bliži je standardnom jeziku od razgovornog stila i književnoumjetničkog i manje je opterećen normom hrvatskog standardnog jezika nego administrativni i znanstveni (Hudaček, Mihaljević, 2009., str. 10). Funkcije ovog stila su informativna, propagandna, popularizatorska, prosvjetiteljska, agitativna, pedagoška i zabavna (Silić, 2007., str. 77). Funkcije stila dijele se na dvije skupine. Prva skupina je informativna, popularizatorska i prosvjetiteljska. Drugu skupinu čine agitativna, propagandna i zabavna.

Novinski naslovi

U vremenima brze informatizacije sve je zahtjevnije privući čitatelje čitanju novina. A, naravno, to se postiže naslovima. Zato naslove treba pažljivo birati i smišljati jer upravo oni imaju značajan utjecaj na privlačenje čitatelja, na njegov izbor hoće li privući nekog čitatelja na čitanje članka ili ne. Rišner i Glušac (2011. str. 147). navode kako je uloga novinskih naslova dvojaka: prva je pragmatička koja se zasniva na

privlačenju pozornosti čitatelja, a druga je obavijesna, koja ukratko iznosi osnovne stavke članka kojem naslov prethodi. Dakle, s jedne strane naslov je sažimanje teksta u konkretnu obavijest tako da čitatelj može izabrati hoće li članak pročitati u cijelosti, a s druge strane naznačivanje mogućega sadržaja sa svrhom buđenja čitateljeve radoznalosti (Hudaček, 2006., str. 297). Postoje tri vrste novinskih naslova (Silić, 2007., str. 89): nominalni naslovi: npr. Borba protiv burnouta, Drvo pokraj staze. Naslov je najčešće napisan metaforički i iz njega ne možemo spoznati o čemu se u članku govori bed da ga u cijelosti pročitamo. Zatim informativni: npr. Kako postići da radite s najboljim klijentima? Kako postići harmoniju bez izgaranja? Informativni nam naslovi upitnim rečenicama otkrivaju o čemu će govoriti tekst. I reklamni: ELEMENTUM – plemenite kovine, Prilika za kupce i prodavače (Poduzetnik). Reklamni ima ulogu uvjeravanje i predstavljanje pozitivnih osobina nekog proizvoda. Često se u naslovima i tekstovima poslovnih novina javljaju otpor prema hrvatskom jeziku i daje se prednost, kod određenih riječi, engleskom jeziku. Postoji nekoliko razloga za navedeno. Prvi razlog je taj što je jednostavnije upotrijebiti neki strani izraz nego ga prevoditi ili napraviti novu riječ. Često ni govornici hrvatskog jezika ne prihvaćaju novotvorenice nego se služe riječima koje su prve čuli. Drugi je taj što govornici često smatraju da je engleski jezik precizniji, da neka riječ gubi pravo, izvorno, značenje ako je prevedena. I treći je što globalizacijski društveni tijekovi znatno utječu na razvoj hrvatskog jezika u poslovnom diskursu. Kako sve više poslodavaca, uključujući i strane državljane kojima engleski nije prvi jezi, ali govori engleski jezik, jednostavno nema potrebe prevoditi riječi na hrvatski koji nije u uporabi stranih govornika (Hudaček, Čutuk, 2016. str. 200). Internacionalizmi postaju neodvojivi dijelovi novinskog standarda, brojne strane riječi ulaze u uporabu jer zvuče efektivnije od hrvatskog sinonima, npr. dijaboličan/đavolski, misterij/tajna (Silić, 2007. str. 93).

Nачin naslovljavanja novina i članaka

Često se novine i časopisi naslovljavaju imenima stranog podrijetla i unutar novina mogu se pronaći strani naslovi. Lider (vođa), business.hr, progressive magazin...prilikom zapisivanja imena poslovnih časopisa postoje nedoumice oko njihovih zapisa u nominativu, a isto tako i kod zapisivanja njihovih oblika. Ovaj se problem prema (Hudaček, Čutuk, 2016. str. 205.) može riješiti na dva načina. Uvijek se u nominativu zapisuje ime za koje postoji nedoumica kako mu zapisati oblik. Zapis tada ne prati izgovor pa to nije dobro rješenje. Drugi je način taj što se ispred ili iza riječi napisane u nominativu umeće riječ koja se deklinira. Časopise koji imaju imena kao internetski portali trebalo bi zapisivati dodavanjem padežnog nastavka i pisanjem spojica. U uporabi u poslovnim časopisima najuočljivije značajke naziva su prema (Hudaček, Čutuk 2016., str. 206) podijeljene u pet vrsta koje se protive hrvatskom jeziku. Pod jedan je uporaba stranih/žargonskih izraza. Pod dva česta uporaba internacionalizama. Pod tri uporaba sinonimnih nizova u istome časopisu i u istome članku. Četiri česta uporaba lažnih prijatelja. I pet česta uporaba naziva koji se ne uklapaju u sustav standardnoga jezika. Kako bi se uspostavila pravila normiranja jezika poslovnih novina potrebno je poštivati terminološka načela, a to su da domaće riječi imaju prednost pred stranim, nazivi latinskoga i grčkog podrijetla imaju prednost pred nazivima preuzetim iz engleskoga, francuskoga, njemačkoga itd., prošireniji i

prihvatljiviji naziv ima prednost pred manje proširenim, naziv usklađen s fonološkim, morfološkim, tvorbenim, sintaktičkim sustavom hrvatskoga standardnog jezika, kraći pred duljima, lakše tvori tvorenicu, izbjegavanje više značenja, nazive se ne smije mijenjati bez valjanog razloga, ima prednost ako odgovara pojmu koji je pridružen i odražava mjesto u svom pojmovnome sustavu (Hudeček, Mihaljević 2012. str. 70-71.).

Zaključak

Tiskani mediji, uključujući novine i časopise, neodvojivi su dio ljudske komunikacije i informiranja. Časopisi, kao važan dio tiskanih medija, obrađuju specifične teme i nude bogat slikovni sadržaj. Imali su i imaju ključnu ulogu u prijenosu informacija, mada se suočavaju s izazovima novih medija poput televizije i interneta. Usprkos padu popularnosti tiskanih izdanja, zadržali su svoju relevantnost kroz specijalizirane sadržaje i prilagodbu digitalnim platformama. Neizostavni dijelovi tiskanih medija su funkcionalni stilovi hrvatskog standardnog jezika. Svaki stil ima svoja prepoznatljiva obilježja i podvrste. Novinarsko-publicistički stil, kao najsloženiji stil, neizostavni je dio jezika poslovnih časopisa i novina, odražava važnost preciznosti, privlačnosti naslova te prilagodbe jezika suvremenim trendovima, uključujući sve češću uporabu stranih izraza, internacionalizama i žargonizama.

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PROMICANJE OČUVANJA KULTURNE BAŠTINE: SUDJELOVANJE POMORSKE ŠKOLE BAKAR U PROGRAMU *THE EUROPE CHALLENGE 2024*

Marija MILETIĆ
Pomorska škola Bakar
marija.miletic6@skole.hr

Sažetak

Predmet/ishodište rada: Knjižnica Pomorske škole Bakar posjeduje zbirku starih knjiga upisanih u Registar kulturnih dobara Republike Hrvatske i iz tog se razloga uključuje u razne projekte očuvanja kulturne baštine. Europska kulturna zaklada sa sjedištem u Amsterdamu, Nizozemska, podupire programe angažiranja knjižnica i lokalne zajednice u aktivnostima koje promoviraju europske vrijednosti kao što su solidarnost, raznolikost, održivost, aktivno građanstvo i slično. Knjižnica i učenici Pomorske škole Bakar izabrani su kao prvi i jedini predstavnik iz Hrvatske sa svojim projektom S.O.S. Heritage – Save Our School Heritage (Očuvajmo baštinu naše škole) u godišnji program Europske kulturne zaklade The Europe Challenge 2024 koji je osmišljen za knjižnice diljem Europe za rješavanje izazova s kojima se one susreću. Knjižnica je ovim projektom postala mjesto učenja o kulturnoj baštini gdje su se učenici uključivali u aktivnosti očuvanja školske kulturne baštine. Navedene aktivnosti promiču temeljne vrijednosti Europske unije kao što su raznolikost, solidarnost i aktivno građanstvo koje u učenika jačaju osjećaj europskog identiteta.

Ciljevi: Cilj je ovoga rada pokazati kako obrazovna institucija može postati mjesto promicanja vrijednosti očuvanja kulturne baštine i kako se aktivnosti očuvanja kulturne baštine mogu uključiti u školski kurikulum.

Metodologija: Metodologija se temelji na kvalitativnoj analizi aktivnosti u projektu očuvanja kulturne baštine u Pomorskoj školi Bakar koje su usmjerene na promicanje europskih vrijednosti.

Rezultati: Ovaj projekt može poslužiti kao primjer drugim obrazovnim institucijama koje se suočavaju s istim izazovom. Lokalne inicijative same po sebi nisu dovoljne i za uspjeh je nužno uključivanje u nacionalne i europske inicijative očuvanja kulturne baštine. Prikazom aktivnosti u knjižnici Pomorske škole Bakar potvrđeno je da škola može postati platforma za promicanje vrijednosti očuvanja kulturne baštine na način koji nadilazi formalni kurikulum. Ukazano je na to kako knjižnica nadopunjuje školski kurikulum i omogućava učenicima učenje vrijednosti koje će ih pratiti kroz život i pomoći im da postanu aktivni građani Europske unije

Ključne riječi: mladi i aktivno društvo EU-a, kulturna baština, solidarnost, raznolikost

JEL klasifikacija: I28, J13, Z13

Uvod

Institucije Europske unije veliku važnost pridaju očuvanju kulturne baštine kroz aktivno sudjelovanje građana. Konvencija o vrijednosti kulturne baštine za društvo (Konvencija iz Fara, 2005.) priznaje da svaka osoba ima pravo baviti se kulturnom baštinom po vlastitom izboru, uz poštovanje prava i sloboda drugih. Ista naglašava važne aspekte baštine koji se odnose na ljudska prava i demokraciju. Promiče šire razumijevanje baštine i njezina odnosa prema zajednicama i društvu. U konvenciji se ističe važnost prepoznavanja da nisu objekti sami po sebi ono što je važno za kulturnu baštinu već su važni zbog značenja i upotrebe koje im ljudi pridaju i vrijednosti koje predstavljaju.

Europska kulturna zaklada - European Cultural Foundation (<https://culturalfoundation.eu/>), u tekstu ECF, osnovana je 1954. godine u Ženevi, a 1960. godine zaklada je presjedanje preselila u Amsterdam. Stvorena je s idejom ujedinjene Europe u kojoj se građani osjećaju ponosnim Europljanima i gdje mogu živjeti, raditi, izražavati se te slobodno sanjati, u raznolikosti i skladu. Otada ECF promiče europski osjećaj podržavanjem raznih kulturnih inicijativa, uz fokus na programe i potpore koji omogućuju mobilnost i razmjenu ideja, obrazovanje kroz kulturu i izgradnju kapaciteta. Pokrenula je i razvila desetke programa, podržala tisuće Europljana stipendijama i razmjenama te pomogla da se kultura i kulturne politike stave na europski dnevni red. ECF podupire programe angažiranja knjižnica i lokalne zajednice u aktivnostima koje promoviraju EU vrijednosti kao što su solidarnost, raznolikost, održivost, aktivno građanstvo.

Jedan od tih programa je *The Europe Challenge* u koji se 2024. godine uključila Pomorska škola Bakar. U ovom će se radu predstaviti navedena inicijativa i aktivnosti koje je knjižnica provela te kako one mogu biti moćan alat za promicanje europskih vrijednosti među učenicima. Prikazat će se kako izvannastavne aktivnosti mogu djelovati kao moćni alati za promicanje europskih vrijednosti među učenicima, ali i šire.

Program *The Europe Challenge* pokazuje kako knjižnice i njihove zajednice surađuju u rješavanju izazova s kojima se susreću kao što su socijalna izolacija, dezinformacije, klimatske promjene i slično. Knjižnice su mjesta gdje se okupljaju različite skupine, bilo u velikim gradovima ili malim mjestima. One se uvijek trude doprijeti do svih korisnika stvarajući ugodan prostor u kojemu mogu naći pregršt stvari koje ih zanimaju. Inicijativa je započela 2020. godine za rješavanje lokalnih problema od kojih može imati koristi cijela Europa. Neki od sudionika programa su škotska zatvorska knjižnica, bugarska knjižnica koja radi s ukrajinskim izbjeglicama, grčka knjižnica stripova koja istražuje *biblioterapiju* u borbi protiv usamljenosti i mentalnog zdravlja.

U prosincu 2023. godine knjižnica i učenici Pomorske škole Bakar izabrani su u program *The Europe Challenge 2024* kao prvi i jedini predstavnik iz Hrvatske sa svojim projektom *S.O.S. Heritage – Save Our School Heritage (Očuvajmo baštinu naše škole)*. Knjižnica Pomorske škole Bakar se uključuje sa svojim izazovom očuvanja starih

knjiga i interpretacije kulturne baštine te tako postaje mjesto učenja o kulturnoj baštini gdje se učenici uključuju u razne aktivnosti očuvanja školske kulturne baštine.

Školska kulturna baština u Pomorskoj školi Bakar

Grad Bakar, Hrvatska, smješten na obali Jadranskog mora, oduvijek je bio važno pomorsko središte poznato po brodogradnji, trgovini i iznimnom obrazovanju pomoraca. Pomorska škola Bakar, osnovana 1849. godine, najstarija je strukovna škola u Hrvatskoj i jedna od najstarijih pomorskih institucija na Mediteranu. Tijekom stoljeća odigrala je presudnu ulogu u obrazovanju naraštaja pomoraca i oblikovanju pomorske industrije u Europi i svijetu.

Danas Pomorska škola Bakar predstavlja važan spomenik pomorske tradicije u Hrvatskoj i 2024. godine će obilježiti svoju 175. godišnjicu postojanja. Blago koje se generacijama čuva u njezinoj knjižnici svjedoči o bogatom svijetu pomorske baštine bakarske nautike te njezinih učenika i nastavnika kojima je more odredilo način života.

Pomorska škola Bakar je potvrdu svoje povijesne važnosti dobila u listopadu 2022. godine rješenjem Nacionalne i sveučilišne knjižnice u Zagrebu kojim se utvrđuje da zbirka starih knjiga njezine knjižnice ima svojstvo kulturnog dobra Republike Hrvatske. Ova jedinstvena zbirka s više od 200 naslova predstavlja svojevrsnu rijetkost u području srednjoškolskih knjižnica. Najveći je dio građe tematski vezan uz područja u skladu s potrebama škole, kao što su matematika, fizika, mehanika, astronomija, brodarstvo, pravo, trgovina, povijest i sl. Jezici zbirke su njemački, talijanski, engleski, francuski, španjolski i latinski, a knjige su tiskane latinicom i goticom. Najstarija knjiga u zbirci je kartografski prikaz iz 1574. godine *Viaggio da Venetia a Constatinopoli per mare e per terra (Put od Venecije do Carigrada morem i kopnom)*, talijanskog kartografa Giuseppea Rosaccia. U veljači 2024. godine na cjelokupnoj zbirci je izvedena preventivna konzervacija koja je obuhvatila zaštitu građe kroz suho mehaničko čišćenje listova i otprašivanje, konzerviranje korica od pergamene i kože, dezinfekciju etilnim alkoholom te izradu ovitaka od neutralnog papira za sveske kojima su oštećeni uvezi. Do kraja 2024. godine očekuje se završetak restauracije vrijednog kataloga i atlasa iz 17. stoljeća omogućen sredstvima Ministarstva kulture i medija Republike Hrvatske i Grada Bakra.

Obveza vlasnika kulturnog dobra prema članku 20. Zakona o zaštiti i očuvanju kulturnih dobara, između ostalih, je omogućiti dostupnost kulturnog dobra javnosti. U skladu s tim se knjižnica Pomorske škole Bakar u rujnu 2023. godine uključila u projekt *eKultura - Digitalizacija kulturne baštine* kojemu je cilj povećanje zaštite i online dostupnosti digitalnog kulturnog sadržaja te osiguravanje njegove sigurne pohrane. Zahvaljujući programu digitalizirat će se petnaestak najstarijih primjeraka građe. Također, proveden je projekt digitalizacije atlasa i kataloga iz 17. i 18. stoljeća zahvaljujući sredstvima Ministarstva kulture i medija RH. Sva digitalizirana građa bit će dostupna u Zavičajnoj digitalnoj knjižnici Primorsko-goranske županije i u sustavu

eKultura. Očuvanje starih pomorskih knjiga i karata ključno je, ne samo za Pomorsku školu Bakar, već i za hrvatsku i europsku pomorsku povijest.

Uloga projekta *S.O.S. Heritage* u promicanju vrijednosti očuvanja školske kulturne baštine

Angažman obrazovnih institucija u očuvanju kulturne baštine neophodan je za jačanje nacionalnog identiteta. Bakarska pomorska škola predstavlja važno mjesto za pomorsku baštinu koju je očuvala kroz stoljeća svog postojanja. Izazov njezine knjižnice je očuvanje i interpretacija starih knjiga i karata koji su u opasnosti od propadanja zbog starenja, neadekvatnog smještaja i utjecaja klime. Sudjelujući u inicijativi *The Europe Challenge* projektom *S.O.S. Heritage: Save Our School Heritage* knjižnica uključuje učenike u aktivnosti očuvanja kulturne baštine.

Knjižnica ovim projektom postaje središnje mjesto u školi za kulturnu baštinu tzv. *heritage hub* gdje se učenici, nastavnici i lokalna zajednica uključuju u očuvanje kulturne baštine kroz razne aktivnosti (radionice, kvizovi, predavanja, izložbe i sl.). Knjižnica je, zahvaljujući sredstvima ECF-a i Ministarstva znanosti, obrazovanja i mladih RH, angažirala stručnjake iz područja *storytellinga*, interpretacije baštine, povijesti knjige, povijesti umjetnosti te restauracije i konzervacije starih knjiga.

U školskoj godini 2023./2024. provedene su brojne aktivnosti, u koje su bili uključeni učenici, ali i nastavnici škole. Na prvom sastanku sudionika programa *The Europe Challenge* u ožujku 2024. godine održanog u Milanu, Italija, nastavnica engleskog jezika i stručna suradnica knjižničarka su u tri dana radionica stekle nova znanja i vještine za rješavanje izazova s kojim se knjižnica suočava. Prikazani su načini kako stvoriti jedinstvenu priču i vizualni identitet kroz *storytelling* i *prototyping* te su upoznate s pojmom *democracy fitness* – načinom kojim knjižnice mogu kreirati lokalnu demokraciju zajedno sa svojim korisnicima. Ova aktivnost pomogla je nastavnicama da kroz kreativne metode jačaju svijest o važnosti lokalne i šire zajednice, a školski su projekt predstavile na europskoj razini i uspostavljene su brojni kontakti za buduću suradnju.

U travnju 2024. godine je u školi održana dvodnevna radionica pripovijedanja, usmjerena na poboljšanje iskustva učenja učenika i nastavnika kroz tehniku *storytellinga*. Radionicu je vodila Ivanka Ferenčić Martinčić, knjižničarka, autorica dječjih knjiga i slikovnica, interpretatorica baštine. Učenici prvih, drugih i trećih razreda te nastavnici i stručni suradnici su imali priliku naučiti osnove pripovijedanja i primjenu istoga u očuvanju kulturnog identiteta. U radionici je sudjelovalo ukupno 18 učenika (2 učenice i 4 učenika prvog razreda, 2 učenice i 2 učenika drugih razreda te 5 učenika i 3 učenika trećih razreda). Za nastavnike su organizirane posebne radionice u koje se uključilo ukupno 10 nastavnika, 8 nastavnica/stručnih suradnica i 2 nastavnika. Nakon održane radionice, učenici su stečene vještine primijenili na vrlo zanimljiv način – pripovijedajući priče djeci iz Dječjeg vrtića Bakar i Osnovne škole Bakar. Osim što je ova aktivnost omogućila učenicima da ovladaju tehnikom *storytellinga* i unaprijede

svoje komunikacijske vještine, potaknula je dijalog o važnosti očuvanja školske kulturne baštine i prijenosu kulturnih vrijednosti na mlađe generacije.

Učenice trećih razreda su projekt *S.O.S. Heritage* predstavile na najvećoj manifestaciji popularizacije znanosti u Hrvatskoj, koja se održava od 2003. godine – *Festivalu znanosti*, a naša škola redovito sudjeluje u njoj. Pokazale su kako se na zanimljiv način i uz pomoć umjetne inteligencije može interpretirati kulturna baština. Projekt je predstavljen i na završnoj aktivnosti *Festivala znanosti* u Gradskoj vijećnici grada Rijeke zajedno s učenicima naše škole i drugih škola Primorsko-goranske županije. Spajanjem suvremene tehnologije s očuvanjem kulturne baštine ova je aktivnost potaknula učenike da razvijaju inovativne pristupe u očuvanju povijesnih vrijednosti.

S ciljem predstavljanja projekta na međunarodnom sajmu *Salone dell'arte e del restauro* u travnju 2024. šest učenica i dvije nastavnice (stručna suradnica knjižničarka i nastavnica engleskog jezika) posjetile su talijanski grad umjetnosti Firencu. Sajam umjetnosti i restauracije je poslužio kao platforma za podizanje svijesti o važnosti očuvanja kulturne baštine i za poticanje međunarodne suradnje. Sudjelovanjem na međunarodnom sajmu učenice i nastavnice su ojačale svijest o važnosti međunarodne suradnje. U posjeti Institutu za umjetnost i restauraciju *Palazzo Spinelli* u Firenci, studenti i profesor restauracije u laboratoriju za obradu papira pokazali su tehnike restauracije i uvezivanja knjiga. Posjet poznatoj školi za restauraciju omogućio je stjecanje znanja o restauraciji knjiga, što doprinosi razvoju vještina potrebnih za očuvanje kulturne baštine.

U lipnju 2024. godine je trenerica udruge *Interpret Europe* i interpretatorica baštine Iva Silla održala je u školi dvodnevnu radionicu inovativne prezentacije baštine u kojoj je 10 učenika prvog razreda kroz igrifikaciju stvorilo zanimljive zagonetke o knjigama i predmetima koji se čuvaju u školskoj knjižnici. Ova radionica učenike je potaknula u razvoju kreativnosti i inovacije. Upotrebom mašte i zanimljivim metodama rješavanja problema interpretirali su kulturnu baštinu na inovativan način. Inspirativno predavanje je održala povjesničarka umjetnosti mr.sc. Daina Glavočić i učenicima predstavila posljednja počivališta poznatih bakarskih pomoraca te mnogih nastavnika Pomorske škole Bakar. Restaurator-konzervator Velimir Mikac održao je u knjižnici dvodnevni tečaj knjigoveštva za 8 učenika prvih razreda gdje su imali priliku naučiti šivati knjižni blok i sudjelovali u izradi korice za rokovnik koji će im ostati nakon radionice. Ovom se aktivnošću utjecalo na očuvanje tradicionalnih vještina i omogućilo učenicima praktično učenje o vrijednosti kulturne baštine.

Prigodnom izložbom „Tajne školske knjižnice“ 29. lipnja 2024. godine školski projekt očuvanja starih knjiga predstavljen je lokalnoj zajednici u sklopu programa *Šetnja kroz povijest* manifestacije grada Bakra *Margaretino leto*. Interpretacijsku šetnju po Bakru Iva Silla je završila u knjižnici Pomorske škole Bakar i posjetitelji su imali priliku vidjeti zanimljive izložke poput knjige Janet Taylor, prve žene u pomorskoj navigaciji, prva opažanja oblaka profesora Andrije Mohorovičića, jedinstvenu ljubavna posveta na koricama priručnika iz matematike iz 19. stoljeća, ali i karte zvjezdanog neba stare više od 150 godina. Izložba je pojačala povezanost s lokalnom zajednicom i osvijestila

posjetiteljima važnost očuvanja zbirke koju knjižnica posjeduje te promovirala učenike Pomorske škole Bakar kao aktivne sudionike u očuvanju lokalne pomorske baštine.

Knjižničarka škole projekt je predstavila na završnom događaju programa *The Europe Challenge* u Amsterdamu „If Librarians Ran Europe“. Timovi iz 55 europskih zemalja pokazali su svoje inovativne inicijative i pokazali da knjižnice nisu samo mjesta za knjige već pokretači promjena. Ova je aktivnost omogućila jačanje europskog identiteta Pomorske škole Bakar, moguću buduću suradnju i razmjenu znanja. Kroz međunarodni dijalog, sudionicima se omogućilo da uče iz iskustava drugih europskih zemalja i time razvija svijest o važnosti knjižnica kao centara inovacija i društvenih promjena. Svaka od navedenih aktivnosti doprinijela je razvoju učenika i nastavnika naglašavajući ključne europske vrijednosti koje su temeljne za unapređenje obrazovnog procesa, kao što raznolikost, solidarnost, aktivno sudjelovanje, održivost i sl.

Rezultati projekta *S.O.S. Heritage*

Projekt *S.O.S. Heritage* dokazuje važnost Pomorske škole Bakar koja je školovanjem vrhunskih pomoraca dala golem doprinos europskom i svjetskom pomorstvu. ECF je kao vodeća europska kulturna institucija prepoznala njezinu vrijednost i omogućila njezinoj knjižnici da postane mjesto očuvanja školske kulturne baštine. Uključivanje učenika u aktivnosti očuvanja i interpretacije ne služi samo obrazovnoj svrsi, već im daje i osjećaj odgovornosti i ponosa na njihovu kulturnu baštinu. Ovaj projekt može poslužiti kao primjer drugim obrazovnim institucijama koje se suočavaju s istim izazovom. Lokalne inicijative same po sebi nisu dovoljne i za uspjeh je nužno uključivanje u nacionalne i europske inicijative očuvanja kulturne baštine. Prikazom aktivnosti u knjižnici Pomorske škole Bakar potvrđeno je da obrazovna institucija može postati platforma za promicanje vrijednosti očuvanja kulturne baštine na način koji nadilazi formalni kurikulum.

Za smještaj zbirke starih knjiga po mjeri je izrađen drveni ormar i građa je adekvatno smještena, uz sve mjere kontrole odgovarajućih uvjeta (UV zaštitne folije, mjerač temperature i vlage). Nabavljen je knjižnični namještaj i elektronička oprema. Osiguran je materijal i alat za zaštitu knjiga (zaštitna odijela i rukavice, spužve od kaučuka, kistovi za mehaničko čišćenje knjiga, konzervatorska mast i sl.). Provedene su brojne promotivne kampanje za koje je izrađen promotivni materijal. Sredstvima projekta za knjižnicu je nabavljen *ScanTent* koji će omogućiti jeftino, ali kvalitetno skeniranje. Šator za skeniranje zajedno s mobilnom aplikacijom omogućava skeniranje bez potrebe za pritiskanjem tipke na mobilnom uređaju. Fotografije se automatski snimaju nakon što se stranica okrene i automatski se izrezuju kako bi se izvezle u jedinstven dokument. U planu je održavanje natjecanja tzv. *scanatona* u skeniranju za učenike. Angažiranje učenika u skeniranje građe daje im priliku da razviju praktične vještine u područjima kao što su informacijska i digitalna pismenost, upravljanje arhivima, digitalne tehnologije i povijesna istraživanja.

Knjižnica Pomorske škole Bakar jedina je srednjoškolska knjižnica u Primorsko-goranskoj županiji koja digitalni sadržaj postavlja u repozitorij Zavičajne digitalne knjižnice Primorsko-goranske županije. Također, jedna je od dvije srednje škole uključene u projekt Ministarstva kulture i medija *eKultura* koji u središte stavlja izgradnju i održavanje digitalnih usluga radi poboljšanja dostupnosti, pristupačnosti i dugoročnog očuvanja kulturne baštine. Baštinske institucije na tom portalu neprestano digitaliziraju građe kako bi bogati izvori informacija bili dostupni javnosti.

Zaključak

Ovim je radom istaknuta važnost kulturne baštine u obrazovanju i njezino održivo korištenje. Zbirka starih knjiga u Knjižnici Pomorske škole Bakar svjedoči o višestoljetnom radu bakarske nautike i pomorskoj tradiciji grada Bakra te o Republici Hrvatskoj kao vrijednom čuvaru europske i svjetske pomorske baštine. Ona nije samo izvor povijesnih znanja, nego može poslužiti i kao inspiracija za stvaranje kreativnih sadržaja koji učenicima obogaćuju iskustvo učenja. Aktivnostima očuvanja starih knjiga prikazano je kako obrazovne institucije imaju važnu ulogu u očuvanju kulturne baštine za buduće naraštaje. Učenici su pokazali povećano razumijevanje i interes za zaštitu i očuvanje te osvijestili važnost očuvanja kulturne baštine. Aktivno su se uključili u njezino očuvanje što doprinosi njihovu obrazovanju i osobnom razvoju. U aktivnostima su implementirane temeljne EU vrijednosti kao što su održivost, raznolikost, solidarnost i aktivno građanstvo.

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GRAD PAZIN KAO 15-MINUTNI GRAD – PERCEPCIJA KORISNIKA GRADSKE KNJIŽNICE PAZIN

Majda MILEVOJ KLAPČIĆ
Gradska knjižnica Pazin
mmilevoj6@gmail.com

Kristina STANIĆ
Gradska knjižnica Pazin
stanic.kristina06@gmail.com

Sažetak

Predmet/ishodište rada: U uvodu se održivi razvoj definira kroz brigu za buduće generacije, uz europske inicijative poput Zelenog plana i koncepta 15-minutnog grada. Taj koncept promiče urbanistički model koji smanjuje potrebu za automobilima kako bi poboljšao kvalitetu života, fokusirajući se na blizinu usluga, raznolikost zajednica i digitalizaciju. U radu se istražuje kako se Pazin uklapa u koncept 15-minutnog grada, mogu li građani ispuniti osnovne potrebe unutar kratke šetnje ili vožnje biciklom.

Ciljevi: Istraživanje percepcije korisnika Gradske knjižnice Pazin na temu Pazin 15 – minutni grad imalo je zadatak ustvrditi koliko je prosječnom ispitaniku svakodnevni život unutar 15 minutnog radijusa kretanja, te smatraju li ispitanici uklapa li se Grad Pazin u koncept 15-minutnog grada. Cilj je bio kroz odgovore na pitanja o načinu prijevoza na posao, broju automobila po kućanstvu, trajanju puta do posla, te procjene prosječnih kretanja članova obitelji analizirati uklapa li se Grad Pazin u koncept 15-minutnog grada, te zaključiti što bi još trebalo osigurati da postane održiv grad.

Metodologija: U radu je korišten način anketnog ispitivanja putem Google obrazaca (prilog 1.). Ispitanici su ispunjavali upitnik koji je uključivao pitanja o njihovom mjestu stanovanja, načinu prijevoza, trajanju puta do posla, broju automobila u kućanstvu, kao i ocjenama u vezi s tvrdnjama o kvaliteti života, te o Pazinu kao 15-minutnom gradu. Upitnik je strukturiran da s pomoću Likertove ljestvice analizira stupanj slaganja, odnosno neslaganja s određenom tvrdnjom. Ispitanici su u pitanju otvorenog tipa dali svoje prijedloge o tome što bi željeli da Grad Pazin osigura kako bi im život u gradu bio lakši i ugodniji.

Rezultati: Iako se samo 9,7 % ispitanika izjasnilo da se ne slažu s tvrdnjom da je Grad Pazin 15-minutni grad, ostali odgovori upućuju da 69,4 % ispitanika ide na posao osobnim automobilom, 69,4 % ispitanika imaju 2 ili više osobnih automobila u kućanstvu, a na pitanja o procjeni vlastitih kretanja i kretanja svoje obitelji se oko 50 % ispitanika slaže s tim da se njihova svakodnevna kretanja uklapaju u radijus od 15 minuta. Da nemaju potrebu svaki dan voziti automobil potvrdilo je 36,1 % ispitanika. Iz otvorenih odgovora o potencijalnim poboljšanjima u Gradu Pazinu, velik broj ispitanika priželjkuje redovit javni prijevoz, jeftiniji ili besplatan parking, više sadržaja za mlade, biciklističke staze, gradski bazen, povoljnije uvjete kupovina nekretnina, te kvalitetnije održavanje javnih površina i parkova. Zaključak je da Grad Pazin ima potencijal postati 15–minutni grad, ali je potrebno dodatno ulaganje u infrastrukturu, javni prijevoz i društvene usluge. Ispitanici su generalno zadovoljni životom u gradu i njegovoj okolini,

ali vide prostor za poboljšanja.

Ključne riječi: grad Pazin, održivost, 15-minutni grad, raznolikost

JEL klasifikacija: R11, R41, Q01, Q56, Q58

Uvod

Kako bi se razvoj društva odvijao u smjeru koji nije poguban za buduće naraštaje počelo se razmišljati o pojmu održivosti. Komisija Ujedinjenih naroda Bruntland je 1987. godine definirala održivost kao „*zadovoljavanje potreba sadašnjosti bez ugrožavanja sposobnosti budućih generacija da zadovolje svoje vlastite potrebe*“ (United Nations, s.a.). Današnje tumačenje održivosti podrazumijeva zadovoljavanje potreba sadašnjeg stanovništva uz očuvanje okoliša i društva (Teh, Corbitt 2015). Održivi gradovi dizajniraju se s fokusom na ekološku, društvenu i ekonomsku održivost. U skladu s tim razvijeno je nekoliko inicijativa na razini Europe: Europski zeleni plan, 17 ciljeva održivog razvoja i Koncept 15-minutnog grada (Marić i sur., 2023). Koncept 15-minutnog grada postao je ključni cilj modernih urbanističkih planova usmjerenih na održivost, smanjenje ekološkog otiska i poboljšanje kvalitete života. Iako su sve inicijative isprepletene s ciljevima održivosti, u ovom radu bavit ćemo se konceptom 15-minutnog grada na primjeru Grada Pazina. „15-minutni grad temelji se na konceptu takozvanog „krono-urbanizma“, koji ističe da je kvaliteta urbanog života obrnuto proporcionalna količini vremena potrošenog na prijevoz, posebice korištenjem automobila. Ovaj koncept potječe od prvog autora, Carlosa Morena, koji se zalaže za urbanu organizaciju prostora u kojoj građani mogu realizirati sve svoje osnovne potrebe na udaljenostima za koje im ne treba više od 15 minuta hodanja ili vožnje biciklom.“ (Marić i sur., 2023, kako je navedeno u Moreno i sur., 2021). Ovaj rad analizira percepciju građana Pazina o tome u kojoj mjeri grad ispunjava uvjete za postizanje statusa 15-minutnog grada.

15-minutni gradovi

Koncept 15-minutnog grada opisuje planiranje razvoja grada koji će svojim stanovnicima omogućiti uživanje u višoj kvaliteti života u 6 bitnih urbanih društvenih funkcija: 1. život, 2. rad, 3. trgovina, 4. zdravstvena skrb, 5. obrazovanje i 6. zabava. Zaključak autora Carlosa Morena odnosi se na sljedeće: „što se više ti elementi uklapaju unutar 15-minutnog područja aktivne pokretljivosti (pješice ili biciklom), to se poboljšava kvaliteta života u gradu.“ (Marić i sur., 2023, kako je navedeno u Moreno i sur., 2021). Okvir u kojem su opisane prakse 15-minutnog grada obuhvaća 4 područja: 1. gustoća, 2. blizina, 3. raznolikost i 4. digitalizacija (Marić i sur., 2023). U prvom području – 1. gustoća podrazumijeva broj građana na km²... „najvažnije je razmotriti optimalan broj ljudi koje dotično područje može ugodno održati u kontekstu pružanja urbanih usluga i potrošnju resursa.“ (Moreno i sur., 2021). Prethodno osmišljen način gradnje visokih nebodera s velikom količinom ureda i radnika zahtijevao je prekomjernu potrošnju resursa, te preveliku potrebu oslanjanja na fosilna goriva kako

bi se visoki neboderi napajali. Ovakav način gradnje zahtijevao je veći broj automobila. Optimalna gustoća koju podrazumijeva koncept 15-minutnog grada pokušava osigurati optimalan, a ne prekomjeran broj stanovnika i radnika na određenom području grada. Planirajući optimalnu gustoću moguće je implementirati lokalna rješenja za štedljivu proizvodnju energije, opskrbu hranom i opetovano iskorištavanje dostupnog javnog prostora. Osiguravajući ove uvjete, zadovoljava se i područje 3. raznolikost, jer smanjuje razlike u zajednicama koje čine građani različitog ekonomskog statusa. Onima koji su u nepovoljnom položaju pruža se jednaka šansa za sudjelovanje u urbanim uslugama (osiguravajući blizinu bitnih sadržaja i povoljan javni gradski prijevoz). U području 2. blizina, rješenja podrazumijevaju reorganizaciju javnog prijevoza koji bi pogodovao većom implementacijom biciklističkih i pješačkih staza, a reducirao korištenje osobnih automobila. Sljedeća promjena je uvesti maksimalno korištenje javnih površina, pa tako školska igrališta u popodnevnim satima, nakon nastave, postaju javno dostupna građanima, a nalaze se u blizini njihovih domova. U području 3. raznolikost ubraja se i ostvarivanje multikulturalnih susjedstva. Multikulturalna dimenzija naselja ima pozitivne učinke iz perspektive ekonomije, osiguravajući široku ponudu kulturoloških proizvoda i kulturološkog naslijeđa u blizini domova građana. Pod 4. digitalizacija podrazumijeva se implementacija različitih digitalnih inovacija koje bi olakšale prva tri područja i osigurale održivost i štednju resursa (Zakariasson, A., 2022). Na primjer iznajmljivanje elektroničkih bicikala, digitalno upravljanje grijanja i hlađenja zgrada, digitalizirani odvoz smeća, digitalno upravljanje javnom rasvjetom... itd.

Kao primjeri gradova koji su uspješno inkorporirali prakse održivosti možemo navesti Beč (Austrija), Ljubljanu (Slovenija) i Singapur (grad-država) (Marić i sur., 2023). Beč predstavlja primjer uzornog grada, a tome svjedoči i činjenica da je već desetu godinu zaredom proglašen najboljim gradom za život u konkurenciji od 230 svjetskih gradova (Oršulić, 2020b). Iznimno za istaknuti je sustav javnog prijevoza koji se sastoji od tramvaja, autobusa, vlakova, podzemne željeznice i javnih električnih skutera. U Beču 73 % stanovnika na posao putuje javnim prijevozom. Vrijedno je spomenuti i sustav informacijske tehnologije koji se koristi za optimalno upravljanje energijom u zgradama. Pametni sustavi upravljaju potrošnjom energije oslanjajući se na vremenske prognoze. Umirovljenički domovi opremljeni su senzorima koji javljaju hitnim službama ako sugrađani padnu. Umjetna inteligencija na uređajima u domovima podsjeća stariju populaciju da ne zaborave popiti lijekove ili izmjeriti tlak (Oršulić, 2020a).

Singapur je održivi grad koji se može istaknuti kvalitetnim javnim prijevozom i prometnom regulacijom, urbanom pošumljavaju, tehnologijom i digitalizacijom. Singapur ima najgušću naseljenost u svijetu, te je uloga i utjecaj javnog prijevoza izuzetno važan kod postizanja održivosti. Toj održivosti doprinosi velik udio električnih vozila u javnom prometu. Singapur je uložio u pošumljavanje i automatizirani sustav prikupljanja smeća. Uvedena je i digitalna reforma (Smart Nation) u kojoj je Singapur uveo niz inovacija: nacionalni digitalni identitet, beskontaktno e-plaćanje, pametne kuće i stanovi ekološki prihvatljivih izvora energije, autonomni autobusi i *shuttle-ovi*.

Među spomenutim 15-minutnim gradovima, zabilježen je i glavni grad Slovenije,

Ljubljana. 2016. godine Europska komisija je Ljubljani proglasila Europskom zelenom prijestolnicom. Istaknula se uvodeći punionice za električna vozila, uveden je električni vlak i mogućnost korištenja električnih bicikala. Ljubljana nudi i sustav dijeljenja električnih automobila koje građani mogu iznajmljivati putem napredne aplikacije. Grad Ljubljana uveo je ekološke aktivnosti, odvaja se 60 % otpada, te se može pohvaliti s prosjekom od 542 m² zelenih površina po glavi stanovnika. U Ljubljani je u staroj jezgri grada šuma kroz koju se može pješke popeti na vrh brda s kojeg je vidljiv panoramski pogled na cijeli grad (Marić i sur., 2023).

Metode / Metodologija: Istraživanje Grad Pazin kao 15-minutni grad

Metodologija ovog istraživanja temelji se na analizi ankete provedene među korisnicima Gradske knjižnice Pazin. Ključni koraci istraživačkog procesa ovog rada uključuju Google obrazac koji ispituje percepcije korisnika o Gradu Pazinu kao 15-minutnom gradu, o mobilnosti, dostupnosti osnovnih usluga, te o njihovom zadovoljstvu životom u gradu. Upitnik se sastoji od 14 pitanja koji uključuju pitanja s mogućnošću višestrukih odgovora o njihovom mjestu stanovanja (grad Pazin, općine Pazinštine ili van grada Pazina), mjestu rada, načine odlaska na posao, broj osobnih automobila u kućanstvu, te vrijeme potrebno da se svaki dan stigne na posao.

Ostala pitanja su postavljena da s pomoću Likertove ljestvice ispituju stupanj slaganja ispitanika s određenom tvrdnjom. U pitanju u kojem se traži stupanj slaganja s tvrdnjom da je „Grad Pazin 15-minutni grad“ je ispitanicima napisano objašnjenje koje definira koncept 15-minutnog grada: *„15-minutni grad temelji se na konceptu takozvanog „krono-urbanizma“, koji ističe da je kvaliteta urbanog života obrnuto proporcionalna količini vremena potrošenog na prijevoz, posebice korištenjem automobila. (...) ... građani mogu realizirati sve svoje osnovne potrebe na udaljenostima za koje im ne treba više od 15 minuta hodanja ili vožnje biciklom. (...) Načelo 15-minutnog grada pokušava uskladiti mjesta života s vremenom života matricu sa šest društvenih, urbanih i teritorijalnih funkcija: živjeti, raditi, skladištiti, učiti, napredovati i moći pristupiti blagostanju. Njegov zaključak odnosi se na sljedeće: što se više ti elementi uklapaju unutar 15-minutnog područja aktivne pokretljivosti (pješice ili biciklom), to se poboljšava kvaliteta života u gradu.“* (Marić i sur., 2023). Nastavljaju se pitanja o slaganjima s tvrdnjama uklapaju li se svakodnevna kretanja ispitanika i kretanja njihovih ukućana u koncept 15-minutnog grada, imaju li potrebu svaki dan voziti auto, te uštede li na gorivu i amortizaciji vozila ako su im željeni sadržaji u pješačkoj blizini. Istražen je i stupanj slaganja s tvrdnjom da je „Grad Pazin održivi grad“, gdje je također ispitanicima ponuđeno objašnjenje održivog grada: *„Održivi grad je onaj u kojem ima dovoljno mjesta za stanovanje, u kojem je moguće javnim prijevozom ili biciklom sigurno doći na posao, gdje su parkovi dobro raspoređeni između zgrada i poslovnih prostora te svi ljudi imaju nesmetan pristup javnim ustanovama i prostorima (Romanelli, 2017). Također Romanelli (2017) dodaje da su u takvom gradu dostupne i kulturne, društvene i druge usluge te je takav grad prilagodljiv i otporan na klimatske promjene, a ljudi različitih struka rade zajedno za boljitak zajednice.“* (Marić i sur., 2023 kako je navedeno u Romanelli, 2017). Istraženo je slaganje s tvrdnjom promiče li se u gradu okruženje koje prihvaća različite kulture i ljude. Postavljeno je i

pitanje otvorenog tipa: što bi ispitanici voljeli da Grad Pazin ima, tj. osigura kako bi im život u gradu bio lakši i ugodniji. Ovo pitanje je ciljano postavljeno kako bi detektiralo subjektivne stavove i prijedloge svakog pojedinačnog ispitanika o tome što je potrebno osigurati za građane, u budućnosti. Posljednje pitanje traži stupanj slaganja s tvrdnjom osjećaju li se ispitanici sretno i ponosno što žive u svoj susjedstvu kako bi se ispitao stupanj topofilije.

Rezultati

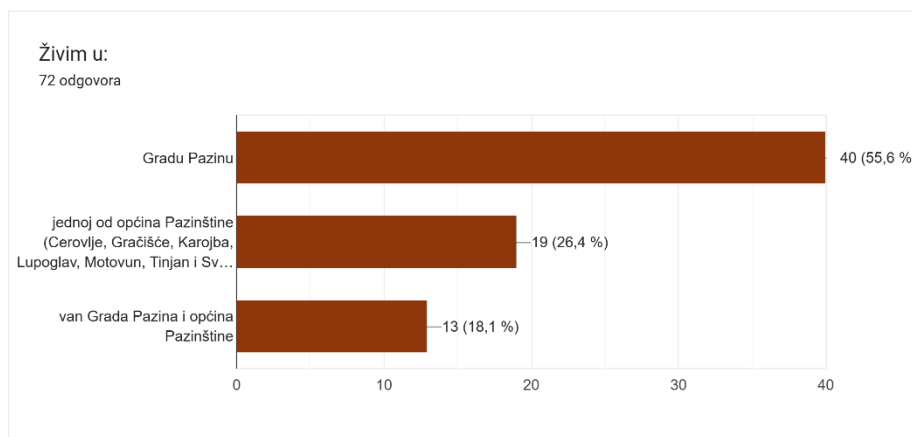
Prikupljeno je 72 odgovora na anketni upitnik (*prilog 1.*) s 14 pitanja u razdoblju od 18. do 26. listopada 2024. godine. Od svih ispitanih korisnika, 55,6 % korisnika žive u Gradu Pazinu, a 26,4 % u jednoj od općina Pazinštine (grafikon 1). 72,2 % ispitanika rade u Gradu Pazinu, a 20,8 % u jednoj od općina Pazinštine (grafikon 2). Na pitanje na koji način idu na posao ispitanici su dali odgovore prikazane u grafikonu 3: samo 23,6 % ispitanika ide na posao pješice ili biciklom, dok 69,4 % koristi osobni automobil. Autobusom (5,6 %) i vlakom (2,8 %) putuje vrlo mali postotak ispitanika. Velik postotak korištenja osobnog automobila potvrđuje i odgovor na pitanje o broju osobnih automobila (grafikon 4.) u kojem 69,4 % ispitanika imaju 2 ili više automobila u jednom kućanstvu. Na pitanje koliko im vremena treba do posla 50 % ispitanika se izjasnilo da im ne treba duže od 15 minuta (pješice ili automobilom), dok ostali odgovori upućuju da je potrebno duže od 15 minuta, a samo 2,78 % ispitanika rade od kuće pa nemaju potrebu putovati na posao.

77,8 % ispitanika se slaže da je Grad Pazin 15-minutni grad, no pitanja koja analiziraju koliko imaju potrebu voziti osobne automobile na posao i koliko to čine njihovi članovi obitelji upućuju da 69,4 % ispitanika ide na posao osobnim automobilom, te da taj isti postotak ispitanika u kućanstvu posjeduje 2 ili više osobnih automobila. Samo 23,6 % ispitanika na posao ide pješice ili biciklom. S tvrdnjom da se njihova osobna kretanja uklapaju u 15-minutni grad slaže se 50 % ispitanika (grafikon 7.), a da se kretanja njihovih članova obitelji uklapaju u 15-minutni grad slaže se 48,6 % ispitanika. S tvrdnjom da njihovo kućanstvo nema potrebu svaki dan voziti automobil slaže se 36,1 % ispitanika (grafikon 9), te isti broj ispitanika tvrdi da radi toga štedi na gorivu, amortizaciji goriva i parkingu (grafikon 10). Da je „Grad Pazin održivi grad“ smatra 40,3 % ispitanika (grafikon 11). 43,6 % ispitanika se slaže s tvrdnjom da je grad Pazin okruženje koje prihvaća različite kulture i ljude (grafikon 12). Pitanje imaju li potrebu voziti automobil svaki dan (grafikon 9) potvrđuje svakodnevnu ovisnost o osobnom automobilu 61,1 % ispitanika.

U otvorenom pitanju koje glasi „Što biste voljeli da Grad Pazin ima, tj. osigura kako bi Vam život u gradu bio lakši i ugodniji?“ svaki je ispitanik dao svoj jedinstveni odgovor, no odgovori koji su se ponavljali su želja za redovitim javnim gradskim prijevozom, jeftinijim ili besplatnim parkingom, više biciklističkih staza, gradski bazen, više sadržaja za mlade, veći izbor srednjoškolskih smjerova, povoljnije uvjete za kupovinu nekretnina i kvalitetnije održavanje parkova i javnih površina.

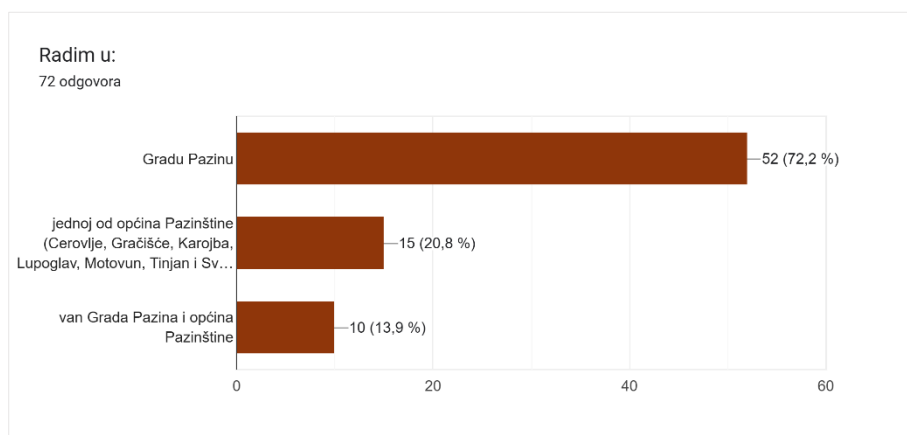
S posljednjom tvrdnjom osjećaju li se sretno i ponosno što žive u svom susjedstvu složilo se 73,6 % ispitanika.

Grafikon 1. Gdje ispitanici žive



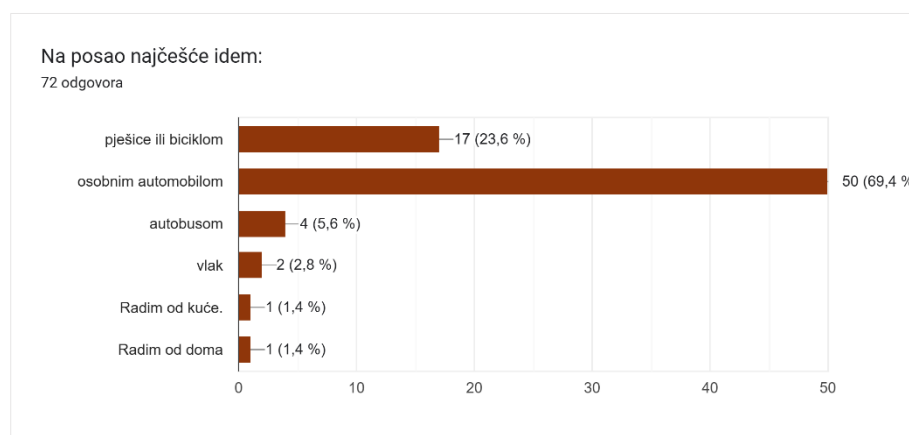
Izvor: Izrada autora (Google obrazac)

Grafikon 2. Gdje ispitanici rade



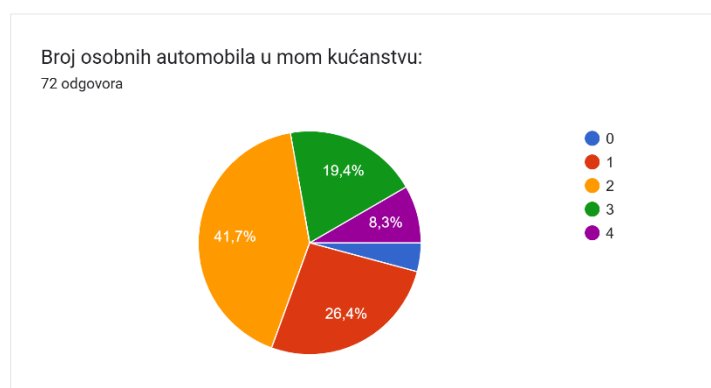
Izvor: Izrada autora (Google obrazac)

Grafikon 3. Kako ispitanici putuju na posao



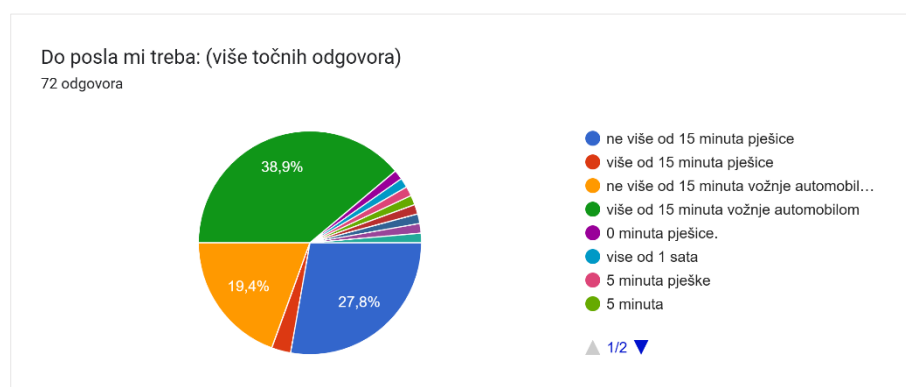
Izvor: Izrada autora (Google obrazac)

Grafikon 4. Broj osobnih automobila u kućanstvu



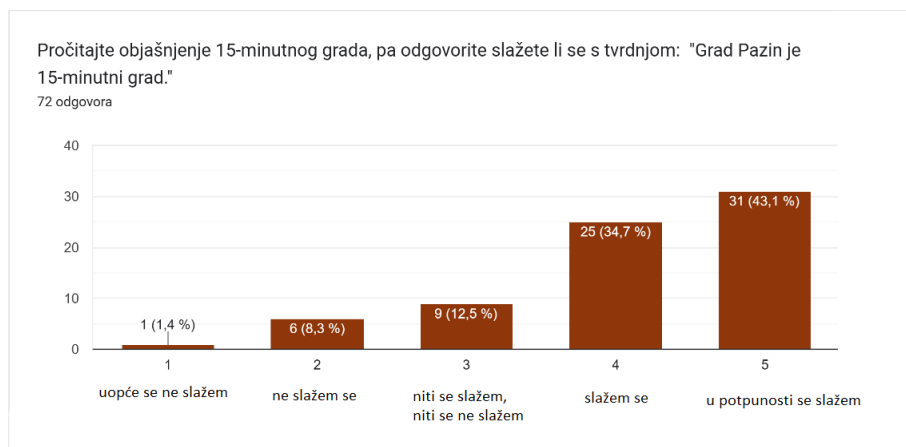
Izvor: Izrada autora (Google obrazac)

Grafikon 5. Procjena vremena putovanja do posla



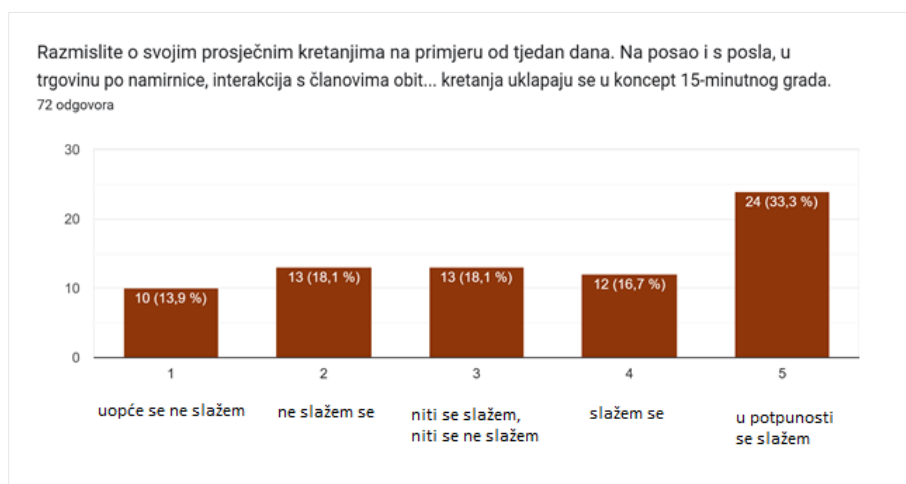
Izvor: Izrada autora (Google obrazac)

Grafikon 6. Slaganje s tvrdnjom „Grad Pazin je 15-minutni grad“



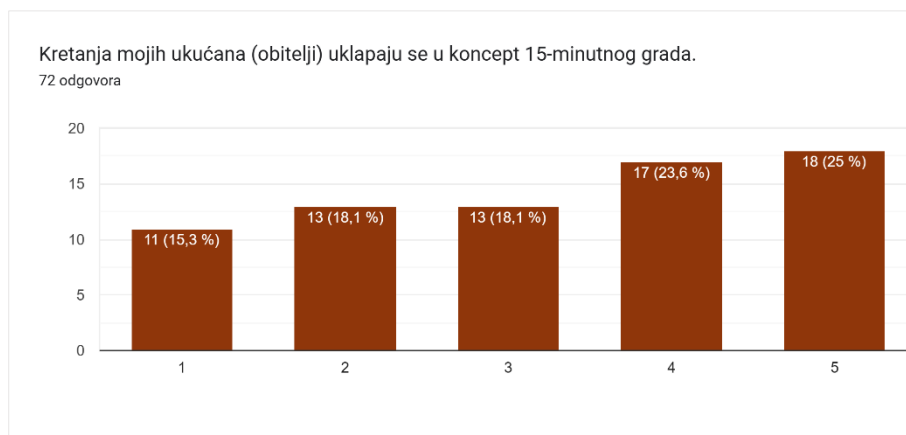
Izvor: Izrada autora (Google obrazac)

Grafikon 7. Slaganje s tvrdnjom „Moja kretanja uklapaju se u koncept 15-minutnog grada“



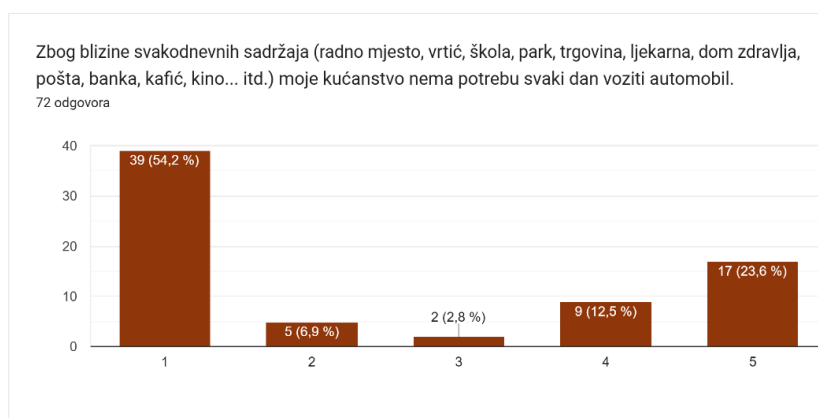
Izvor: Izrada autora (Google obrazac)

Grafikon 8. Slaganje s tvrdnjom „Kretanja mojih ukućana (obitelji) uklapaju se u koncept 15-minutnog grada“



Izvor: Izrada autora (Google obrazac)

Grafikon 9. Slaganje s tvrdnjom „Moje kućanstvo nema potrebu svaki dan voziti automobil“



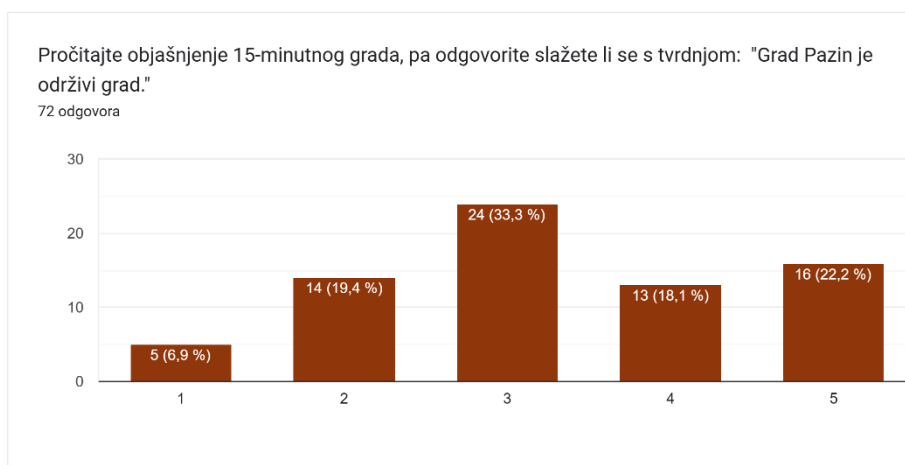
Izvor: Izrada autora (Google obrazac)

Grafikon 10. Slaganje s tvrdnjom „Moje kućanstvo štedi na gorivu, amortizaciji vozila i parkingu“



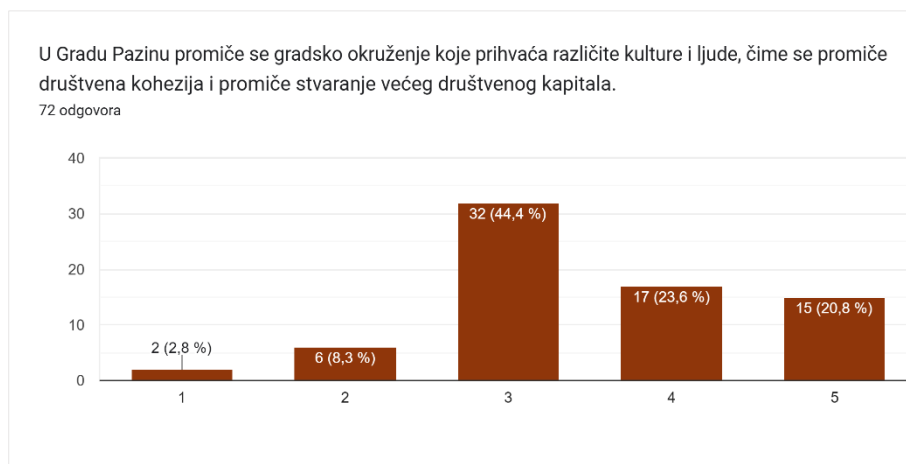
Izvor: Izrada autora (Google obrazac)

Grafikon 11. Slaganje s tvrdnjom „Grad Pazin je održivi grad“



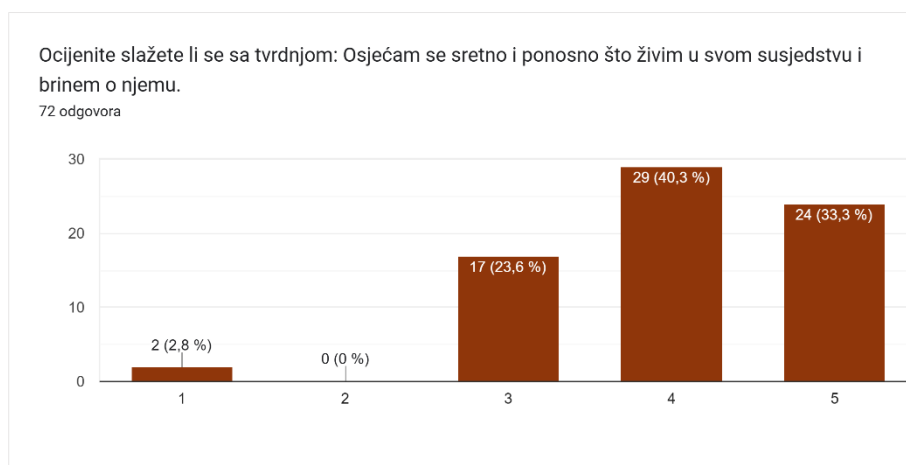
Izvor: Izrada autora (Google obrazac)

Grafikon 12. Slaganje s tvrdnjom „U Gradu Pazinu promiče se okruženje koje prihvaća različite kulture i ljude“



Izvor: Izrada autora (Google obrazac)

Grafikon 13. Slaganje s tvrdnjom „Osjećam se sretno i ponosno što živim u svom susjedstvu i brinem o njemu“



Izvor: Izrada autora (Google obrazac)

Zaključak

Rezultati ankete upućuju da Pazin još uvijek nije u potpunosti 15-minutni grad, no analizirajući odgovore ispitanika i dokument Plan razvoja Grada Pazina 2021.-2027. (Plan razvoja Grada Pazina 2021.-2027.,2022) ima potencijal da to postane. Ispitanici se većinom slažu da je Grad Pazin 15-minutni grad, no pitanja koja analiziraju koliko imaju potrebu voziti osobne automobile na posao i koliko to čine njihovi članovi obitelji upućuju na veliku ovisnost o osobnim automobilima.

Plan razvoja Grada Pazina 2021.-2027. predviđa nekoliko mjera koje bi mogle riješiti ključne probleme navedene u istraživanju: Grad planira izgraditi novi autobusni

kolodvor i čekaonice te povećati dostupnost javnog prijevoza, posebno između središta grada i okolnih općina. Također, razvijaju se analize za poboljšanje javnog prijevoza koje bi trebale osigurati održivo povezivanje Pazina s ruralnim područjima. Budući plan prijevoza predlaže razvoj e-autobusa i autobusa na vodik, te car-sharing sustave (sustave za iznajmljivanje automobila). Plan obuhvaća unaprjeđenje biciklističke mreže i uvođenje novih biciklističkih staza i punktova za e-bicikle, što bi moglo smanjiti ovisnost o automobilima i povećati korištenje bicikala u gradu. Planirano je i ulaganje u pješačku infrastrukturu i izgradnju novih šetnica i rekonstrukciju postojećih, čime se potiče pješčenje i poboljšava sigurnost svih sudionika u prometu. Navedeno potvrđuje da javni gradski prijevoz, biciklističke staze i pješačke staze u Pazinu svakako treba poboljšati, ali i da vodeća infrastruktura Grada Pazina predosjeća potencijalne probleme i planira adekvatna rješenja u budućnosti.

Navedeno potvrđuju i odgovori ispitanika na otvoreno pitanje „Što biste voljeli da Grad Pazin ima, tj. osigura kako bi Vam život u gradu bio lakši i ugodniji?“ u kojem je više ispitanika odgovorilo da nedostaje javni gradski prijevoz s više i češće osiguranim linijama prema općinama. U odgovorima se ponavljala i potreba za više biciklističkih staza, iz čega se može zaključiti da bi građani Pazina češće vozili bicikle kada bi za to postojala prikladna infrastruktura. Da nemaju potrebu svaki dan voziti automobil potvrdilo je 36,1 % ispitanika. Od ukupnog broja ispitanika samo 5,6 % putuje autobusom, a 2,8 % vlakom. Kada bismo to usporedili s postocima u uvodu, gdje je iznijet podatak da u Beču 73 % stanovnika na posao ide javnim prijevozom, tada vidimo da je Pazinu potrebna infrastruktura javnog prijevoza koja bi doprinijela smanjenju korištenja osobnih automobila. Na pitanje koliko im je potrebno vremena do posla oko 50 % ispitanika se slaže da im ne treba duže od 15 minuta pješice ili automobilom. Može se zaključiti da postoji potencijal da stanovnici koji ne voze automobil duže od 15 minuta do posla, zamijene osobni automobil javnim prijevozom, kada bi on bio osiguran. U Planu Grad planira izgradnju parkirališta i garaža te uvođenje rješenja za elektrifikaciju parkirališta, što bi moglo doprinijeti rješavanju problema nedostatka parkirnih mjesta i olakšati tranziciju prema održivoj mobilnosti.

Slaganje s tvrdnjom je li grad Pazin održivi grad rezultiralo je podijeljenim odgovorima što vodi u zaključak da ispitanici smatraju da nedostaje uvjeta kako bi Pazin postigao opisanu održivost. S tvrdnjom promiče li se u Pazinu gradsko okruženje koje prihvaća različite kulture i ljude složilo se 44,4 % ispitanika što upućuje da je i područje raznolikosti dio koji bi trebalo poboljšati i promovirati u gradu. U Planu je opisana planirana kontinuirana podrška kulturnim programima i manifestacijama, podrška multikulturalnim projektima i uključivanje civilnog društva, te jačanje kulturne ponude kroz suradnju i edukaciju. Ove inicijative trebale bi doprinijeti stvaranju otvorenijeg i inkluzivnijeg okruženja za različite kulture u Pazinu, te naposljetku poboljšati raznolikost.

Iz otvorenih odgovora o potencijalnim poboljšanjima u Gradu Pazinu, ponavljali su se i odgovori u kojem ispitanici priželjkju jeftiniji ili besplatan parking, s više parkirnih mjesta, više sadržaja za mlade, ulaganje u obrazovni sustav (više različitih strukovnih smjerova za srednjoškolce) gradski bazen, povoljnije uvjete kupovina nekretnina, te kvalitetnije održavanje javnih površina i parkova. U Planu se navodi jačanje

obrazovanja kroz dodatna ulaganja u strukovno obrazovanje, čime bi se mladima omogućilo više opcija za obrazovanje u lokalnoj zajednici, što je također navedeno kao jedna od želja građana. S tvrdnjom „Osjećam se sretno i ponosno što živim u svom susjedstvu i brinem o njemu“ slaže se 73,6 % ispitanika što potvrđuje topofiliju – činjenicu da je osoba sretna i ponosna na svoje susjedstvo.

Zaključak je da Grad Pazin ima potencijal postati 15–minutni grad, ali je potrebno dodatno ulaganje u infrastrukturu, javni prijevoz i društvene usluge. Potvrđena je i svjesnost o potrebnim ulaganjima, budući da se određena rješenja na detektirane probleme nude u dokumentu Plan Grada Pazina 2021.-2027. Ispitanici su generalno zadovoljni životom u gradu i njegovoj okolini, ali vide prostor za poboljšanja.

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Prilozi

1. Anketni – Google obrazac (izrada autora):

PAZIN
#centralistria #pazin

Grad Pazin kao 15-minutni grad - percepcija korisnika Gradske knjižnice Pazin

Gradska knjižnica Pazin istražuje percepciju korisnika Knjižnice o mogućnosti razvoja Grada Pazina u 15-minutni grad. Istraživanje se radi u sklopu projekta EuSolis Ekonomskog fakulteta Sveučilišta u Zagrebu.

Upitnik je anonimn, a vrijeme koje je potrebno da ga se ispuni ne premašuje 10 minuta. Hvala!

stanic.kristina06@gmail.com [Promijeni račun](#)

Nije dijeljeno

* Označava obavezno pitanje

Živim u: *

☐ Gradu Pazinu

☐ jednoj od općina Pazinštine (Cerovlje, Gračišće, Karojba, Lupoglav, Motovun, Tinjan i Sveti Petar u Šumi)

☐ van Grada Pazina i općina Pazinštine

Radim u: *

☐ Gradu Pazinu

☐ jednoj od općina Pazinštine (Cerovlje, Gračišće, Karojba, Lupoglav, Motovun, Tinjan i Sveti Petar u Šumi)

☐ van Grada Pazina i općina Pazinštine

Na posao najčešće idem: *

☐ pješice ili biciklom

☐ osobnim automobilom

☐ autobusom

☐ Ostalo: _____

Broj osobnih automobila u mom kućanstvu: *

Odaberi ▼

Do posla mi treba: (više točnih odgovora) *

- ☐ ne više od 15 minuta pješice
- ☐ više od 15 minuta pješice
- ☐ ne više od 15 minuta vožnje automobilom
- ☐ više od 15 minuta vožnje automobilom
- ☐ Ostalo: _____

Pročitajte objašnjenje 15-minutnog grada, pa odgovorite slažete li se s tvrdnjom: *
"Grad Pazin je 15-minutni grad."

"15-minutni grad temelji se na konceptu takozvanog "krono-urbanizma", koji ističe da je kvaliteta urbanog života obrnuto proporcionalna količini vremena potrošenog na prijevoz, posebice korištenjem automobila. (...) ... građani mogu realizirati sve svoje osnovne potrebe na udaljenostima za koje im ne treba više od 15 minuta hodanja ili vožnje biciklom. (...) Načelo 15-minutnog grada pokušava uskladiti mjesta života s vremenom života matricu sa šest društvenih, urbanih i teritorijalnih funkcija: živjeti, raditi, skladištiti, učiti, napredovati i moći pristupiti blagostanju. Njegov zaključak odnosi se na sljedeće: što se više ti elementi uklapaju unutar 15-minutnog područja aktivne pokretljivosti (pješice ili biciklom), to se poboljšava kvaliteta života u gradu."

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

Razmislite o svojim prosječnim kretanjima na primjeru od tjedan dana. Na posao i *
s posla, u trgovinu po namirnice, interakcija s članovima obitelji (djeca, stariji
članovi obitelji), pa odgovorite koliko se slažete sa sljedećim tvrdnjama:

Moja kretanja uklapaju se u koncept 15-minutnog grada.

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

Kretanja mojih ukućana (obitelji) uklapaju se u koncept 15-minutnog grada. *

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

**Zbog blizine svakodnevnih sadržaja (radno mjesto, vrtić, škola, park, trgovina, *
lijevakarna, dom zdravlja, pošta, banka, kafić, kino... itd.) moje kućanstvo nema
potrebu svaki dan voziti automobil.**

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

**Zbog blizine svakodnevnih sadržaja (radno mjesto, vrtić, škola, park, trgovina, *
ljekarna, dom zdravlja, pošta, banka, kafić, kino... itd.) moje kućanstvo štedi na
gorivu, amortizaciji vozila i parkingu.**

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

Pročitajte objašnjenje 15-minutnog grada, pa odgovorite slažete li se s tvrdnjom: *
"Grad Pazin je održivi grad."

Održivi grad je onaj u kojem ima dovoljno mjesta za stanovanje, u kojem je moguće javnim prijevozom ili biciklom sigurno doći na posao, gdje su parkovi dobro raspoređeni između zgrada i poslovnih prostora te svi ljudi imaju nesmetan pristup javnim ustanovama i prostorima (Romanelli, 2017). Također Romanelli (2017) dodaje da su u takvom gradu dostupne i kulturne, društvene i druge usluge te je takav grad prilagodljiv i otporan na klimatske promjene, a ljudi različitih struka rade zajedno za boljitak zajednice.

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

**U Gradu Pazinu promiče se gradsko okruženje koje prihvaća različite kulture i *
ljudе, čime se promiče društvena kohezija i promiče stvaranje većeg društvenog
kapitala.**

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

Što biste voljeli da Grad Pazin ima, tj. osigura kako bi Vam život u gradu bio lakši i *
ugodniji?

Vaš odgovor _____

Ocijenite slažete li se sa tvrdnjom: **Osjećam se sretno i ponosno što živim u svom *
susjedstvu i brinem o njemu.**

1 2 3 4 5

uopće se ne slažem ☐ ☐ ☐ ☐ ☐ u potpunosti se slažem

Podnesi

Izbriši obrazac

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Google Obrasci

Izvor: Anketni upitnik 1. : Izrada autora (Google obrazac)

SUVREMENA UPORABA INFORMACIJSKIH I KOMUNIKACIJSKIH TEHNOLOGIJA U UČENJU O OČUVANJU OKOLIŠA

Ljiljana ZMIJANOVIĆ
Srednja škola Ivana Meštrovića Drniš
ljiljana.zmijanovic@skole.hr

Sažetak

Predmet/ishodište rada: Suvremen pristup obrazovanju u uvjetima rastućeg trenda uporabe informacijskih i komunikacijskih tehnologija, s naglaskom na uporabu tehnologija umjetne inteligencije zahtijeva nova i kvalitetna znanja kao temelje odgovorne primjene u praksi. Rad se bavi pitanjem potencijala primjene znanja o suvremenim tehnologijama i integracije tehnologija umjetne inteligencije u ekonomskom diskursu i učenju o važnosti očuvanja okoliša.

Ciljevi: Studijom slučaja navodi se i razmatra srednjoškolski projekt 'Šumski asistent AI' koji je razvijen u tročlanom timu učenika pod mentorstvom autorice rada, a kojim je tim sudjelovao na državnom natjecanju Poslovni izazov 2024. Svrha je bila primjenom usvojenih znanja i vještina u skladu s ishodima učenja nastavnog procesa razviti i prezentirati zamišljenu tvrtku koja se bavi razvojem sofisticiranih alata za analizu šuma. Temelji se na prostornim informacijskim tehnologijama, odgovornom i održivoj primjeni tehnologija umjetne inteligencije, kako bi se raznim korisnicima pružila putem kreiranog Chatbot AI podrška za očuvanje, upravljanje i održivo korištenje, te poboljšanje zdravlja šuma. Cilj je osnaživanje ljudi i organizacija za bolje upravljanje šumama pomoću analitike satelitskih podataka temeljene na daljinskim istraživanjima, te implementacija i integracija sustava umjetne inteligencije u gospodarenju šumama nove generacije.

Metodologija: Pažljivom primjenom principa multimedijskog učenja i smjernica moguće je iskoristiti mogućnosti tehnologija umjetne inteligencije kako bi se poboljšalo iskustvo učenja.

Rezultati: Učenja o primjenama koncepcije održivog razvoja Europske unije vizija je budućnosti, a održivost razvojni kriterij, odnosno koncepcija unutar koje se promišlja o učincima ljudskog djelovanja.

Ključne riječi: informacijska i komunikacijska tehnologija, umjetna inteligencija, obrazovanje, okoliš

JEL klasifikacija: I23, Q20

Uvod

Budućnost će biti sasvim drugačija od neposredne prošlosti. Naša djeca i mi kao društvo u cjelini suočavamo se sa svjetskom međuovisnom civilizacijom oblikovanom ekonomskim turbulencijama uzrokovanim uporabom tehnologija umjetne inteligencije i globalizacijom, neuspjehom u postizanju ciljeva održivog razvoja Ujedinjenih naroda, globalnim klimatskim promjenama i brzim promjenama potaknutim mobilnim uređajima širom svijeta opremljenim društvenim medijima. Čovječanstvo u desetljeću klimatskih ekstrema i promjena zahtjeva davanje hitnog odgovora na pitanje procjene otpornosti šuma. Šume su neophodne za život na Zemlji, zato je njihovo zdravlje ključno za zdravlje našeg planeta. Praćenje razvoja i zdravlja nužno je za uspješno održivo gospodarenje šumama i njihovo očuvanje u budućnosti. Pitanje je na koji način suvremene tehnologije mogu pomoći u razumijevanju ranjivosti našeg okoliša i biti potporom više održivog i učinkovitog upravljanja i korištenja prirodnih bogatstava.

Prostorne informacijske tehnologije za upravljanje prirodnim resursima

Prirodni resursi u mnogim zemljama svijeta doživljavaju promjene onim intenzitetom kakav se do sada nije bilježio. U izdanju Izvještaja o stanju planeta (WWF, Living Planet Report LPR, 2022) veoma je uočljiv Indeks živućeg planeta (engl. Living Planet Index LPI), koji je parametar stanja svjetske biološke raznolikosti. Izvještaj se temelji na kretanjima i analizi populacijskih trendova vrsta kralježnjaka iz kopnenih, slatkovodnih i morskih staništa. Indeks pokazuje da je broj populacije sisavaca, ptica, gmazova, vodozemaca i riba drastično pao (više od 52%) od 1970. godine, do 2022 godine.

Doprinos globalnoj raspravi o klimatskim promjenama koje naglašavaju nužnost poduzimanja akcija za održivu prilagodbu klimatskim promjenama je i godišnja konferencija Ujedinjenih naroda. Konferencija Ujedinjenih naroda o klimatskim promjenama se održava u Bakuu, Azerbajdžan od 11. do 22. studenog 2024. godine. Konferencije UN-a o klimatskim promjenama (ili COP) održavaju se svake godine i jedini su svjetski multilateralni forum za donošenje odluka o klimatskim promjenama koji okuplja gotovo sve zemlje. 'U znak solidarnosti za zeleni svijet' sintagma je ovogodišnje konferencije. Pojednostavljeno rečeno, COP je mjesto gdje se svijet okuplja kako bi se dogovorio o akcijama za rješavanje klimatske krize, kao što je ograničavanje porasta globalne temperature na 1,5 stupnjeva Celzijusa, pomoć ranjivim zajednicama u prilagodbi učincima klimatskih promjena i postizanje neto - nula emisija do 2050. COP 29 okupit će svjetske čelnike i pregovarače iz država članica (ili stranaka) Okvirne konvencije UN-a o klimatskim promjenama (UNFCCC) radi daljnjeg globalnog napretka, s poslovnim čelnicima, mladima, klimatskim znanstvenicima, domorodačkim narodima i civilnim društvom uvide i najbolje prakse za jačanje globalne, zajedničke i uključive klimatske akcije. Među ključnim prioritetima COP 29 je osiguranje novog cilja financiranja klimatskih promjena, osiguravanje da svaka zemlja ima sredstva za poduzimanje mnogo snažnijih klimatskih mjera, smanjenje emisija stakleničkih plinova i izgradnja otpornih zajednica.

Uporaba suvremenih tehnologija u analitici obrade podataka i izvještavanja u bitnom doprinosi bržem i kvalitetnijem protoku informacija u znanstvenom i stručnom okruženju, dok vizualni identitet potpomognut grafičkim obradama tako predstavljenih izvješća omogućava preglednije i lakše korištenje.

Prostorne informacijske tehnologije mogu se koristiti kao sustavi za podršku odlučivanju i donošenju odluka. Tipično, takav sustav sadrži prostorne podatke relevantne odlukama, odnosno analitičke alate za obradu podataka u smislene načine za odlučivanje (Zmijanović, 2018).

Prostorne informacijske tehnologije uključuju tri glavne vrste:

- Globalni sustav pozicioniranja (engl. Global Positioning System GPS)
- Daljinska istraživanja (engl. Remote sensing RS), u zraku i satelitske
- Geografski informacijski sustav (engl. Geographic Information System GIS).

U radu će se razmatrati mogućnosti uporabe daljinskih istraživanja i onih tehnologija vezanih za praćenje šuma, kao svojevrsnih podloga predstavljenog projekta u studiji slučaja.

Navedene tri kategorije su povezane i kada se koriste na integriran način povećavaju korisnost tako dobivenih informacija. Često RS slike i GPS podaci služe kao ulaz u sustav GIS. Nadalje, mnogi prostorni podaci su sada dostupni u distribuiranim i 'web-based' bazama podataka. Za zaključiti je sa kretanja u prostornim informacijskim tehnologijama ne mogu biti odvojeni od općih trendova u informacijskim i komunikacijskim tehnologijama.

Još na Svjetskom kongresu parkova 2014. godine u središtu pozornosti bila je paradigma doprinosa suvremenih tehnologija za praćenje zaštićenih područja uz pomoć alata kao što su Global Forest Watch (GFW), 'on-line' praćenje šuma i sustava uzbuđivanja koji objedinjuje satelitsku tehnologiju, 'cloud computing', i 'on-line' alate za osiguran pristup pravovremenim i pouzdanim informacijama o prirodnim resursima, sa posebnim naglaskom na šumama. U smislu razvoja GFW alata u proteklom desetljeću je više znanja o stanju svjetskih zaštićenih područja nego ikada prije.

Kako se razvijala internetska povezanost, osobito putem mobitela, omogućen je pristup važnim informacijama u stvarnom vremenu, pa čak i dijeljenje informacija o promjenama na terenu. Primjera radi, platforma Global Forest koristi satelitske podatke za praćenje šumskog pokrova i prati promjene u gotovo realnom vremenu. Korisnike u gotovo realnom vremenu može upozoriti ukoliko je otkrivena sječa stabala u njihovoj blizini.

Nadalje, višestruko je poboljšana prostorna razlučivost satelitskih snimaka. Na primjer, uz pomoć 'the Worldview-3' četvrte generacije satelita koji je pokrenula tvrtka Digital Globe može se vidjeti zemlja u rezoluciji od oko 30 centimetara. To znači da su slike dovoljno referentne za razlikovanje pojedinih stabala, a ponekad čak i identificiranje vrsta.

Korisna i smislena uporaba geoprostornih informacija predstavlja jedan od najvećih izazova. Potreba je pretvoriti nesagledivu količinu sirovih podataka u razumljiv, jednostavan model pristupa informacijama. Analitičarima je nužno potrebno preuzimanje slika iz više vremenskih razdoblja kako bi mogli otkriti promjena putem satelitskih snimaka. Uz to, potrebno ih je vizualno interpretirati i pronaći razlike. Riječ je o dugotrajnom procesu.

U proteklom desetljeću računalna snaga je evoluirala od obrade ogromne arhive satelitskih podataka do vrlo dostupne mogućnosti dobivanja satelitskih pregleda visoke razlučivosti i dobivanja perspektive krajolika. Važnost leži u otkrivanju promjena u krajoliku, poglavito neplanirane ili nezakonite izmjene, a to dovoljno rano da se mogu pokrenuti akcije.

Za dio odgovora zaslužna su dostignuća poput tehnologije 'cloud computing', koja su dovela do kreacije automatskih algoritama za detekciju promjena. Radi se o tehnologiji koja može analizirati satelitske snimke čim su dostupne. Kao rezultat može se navesti brzo dobivanje pokazatelja za praćenje promjena u krajoliku, ali i omogućiti procjenu gdje se promjene potencijalno mogu dogoditi.

Daljinska istraživanja (RS)

Daljinska istraživanja obuhvaćaju sve tehnike vezane za analizu i uporabu podataka dobivenih sa satelita i fotografije iz zraka. Daljinska istraživanja razumijevaju se kao dobivanje, odnosno dostupnost informacija o objektu ili fenomenu kroz uređaj koji nije u fizičkom kontaktu s objektom (Jones & Vaughan, 2010). Imaju značajan potencijal kao izvor informacija o stanju i pritiscima na biološku raznolikost. Veći dio daljinski detektiranih podataka se koristi za izradu mapa i za izrade raznih prostornih analiza. Na taj način moguće je tumačiti i otkriti podatke o zdravlju i stanju usjeva, vegetaciji, šumama i drugim vrstama vegetacije, na što je stavljen naglasak u ovom radu. Mnogi sateliti usmjereni su na praćenje prirodnih resursa. Sateliti kreiraju peta - bajte podataka i mogu poslužiti otkriti promjene u krajoliku i doprinijeti otkrivanju odgovornosti. Često se naglašava značaj korištenja daljinskih istraživanja za korisne prostorne bio - fizikalne i socio - ekonomske informacije koje mogu doprinostiti donošenju odluka (Jensen 2006).

Za praćenje i upravljanje resursima Zemlje od neosporne važnosti su NASA-ini sateliti Landsat. Satelit Landsat 8 lansiran je u veljači 2013. godine. Svrha satelita Landsat je pružanje znanstvenicima mogućnosti primjene aplikacije za daljinsko očitavanje podataka. Zahvaljujući zapisima moguće je pratiti globalno važna pitanja kao što je globalni ciklus ugljika.

NASA je istraživanjima primjena programa očuvanja životne sredine unaprijedila naše razumijevanje globalnih utjecaja i promjena u okolišu. U naprednim računalnim modelima zemljana zapažanja 'Space-based' zemljina zapažanja također je korištena kao svojevrsni ulaz koji pomaže pri identificiranju i predviđanju promjena u okolišu. Ovim informacijama zajednice za očuvanje mogu kvalitetnije razviti strategije

prilagodbe i pripreme za utjecaje poput onih koje bi izazvale poremećene migracije, povećani požari, poplave, suše i drugo.

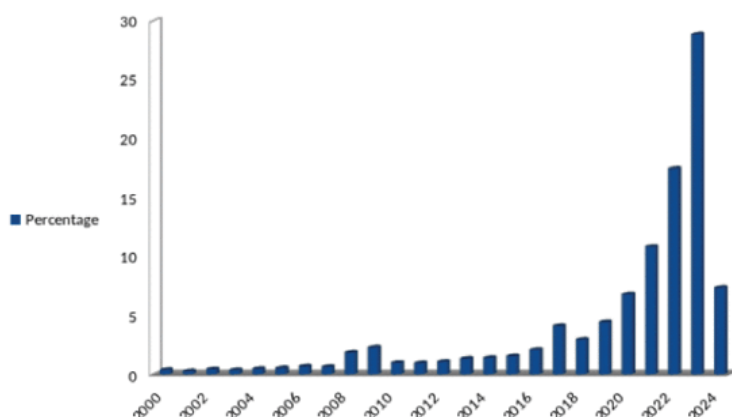
Integracija tehnologija umjetne inteligencije u obrazovanju

Digitalni alati i platforme za učenje sveprisutni su u obrazovanju. Nastavnici i učenici svih razina obrazovanja sve više imaju različita digitalna iskustva. Kao rezultat toga, generiraju ogromne količine više modalnih podataka, kao što su velike datoteke; audio, video i tekstualne datoteke. Analizom tih podataka putem tehnika umjetne inteligencije (AI), kao što su strojno učenje, računalni vid i obrada prirodnog jezika, može se odgovoriti na instruktivna i administrativna pitanja, otkriti nove i neočigledne odnose i obrasce, predvidjeti ishode učenja i automatizirati nisku razinu odluke. Istodobno, složena i međusobno povezana etička pitanja o učenju i poučavanju podupiru faze povezane s generiranjem, analiziranjem i tumačenjem podataka pomoću umjetne inteligencije.

Posljednjih je godina integracija tehnologija umjetne inteligencije (AI) u obrazovni sektor naglo porasla, kao što svjedoče temeljne postojeće studije (Zhang, K., Aslan, A.B. 2021., Elbanna & Armstrong 2024; Bukaret et al., 2024). Razvoj umjetne inteligencije može se pratiti od tradicionalnih sustava temeljenih na računalu do sofisticiranih platformi temeljenih na webu i humanoidnih robota. Hijerarhijska implementacija umjetne inteligencije u obrazovanju pokazuje zamršenu interakciju između razvoja sustava, tehnika ekstrakcije i domena primjene, što daje jasan pokazatelj kako tehnologije umjetne inteligencije preoblikuju obrazovne paradigme na različitim razinama. Sustavi umjetne inteligencije utjecali su na obrazovne prakse, uključujući administrativne zadatke, metodologije podučavanja i iskustva učenja. Ovi sustavi nude bezbrojne prednosti i primjene u raznim područjima obrazovanja kao što su poticanje razgovora i povećanje interesa i angažmana učenika. Poseban primjer takvih alata može se uočiti u potencijalu Chatbota, poznatog kao ChatGPT, jezičnog modela temeljenog na umjetnoj inteligenciji, koji revolucionira obrazovne prakse (Elbanna & Armstrong 2024), pridonoseći akademskom napretku poticanjem novih znanja, misli i ideja, ali i rizika netočnog informacije. Zanimljivo je da interes za umjetnu inteligenciju u obrazovnim praksama raste.

Slika 1. ilustrira putanju eksponencijalnog rasta istraživačkih dokumenata o ovoj temi, pružajući vizualni prikaz sve većeg znanstvenog interesa za ulogu umjetne inteligencije u obrazovnom kontekstu.

Slika 1: Putanja eksponencijalnog rasta članaka u časopisima o umjetnoj inteligenciji i obrazovanju od 2000. do 2024. godine



Izvor: Scopus

U krajoliku umjetne inteligencije koji se neprestano razvija, generativne AI tehnologije poput ChatGPT-a mijenjaju način na koji komuniciramo s tehnologijom. Slično tome, sustavi kao što su Appleov Siri, Googleov Assistant, Amazonova Alexa, Bard, IBMov Watson, Microsoftova Cortana i Samsungov Bixby postaju sve sofisticiraniji. Kako ovi razgovorni agenti napreduju, zabrinutost oko njihove etičke upotrebe i utjecaja na društvo se pojačava, naglašavajući potrebu za odgovornom upotrebom. Problemi u sustavima umjetne inteligencije proizlaze iz nužnosti obrane od potencijalnih prijetnji i osiguravanja zaštite pojedinaca od odluka generiranih umjetnom inteligencijom koje bi mogle ugroziti njihovu dobrobit. Integracija naprednih AI modela poput ChatGPT-a u obrazovanje nudi značajne prednosti, uključujući sažimanje teksta i smanjenje radnog opterećenja za studente i akademike. Međutim, ova inovacija također uvodi etička pitanja, kao što su pitanja privatnosti, potencijalne pristrane reakcije, dezinformacije i rizik od netočnih citata. Obrazovni dionici suočeni su s ključnim odlukama u vezi s promicanjem, obeshrabrivanjem, ograničavanjem ili reguliranjem korištenja ChatGPT-a.

Kao odgovor na to, akademsko izdavaštvo odlučilo je potaknuti odgovornu upotrebu ovih alata umjetne inteligencije pokretanjem jasnih smjernica posebno bitnih u sustavu obrazovanja uzimajući u obzir sveukupne potencijalne rizike i etičke dileme.

Uvjeti potrebni da se *stvari rade bolje* i *da se rade bolje stvari* s digitalnim alatima i platformama za učenje poboljšanim umjetnom inteligencijom unutar svake podjele i kroz ciklus zahtijevaju kontinuirano suradničko promišljanje i poboljšanje svih dionika.

Studija slučaja – srednjoškolski projekt 'Šumski asistent AI'

Projekt 'Šumski asistent AI' je razvijen u tročlanom timu učenika srednje škole Ivana Meštrovića Drniš pod mentorstvom autorice rada. Tim 'Šumari' je sudjelovao na državnom natjecanju Poslovni izazov 2024. Izradili su idejno rješenje kreirajući IT tvrtku Control center forest AI d.d. kao osnivača sustava 'Šumski asistent AI'.

Demonstracijski projekt Šumskog asistenta AI omogućio je sofisticirani razvoj alata za analizu šuma koji se temelji na daljinskim istraživanjima i umjetnoj inteligenciji kako bi se zemljoposjednicima pružila putem kreiranog Chatbot AI podrška za očuvanje, održivo korištenje i poboljšanje zdravlja šuma. Cilj je osnaživanje ljudi i organizacija za bolje upravljanje šumama pomoću analitike satelitskih podataka temeljene na daljinskim istraživanjima, te implementacijom i integracijom sustava umjetne inteligencije u gospodarenju šumama nove generacije.

Šumski asistent AI alat za analizu šuma kombinira tradicionalne mjere s umjetnom inteligencijom i satelitskim podacima za pružanje ažurnih informacija o stanju šuma, rizicima, potrebama gospodarenja i promjenama. Usluge uključuju automatske obavijesti o AI detekcijama, a rezultati su lako dostupni putem korisničkih sučelja jednostavnih za korištenje.

Sustav odlikuje primjena inovativnih programskih rješenja za dizajn, oblikovanje i izradu. Satelitski podaci koriste se za otkrivanje promjena i procjena trenutnog statusa šuma, s naglaskom na praćenje rizika kao što su nezakonita prorjeđivanja, sječa i požari. Državne institucije, udruge i vlasnici zemljišta potencijalni su korisnici usluga. Sustav pruža bolju procjenu skladištenja ugljika kao i predviđanja budućeg zdravlja šuma na temelju otkrivanja statusa zdravstvenog rizika.

Tim je dizajnirao i razvio simulacijski Centar Razvođe u sklopu kojega je organiziran Centar za sjemenarstvo i rasadničarstvo u kojem je smještena regionalna banka biljnih gena. Čuvanjem sjemena hrvatskih šuma u bankama biljnih gena osigurana je dostupnost sjemena budućim generacijama. Kao važan genetski materijal koji treba sačuvati odabrane su primke europskih, a posebno hrvatskih tradicijskih sorti koje znanstvenici izdvajaju kao uspješne u prilagodbi klimatskim promjenama i ekstremima.

Održivost ideje

Motor 'traga' po satelitskim slikama za promjene na krošnjama šuma. Kada pronađe područje promjene, pripisuje vjerojatni uzrok - recimo, štetu od oluje. Algoritam zatim unakrsno provjerava druge ulaze, kao što su povratne informacije korisnika i opažanja na terenu. Ako ovi podupiru odbitak motora - npr. šumar dodaje da je to područje doista oštećeno u oluji – saznaje da ista opažanja na drugim lokacijama također mogu ukazivati na štetu od oluje. Međutim, ako odbitak nije potkrijepljen drugim izvorima, motor će 'naučiti' da je to manje vjerojatan zaključak iz signala.

Ključni dio projekta Šumski asistent AI bio je integracija usluga u aplikacije koje koriste šumari i vlasnici šuma, kako bi informacije bile lako dostupne. Putem ovih aplikacija, Šumski asistent AI automatski upozorava 'stranice' koje trebaju pozornost. Šumari i vlasnici šuma mogu imati pristup podacima, što omogućuje veću transparentnost, djelovanje i razumijevanje zdravlja šuma na objema stranama.

Paradigma tima je ne analizirati satelitske podatke i ne razvijati algoritme umjetne inteligencije jer je to moderno, već razvijati usluge koje šumarskim stručnjacima konkretno olakšavaju rad, a vlasnicima šuma poboljšavaju pružene usluge. Projekt se ne odnosi samo na satelitske podatke, već i na omogućavanje njihovih prednosti u radu na terenu. Neke od dodanih varijabli uključuju štetu od oluja i insekata, a sustav može pružiti bolju procjenu skladištenja ugljika kao i predviđanja budućeg zdravlja šume na temelju otkrivanja statusa zdravstvenog rizika.

Razvoj projekta

Tim je za potrebe projekta konzultirao jednu od najopsežnijih studija globalnog šumskog pokrova (Hansen et al., 2013). Ista je nastala korištenjem analize rezultata iz vremenske serije Landsat skale u konkretizaciji globalnih razmjera šuma i njihovih promjena. Istim su konzultirali mrežna mjesta znanstvenika daljinskih istraživanja sa Sveučilišta u Marylandu, koji su razvili i testirali model za obradu i karakteriziranje Landsat podataka. Na primjer, uočena su među brojnim rezultatima otkrića trenda alarmantnog gubitka tropskih šuma i promatrana je globalna karta promjena šumskog pokrova kroz vrijeme.

Nakon početnih istraživanja promjena stanja šumskog pokrova, u projektu su razvijene usluge temeljene na satelitskom nadzoru koje koriste 'samoučeću' umjetnu inteligenciju. Ažurne informacije o trenutnom stanju šuma, njihovim rizicima, potrebama gospodarenja i promjenama dobivaju se kombinacijom satelitskih podataka s drugim skupovima podataka koji se odnose na šumska zemljišta. Usluge uključuju automatske obavijesti o AI detekcijama i mogućnost dodavanja mobilnih opažanja i slanja povratnih informacija o kvaliteti podataka, koji se koriste za automatsko poboljšanje AI modela. Rezultati AI usluga lako su dostupni putem korisničkih sučelja jednostavnih za korištenje. Pojednostavljeno rečeno, korisnik na sučelju mobitela dobiva informaciju, na primjer o požaru koji je detektiran neposredno u blizini čestice zemljišta vlasnika, odnosno korisnika usluge.

Koncept usluge/sustava

Samoučeći AI motor kombinira:

- Satelitske podatke
- Korisničke podatke
- Razne GIS izvore podataka

AI modeli pružaju točne i ažurne podatke o:

- Šumskim atributima
- Uočenim promjenama i oštećenjima
- Vitalnosti šuma i područja s povećanim zdravstvenim rizikom
- Hitnim potrebama gospodarenja šumama

Korisnici mogu pristupiti AI rezultatima:

- Provjeravajući ih na karti
- Primanjem automatskih obavijesti/poruka

Samoučeći AI motor kontinuirano 'uči' na temelju korisnika:

- Povratnih informacija o ispravnosti AI detekcija
- Povratnih informacija o kvaliteti slojeva karata

Satelitski podaci koriste se u usluzi otkrivanja promjena za pružanje procjena trenutnog statusa šuma, sječa, šteta i rizika od štete pomoću AI modela s različitim skupovima podataka za obradu. Izrađen je 'samoučeći' AI motor koji kontinuirano ažurira AI modele na temelju povratnih informacija korisnika i mobilnih promatranja. Implementirane usluge u idejnom rješenju moguće je operativno i komercijalno koristiti na području cijele Europske unije.

Šumski asistent AI je započeo kao usluga otkrivanja šumskih promjena 2024. godine, analizirajući fizičke promjene u okolišu. Državne institucije, udruge i vlasnici zemljišta potencijalni su korisnici usluga kreirane tvrtke Control center forest AI za praćenje nezakonitih prorjeđivanja i sječa u stvarnom vremenu.

Poslovna ideja tima može se pogledati na Youtube kanalu putem linka:

https://www.youtube.com/watch?v=N4uw_KgNhqE i posjetiti mrežno mjesto njihove tvrtke <https://sumski-asistent4.webnode.page/>

Tim je objavio link na izrađenu stranicu i mrežno mjesto tvrtke s dojmljivim vizualnim identitetom koristeći tehnologije umjetne inteligencije. No, uvijek se imalo na umu da upečatljiva grafika privlači pažnju ljudi, ali ne potiče uvijek učenje. Zapravo, slike s ometajućim ili nevažnim detaljima mogu ometati proces učenja. Stoga, bilo je potrebno istražiti i postaviti utemeljen okvir za stvaranje i vođenje učinkovitih obrazovnih slika na koji se način izbjegavalo da generirane slike budu same sebi svrhom na štetu istraživačke ideje. Tim je cjelovitu grafiku razvio korištenjem umjetne inteligencije, ali s prethodno jasno razrađenom poduzetničkom idejom koja je uključivala izradu poslovnog plana i drugih usvojenih nastavnih sadržaja primijenjenih u projektu. Na taj način stvoreni su uvjeti za korištenje računalno generiranih slika za stvaranje vizualnog identiteta koji je uključio i izradu logotipa tvrtke, kao i 'opremio' radionicu malih robota u programu za djecu.

Zaključak

Tehnološki razvoj mora počivati na održivosti ljudskog razvoja. Tehnologija je samo podupirač ljudskih namjera i sposobnosti i ne može biti zamjena za njega. Informacije dobivene satelitskim daljinskim istraživanjima su potencijal budućnosti. Obrazovne intervencije igraju ključnu ulogu u poticanju kulture etičkog ponašanja i odgovornog korištenja ChatGPT-a među studentima, nastavnicima i administratorima. Uključivanjem modula o digitalnoj pismenosti, akademskoj čestitosti i kritičkom razmišljanju u kurikulum, ustanove mogu opremiti pojedince vještinama i znanjem potrebnim za učinkovito rješavanje etičkih dilema. Proaktivnim rješavanjem ovih etičkih pitanja moguće je iskoristiti potencijal Gen-AI-ja za poboljšanje poučavanja i učenja, istovremeno čuvajući integritet i etička načela obrazovanja.

U budućnosti ukoliko bi ista bila kreirana po principima pravednosti i održivosti današnji sustavi školovanja moraju doživljavati promjene. Koristeći tehnologije umjetne inteligencije, nastavnici i profesori mogu stvoriti, procijeniti i poboljšati transformativna iskustva kontinuiranog učenja koja učenicima pružaju sofisticirano znanje, vještine i dispozicije koje su im potrebne u našoj evoluirajućoj globalnoj digitalnoj civilizaciji. Pažljivom primjenom principa multimedijskog učenja i smjernica moguće je iskoristiti mogućnosti umjetne inteligencije da se poboljša, umjesto da se odvрати pažnja od iskustava učenja. Ključ je korištenje slika generiranih umjetnom inteligencijom koje upravljaju osnovnom obradom, motiviraju generativnu obradu i izbjegavaju vanjska kognitivna opterećenja. Naglasak se stavlja na sadržaj i suštinu onoga što se istražuje, a korištenje postavki umjetne inteligencije potiče učenje o njoj, ali i kritičko razmišljanje učenika i profesora o odgovornoj primjeni kroz razne projekte. Napredak u umjetnoj inteligenciji, koji ubrzava ovaj izazov, također može pomoći u suočavanju s izazovima uz uvjet da se razviju načini za smisleno, korisno i etično korištenje umjetne inteligencije.

Usluga Šumskog asistenta AI izvrstan je primjer digitalne transformacije za praktičnu primjenu u šumarstvo i koristi podatke satelitskog promatranja Zemlje za potrebe upravljanja šumama i na taj način osnažuje i izravno uključuje vlasnike šuma i druge korisnike. Rad sustava postignut je kombinacijom detaljnih satelitskih snimaka i dubokog učenja – napredne metode umjetne inteligencije. Odabrani su vizualni elementi koji su u skladu s ishodima učenja. Nisu korišteni vizualni elementi generirani umjetnom inteligencijom koji su samo površno povezani s temom. Iako bi ti vizualni elementi bili privlačni mogu ometati učenike u učenju tako što im mogu odvući pozornost od temeljnog koncepta. Umjesto toga, identificirane su ključne ideje koje su se željele naglasiti i odabrani vizualni elementi koji izravno podržavaju ishod učenja.

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SNAGA ODRŽIVOSTI, OBITELJI I LOKALNE ZAJEDNICE U PODUZETNIŠTVU

Jadranka DOREŠIĆ
Srednja škola Ivan Švear Ivanić Grad
jadranka.doresic@gmail.com

Josipa HLEVNJAK
Srednja škola Ivan Švear Ivanić Grad
josipahlevnjak@yahoo.com

Aleksandra HOHNJEC
Ekonomska i birotehnička škola Bjelovar
fluence999@gmail.com

Sažetak

Predmet/ishodište rada: Ovaj rad istražuje ključne aspekte održivog poduzetništva kroz tri segmenta: održivost, lokalna zajednica i obitelj kao temelj poduzetništva.

Cilj: Cilj rada je istražiti kako poduzetnici mogu integrirati ekologiju, ojačati vezu s lokalnom zajednicom te osnažiti obiteljsku strukturu kao temelj uspješnog poslovanja. Rad se bavi konceptima poput Zero Waste 4F, smanjenja ugljikovog otiska te novijim pristupima održivosti kroz 7R pravilo i teoriju odrasta. Fokus je na integraciji obitelji i lokalne zajednice u poslovne procese.

Metodologija: Metodologija je obuhvatila pregled postojećih teorija i praksi održivog poslovanja. Analizirani su podaci o implementaciji održivih strategija u malim i srednjim poduzećima i njihovi utjecaj na okoliš, zajednicu i obiteljske strukture.

Rezultati: Rezultati istraživanja pokazuju kako poduzetnici koji implementiraju održivost kroz smanjenje otpada i ugljičnog otiska ne samo da pridonose očuvanju okoliša, već bilježe i dugoročnu ekonomsku korist. Obitelj, kao temelj poslovanja, pruža stabilnost i podršku poduzetnicima. Istovremeno, jaka povezanost s lokalnom zajednicom omogućava rast i razvoj poslovanja na održiv način. Primjenom načela 7R i teorije odrasta otvaraju se nove perspektive za poduzetnike koji žele smanjiti svoj ugljični otisak i pridonijeti razvoju održivih zajednica. Ovo istraživanje ukazuje na važnost holističkog pristupa održivom poduzetništvu gdje se ekološki, društveni i ekonomski čimbenici međusobno nadopunjuju kako bi se postigli dugoročni ciljevi održivog razvoja.

Ključne riječi: poduzetništvo, održivost, obitelj, lokalna zajednica, enciklike

JEL klasifikacija: M14, M21, Q56, L26, J12

Uvod

Održivost je postala središnja tema u poslovnom svijetu, a njezini uzroci uključuju klimatske promjene, iscrpljivanje resursa i sve veće zagađenje okoliša. U današnjem kontekstu, održivo poduzetništvo nije više samo opcija, već nužnost za poslovne subjekte koji teže dugoročnoj stabilnosti i žele doprinijeti blagostanju društva i planete. Održivo poduzetništvo usklađuje ekonomske, okolišne i društvene interese, stvarajući vrijednost dok istovremeno smanjuje negativan utjecaj na okoliš, poboljšava život zajednice i osigurava očuvanje resursa za buduće generacije.

U ovom radu istražujemo ključne koncepte održivog poduzetništva, kao što su Zero Waste, 4R (Reducing, Reusing, Recycling, Recovering), ugljični otisak i teorija "odrasta". Razmatramo kako poduzetnici mogu primijeniti ove strategije za postizanje održivosti, s naglaskom na inovativne prakse koje smanjuju otpad i promiču učinkovitije korištenje resursa.

Osim toga, suvremeno poduzetništvo i inovativnost postaju sve važniji elementi obrazovnog sustava u suvremenom društvu. Obrazovanje koje potiče kreativno razmišljanje i poduzetničke vještine priprema učenike za dinamičan i nepredvidiv tržišni rad. Analizirat ćemo kako se poduzetništvo i inovativnost mogu uspješno integrirati u obrazovni sustav, koristeći primjere iz različitih europskih zemalja. Posebno ćemo se osvrnuti na posjete poduzetnika školama te na odlazak učenika u poduzetničke inkubatore i lokalna poduzeća. Ove aktivnosti pružaju učenicima praktično iskustvo i inspiraciju za razvijanje vlastitih poduzetničkih inicijativa, a istovremeno jačaju veze između obrazovnog sektora i poslovne zajednice.

U kontekstu održivog razvoja, obitelj ima ključnu ulogu. Ona pruža emocionalnu sigurnost, moralni odgoj i socijalizaciju koji su neophodni za razvoj svakog pojedinca i društva u cjelini. Obitelj je mjesto gdje se usvajaju temeljne vrijednosti kao što su ljubav, poštovanje, odgovornost, marljivost i briga za druge. Ove vrijednosti oblikuju osobni karakter i stav prema radu i poduzetništvu te na taj način utječu na opće društveno dobro. Obitelj, kao zdravi temelj društva, doprinosi stvaranju moralno ispravnih poduzetničkih praksi koje su usmjerene ne samo na profit, već i na opće dobro i očuvanje ljudskog dostojanstva.

U današnjem poduzetništvu, koje često dolazi s velikim stresom i neizvjesnošću, obitelj osigurava ravnotežu između profesionalnog i osobnog života. Ona pruža podršku, sigurnost i stabilnost svojim članovima. U obitelji se odgajaju uspješni poduzetnici koji, zahvaljujući primljenim vrijednostima, uspješno se nose s izazovima u poslovnom svijetu. Te vrijednosti oblikuju poslovne modele koji teže održivom rastu i doprinose zapošljavanju i razvoju lokalnih zajednica.

Konačno, katoličke enciklike često naglašavaju vrijednost obitelji kao temeljne jedinice društva i ključnog elementa u izgradnji moralnog, pravednog i uspješnog poduzetništva. Kroz socijalne enciklike, pape su istaknule važnost obitelji u oblikovanju društva, ali i njezinu ulogu u prenošenju moralnih normi koje su potrebne

za održivo i etično poduzetništvo. Kroz povezivanje održivog poduzetništva s obrazovanjem i obitelji, ovaj rad istražuje kako se ova tri područja mogu međusobno podržavati u stvaranju održive budućnosti.

Metode

Metodologija ovog istraživanja temelji se na analizi relevantne literature o održivom poduzetništvu, s posebnim fokusom na strategije za smanjenje otpada, emisije ugljičnog dioksida i implementaciju novih poslovnih modela. Osnovne tehnike koje su istražene uključuju pristupe smanjenju otpada kroz model Zero Waste 4R (smanji, ponovno koristi, recikliraj, obnovi) i širi koncept 7R, koji dodaje nove dimenzije održivosti, poput odbacivanja, dijeljenja i ponovnog razmišljanja o resursima. U sklopu ove metodologije, proučavani su također pristupi smanjenju ugljičnog otiska, koji se oslanjaju na energetske učinkovite tehnologije, obnovljive izvore energije i optimizaciju logistike.

Osim toga, istražena je primjena teorije "odrasta" kao alternativnog koncepta ekonomskog razvoja, koji naglašava potrebu za smanjenjem potrošnje i promicanje životnog stila usmjerenog na održivost. Ova studija koristi kombinaciju kvalitativnih i kvantitativnih istraživačkih metoda. Provedene su ankete među nastavnicima i učenicima u nekoliko europskih škola koje su implementirale programe za razvoj poduzetničkih i inovativnih vještina. Ove ankete omogućile su prikupljanje podataka o iskustvima, percepcijama i rezultatima programa koji su usmjereni na promicanje poduzetničkog duha i inovacija među mladima. Također, analizirani su nastavni planovi, programi i izvješća iz tih škola kako bi se dobila sveobuhvatna slika učinkovitosti ovih programa i njihova primjena u praksi.

Kako bi se istražila uloga i utjecaj obitelji na održivo poduzetništvo, korištena je metoda kvalitativne analize koja se temelji na proučavanju katoličkih socijalnih enciklika i drugih relevantnih izvora. Ovaj postupak uključivao je pregled i analizu temeljnih dokumenata katoličkog socijalnog nauka, posebice enciklika koje se bave ulogom obitelji i njezinim utjecajem na društvo, poduzetništvo i ekonomiju. Analiza ovih dokumenata omogućila je dublje razumijevanje moralnih i etičkih smjernica koje obitelj prenosi na svoje članove, a koje oblikuju stavove prema radu, poduzetništvu i društvenoj odgovornosti. Ova metoda uključuje proučavanje i interpretaciju tekstova, sintezu različitih etičkih i moralnih normi, te korelaciju između moralnog odgoja u obitelji i njegovog utjecaja na društveno odgovorno poduzetništvo.

Navedeni koncepti su detaljno istraženi kroz postojeće studije slučaja i izvještaje o održivim poslovnim praksama. Ovi izvori pružaju konkretne rezultate i prednosti koje ovakvi modeli donose za poduzetništvo, okoliš i društvo. Analizom ovih studija slučaja, istraživači mogu utvrditi uspješne strategije koje poduzetnici primjenjuju kako bi smanjili svoj ekološki otisak, unaprijedili svoje poslovne modele i doprinijeli društvenoj odgovornosti. Tako, ova metodologija ne samo da omogućuje istraživanje trenutnog stanja održivog poduzetništva, već također pruža temelje za daljnje istraživanje i

razvoj strategija koje bi mogle dodatno unaprijediti praksu održivog poduzetništva u budućnosti.

Rezultati

Zero Waste 4R

Zero Waste pristup zasniva se na minimalizaciji otpada u procesu proizvodnje, koristeći četiri ključna načela: smanjenje, ponovno korištenje, reciklažu i obnovu. Poduzeća koja primjenjuju ovu strategiju izvješćuju o značajnom smanjenju operativnih troškova i otpada koji završava na odlagalištima. Korištenjem manje resursa i optimizacijom proizvodnih procesa, ne samo da smanjuju negativan utjecaj na okoliš, već i poboljšavaju svoju konkurentnost na tržištu.

Smanji (reduce) – optimizacijom procesa, poduzeća smanjuju količinu potrebnih materijala što dovodi do nižih troškova i manjih emisija.

Ponovno koristi (reuse) – produžavanjem vijeka proizvoda poduzeća smanjuju potrebu za novim resursima što pridonosi očuvanju prirodnih resursa.

Recikliraj (recycle) – omogućavanje ponovnog korištenja resursa smanjuje potrebu za eksploatacijom sirovina.

Obnovi (recover) – oporavak energije iz nerecikliranih materijala smanjuje ovisnost o fosilnim gorivima. Ovaj pristup doprinosi ne samo smanjenju ekološkog otiska poduzeća već i unaprjeđenju njihove društvene odgovornosti i reputacije.

Smanjenje ugljičnog otiska – jedan je od ključnih izazova s kojima se suočavaju poduzetnici. Uvođenje mjera poput energetske učinkovitosti, korištenje obnovljivih izvora energije te optimizacije logistike pokazuje se kao uspješan put prema smanjenju emisija.

Energetska učinkovitost - poduzeća koja koriste tehnologije visoke energetske učinkovitosti ostvaruju značajnu uštedu energije i smanjenje troškova. Primjerice, prelazak na LED rasvjetu ili uvođenje automatskih sustava za kontrolu potrošnje energije može smanjiti emisije do 20%.

Obnovljivi izvori energije - Investicije u solarne panele, vjetroelektrane i druge oblike obnovljive energije smanjuju potrebu za fosilnim gorivima i emisiju CO₂.

Optimizacija logistike - smanjenje nepotrebnih transportnih ruta i prelazak na električna vozila značajno smanjuju emisije stakleničkih plinova. Poduzeća koja su usvojila ove prakse ostvarila su bolji tržišni položaj, posebice među ekološki osviještenim potrošačima, te su istovremeno doprinijela smanjenju globalnog zatopljenja.

Ugljični otisak

Drugi ključni aspekt održivog poduzetništva je ugljikov otisak (carbon footprint) koji predstavlja ukupnu količinu emisija stakleničkih plinova koje proizvodi neko poduzeće kroz svoje aktivnosti. U eri globalnog zatopljenja, smanjenje ugljičnog otiska postalo je jedan od glavnih ciljeva održivog razvoja. Poduzeća mogu smanjiti svoj ugljični

otisak kroz razne mjere: povećanjem energetske učinkovitosti, korištenjem obnovljivih izvora energije, optimizacijom logistike te kompenzacijom emisija. Smanjenje ugljičnog otiska ne samo da doprinosi borbi protiv klimatskih promjena već i poboljšava reputaciju poduzeća među ekološki svjesnim potrošačima.

Primjena 7R pravila

Koncept 7R donosi širi okvir održivosti što se tiče poslovanja. Dodavanjem načela promisli, odbij i popravi, poduzeća mogu postići dodatne prednosti u održivosti. Promisli (rethink) – poduzeća preispituju svoje poslovne modele kako bi osigurala usklađenost s načelima održivosti što uključuje prelazak na cirkularnu ekonomiju i ekološki prihvatljive proizvode. Odbij (refuse) – odbacivanjem neodrživih materijala i proizvoda poduzeća smanjuju svoj negativni utjecaj na okoliš. Popravi (repair) – umjesto zamjene proizvoda, popravci produžuju vijek trajanja što smanjuje potrebu za proizvodnjom novih predmeta. Reduce (smanji) – smanjenje količine resursa koji se koriste u poslovanju. Recycle (recikliraj) – omogućavanje reciklaže materijala kako bi se smanjio utjecaj na okoliš. Recover (obnovi) – obnova energije iz materijala koj se više ne mogu koristiti. Reuse (ponovno koristi) – produživanje vijeka trajanja proizvoda i materijala kroz ponovnu uporabu. Primjena ovih načela omogućava poduzećima da smanje operativne troškove i pritisak na prirode resurse čime postižu dugoročnu održivost.

Teorija „odrasta“ (degrowth)

Jedna od najkontroverznijih koncepata u održivom poslovanju je teorija odrasta. Ova teorija dovodi u pitanje tradicionalni ekonomski model koji se oslanja na beskonačan rast. Umjesto stalnog rasta, teorija zagovara usmjerenje na kvalitativni rast koji smanjuje eksploataciju prirodnih resursa i promiče socijalnu jednakost. Poduzeća bi trebala smanjiti svoje ambicije za kontinuiranim povećanjem proizvodnje i potrošnje te se fokusirati na zadovoljenje stvarnih potreba društva. To može značiti: lokalizaciju proizvodnje, skromnost u potrošnji te povećanje kvalitete umjesto kvantitete. Primjena ove teorije omogućava poduzetnicima da stvore održive poslovne modele koji nisu ovisni o iscrpljivanju resursa, čime se osigurava stabilnost u dugoročnom razvoju.

Integracija poduzetništva u obrazovni sustav

Osim što je važan u poslovnom svijetu, održivi razvoj i inovacije postaju sve značajniji i u obrazovanju. U školama se više pažnje posvećuje temama koje pomažu učenicima da razumiju kako njihov rad i odluke mogu utjecati na okoliš i društvo. Važno je ne samo educirati učenike o različitim predmetima, već i poticati ih da razmišljaju o održivosti i traže kreativna rješenja za suvremene izazove, poput klimatskih promjena. Uključivanjem svjesnosti o održivosti u nastavu, škole pomažu učenicima da se pripreme za budućnost i oblikuju generacije koje će aktivno raditi na poboljšanju

društva. Poduzetničke vještine i inovativnost, koje potiču kreativno razmišljanje, pripremaju učenike za suvremeno tržište rada koje je dinamično i često nepredvidivo. Uvođenjem poduzetničkih inkubatora, posjeta lokalnim poduzećima i uključivanjem poduzetnika u školske aktivnosti, učenici dobivaju priliku povezati teoriju s praksom, stječući neophodne vještine za buduće karijere. Ovaj rad nudi cjelovit prikaz načina na koji se održivo poduzetništvo i inovativne prakse mogu implementirati u poslovno okruženje i obrazovni sustav, čime se potiče dugoročna održivost i pozitivan doprinos zajednici i okolišu.

Primjeri dobre prakse

U Finskoj, školski kurikulum uključuje projekte u kojima učenici razvijaju vlastite poslovne ideje, radeći u timovima kako bi ih realizirali. Finske škole redovito organiziraju posjete poduzetničkim inkubatorima gdje učenici mogu vidjeti kako funkcioniraju start-up tvrtke i dobiti savjete od uspješnih poduzetnika. U Nizozemskoj, škole organiziraju 'poduzetničke dane' gdje učenici prezentiraju svoje inovativne projekte pred lokalnim poduzetnicima, a posjete lokalnim poduzećima omogućuju im uvid u svakodnevni rad i izazove s kojima se poduzetnici suočavaju.

Alati i pristupi

Koriste se različiti alati i pristupi, kao što su dizajnersko razmišljanje (design thinking), projektno učenje (project-based learning) i simulacije stvarnih poslovnih situacija. Ovi pristupi omogućuju učenicima da steknu praktično iskustvo i razviju svoje vještine u sigurnom školskom okruženju.

Posjete poduzetnika školama

Posjete poduzetnika školama pružaju učenicima priliku da iz prve ruke čuju o iskustvima i izazovima s kojima se poduzetnici suočavaju. Ove posjete mogu uključivati predavanja, radionice i interaktivne radionice gdje učenici mogu postavljati pitanja i dobiti povratne informacije o svojim poslovnim idejama.

Odlasci učenika u poduzetničke inkubatore i lokalna poduzeća

Odlasci učenika u poduzetničke inkubatore i lokalna poduzeća omogućuju im da vide stvarne poslovne procese i steknu uvid u svakodnevni rad poduzetnika. Ovi posjeti mogu uključivati obilazak prostorija, razgovore s poduzetnicima i zaposlenicima te sudjelovanje u radionicama i praktičnim zadacima.

Projekt "Suradnja s lokalnom zajednicom - u susret poduzetništvu"

Na inicijativu autora ovog rada, u školi u kojoj radi, u školski kurikulum je uvršten projekt pod nazivom "Suradnja s lokalnom zajednicom - u susret poduzetništvu".

Temeljem ovog projekta, poduzetnici s lokalnog područja pozivani su u školu, ili su učenici išli u posjet poduzetnicima u lokalnom području. Cilj je povezati učenike s poduzetnicima te im omogućiti da primijene teorijsko znanje stečeno u školi u stvarnom životu. Ovaj projekt se provodi već dvije godine, a suradnja s lokalnom zajednicom koja obogaćuje nastavu prvenstveno završnih strukovnih razreda, čineći je interesantnijom i stvarnijom. Poduzeća koja su sudjelovala u ovom projektu osigurala su učenicima redovnu stručnu praksu, a nekima i zaposlenje. Na taj način ostvarila se suradnja na lokalnom području, što je i bio cilj ove inicijative - povezati učenike s lokalnim poduzećima te ih pripremiti za buduće zaposlenje u njihovom gradu. Tijekom projekta, poduzetnici su dolazili u razrede gdje su s učenicima radili na izradi poslovnih planova za odabrane poslovne ideje, što je dodatno obogatilo njihovo obrazovanje i praktične vještine.

Prepreke i izazovi

Integracija poduzetništva i inovativnosti u obrazovanje suočava se s brojnim izazovima, uključujući nedostatak resursa, otpor prema promjenama među nastavnicima i učenicima te potrebu za dodatnom obukom nastavnika.

Strategije za unapređenje

Profesionalni razvoj nastavnika: Nastavnici trebaju kontinuiranu obuku kako bi bili u tijeku s najnovijim metodama i alatima za poticanje poduzetničkog razmišljanja i inovativnosti. To se može postići na nekoliko načina:

Suradnjom s lokalnom zajednicom: Škole trebaju aktivno surađivati s lokalnim poduzetnicima, poduzetničkim inkubatorima i organizacijama kako bi učenicima pružile realne prilike za učenje i razvoj.

Uključivanjem inovativnih metoda u nastavni plan: Nastavni plan i program trebaju biti fleksibilni i omogućiti integraciju projektnih aktivnosti, praktičnih zadataka i suradničkog učenja.

Kroz ove pristupe, obrazovni sustav može postati učinkovitiji u poticanju poduzetničkog duha i inovativnosti, čime se doprinosi ne samo individualnom razvoju učenika, već i općem napretku društva i gospodarstva. Integracija održivog razmišljanja i inovacija u obrazovanje ne samo da priprema mlade za tržište rada, već i promiče vrijednosti održivosti koje su ključne za budućnost naše zajednice i planeta.

Izazovi i prilike održive poduzetničke budućnosti temeljene na papinskim enciklikama

U suvremenom društvu, koncept održivog razvoja i etičkog poduzetništva postaje sve važniji, ne samo u poslovnom svijetu, već i unutar obrazovnog sustava. Kroz različite društvene i ekonomske izazove, uloga obitelji kao osnovne jedinice društva prepoznaje se kao ključna za oblikovanje moralnih i etičkih normi koje utječu na način vođenja poslovanja. Katolički socijalni nauk, kao bogat izvor mudrosti i etičkih smjernica, nudi niz enciklika koje istražuju odnose između obitelji, društva i

gospodarstva. Ovi dokumenti, počevši od "Rerum novarum" do "Amoris laetitia", ne samo da naglašavaju važnost pravednog odnosa između radnika i poslodavaca, već i ukazuju na potrebu za odgovornim poduzetništvom koje poštuje dostojanstvo pojedinca. Integracija ovih vrijednosti u obrazovne kurikule može pripremiti buduće generacije za izazove modernog tržišta, potičući inovacije i doprinos društvenim promjenama. U nastavku se razmatraju ključne enciklika koje osvjetljavaju ovu temu i njihova uloga u oblikovanju održivog razvoja i poduzetništva kroz prizmu obiteljskih vrijednosti.

Enciklika „Rerum novarum“ (1891.) – papa Lav XIII. temeljni je dokument katoličkog socijalnog nauka koji naglašava važnost pravednog odnosa između radnika i poslodavaca, kao i ključnu ulogu obitelji u ekonomiji i društvu. Obitelj se prikazuje kao temeljna jedinica društva, a moralni principi koji se prenose unutar obitelji ključni su za pravedno vođenje poduzeća i osiguranje društvene stabilnosti. Ova enciklika naglašava potrebu za odgovornim poduzetništvom koje poštuje dostojanstvo pojedinca, što se može povezati s održivim razvojem poduzetništva, jer uključuje etičko vođenje poslovanja i brigu o radnicima.

Enciklika „Centesimus annus“ (1991.) – papa Ivan Pavao II. obilježava 100 godina od „Rerum novarum“ i fokusira se na suvremene društvene i ekonomske izazove. U ovoj enciklici naglašena je uloga obitelji u stvaranju moralnog temelja za društvo i poduzetništvo. Ovaj moralni temelj, ukorijenjen u obiteljskim vrijednostima, potiče odgovorno vođenje poduzeća, što je u skladu s principima održivog razvoja. Obrazovni sustav može igrati ključnu ulogu u prenošenju tih vrijednosti budućim generacijama, osposobljavajući ih za etično i inovativno poslovanje.

Enciklika „Familiaris consortio“ (1981.) – papa Ivan Pavao II. bavi se ulogom kršćanske obitelji u suvremenom svijetu, naglašavajući da obitelj nije samo biološka zajednica, već i temelj moralnog odgoja i duhovnog razvoja. Ova enciklika ukazuje na važnost odgoja budućih generacija koje će poštivati moralne norme, što je ključno za inovacije u obrazovanju. Kroz obrazovni proces, učenici mogu razviti vještine i vrijednosti potrebne za održivo poduzetništvo, čime se doprinosi širenju pozitivnih promjena u društvu.

Enciklika „Caritas in veritate“ (2009.) – papa Benedikt XVI. promiče ljubav i istinu u društvenom, gospodarskom i političkom životu, a obitelj je predstavljena kao mjesto gdje se učvršćuju moralne norme koje se potom prenose u poslovni svijet. Održivi razvoj i socijalna pravednost, istaknuti u enciklici, trebaju se integrirati u obrazovne kurikule kako bi učenici postali odgovorni i inovativni poduzetnici koji su svjesni svojih društvenih obveza.

Enciklika „Laudato si“ (2015.) – papa Franjo, iako prvenstveno ekološke tematike, naglašava međusobnu povezanost obitelji, gospodarstva i okoliša. Ova povezanost ukazuje na važnost održivog razvoja, što je ključno za obrazovanje. Učitelji i obrazovne institucije trebaju poticati učenike da razumiju kako njihove odluke u poduzetništvu utječu na okoliš, čime se razvija etičko razmišljanje i odgovornost prema prirodi.

Enciklika „Amoris laetitia“ (2016.) – papa Franjo se bavi suvremenim izazovima s kojima se obitelji suočavaju i naglašava njihovu ulogu u prenošenju moralnih i duhovnih vrijednosti koje čine temelj za zdravo društvo i moralno poduzetništvo. Ova enciklika pokazuje kako obrazovni sustav može oblikovati buduće poduzetnike koji će cijeliti etičke principe i održivost, stvarajući inovativna rješenja koja doprinose razvoju društva. Kroz ove enciklike, vidljivo je da obitelj igra ključnu ulogu u oblikovanju moralnih principa koji su neophodni za odgovorno poslovanje, održivi razvoj poduzetništva i inovacije u obrazovanju.

Integracijom ovih vrijednosti u obrazovni sustav, možemo osigurati da buduće generacije budu spremne za izazove modernog tržišta, istovremeno doprinoseći društvenim promjenama i očuvanju okoliša.

Zaključak

Uloga poduzetništva u današnjem društvu postaje sve važnija, ne samo zbog svog ekonomskog doprinosa, već i zbog sposobnosti oblikovanja održivih i odgovornih zajednica. Lokalni poduzetnici, kroz bliske veze sa zajednicom, prepoznaju specifične potrebe i doprinose njihovom ispunjenju, potičući gospodarski rast i stvarajući nove prilike za zapošljavanje. Poduzetništvo i inovativnost ključni su čimbenici koji pripremaju učenike za buduće profesionalne izazove, a njihova integracija u obrazovni sustav zahtijeva holistički pristup. Taj pristup uključuje profesionalni razvoj nastavnika, suradnju s lokalnom zajednicom i prilagodbu nastavnog plana, čime se otvaraju nove mogućnosti za razvoj učenika i cjelina.

Primjeri dobre prakse iz europskih zemalja pokazuju da je moguće učinkovito integrirati poduzetništvo i inovativnost u obrazovanje, ali postojeće prepreke i izazovi moraju se prevladati kako bi sustav funkcionirao. Ovaj proces transformacije obrazovnog sustava ima potencijal nadahnuti nastavnike, učenike i kreatore obrazovne politike da prihvate poduzetničke i inovativne vrijednosti. Također, održivo poduzetništvo, koje uvažava ekološke, ekonomske i društvene aspekte, predstavlja ključ za budućnost. Poslovni uspjeh ne mora značiti iscrpljivanje prirodnih resursa, već njihovo očuvanje i dugoročno održivo poslovanje, što doprinosi ne samo zaštiti okoliša već i stvaranju novih prilika za poduzeća i zajednice.

Obitelj, kao temelj poduzetništva, igra ključnu ulogu u oblikovanju poduzetničke kulture. Obiteljski poslovi često pružaju stabilnost, kontinuitet i vrijednosti koje su potrebne za uspjeh u poduzetništvu. Obitelj kao oslonac omogućuje poduzetnicima da prebrode izazove i donesu mudre odluke koje nisu isključivo vođene profitom. Kombinacija povezanosti s lokalnom zajednicom, odgovornosti prema održivosti i podršci obitelji čini temelj uspješnog i dugoročnog poduzetništva. Ove međusobno povezane dimenzije doprinose cjelovitom razumijevanju poduzetništva koje gradi bolju i održivu budućnost za sve nas

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INTEGRACIJA EUROPSKIH VRIJEDNOSTI U STRUKOVNOM OBRAZOVANJU REPUBLIKE HRVATSKE KROZ EPAS, ERASMUS+ I ETWINNING PROJEKTE

Martina JERKOVIĆ
Srednja škola Ivana Meštrovića Drniš
martina.jerkovic@skole.hr

Melita TODOROVIĆ
Druga srednja škola Beli Manastir
melita.todorovic@skole.hr

Olivera STOJAKOVIĆ
Prva srednja škola Beli Manastir
olivera.stojakovic1@skole.hr

Sažetak

Predmet/ishodište rada: Strukovno obrazovanje u Hrvatskoj igra ključnu ulogu u pripremi mladih za tržište rada te promiče europske vrijednosti kao što su jednakost, solidarnost, održivost, ljudska prava, demokracija i vladavina prava. U kontekstu članstva Hrvatske u Europskoj uniji, rad ispituje integraciju tih vrijednosti u obrazovni sustav kroz programe kao što su EPAS (European Parliament Ambassador School), eTwinning i Erasmus+.

Cilj: Cilj istraživanja je analizirati kako međunarodni edukativni programi potiču razvoj građanske i političke pismenosti, profesionalnih vještina te interkulturalne kompetencije.

Metodologija: Istraživanje koristi analizu relevantnih dokumenata, programa i primjera dobre prakse iz hrvatskih škola. Programi EPAS, eTwinning i Erasmus+ analizirani su kroz rezultate sudjelovanja učenika i nastavnika u međunarodnim obrazovnim projektima.

Rezultati: Programi Europske unije značajno doprinose razvoju građanske svijesti, profesionalnih vještina i osjećaja europskog identiteta među mladima. Kroz međunarodnu suradnju, učenici stječu interkulturalne kompetencije, medijsku pismenost i osnažuju svoje aktivno sudjelovanje u demokratskim procesima.

Ključne riječi: Strukovno obrazovanje, europske vrijednosti, EPAS, eTwinning, Erasmus+

JEL klasifikacija: D83, I25, I20.

Uvod

Strukovno obrazovanje igra ključnu ulogu u pripremi mladih za tržište rada, osiguravajući im vještine potrebne za suvremeno gospodarstvo. U kontekstu Republike Hrvatske, integracija europskih vrijednosti u strukovno obrazovanje postaje sve važnija, osobito s obzirom na članstvo Hrvatske u Europskoj uniji. Strategija Europske unije za mlade za razdoblje 2019.-2027. nastoji odgovoriti na postojeće i buduće izazove s kojima se mladi suočavaju diljem Europe. Ova strategija definira okvire, načela, prioritete i ključna područja te mjere za suradnju u području politike za mlade, namijenjene svim relevantnim dionicima, uz poštivanje njihovih nadležnosti i načela supsidijarnosti.

Promicanje europskih vrijednosti, kao što su jednakost, solidarnost, održivost i inovativnost, može značajno pridonijeti kvaliteti i relevantnosti strukovnog obrazovanja. Europske vrijednosti uključuju i promicanje ljudskih prava, demokracije, vladavine prava te ekološke svijesti i održivosti. U strukovnom obrazovanju, ove vrijednosti integriraju se kroz kurikule i izvannastavne aktivnosti poput EPAS (*European Parliament Ambassador School*) programa koji potiče kritičko razmišljanje, suradnju i inovativnost.

Dodatno, međunarodna suradnja koja se ostvaruje kroz sudjelovanje na platformama kao što je Europska platforma za školsko obrazovanje – *eTwinning* ili kroz Erasmus+ projekte, omogućava učenicima stjecanje iskustava u drugim zemljama (*eTwinning, 2024; Erasmus+, 2024*). To pridonosi razvoju interkulturalnih kompetencija i boljem razumijevanju europskih vrijednosti.

Metode

Metode korištene za istraživanje integracije europskih vrijednosti u strukovno obrazovanje Republike Hrvatske temeljile su se na analizi relevantnih dokumenata i programa, uključujući EPAS škole, *eTwinning* i Erasmus+ projekte. Analizirani su strateški dokumenti kao što su *Godišnje izvješće Agencije za strukovno obrazovanje i obrazovanje odraslih* za 2023. godinu, *Strategija obrazovanja, znanosti i tehnologije*, te *Nacionalni kurikulum za strukovno obrazovanje* (ASOO, 2023; Ministarstvo znanosti i obrazovanja Republike Hrvatske, 2018). Ti dokumenti omogućuju detaljno razumijevanje uloge obrazovnih politika u implementaciji europskih vrijednosti na nacionalnoj razini. Također, korišteni su i dokumenti Europske unije, poput *Strategije EU za mlade 2019-2027*, koja pruža kontekst o općim ciljevima EU prema mladima (Europska komisija, 2019).

Istraživanje je naišlo na određena ograničenja, uključujući dostupnost podataka, dodatno, istraženi su primjeri dobre prakse u hrvatskim školama te evaluirani rezultati aktivnosti u okviru međunarodnih projekata.

Rezultati

Rezultati istraživanja ukazuju na značajan doprinos europskih programa, poput EPAS, eTwinning i Erasmus+, u razvoju interkulturalnih kompetencija, građanske svijesti i profesionalnih vještina među učenicima strukovnih škola u Hrvatskoj. Kroz ove programe, učenici su stekli bolji uvid u europske vrijednosti kao što su demokracija, jednakost i održivi razvoj

EPAS škole u funkciji integracije europskih vrijednosti u obrazovni sustav

EPAS škole, kao ambasadori Europskog parlamenta, kroz izvannastavne aktivnosti pridonose kvalitetnijem obrazovanju mladih te boljoj informiranosti o Europskoj uniji i njezinim institucijama. U današnje vrijeme, kada se Europska unija suočava s brojnim izazovima, nastavnici-ambasadori Europskog parlamenta igraju ključnu ulogu u školama približavajući vrijednosti Europske unije svojim učenicima. Tako je učenicima omogućeno bolje razumijevanje Europske unije, njezinih vrijednosti i važnosti aktivnog sudjelovanja u demokratskim procesima. Ukupan broj uključenih škola u EPAS program – Škole ambasadori europskog parlamenta u prošloj školskoj godini u Republici Hrvatskoj iznosio je 57, broj nastavnika ambasadora 85, a broj učenika mlađih ambasadora 1403 (Europski parlament – Ured u Zagrebu interni dokument, 2024).

Junior ambasadori Europskog parlamenta su srednjoškolci koji zajedno s nastavnicima dobrovoljno sudjeluju u provedbi EPAS programa. Njihova je zadaća kroz različite module promovirati Europsku uniju među svojim vršnjacima u školi i na lokalnoj razini. Njihova misija nije samo informiranje javnosti, već i poticanje mladih da postanu aktivniji sudionici u društvu. Kroz raznovrsne aktivnosti, poput obilježavanja važnih datuma za Europsku uniju, pokretanja humanitarnih akcija, promocija, prezentacija i debata, ambasadori približavaju teme poput ljudskih prava, održivog razvoja, demokratskih izbora i drugih važnih pitanja koja se odnose na Europsku uniju.

Jedna od ključnih uloga ambasadora Europskog parlamenta je poticanje kritičkog razmišljanja među mladima. U današnje vrijeme, s razvojem umjetne inteligencije i velikom količinom informacija, mladima je potrebna pomoć u razlikovanju pouzdanih izvora od dezinformacija. Ambasadori obilježavajući Dane medijske pismenosti razgovaraju o važnosti medijske pismenosti i istražuju kako mediji oblikuju naše razumijevanje svijeta oko nas. Na taj način se, osim edukacije, potiče razvoj građanske svijesti i odgovornosti.

Ambasadori Europskog parlamenta kroz zajedničke projekte i međunarodnu suradnju na eTwinning platformi razvijaju osjećaj pripadnosti europskoj zajednici. Ova iskustva pomažu mladima u shvaćanju važnosti njihovih osobnih aktivnosti, osjećaja pripadnosti i ukupnog utjecaja na širu zajednicu. Sudjelovanjem u različitim aktivnostima u školi i zajednici te kroz javne nastupe, pridonose razvoju svojih osobnih vještina i jačanju samopouzdanja, što je izuzetno važno za njihove buduće poslove,

bez obzira na to čime će se baviti.

Ove superizborne godine, jedna od važnih inicijativa koje su ambasadori promovirali bilo je aktivno sudjelovanje u izborima za Europski parlament. Mnogi mladi ljudi nemaju povjerenja u političke institucije, a ambasadori igraju ključnu ulogu u poticanju mladih da se uključe u političke procese i ostvare svoje pravo glasa. Kampanja „Iskoristi svoj glas“ imala je za cilj osnažiti mlade da postanu svjesni svojih prava i obveza, jer upravo oni pomažu u izgradnji aktivnog društva (AMPEU, 2024).

Ambasadori Europskog parlamenta, učenici i nastavnici u školama, predstavljaju važnu poveznicu između mladih ljudi i europskih institucija. Provedbom edukacija, angažmanom i poticanjem aktivnog građanstva, zajedno ostvaruju značajan utjecaj na buduće generacije mladih. Ulaganjem u obrazovanje i jačanje njihova razumijevanja Europske unije stvaraju se temelji za budućnost temeljenu na suradnji, toleranciji i zajedničkim vrijednostima. Na taj način Europska unija, kroz obrazovni sustav, širi svoje ideje koje ju čine snažnom i relevantnom u današnjem globaliziranom svijetu.

eTwinning projekti kao alat za integraciju europskih vrijednosti škole

eTwinning platforma je jedna od ključnih inicijativa koja promovira suradnju među školama u Europi, a poticanjem međunarodne suradnje i korištenjem digitalnih alata doprinosi razvoju europskog identiteta i solidarnosti među mladima. Projekt poput „Sudjelujmo u EU izborima 2024“ pridonosi razvoju političke pismenosti i građanske odgovornosti učenika, što je u skladu s ciljem Europske unije da mlade građane aktivno uključi u demokratske procese i razvije njihovu svijest o važnosti sudjelovanja u političkom životu (eTwinning, 2024).

Uvođenje ovakvih projekata u strukovno obrazovanje ne samo da potiče razumijevanje i usvajanje europskih vrijednosti, nego i razvija vještine ključne za tržište rada, poput timskog rada, interkulturalne komunikacije, korištenja informacijsko-komunikacijskih tehnologija (IKT), te sposobnosti kritičke analize informacija. Također, sudjelovanjem u ovakvim međunarodnim projektima učenici stječu iskustvo rada u međunarodnim timovima, što dodatno promiče svoje vrijednosti i interkulturalno razumijevanje – temeljne vrijednosti Europske unije.

Osim toga, suradnja s predstavnicima *Europe Directa* i upoznavanje s programima poput Erasmus+, Europskih snaga solidarnosti i *DiscoverEU* omogućava učenicima izravnu povezanost s mogućnostima koje im pruža Europska unija. Na taj način, projekt ima ne samo obrazovnu funkciju, već i praktičnu primjenu, pomažući učenicima da prepoznaju vlastite mogućnosti u kontekstu europskog društva.

Uvođenjem ovakvih projekata u kurikulum hrvatskih strukovnih škola jača se integracija europskih vrijednosti u obrazovni sustav, istovremeno podižući kvalitetu obrazovanja kroz inovativne metode učenja i međunarodnu suradnju.

Mobilnost i suradnja kroz Erasmus+ program

Erasmus+ program predstavlja jedan od ključnih instrumenata Europske unije za poticanje suradnje u području obrazovanja, osposobljavanja, mladih i sporta. Ovaj program omogućava učenicima i nastavnicima sudjelovanje u raznim međunarodnim projektima koji promiču mobilnost, interkulturalno razumijevanje, profesionalni razvoj, a učenike priprema za buduće dinamično tržište rada (Erasmus+, 2024). Erasmus+ projekti u području strukovnog obrazovanja osobito pridonose razvoju temeljnih kompetencija kod učenika, tako što dobivaju priliku sudjelovanja u međunarodnim projektima i suradnji s vršnjacima ili stručnjacima iz drugih zemalja. To im omogućuje stjecanje međukulturalnih kompetencija, profesionalni razvoj, samopouzdanje, razvoj jezičnih i stručnih kompetencija potrebnih za buduće dinamično tržište rada.

Zaključak

Programi poput EPAS-a, eTwinninga i Erasmus+ ključni su alati za integraciju europskih vrijednosti u obrazovni sustav. Njihova provedba omogućava mladima ne samo stjecanje novih znanja i vještina, već i razumijevanje šireg europskog konteksta u kojem djeluju. Kroz takve inicijative Europska unija jača temelje suradnje i solidarnosti, što je ključno za razvoj budućih generacija (Ministarstvo znanosti i obrazovanja Republike Hrvatske, 2018).

Kroz programe poput EPAS škola, eTwinning i Erasmus+ projekata, učenici razvijaju profesionalne vještine te svijest o važnosti europskih vrijednosti, kao što su demokracija, ljudska prava, jednakost i održivost. Ovi programi omogućuju mladima stjecanje interkulturalnih kompetencija i pružaju im priliku za međunarodnu suradnju što je neophodno u suvremenom globalnom svijetu. Posebno je važno istaknuti, kako su ovakvi projekti i aktivnosti usklađeni s ciljevima Europske unije za razvoj obrazovanja i poticanje građanskog angažmana mladih. Time se jača obrazovni sustav i dugoročno pridonosi stvaranju veće uključenosti pojedinaca te održivijeg društva temeljenog na zajedničkim europskim vrijednostima.

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OBRAZOVANJE ZA ODRŽIVI RAZVOJ U REPUBLICI HRVATSKOJ I EUROPI

Morana PERIŠIĆ
Elektrotehnička škola - Split
morana.perisic@gmail.com

Sažetak

Predmet/ishodište rada: U radu se analizira integracija održivog razvoja u kurikulum osnovnih i srednjih škola u Republici Hrvatskoj, s naglaskom na europske obrazovne smjernice. Ističe se važnost obrazovanja za održivi razvoj kao ključne komponente za oblikovanje odgovornih pojedinaca.

Ciljevi: Istraživanje obuhvaća relevantne dokumente Europske komisije i inicijative poput GreenCompa i Zelenog plana te UNESCO-ove Bonske deklaracije, s ciljem ocjene učinkovitosti prenošenja kompetencija za održivost.

Ciljevi istraživanja uključuju ispitivanje razine integracije održivosti u kurikulum, usporedbu s europskim standardima, identifikaciju dobrih praksi te sagledavaju ulogu učitelja i obrazovnih institucija.

Metodologija: Metode korištene u istraživanju uključuju analizu dokumenata, komparativnu analizu i studije slučaja.

Rezultati: Rad se fokusira na trenutnu situaciju u Hrvatskoj, u kojoj je održivi razvoj prepoznat kao međupredmetna tema unutar reformiranog kurikuluma, ali se suočava s izazovima poput nedostatka nastavnih materijala i stručnog usavršavanja nastavnika. Iako su nacionalne strategije jasno definirale važnost obrazovanja za održivi razvoj, implementacija ostaje neujednačena. U europskom kontekstu, u radu se naglašava uloga EU-a i UNESCO-a u promicanju obrazovanja za održivi razvoj različitim preporukama i smjernicama. Primjeri dobre prakse iz zemalja poput Finske, Švedske i Njemačke pokazuju različite pristupe integraciji održivosti. Ističu se izazovi poput nedostatka resursa i nejednakosti među državama članicama. Zaključno, u radu se naglašava kako je uspješna integracija održivosti u obrazovni sustav ključna za oblikovanje održivih budućih generacija. Potrebno je osnažiti ulogu učitelja i pružiti bolje resurse, uz suradnju obrazovnih institucija, lokalnih zajednica i poslovnog sektora, kako bi se postigla ravnoteža nacionalnih politika i lokalnih potreba. Ulaganje u obrazovanje za održivi razvoj treba postati prioritet za društvo u cjelini.

Ključne riječi: održivi razvoj, obrazovanje, RH, Europska Unija

JEL klasifikacija: Q56

Uvod

Održivi razvoj postaje sve važnija komponenta u obrazovnim sustavima diljem svijeta. Obrazovanje ima ključnu ulogu u oblikovanju pojedinaca koji su osposobljeni za donošenje odluka koje podržavaju održivi razvoj i odgovorno djelovanje prema okolišu. U europskom kontekstu, mnoge inicijative, strategije i politike podržavaju uvođenje održivosti u obrazovni proces. Ovaj članak analizira kurikulare osnovnih i srednjih škola u Republici Hrvatskoj u svjetlu europskih obrazovnih smjernica i inicijativa, s posebnim naglaskom na integraciju kompetencija za održivi razvoj. Cilj je istražiti kako se ove smjernice odražavaju na nacionalni kurikulum, ulogu učitelja i obrazovnih sustava te koliko su učinkovite u prenošenju kompetencija koje podržavaju održivost.

U ovom radu analizirat će se relevantni dokumenti Europske komisije i Europske unije, uključujući ključne smjernice poput GreenCompa i Zelenog plana, te njihova provedba u obrazovnim sustavima Hrvatske i u ostatku Europe. Dodatno, analizirat će se kako se međunarodne preporuke, poput UNESCO-ove Bonske deklaracije iz 2009. godine, reflektiraju na lokalni obrazovni sustav. Cilj ovog rada je pružiti sveobuhvatan pregled stanja u obrazovanju za održivi razvoj, izazove s kojima se susreću obrazovne institucije i mogućnosti daljnjeg unapređenja.

Ciljevi ovog istraživanja su:

Istražiti stupanj integracije održivog razvoja u obrazovne kurikulare osnovnih i srednjih škola u Republici Hrvatskoj.

Usporediti hrvatski obrazovni okvir s europskim standardima i smjernicama, poput GreenComp-a i Zelenog plana i preporuka Vijeća Europske unije.

Ukazati na primjere dobre prakse u obrazovanju za održivost na europskoj razini.

Razmotriti ulogu učitelja, škola i obrazovnih institucija u stjecanju kompetencija za održivost, kako je navedeno u dokumentima Europske komisije i UNESCO-a.

Za istraživanje su korišteni sljedeći izvori i metode:

Analiza dokumenata: Pregled kurikuluma osnovnih i srednjih škola u Republici Hrvatskoj, europskih smjernica poput GreenCompa, Europskog zelenog plana i drugih relevantnih izvještaja i preporuka.

Komparativna analiza: Usporedba hrvatskog obrazovnog okvira s europskim smjernicama i preporukama u području obrazovanja za održivost.

Studije slučaja: Analiza primjera dobre prakse iz različitih europskih zemalja koje su uspješno integrirale održivost u obrazovni sustav, na temelju izvještaja Europske komisije i drugih međunarodnih organizacija.

Obrazovanje za održivi razvoj u Republici Hrvatskoj

Obrazovanje za održivi razvoj u Republici Hrvatskoj dobilo je zamah kroz niz strategija i reformi kurikuluma koje su integrirale koncepte održivosti u formalno obrazovanje. Uvođenjem kurikularne reforme, koja je započela 2018. godine, održivi razvoj

prepoznat je kao jedan od ključnih međupredmetnih tema koje su obuhvaćene u nacionalnim obrazovnim programima. Međupredmetne teme omogućuju učenicima razvijanje ključnih kompetencija potrebnih za suočavanje s izazovima u 21. stoljeću, uključujući ekološku odgovornost, društvenu pravednost i gospodarsku održivost.

Održivi razvoj u kurikulumima osnovnih i srednjih škola u Republici Hrvatskoj

Republika Hrvatska je 2019. godine donijela Odluku o donošenju kurikuluma za međupredmetnu temu Održivi razvoj¹, što je bio ključan korak u integraciji održivog razvoja u obrazovni sustav. Međupredmetna tema Održivi razvoj nije poseban predmet, već je integrirana kroz različite predmete u osnovnim i srednjim školama. Predmeti poput prirode i društva, biologije, geografije, etike i građanskog odgoja uključuju teme održivosti. Ipak, prisutan je nedostatak sustavne i holističke integracije ovih tema kroz cijeli obrazovni sustav. Ovaj pristup osigurava da učenici stječu kompetencije za održivi razvoj kroz različite aspekte obrazovanja, od prirodnih znanosti do društvenih predmeta.

Kurikulum predviđa da učenici razvijaju kritičko razmišljanje o pitanjima okoliša, ekonomije i društvene odgovornosti. Također, predviđa se jačanje kompetencija za aktivno sudjelovanje u zajednici i doprinos održivom razvoju.

Nacionalne strategije i dokumenti

Hrvatska je prepoznala važnost održivog razvoja kroz strategiju održivog razvoja Republike Hrvatske (2009.)² u kojoj je jasno definirano obrazovanje kao ključan element za postizanje održivog razvoja. U priručniku Obrazovanje za održivi razvoj Ministarstvo znanosti i obrazovanja prepoznaje važnost sveobuhvatnog i interdisciplinarnog pristupa učenju, ali i potrebu za jačom suradnjom svih razina obrazovanja te osnaživanjem učitelja.

Izazovi obrazovanja za održivi razvoj u hrvatskom obrazovnom sustavu

U osnovnim školama obrazovanje za održivi razvoj može se integrirati unutar različitih predmeta, kao što su biologija, geografija i društveni predmeti. Međutim, često se ne obrađuje na sveobuhvatan način, što smanjuje njegovu učinkovitost.

U srednjim školama postoji veća fleksibilnost u izboru predmeta, što može omogućiti dublje istraživanje obrazovanja za održivi razvoj. Međutim, prema izvješću Eurydicea, nedostatak obveznih predmeta koji se specifično fokusiraju na održivi razvoj pokazalo se kao velika prepreka.

¹ Narodne novine. (2019). Odluka o donošenju kurikuluma za međupredmetnu temu Održivi razvoj za osnovne i srednje škole u Republici Hrvatskoj. Narodne novine, br. 7/2019. https://narodne-novine.nn.hr/clanci/sluzbeni/2019_01_7_152.html

² Republika Hrvatska. (2009). Strategija održivog razvoja Republike Hrvatske. Narodne novine, br. 30/2009. Pristupljeno 18.9.2024. na: https://narodne-novine.nn.hr/clanci/sluzbeni/2009_03_30_658.html

Iako se prepoznaje napredak u formalnom priznavanju održivosti kao obrazovne vrijednosti, postoji nekoliko izazova u provedbi obrazovanja za održivi razvoj u Hrvatskoj. Ključni izazovi uključuju:

- * Nedostatak nastavnog materijala: Učitelji često nemaju dostupne resurse koji bi im pomogli u integraciji održivog razvoja u nastavu.
- * Stručna osposobljenost nastavnika: Mnogi nastavnici nisu adekvatno obučeni za podučavanje održivog razvoja, što dovodi do različitih razina znanja i angažmana među učenicima.
- * Ovisnost o osobnoj inicijativi: Provedba obrazovanja za održivi razvoj često ovisi o osobnoj inicijativi učitelja i njihovom individualnom razumijevanju ovog koncepta.

Europski okviri i politike koje podržavaju obrazovanje za održivi razvoj

Europska unija igra ključnu ulogu u promoviranju obrazovanja za održivi razvoj na razini država članica. Nizom strateških dokumenata i preporuka, EU potiče države članice na integraciju održivosti u svoje obrazovne sustave.

Preporuke Vijeća Europske unije

Europska unija (EU) već godinama radi na poticanju obrazovanja za održivi razvoj kroz obrazovne inicijative. Vijeće Europske unije donijelo je 2022. godine Preporuke o obrazovanju za održivi razvoj³ koje ističu potrebu za osnaživanjem svih razina obrazovnih sustava u području održivosti. Države članice pozvane su da razvijaju kurikule, programe osposobljavanja učitelja i institucionalne okvire kako bi podržale uvođenje obrazovanja za održivi razvoj. U svojim smjernicama, EU naglašava važnost cjeloživotnog učenja i interdisciplinarnog pristupa u obrazovanju za održivost. Preporuke su osmišljene kako bi osnažile učitelje i obrazovne institucije u implementaciji obrazovanja za održivi razvoj. Preporuke također naglašavaju potrebu za suradnjom između obrazovnih sektora, civilnog društva i poslovnog sektora.

UNESCO-vi globalni ciljevi i obrazovanje za održivi razvoj

UNESCO, kao globalna organizacija za obrazovanje, igra jednu od ključnih uloga u promicanju obrazovanja za održivi razvoj. Izvještajima i smjernicama UNESCO potiče integraciju održivosti u sve obrazovne procese, počevši od osnovnog obrazovanja do cjeloživotnog učenja.

UNESCO-vi globalni ciljevi, poznati i kao Ciljevi održivog razvoja, predstavljaju međunarodni okvir koji je usvojen 2015. godine s ciljem stvaranja održivijeg, pravednijeg i prosperitetnijeg svijeta do 2030. godine. Ovi ciljevi obuhvaćaju različite aspekte društvenog, ekonomskog i okolišnog razvoja. UNESCO-vi globalni ciljevi i

³ European Commission. (2022). *Preporuke Vijeća Europske unije o obrazovanju za održivi razvoj*.
<https://education.ec.europa.eu/hr/focus-topics/green-education/learning-for-the-green-transition>

obrazovanje za održivi razvoj usko su povezani jer obrazovanje igra ključnu ulogu u ostvarivanju ovih ciljeva. Ulaganje u obrazovanje za održivi razvoj ne jača samo kapacitete pojedinaca i zajednica, već doprinosi stvaranju održivijeg svijeta za buduće generacije.

Europski okvir kompetencija za održivost (GreenComp)

GreenComp, Europski okvir kompetencija za održivost,⁴ objavljen 2022. godine, pruža jasne smjernice za razvoj kompetencija koje podržavaju održivi razvoj. Ovaj okvir naglašava četiri ključne dimenzije: holističko razmišljanje, predviđanje budućnosti, razvoj zajedničkih vrijednosti i suradnje te djelovanje za održivost. GreenComp donosi strukturu koja može biti integrirana u nacionalne kurikulume diljem Europe, s ciljem poticanja učenika na kritičko promišljanje i odgovorno ponašanje prema okolišu i društvu.

Primjena GreenCompa u hrvatskom obrazovnom sustavu još je uvijek u ranoj fazi. Premda su škole počele prepoznavati važnost održivosti, postoji potreba za jačanjem profesionalnog razvoja učitelja i bolje usklađenosti s europskim smjernicama. Ključni izazovi su također vezani uz mjerila vrednovanja kompetencija za održivost, koja su još uvijek nedovoljno razvijena.

Pregled dobrih praksi i izazova u provedbi obrazovanja za održivi razvoj u Europi

Europske zemlje primjenjuju različite pristupe u implementaciji obrazovanja za održivi razvoj, a rezultati su često ovisni o nacionalnim politikama, obrazovnim tradicijama i resursima. Na europskoj razini, postoji mnogo primjera dobre prakse u obrazovanju za održivost. Izvješće Eurydicea⁵ iz 2024. godine ističe nekoliko zemalja koje su uspješno implementirale obrazovanje za održivost u svoje nacionalne kurikulume.

Primjeri dobre prakse

Finska je poznata po svojoj sveobuhvatnoj integraciji održivog razvoja u sve razine obrazovanja. U školama se održivi razvoj podučava kao dio svakodnevnog života, uz poseban naglasak na praktične projekte poput školskih vrtova, recikliranja i energetske učinkovitosti.

⁴ European Commission, Joint Research Centre. (2022). *GreenComp: Europski okvir kompetencija za održivost*. Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2760/41834>

⁵ European Commission, European Education and Culture Executive Agency. (2024). *Learning for sustainability in Europe: Building competences and supporting teachers and schools. Eurydice Report*. Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2797/81397>

Švedska je razvila kurikulum koji uključuje održivost kroz interdisciplinarni pristup, pri čemu se naglašava kritičko razmišljanje i angažman učenika u rješavanju globalnih izazova, poput klimatskih promjena.

U Njemačkoj, obrazovanje za održivi razvoj podržano je unutar savezne strategije koja osigurava suradnju između obrazovnog sektora i gospodarstva, što omogućuje učenicima stjecanje praktičnih vještina povezanih s održivim poslovnim praksama.

Uloga učitelja i njihova stručna osposobljenost ističu se kao ključni faktori za uspješnu implementaciju obrazovanja za održivost. Europska komisija u svojim izvješćima iz 2023.⁶ godine naglašava potrebu za kontinuiranom edukacijom učitelja i njihovu aktivnu ulogu u promicanju održivosti u učionicama. Uz to, potrebna je i podrška školama resursima, alatima i partnerskim projektima poput eTwinninga ili Erasmus, koji omogućuju suradnju među školama i učiteljima diljem Europe.

Izazovi u provedbi

Iako se na razini EU provode značajni naponi za promicanje obrazovanja za održivi razvoj, još uvijek postoje izazovi u implementaciji. Neki od njih uključuju:

Razlike među državama članicama: Nejednakosti obrazovnih sustava u državama članicama EU dovode do različitih pristupa implementaciji obrazovanja za održivi razvoj. Dok neke zemlje, poput Finske i Švedske, imaju razvijene sustave, druge još uvijek zaostaju u integraciji ovih tema.

Nedostatak nastavnih materijala i stručnog usavršavanja nastavnika: Kao i u Hrvatskoj, u mnogim zemljama članicama nedostaju resursi za kvalitetnu provedbu obrazovanja za održivi razvoj, a nastavnici često nisu dovoljno educirani kako bi uspješno integrirali održivost u svoje predmete.

Održavanje ravnoteže između kurikuluma i specifičnih lokalnih potreba: S obzirom na različite ekološke, ekonomske i socijalne izazove u pojedinim državama, postoji izazov kako prilagoditi kurikulume specifičnim potrebama lokalnih zajednica, a istovremeno osigurati usklađenost s europskim i globalnim ciljevima.

Uloga učitelja, škola i obrazovnih institucija u stjecanju kompetencija za održivost

Uloga učitelja, škola i obrazovnih institucija u stjecanju kompetencija za održivost ključna je za razvoj održivog društva i očuvanje okoliša. Obrazovanje za održivost podrazumijeva integraciju ekoloških, društvenih i ekonomskih aspekata u obrazovni proces kako bi se osnažili učenici za donošenje informiranih odluka i preuzimanje odgovornosti prema zajednici i planetu. Neki od ključnih aspekata su:

⁶ European Commission, Directorate-General for Education, Youth, Sport and Culture. (2023). *Planiranje i oblikovanje kurikuluma i razvoj temeljnih kompetencija: Ključne poruke*. Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2766/48859>

European Commission, Directorate-General for Education, Youth, Sport and Culture. (2023). *Suradnja i partnerstva za održivost: Glavne poruke*. Luxembourg: Publications Office of the European Union. : <https://data.europa.eu/doi/10.2766/560544>

Obrazovanje i svijest o održivosti

Integracija održivosti u kurikulum: Učitelji mogu uključiti teme održivosti u različite predmete, kao što su biologija, geografija, povijest i umjetnost. Time se potiče kritičko razmišljanje o utjecaju ljudskih aktivnosti na okoliš.

Projektno učenje: Učenje kroz projekte omogućava učenicima da istražuju lokalne ekološke probleme i razvijaju rješenja. Ovaj pristup potiče suradnju, kreativnost i praktične vještine.

Razvoj kompetencija i vještina

Kritičko razmišljanje i rješavanje problema: Učitelji trebaju poticati učenike da razvijaju vještine analize i donošenja odluka. To uključuje istraživanje različitih perspektiva o održivosti i razvijanje sposobnosti rješavanja problema.

Praktične vještine: Škole mogu organizirati situacije za učenje praktičnih vještina, kao što su vrtlarstvo, recikliranje ili energetska učinkovitost. Ovo ne samo da povećava svijest o održivosti, već i osnažuje učenike da djeluju u svojoj zajednici.

Uloga učitelja kao modela

Oснаživanje učitelja: Učitelji bi trebali biti educirani o održivosti kako bi mogli biti uzori svojim učenicima. Sudjelovanje u profesionalnom razvoju i stalnom obrazovanju može pomoći učiteljima da ostanu informirani o najnovijim trendovima i praksama održivosti.

Etika i vrijednosti: Učitelji igraju ključnu ulogu u oblikovanju etičkih vrijednosti učenika. Promicanjem odgovornog ponašanja i vrijednosti kao što su solidarnost, jednakost i poštovanje prema prirodi, učitelji mogu inspirirati učenike na održive akcije.

Suradnja i zajednica

Umrežavanje s lokalnim zajednicama: Škole mogu surađivati s lokalnim organizacijama, nevladinim udrugama i poslovnim sektorom na projektima održivosti. Ova suradnja može obogatiti obrazovni proces i omogućiti učenicima da vide konkretne primjere održivih praksi.

Uključivanje roditelja i šire zajednice: Aktivnosti koje uključuju roditelje i članove zajednice mogu doprinijeti jačanju svijesti o održivosti. Organizacija radionica, predavanja ili ekoloških akcija potiče širu zajednicu da se uključi u održive inicijative.

Evaluacija i unaprjeđenje

Praćenje i evaluacija: Obrazovne institucije trebaju redovito procjenjivati svoje programe i inicijative vezane uz održivost. Evaluacija može pomoći u identificiranju

uspjeha i područja za poboljšanje te prilagodbi kurikuluma potrebama učenika i zajednice.

Zaključak

Obrazovanje za održivi razvoj postaje ključni element u oblikovanju budućih generacija, a Republika Hrvatska je prepoznala važnost integracije održivosti u svoje obrazovne kurikulume. Analiza kurikuluma osnovnih i srednjih škola ukazuje na napredak u integraciji održivog razvoja, ali istovremeno otkriva brojne izazove koji otežavaju njegovu punu primjenu. Iako su europske smjernice, poput GreenCompa i Zelenog plana, pružile okvir za razvoj kompetencija potrebnih za održivost, potrebno je osnažiti ulogu učitelja kroz profesionalni razvoj i bolju dostupnost nastavnih materijala.

Primjeri dobre prakse iz drugih europskih zemalja pokazuju da uspješna implementacija obrazovanja za održivi razvoj zahtjeva interdisciplinarni pristup, prilagodbu lokalnim potrebama i suradnju obrazovnih institucija, lokalne zajednice i poslovnog sektora. Ključni je izazov održavanje ravnoteže između nacionalnih obrazovnih politika i specifičnih lokalnih potreba, što zahtijeva fleksibilnost i inovativnost u obrazovnom procesu.

U konačnici, ulaganje u obrazovanje za održivi razvoj nije samo odgovornost obrazovnih institucija, već i cijelog društva, kako bi se osnažile buduće generacije za donošenje informiranih odluka i aktivno sudjelovanje u izgradnji održivijeg svijeta. Razvoj i implementacija kurikuluma koji uključuju održivost trebaju biti prioritet, a kontinuirano obrazovanje i podrška učiteljima ključni su za uspjeh ovih inicijativa.

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