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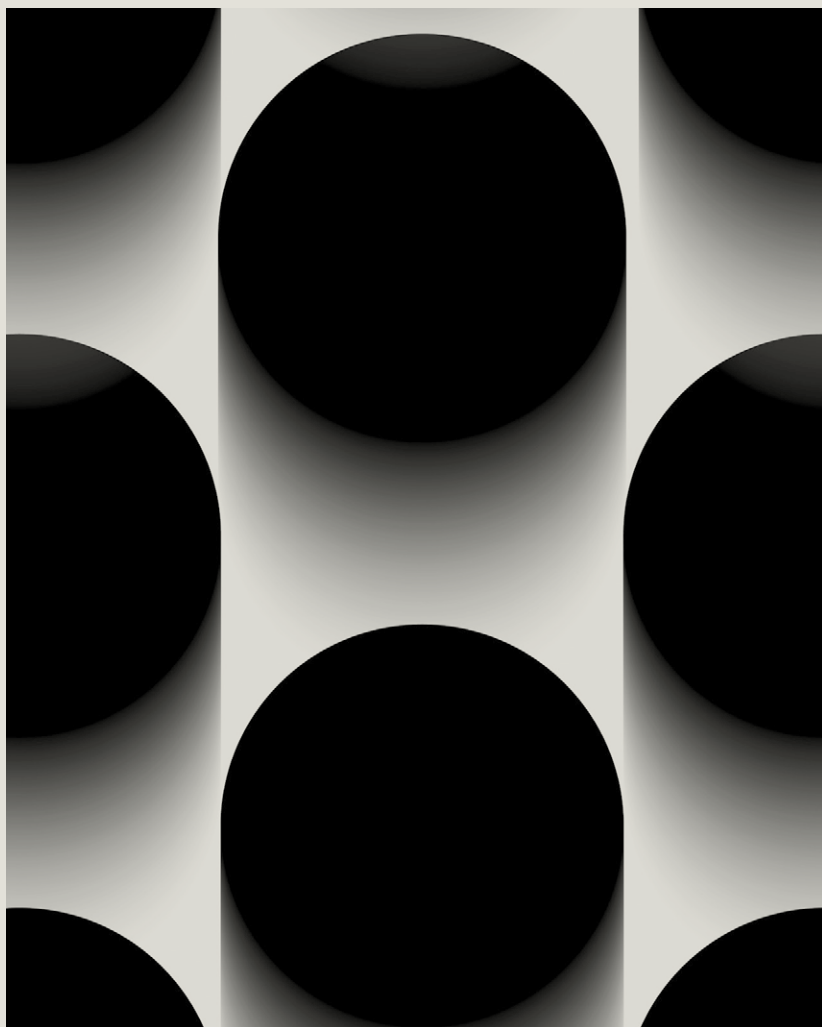
Sociodemografski trendovi i održivi razvoj

Sociodemographic trends and sustainable development

Gostujuće urednice │ **Guest editors**
Jelena Zvezdanović Lobanova & Dijana Štrbac

sadržaj

contents

Guest editors' introduction

Uvodna reč urednica tematskog broja

The concept of sustainable development implies promoting well-being by fostering a harmonious balance between economic progress, environmental protection and social equity i.e. the establishment of societies characterised by peace, justice and inclusivity. The UN Agenda 2030 for Sustainable Development, comprising 17 Sustainable Development Goals (SDGs), envisages the advancement of holistic development (economic, social and environmental) on a global scale, taking into account the needs of the most marginalised groups in society.

Socio-demographic trends can have a profound impact on current and future socio-economic challenges. The course and pace of these trends vary greatly from country to country and are characterised by strong regional demographic differences. In some areas, there is widespread poverty combined with high birth rates, while in others, which are among the most important drivers of global economic growth, the population is ageing rapidly. These expected demographic changes may jeopardise the achievement of the SDGs and pose new challenges, but they also offer opportunities for innovative solutions and policy responses.

As our global community navigates unprecedented demographic shifts, technological advancements, and environmental challenges, understanding socio-demographic dimensions is essential to developing effective strategies that promote lasting social, economic and environmental sustainability. Demographic patterns, which include factors such as population dynamics, ageing and migration, weave a tapestry that profoundly influences the course of sustainable development at local and global levels. Technological progress, which drives economic growth and socio-economic inequalities, is dynamically interrelated. However, this technological push also triggers environmental risks and requires a delicate balance to address the socio-demographic dimensions of environmental challenges. Successful sustainable development initiatives take into account the diverse characteristics of populations and promote equity, inclusion, resilience and environmental responsibility. By reconciling demographic considerations with sustainable development goals, societies can overcome challenges and capitalise on opportunities for long-term well-being.

The thematic issue *Sociodemographic Trends and Sustainable Development* brings together different perspectives on how demographic factors influence sustainability, economic growth and environmental concerns. The articles in this issue address specific topics: the potential of the degrowth model as a substitute for high-growth, consumption-led approaches to development; the relationship between sociodemographic factors and the green finance;

the implications of demographic age-ing for fiscal balance; the impact of de-mographic factors on the effectiveness of public administration training pro-grammes; the problems of household economic sustainability; the attitudes of university students towards environ-mental challenges; and their migration intentions.

The article "Degrowth between nor-mativism and reality" deals with one of the core issues of sustainable develop-ment: the balance between economic growth and ecological sustainability. It contrasts conventional growth mod-els with alternative frameworks such as degrowth, which propose a shift towards sustainable development with-out the pursuit of endless economic ex-pansion. By ranking countries according to their sustainable development and economic outcomes, this research adds an empirical dimension to the discus-sion and demonstrates the complexity and practical challenges of implement-ing degrowth strategies. This paper not only broadens the discussion on sus-tainable development models, but also sheds light on the socio-demographic implications of the transition to alter-native paradigms, which are central to understanding long-term trends in global development.

Exploring the role of socio-demo-graphic trends in shaping sustainable outcomes, the paper "How do socio-de-mographic factors affect green finance growth?" provides valuable insights through the lens of green finance. As green finance is central to supporting environmental goals, the study estab-lishes a link between socio-demograph-ic factors such as education, income inequality and population age, and gov-ernment investment in green research and development. This link emphasises

the crucial influence of social struc-tures and demographic dynamics on national sustainability strategies. Em-pirical evidence supports the idea that the socio-demographic context strong-ly influences the effectiveness of green fiscal policy, which is consistent with the broader theme of demographic trends as drivers of sustainable devel-opment.

Population ageing and its fiscal con-sequences are at the centre of the study "Impact of population ageing on fiscal balance in the European Union," which offers important insights into how de-mographic changes directly affect the fiscal sustainability of EU governments. The findings reveal the growing finan-cial burden on public budgets due to population ageing, especially through higher health expenditure and a shrink-ing tax base. By providing empirical evidence of the negative fiscal impact, this paper emphasises the importance of taking demographic factors into account when designing fiscal policy and long-term economic planning. As governments face increasing pressure to reconcile fiscal sustainability with social welfare, the findings from this study offer a valuable contribution to the policy debate concerning the ways to address the long-term challenges of demographic change.

The article "The influence of demo-graphic characteristics on the effective-ness of public administration training programs" addresses the intersection of socio-demographic factors and in-stitutional effectiveness, which is cru-cial for the sustainable development of public governance. The paper shows how demographic characteristics, in particular work experience and job roles, influence the success of capac-ity building efforts in public adminis-

tration. As effective public administration is critical to achieving sustainable development goals, the study provides evidence on how the internal dynamics of public institutions, shaped by demographic characteristics, can improve institutional performance. By focusing on capacity building in public institutions, this research aligns with the broader theme of fostering resilient and adaptable governance structures that are crucial for long-term sustainable development.

Study *"*On the economic sustainability of Russian households at a socially acceptable level" conducts an in-depth analysis of the thresholds that define socially acceptable criteria for economic sustainability in different types of households in Russia. The authors have created a methodological framework for assessing the economic sustainability of households, emphasising the importance of self-sufficiency and resource management in maintaining socially acceptable levels of consumption and savings. By illustrating the complex interplay between internal household factors (such as composition and labour potential) and external influences (such as labour markets and social support), the paper provides the basis for a deeper understanding of households' economic behaviour and their sustainability strategies.

Authors from North Macedonia analyse the factors that influence the migration intentions of university students in their article "Crossroads of aspiration: unveiling the migration intentions among university students in North Macedonia". Through the use of exploratory factor analysis and logistic regression, the study provides insights into the socio-demographic, living condition, and educational variables that

shape students' decisions to migrate or stay in the country. Their empirical analysis emphasises the significant role of students' educational background and satisfaction with living conditions in their migration intentions and points to the potential problem of brain drain that could adversely affect the country's economic growth. This research provides valuable insights into the motivations for student migration and makes the findings relevant for the policy makers in similar developing countries, particularly in the Western Balkans.

The paper "Environmental attitudes among Serbian university students" also examines the motivations and behaviours of university students, but focuses on their environmental attitudes and behaviours in relation to climate change and sustainability. By identifying key factors (such as self-assessed environmental awareness, gender and family recycling habits), the study provides insights into the way in which these factors shape students' engagement in pro-environmental behaviours. The study emphasises the role of university students as future leaders and decision-makers in addressing environmental challenges, and recommends actions that promote a deeper understanding of sustainability and inspire collective action.

The thematic issue also contains a review of edited volume "Disaster, construction, and reconstruction: essays on ethical and social perspectives" and a review of thematic section "Science and education for sustainable development" from the *European Journal of Transformation Studies*.

As this thematic issue provides both theoretical insights and empirical evidence on the socio-demographic di-

mension of sustainability, we are confident that it will not only contribute to the academic discourse, but also provide practical recommendations for the policy makers and practitioners committed to achieving the SDGs. We hope that this thematic issue will serve as a valuable resource in advancing knowledge and inspire action for a more inclusive, equitable and sustainable future.

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EDITORIAL DISCLOSURE

As part of this thematic issue, one of our guest editors, Dr Dijana Štrbac, along with her coauthors, contributed an article titled "The influence of demographic characteristics on the effectiveness of public administration training programs". In the interest of maintaining editorial independence and transparency, this paper was handled entirely by the core editorial team of *Stanovništvo* and was subjected to the journal's standard peer review process, to which both guest editors were blind.

Članci

Articles

Degrowth between normativism and reality*

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ABSTRACT

This article addresses the increasing debates over the limitations of high-growth models that have contributed to environmental degradation and polycrises. Based on a comprehensive literature review, we look into the basic characteristics and differences between the alternative degrowth and similar new development models; examine the paradigm through the lens of its critics; and look into its viability. The analysis highlights that while degrowth presents a theoretically compelling alternative to traditional growth models, it faces significant practical challenges in implementation, particularly due to its reliance on deep systemic changes and shifts in public values. In the empirical section, we test the hypothesis that countries with better sustainable development progress are more successful than those prioritizing economic outcomes. To do this, we show graphically and analyze the correlation between the average GDP growth and changes in the sustainable development measure using Pearson's correlation coefficient. We rank countries based on their sustainable development and economic performance, averaging these rankings to identify potential degrowth leaders over the past 20 years. Our findings indicate that, while theoretically appealing, the degrowth model faces significant challenges in practice, with no statistical evidence supporting a negative correlation between degrowth and sustainable development progress.

KEYWORDS

degrowth, zero growth, sustainable development, system, capitalism

* The views expressed are those of the authors and do not necessarily reflect those of the United Nations.

1 INTRODUCTION AND METHODOLOGY

We are obsessed with growth believing that it has dominated entire humankind history. In fact it has not. Most of the time the life was stagnant. Most classical economists would have found it unimaginable to actively pursue growth as a policy priority, claims Susskind (2024: 46). The limitations of the current high-growth paradigm in developmental models, or perhaps more accurately, ideology, have also become increasingly evident. As Priewe (2022: 19) states, "climate neutrality can be considered the most important global economic and ecological goal for the twenty-first century, with the decade until 2050." This recognition has sparked debates questioning the anthropocentric, consumerist-focused growth mania that not only fails to resolve crises, but in fact actively fuels them. The catastrophic deterioration of our environment and biosphere highlights the unsustainability—social, ethical, and ecological—of our current model. French philosopher and environmentalist J.P. Dupuy (2014) aptly described the market as a "monster stalking the earth." We find ourselves at a civilization crossroads, with calls for transformative change growing louder (Daugul 2020). Our present trajectory, marked by consumption levels akin to the U.S., would require the resources of five planets (Global Footprint Network 2024), a clear indication that our current lifestyle is unsustainable.

This critical juncture necessitates a reevaluation not only of the growth model, but also of the entire global system, the concept of capitalism, which has proven effective in "nice weather" but falters in crises, ultimately relying on national governments for rescue. Kallis (2018) is clear: "To prosper without growth we have to establish a radically different economic system and way of living". The public awareness is growing that societies must undergo systemic transformation to save the planet. The "degrowth" movement proposes a radical response: if growth is the problem, then less growth—or even no growth or negative growth—is the solution. "Degrowthers get one thing right: we cannot continue on our current growth path" (Susskind 2024: 46). Despite accusations of naivety and utopianism, addressing the degrowth and some other similar models, history shows that many initially utopian ideas have later become feasible. *Mahatma* Gandhi's sentiment that "First They Ignore You, Then They Laugh At You, Then They Fight You, Then You Win" (Gandhi 2012–2013) remains relevant.

The degrowth model, originated in 1972 by A. Gorz[1] criticizes the traditional growth paradigm, advocating for the inclusion of social criteria, population well-being, and harmonious development over environmentally unsustainable GDP growth. As Huwe and Rehm (2022: 408) argue, "our current economic system remains structured around a growth imperative for capital rather than the provisioning of human needs," often ignoring environmental, climate, and biodiversity boundaries, and undermining social justice.

The urgency of seeking new development models in the wake of the Great Recession, COVID-19, and concurrent polycrises (environmen-

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[1] He talked about décroisance. The debate started in France in 2002 with special issue of Silence (Kallis et al. 2015: 2) while the English term 'degrowth' was 'officially' used for the first time at the Paris Conference in 2008.

tal, climate, social, and political) has intensified public and expert debates. Models like green growth, degrowth, zero growth, a-growth (Van den Bergh 2011, 2017), and the doughnut economy (Raworth 2017) are now central to discussions among economists, anthropologists, philosophers, and activists. These approaches, while sometimes contradictory, are complementary to sustainable or green growth concepts.[2] The entire capitalist system is seen as incompatible with the many objectives of new development models, particularly negative growth.

This article will critically evaluate the degrowth model's viability through an interdisciplinary lens, qualitatively comparing its benefits and costs with similar models (green growth, zero growth, a-growth) going beyond normative approaches by testing empirically the results of such models in real life. In such a way it would be possible to argue that such models are at par, or even better than other, more economic growth centered models. However, the complexity and interdisciplinary nature of such new models make it difficult to test all such new models empirically in all dimensions. For one, there is no single indicator to measure the achievements of such new models, like GDP in traditional growth model. Secondly, the economics of degrowth or zero growth has not been applied much practically. The limited space for our article poses an additional limitation.

In the first conceptual part, we are therefore addressing, based on the literature review, the following research questions:

1   What are the basic characteristics and differences between degrowth and similar new development models?
2   Can degrowth concept resolve current development problems in general, and in different groups of countries, from the perspective of its critics?
3   Is degrowth concept viable within the existing system, globally and locally?

In the second part, the following research question and hypothesis are tested empirically:

4   A) Are countries whose non-economic outcomes of development are considerably stronger than the economic ones, more successful than countries whose economic outcomes outweigh their non-economic outcomes' performance?
    B) Hypotheses:
    Null Hypothesis (H₀): There is no correlation between degrowth and sustainable development progress (i.e., the correlation coefficient, r, is zero). H0: r = 0
    Alternative Hypothesis (H₁): There is a negative correlation between degrowth and sustainable development progress (i.e., the correlation coefficient, r, is less than zero). H1: r < 0

A part of the research question is also the hypothesis, that if zero, or degrowth, or a close comparator to the concept is also beneficial for sustainable development outcomes, we should be seeing some face value negative statistical scatter plot depictions and correlation in the data.

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[2] Green growth first became a buzz phrase at the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 (Hickel 2018).

After defining and situating the degrowth model within the global economy, this article will outline its main characteristics compared to other alternative development models. A clear definition is necessary due to the widespread misunderstanding and confusion regarding the model, ranging from zero to negative economic growth. Kallis and colleagues metaphorically describe the goal of degrowth as turning an elephant into a snail, emphasizing that degrowth represents a fundamental shift, rather than a mere reduction (Kallis, Demaria and D'Alisa 2015: 4).

The viability and feasibility of implementing these models will be assessed within different national, regional, and international contexts, especially across various economic groups (developed, developing, and emerging economies).[3] We will confront the degrowth model with its critics from multiple disciplines and examine real-world examples to illustrate the degrowth concept. It focuses on the countries that have made significant strides in selected non-economic dimensions of development without corresponding increases in real GDP growth, juxtaposing these with the nations that achieved economic growth but did not see comparable improvements in other non-economic sectors. This comparative analysis aims to empirically identify what we can learn from the cases where there is progress in human well-being which does not align with traditional economic growth metrics, highlighting the practical implications and challenges of implementing the degrowth model in varying global contexts. In conclusion, we will evaluate the degrowth model against real-world outcomes, discussing its benefits and costs, and offer policy suggestions for potential implementation in diverse socio-political contexts.

2 BASIC CHARACTERISTICS OF THE DEGROWTH CONCEPT

Describing comprehensively the degrowth model is challenging due to its complexity and diversity, encompassing economic theory, social theory, and political movements. Priewe (2022: 36) notes that "a thorough macroeconomic analysis of zero growth, and even more of degrowth, which includes biophysical issues, is rare or missing in standard macroeconomics". To avoid confusion, it is essential to differentiate degrowth from similar concepts like zero growth, a-growth and green growth. Definitions, objectives, major suggested polices to achieve the goals and a critique of all such concept are briefly explained in Table 1. The purpose is to help the reader to place the degrowth concept in the right perspective compared to the traditional growth model. The central idea of all such models is that GDP growth is not a good indicator of social wellbeing, that this anthropocentric model has created the environmental/climate crises that stretch planetary boundaries. Degrowth consequently aims to maintain stable economic output to balance resource consumption, environmental impact, and population growth at sustainable levels, while allowing for technological progress and improvements in living standards.

As presented in Table 1 green growth and A-growth are not departing so much from the growth model. Green growth seeks to reconcile the growth model

[3] Binary approach, concentrating on Global North and Global South is, according Pungas et. al. 2024, insufficient because not taking into account specifics of Central and Eastern European countries as a special category.

Table 1 Comparison between growth, green growth, a-growth, zero growth and degrowth models

Type of "growth"	Definition	Objectives	Policies	Criticism
Growth	Increase of wealth over time measured by GDP.	Maximizing growth of GDP to improve living standards, employment rates, and income levels and maintaining economic and political stability.	Maximizing growth is cure for everything despite the widespread consensus that GDP is a poor measure of progress (Stiglitz 2009).	GDP growth is not an indicator of social wellbeing. If GDP flatlines or contracts, the economy tends to topple into crises of unemployment, debt, inequality, and hardship.
Green growth	Efficient, clean and resilient, environmentally sustainable growth, ensuring that natural resources are used efficiently and ecosystems are protected, mostly within the prevailing capitalist development models.	Reconciling economic growth and environmental sustainability.	Gradual reduction of negative effects of growth on the environment by adjusting market failures, tax instruments, technology advances, green industrial policy, environmentally friendly policies.	Technology cannot prevent climate change, ecosystem destruction and resource depletion (Lancaster University 2020; Van den Bergh and Kallis 2012: 912). Appropriate mainly for advanced countries and not for the least developed countries (LDCs). Underestimation of the underlying economic systems change.
Degrowth	A deliberate and equitable reduction of production and consumption to achieve sustainability, social equity, and well-being (Priewe 2022: 36) should make it consistent with biophysical boundaries, emphasizing localized production and self-sufficiency, sometimes referred to as eco-socialism (Hickel 2018).	A sustainable, equitable, and ecologically balanced human development, social equity and well-being: over material wealth by overproduction and overconsumption, moving beyond GDP as the main indicator of progress.	Downsizing production and consumption, reducing it by decoupling [4] (to reduce the environmental impact), promoting work-sharing (Latouche 2009) and increase of taxes. Precondition is a change in public values.	Unrealistic and naïve, impossible to be realized within the existing political system without political problems, instabilities etc. Based on misunderstanding that "infinite growth is not possible on a finite planet," although it is, according to Susskind (2024: 48) lacking a single measure of progress. Degrowth is socially unstable and potentially catastrophic (Jackson 2009). Its advocates therefore introduced term sustainable degrowth (Kallis 2011).

[4] Environmental Kuznetc curve shows that that decoupling does not hold in general (Stern 2004).

Type of "growth"	Definition	Objectives	Policies	Criticism
Zero growth	Economy stabilizes at a constant size, neither growing nor shrinking maintaining a balance between human needs and ecological constraints without necessarily decreasing GDP. Steady-state economics is less radical than degrowth.	To maintain the balance with ecological limits and long-term well-being quality of life, social equity, and environmental health are the priority (Van den Bergh and Kallis 2012).	Improving productivity through investments in education, R&D to enhance efficiency, social equity by enhancing public services and infrastructure to maintain social stability within ecological limits.	Can lead to stagnation, unemployment and budgetary constraints due to stagnation of GDP growth. Lack of innovation and investment in new technologies dampens future growth prospects.
A-growth	Neutral stance on economic growth, neither advocating for nor against it (growth is not inherently good or bad) (Van den Bergh and Kallis 2012: 911).	Maximization of social welfare giving up some GDP growth and reducing environmental impacts, more leisure and improved public services (Van den Bergh and Kallis 2012: 912).	The first policy priority is a large-scale transition from fossil fuel to renewable energy sources and the second achieving full employment in an economy, which is not always, growing.	Most of the criticisms to other alternative models also apply here.

Sources: Prepared based on: Kallis 2011; Van den Bergh and Kallis 2012; Haberl et al. 2020; Priewe 2022; Stratford 2020; Steinberger et al. 2013; World Bank 2012.

with environmental sustainability; it is, in a way, complementary, but also contradictory to degrowth or zero-growth models. One among major problems is that it is not applicable for all countries, because of their different starting points. A-growth is in fact neutral regarding GDP growth, focusing on the transition to renewable energy sources in an economy, which is not always, growing.

Zero growth, or steady-state economics (Daly 1996), is less radical than degrowth, aiming at stabilizing the economy at a constant size, neither growing nor shrinking. It focuses on maintaining a balance between human needs and ecological constraints without necessarily decreasing GDP. It is less radical than degrowth, but not necessarily sufficient for ecological sustainability (Priewe 2022: 36). The major critique is that it can lead to stagnation with

all social problems by not stimulating technological progress.

Degrowth challenges the conventional belief that continuous economic growth solves societal problems by creating employment, encouraging innovation, and addressing environmental and climate challenges. However, innovations alone cannot guarantee this transformation. Nobel laureate for economics, A. Deaton (2024: 21) argues that the direction of technical change depends on who has the power to decide, highlighting the limitations of relying solely on technological advancements. If we succeed in redirecting technological progress toward the other ends we care about, it can be achieved. Measures like taxes and subsidies, rules and regulations, social norms—for instance created a strong incentive for people to develop clean rather than dirty technologies (Susskind 2024: 48).

The degrowth model emerged as a response to the unsustainability of existing economic growth models, which overexploit natural resources and exacerbate social inequalities. It promotes ecological sustainability by reducing the ecological footprint and aiming for equitable resource distribution without compromising future generations' needs. This approach involves shifting away from perpetual economic growth, reducing resource depletion and environmental damage, and including social criteria to balance human well-being and nature.

Ecological economists define degrowth as "an equitable downscaling of production and consumption that will reduce societies' throughput of energy and raw materials" (Schneider Kallis, and Martinez-Alier 2010: 511). Hickel (2018) elaborates that degrowth means aligning civilization with the planetary boundaries and liberating it from economic growth dependency, particularly in rich nations. It implies maintaining current levels of production and consumption, or shrinking the sectors harmful to ecology and unnecessary for human flourishing.

Kallis, Demaria, and D'Alisa (2015: 4–5) explain that degrowth is not merely negative GDP growth, but a paradigm shift to something entirely new. Van den Bergh's (2011, 2017) concept of A-growth distinguishes five targets for degrowth: GDP, consumption, work time, physical throughput, and 'radical degrowth,' which includes anti-capitalist and grassroots movements. The model also aims to address the uneconomic costs of growth, such as poor psychological health, long working hours, congestion, and pollution (Mishan 1967). Ghosh (2024: 20) emphasizes the need to focus on well-being rather than equating it

with money or consumption. Degrowth proposes reorganizing society to prioritize social well-being, ecological sustainability, and equitable resource distribution, substituting individualism and consumerism with solidarity, conviviality, and respect for nature. It aligns closely with Amartya Sen's concept of development, which focuses on advancing human well-being and human freedom and expanding people's abilities and opportunities rather than aggregating economic growth. For him, "the process of economic growth is a rather poor basis for judging the progress of a country; it is not, of course, irrelevant but it is only one factor among many" (Shaikh 2004). He argues for a paradigm where progress is measured by enhancing individual and collective capabilities, including access to basic needs and opportunities for personal and societal contributions (see Shaikh 2004). This perspective underscores the need to rethink economic models, focusing on qualitative growth and enriching human lives over quantitative economic expansion.

The concept is flexible, considering the local situations of different countries, their development stages, environmental and climate conditions, and social needs. It does not prescribe a one-size-fits-all solution but adapts to the specific contexts of individual countries. This adaptability is crucial for evaluating the impact of the degrowth model on different groups of countries and the international system. Namely, environmental degradation and climate conditions vary, affecting the potential impact of the degrowth model. Industrial countries can emphasize a faster transition to green development, while less developed countries prioritize development and well-being, lifting vast populations out of poverty. The green transition is

not seen as a priority for developing countries, particularly if they are still in the resource or investment-driven development stages. However, the degrowth model could facilitate transition to sustainable and environmentally friendly development, provided there are substantial changes in the international division of labor and significant assistance from industrial countries, compensating for past exploitation and addressing global inequalities.[5]

Implementing globally the degrowth model presents several scenarios: only industrial countries, only developing countries (including emerging economies), or all countries adopting the model. If only industrial countries opt for degrowth, capitalists may relocate production to growing economies in the Global South, aiding capital accumulation's survival. Conversely, implementing degrowth in the Global North would likely lead to a phase of zero growth, avoiding a downward spiral of shrinkage and ensuring compensation for job, income, and capital losses. However, this scenario is unprecedented and highly unlikely in democratic societies (Priewe 2022: 36–37). In any case, implementing any degrowth model requires international cooperation and solidarity to address interconnected global problems. It necessitates concerted efforts at local, national, and global levels to transform existing systems and paradigms.

3 CRITIQUES OF THE DEGROWTH MODEL

The degrowth concept has faced criticism from various academic disciplines, including economics, anthropology, and philosophy, as well as from social activists. This is not surprising given it's a highly normative and idealistic approach, and it involves significant methodological shortcomings, especially in the macroeconomic analysis, which is rare in ecological economics, as well as problems in its practical implementation within the existing political systems without causing political problems, instabilities, and potentially even catastrophes (Jackson 2009). Traditional development theories view the approach as lacking a single measure of progress, being too radical and politically doomed, as it cannot resolve the existing problems, but only freeze them, preserving global inequalities such as poverty in the developing countries. The most radical critics argue that degrowth is incompatible with capitalism,[6] as it challenges its inherent imperative of perpetual capital accumulation and economic growth (Etzioni 2021: 11). Critics suggest that transitioning to degrowth would require fundamental changes to the economic system, likely facing resistance from powerful stakeholders, and could lead to social unrest due to decreased living standards. One of the responses to critiques was introduction of the sustainable degrowth concept (Kallis 2011).

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[5] "Any fair climate treaty should be 'nonreciprocal', with binding responsibilities (in this case, concerning emissions reduction mandates) applying only to the North. Likewise, just as it did in the 1970s, the G-77 insists that the North should transfer technology and provide aid as reparations for the damage caused by historic wrongs—now referring to historic greenhouse gas emissions" (Gilman 2015: 10).

[6] Trainer (2012: 593) has elaborated on the organic connection between growth and capitalism that the degrowth model would challenge. Eliminating profit concepts and the financial system would necessitate alternative systems for stimulating innovation, elimination of market mechanisms, and cultural change.

Economists argue that economic growth and technological development are essential for reducing poverty and improving living standards, especially in the developing countries. Degrowth, they argue, may lead to economic stagnation or recession, while hindering innovation and technological progress, causing unemployment, and lowering living standards. This could disproportionately impact marginalized groups, exacerbating existing disparities and potentially leading to job losses, reduced income, increased poverty and consequently increased political/social instability. It might also impede the development of the technologies that could address environment.

Some argue that technological innovation and market-based approaches are more effective in addressing environmental challenges than degrowth. The environmental Kuznets curve posits that as GDP per capita rises, environmental damage initially increases, but eventually decreases as affluence continues to grow (Mcafee 2020). Business managers claim that degrowth could negatively affect profitability and expansion, while political conservatives view it as a threat to free-market principles and individual liberties. Even critics from emerging economies argue that degrowth policies advocated by affluent nations could hinder their economic development aspirations. K. Raworth, the author of doughnut economics, acknowledges that significant GDP growth is needed for low- and middle-income countries to meet social goals within the ecological limits (Nugent 2021).

Environmentalists criticize degrowth for not going far enough to address urgent environmental challenges, arguing that more radical measures like carbon pricing or ecological taxation are need-ed. Technological optimists believe in the potential of technological innovation to solve environmental problems, suggesting that advancements in clean energy and resource efficiency can enable continued economic growth without exceeding the planetary boundaries.[7]

Cultural critics argue that degrowth threatens the established consumerist lifestyles and cultural norms, potentially leading to social unrest or dissatisfaction among those accustomed to high living standards. Critics also question the political feasibility of implementing degrowth policies, suggesting that significant political and institutional reforms are needed, which may be difficult to achieve within the existing frameworks. Acemoglu (2023) criticizes degrowth from a political economy perspective, arguing that institutions supporting property rights, market competition, and innovation are essential for sustainable economic growth, and degrowth policies could undermine these institutions.

Degrowth requires a strong government role to correct market imperfections and provide appropriate redistribution. Contrary to neoclassical economics thinking that governments should just fix market failures while it should otherwise get out of the way, Mazzucato (2020) argues that governments should actively shape markets. She views ecological crisis as a negative externality, while neoliberal economics regards economic activity as taking place in a kind of environmental and climate vacuum in which market forces lead to optimal outcomes. Governments have

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[7] The argument being that dematerialization can do the trick, that "resources cost money that companies would rather not spend, and tech progress keeps opening up new ways to produce more output (like crops) while spending less on material inputs, like fertilizers)" (Mcafee 2020).

now in fact become a solution to many crises; they are no longer a problem but, in many ways, the only effective instrument in the times of crisis. Fontana and Sawyer (2022: 99) posit that market forces and government policies invoked to align growth rates are not operable under zero growth conditions, necessitating alternative policies. Supporters of degrowth model claim that some of such changes are already under way.[8] Evidence, however, demonstrates that this was not enough to stop environmental degradation and climate change.

Although degrowth proponents emphasize global cooperation to address shared environmental challenges and promote social equity, social justice and solidarity, they may underestimate the limitations of implementing the model within the existing global system. Degrowth could negatively impact global trade networks[9] (global supply chains), hindering the development of developing countries, and exacerbate poverty and inequality by limiting technological progress and innovation, leading to economic instability and geopolitical tensions that require messy political

bargains domestically[10] and globally. "A frequent criticism of the degrowth proposal is that it is applicable only to the overdeveloped economies of the Global North. Since the Global South has to reduce emissions as much as the Global North, the resource-rich countries in the South face the gravest challenges" (Priewe 2022: 19). The poorer countries of the Global South still need to grow to satisfy their basic needs. Indeed, degrowth in the North would liberate ecological space for growth in the South (Kallis, Demaria, and D'Alisa 2015: 5).

The costs of new policies namely imply shifting of the costs to other countries. Concentrating on degrowth may also divert attention and resources away from addressing their critical needs like access to basic services (healthcare, education, infrastructure) and hinder efforts to improve living standards. It may also hinder and limit technological progress and innovation, as well as the ability of developing countries to address pressing challenges such as climate change, food security, and healthcare. It could disrupt global supply chains and trade networks, potentially leading to economic instability and geopolitical tensions, and potentially harm the interests of developing countries.

Perhaps the most radical critique comes from economist R. Spruk, who claims that "degrowth is a development in reverse, one of the most intellectually flawed and dangerous ideas. A world of zero growth entails massive hunger, environmental and moral hazard, soaring public and private indebtedness, and

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[8] Rich countries have reduced their air pollution not by embracing degrowth or offshoring, but instead by enacting and enforcing smart regulation. As economists, J. Shapiro and R. Walker concluded in a 2018 study about the US, "changes in environmental regulation, rather than changes in productivity and trade, account for most of the emissions reductions" (Shapiro and Walker 2018: 3814).

[9] Concerns about negative impacts of trade on growth were put forward already by some neomercantilists like American political economist Carey. He "combined neomercantilist goals with a concern for environmental protection, drawing on the ideas of the German scientist Justus von Liebig, who blamed free trade for exhausting local soils through its promotion of unsustainable monocrop agriculture that served export markets" (Helleiner 2023).

[10] It would be very difficult, if not impossible, to convince poor people in the South, struggling every day to satisfy their basic needs, to give up energy intensive or polluting industries for the benefits of the mankind, seen in their eyes more as benefits of the rich countries.

deteriorating environmental quality with higher pollution. As our societies become richer, technology-driven solutions for climate change become more affordable and feasible" (Damijan 2022). Susskind also believes (2024: 48) that "freezing GDP per capita at current levels would, as others have noted, require either abandoning 800 million people to extreme poverty or slashing the income of the other 7.1 billion—to say nothing of forgoing all the other benefits of higher living standards".

However, most such technological solutions are wrongly based on technology as neutral instrument, not seeing and problematizing "almost complete lack of a comprehensive critical reflection on the fundamental mutually constitutive and co-dependent relationship between capitalism and its central technologies"[11] (Vrečko Ilc 2024: 336). Such thinking "implicitly promotes a 'better' sustainable capitalism that is quite impossible given the centrality of the specific technologies developed and employed according to capitalist imperatives and logics" (Vrečko Ilc 2024: 315).

4 DEGROWTH BETWEEN NORMATIVISM AND EMPIRICAL REALITY

In spite of the superficially attractive ideas proposed by degrowth and similar models, there are several obstacles and limitations on the way to potential implementation of such new development models in practice. The first is political, social and economic feasibility of the model, because the degrowth model implies significant political challenges due to its radical departure from con-

[11] See the critique of digital capitalism by Varoufakis 2024; Zuboff 2020.

ventional economic growth models. The implementation would require substantial changes in policy frameworks, institutional structures, and cultural norms.

Zero growth may be more politically and socially acceptable than degrowth, as it does not necessarily require a contraction of the economy, or significant changes in the consumption patterns. However, achieving zero growth still requires overcoming political and institutional barriers to implementing sustainable policies. Green transition would be much easier and more feasible for the developed countries, while being less so for the developing ones.

Challenges in empirically researching our final research question are manyfold. Firstly, there are, to the best of our knowledge, in fact no countries declaring to follow degrowth or similar alternative to the growth model of development intentionally.[12] In order to overcome this limitation we have chosen the only available approach to evaluating countries' development performance by their growth rates and SDG indicators, which demonstrate to what extent the

[12] A not quite identical, but close enough initiative is the Wellbeing Economy Governments (WEGo), which involves a collaboration of national and regional governments committed to promoting and implementing policies that prioritize wellbeing over traditional economic growth metrics like GDP. The partnership was established in 2018 and includes the governments of Scotland, Iceland, New Zealand, Wales, and Finland, with Canada also actively participating in the initiative. These governments share expertise and policy practices to advance their common goal of creating Wellbeing Economies. This approach involves integrating wellbeing into policy-making, focusing on sustainable development, and addressing economic, social, and environmental challenges in a holistic manner. The partnership aims to support the United Nations Sustainable Development Goals and encourages collaboration to foster innovative policy approaches that prioritize the wellbeing of people and the planet.

countries are following the sustainable development model,[13] while also demonstrating elements of degrowth strategy. It is possible to assume that those with slow, zero growth, or even negative growth rates and those with highly positive social, environmental and other SDG indicators are following the sustainable or other alternative developmental models. Since many of the SDG goals are interconnected, such indicators have also limitations. Namely, the pursuit of one goal may negatively impact another SDGs goal (see table 1 in Jaklič 2024).

The second limitation of such an approach is that the assessment of countries' development/growth performance is ex post not ex ante. Countries with different categories of growth have not decided ex ante to achieve such results as a part of their development strategy. Resulting degrowth, zero growth or negative growth are ex post results of, most often, a growth model of development that just failed due to bad policies or negative external context conditions such as conflicts or different kind of crises. This is important to note as policies can have a significant impact on any developmental model results, and even more so on the degrowth types of development models which involve a much more important role of noneconomic elements.

Since the level of economic development itself is one of the key enablers or frameworks that determine what kind of policy options are available, we start our empirical exploration, i.e. the search

for the degrowth model countries, by firstly looking at each economic GDP per capita group classification separately: low, lower-middle, upper-middle, and high income per capita according to the World Bank definition. Within each group, we then search for the model degrowth performers, by utilizing Sachs, Lafortune and Fuller historical Sustainable Development Goals (SDG) Index (Sachs, Lafortune and Fuller 2024). The SDG Index, covering economic, social, and environmental, as well as governance, peace and partnership dimensions and levers, is the most holistic sustainable development measure that exists today, while it was also agreed to be pursued jointly by all the states through the United Nation General Assembly Resolution on Agenda 2023 in 2015. We use the change in index 2000–2023 as our measure of quality and quantity of advancement in Sustainable Development. Generally, the progress in the realization of SDG goals was modest since only 17 % of the goals have been realized, 18 % modestly and 30% with minimal progress (UN 2024). This is not surprising, since many crises, particularly the COVID-19 pandemic, the war in Ukraine, the crises in the Middle East, have changed the national development priorities and thus caused delays in the implementation of the SDGs. Resources and efforts have been diverted to crisis response rather than sustainable development initiatives and in such a way delayed progress in achieving such goals (Chevenko 2024).

Finally, apart from the World Bank's (WB) income per capita category, which splits the countries into 4 groups, and the SDG Index change in the last 23 years, we also added the real GDP per capita growth variable in the form of the growth rate of GDP adjusted to income

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[13] "Transforming Our World: The 2030 Agenda for Sustainable Development" was adopted by all 193 member states of the United Nations in September 2015. Such an adoption does not mean that the signatories are in fact implementing the Agenda in their development.

levels,[14] and took its average over the same period.

We proceed in 3 steps. First, we show the scatter plot of the SDG Index Change and average growth rate of GDP adjusted to income levels, to see if there is any clear relationship seen from the graph. Second, we check for the significance of Pearson correlation coefficient against our hypotheses. And third, we rank the countries according the top preferred characteristics of the degrowth model, the two main ones being progress in sustainable development dimensions (increase in SDG Index) – the bigger the jump the higher the rank; and progress on the traditionally collected real economic growth (normalized average growth rate of GDP adjusted to income levels) – the lower the growth, the higher the rank. We then proceed to average the two separate rankings, and produce a ranking of the model degrowth countries of the last 20+ years. We perform all three steps for both the entire sample, and within each income per capita category.

In checking for the significance level of the Pearson correlation coefficient, we compare the P-value (calculated exact significance level) with the established significance levels in the literature of $\alpha=0.05$ and $\alpha=0.10$, which represent the threshold below which we can decide to reject the null hypothesis of zero correlation (or in other words, we are accepting a 5% or 10% chance of finding a correlation where none actually exists (Type I error) at those significance levels).

[14] See Sachs, Lafortune and Fuller (2024) for how the authors adjust the growth rate of GDP to income levels (where rich countries are expected to grow less) and how it is expressed relative to the average growth rate of the high-income countries.

Figures 1 – 5 and Table 2 – 6 represent the three empirical steps, first performed on the whole sample, and then on the four income categories subsamples. The graphs represent the visual display of the relationship between SDG Index change and Normalized average growth, which is then tested against the null hypothesis of the zero correlation between the two variables with a Pearson correlation coefficient. Lastly, the tables show the combined ranking of the countries as explained above, combining (averaging) the ranks of the lowest average normalized growth and biggest SDG Index jumps, both for the period 2000–2023, and based on that average rank, identifying the 5 top and 5 bottom countries in terms of the degrowth paradigm. Figure 1 and Table 2 show the global results. Figure 1 does not imply an obvious relationship between the variables, and the Pearson correlation coefficient of -0.023 is insignificant at 0.77 P-value (far from the needed threshold level of significance of 0.10), implying we cannot reject our null hypothesis. The top 5 degrowth countries are mostly characterized by poor economic performance, largely due to their violent past and conflicts. Countries like Afghanistan and Myanmar, despite their significant challenges, have still made some progress in the sustainable development dimensions. However, these nations are not typically seen as role models for development, given their ongoing struggles with instability and low economic growth. On the other hand, the bottom 5 countries in the global ranking, such as Ireland and Denmark, have achieved substantial economic success, but have not progressed as much in other sustainable development dimensions over the past two decades. These countries already enjoy high levels of development and
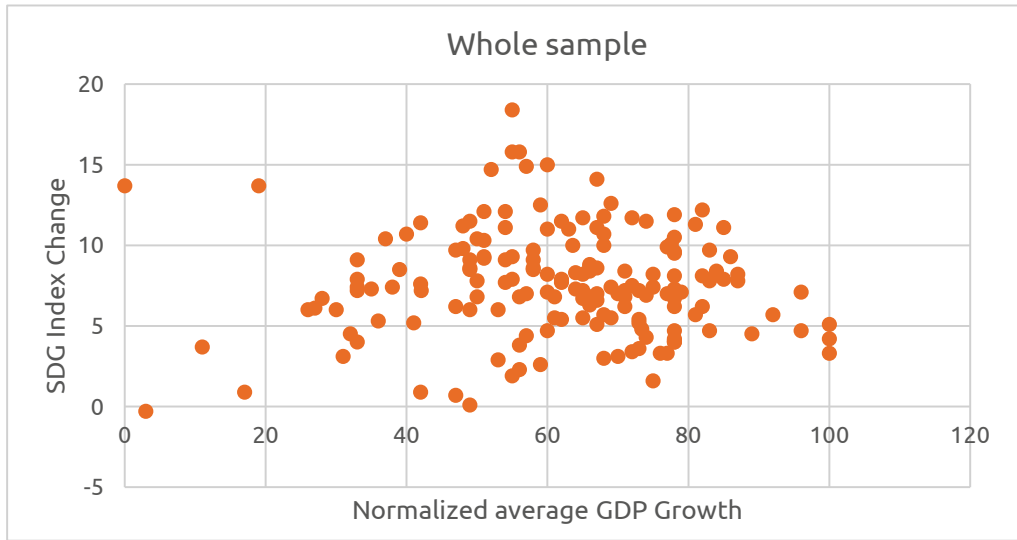
Figure 1 Scatter plot of the whole sample
Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Table 2 Model degrowth countries 2000–2023 globally

Top 5 Degrowth Countries

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Afghanistan	13.7	0	Low-income	9	1	5
Myanmar	13.7	19	Low-income	8	5	6.5
Sierra Leone	11.4	42	Low-income	22	26	24
Mali	10.7	40	Low-income	30	22	26
Mauritania	14.7	52	Low-income	6	46	26

Bottom 5 Degrowth Countries

Country	SDG Index increase	Average normalized growth 2000–2023	WB Income Group	Rank on SDG Index Increase 2000–2023	Rank on Normalized Average Growth 2000–2023	Combined (mean) Rank
Ireland	5.1	100	High-income	135	168	151.5
Denmark	4.5	89	High-income	141	164	152.5
Türkiye	4.7	96	Upper-middle-income	140	167	153.5
Guyana	4.2	100	Lower-middle-income	146	170	158
Norway	3.3	100	High-income	157	169	163

Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Figure 2 Scatter plot of the High-Income countries
Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Table 3 Model degrowth countries 2000–2023 globally, High Income

Top 5 Degrowth Countries 2000–2023						
Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Portugal	8.70	66	High-income	55	94	74.5
Saudi Arabia	12.20	82	High-income	12	151	81.5
Spain	7.10	60	High-income	96	75	85.5
United Arab Emirates	11.30	81	High-income	23	149	86
Brunei Darussalam	7.30	64	High-income	89	85	87

Bottom 5 Degrowth Countries 2000–2023						
Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Australia	4.70	83	High-income	137	155	146
Sweden	1.60	75	High-income	165	128	146.5
Ireland	5.10	100	High-income	135	168	151.5
Denmark	4.50	89	High-income	141	164	152.5
Norway	3.30	100	High-income	157	169	163

Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

quality of life, making them more desirable models despite their lower SDG Index increases, which is to be expected at higher levels of development.

The empirical exercise in identifying the countries that may fit the degrowth model, does not demonstrate its practical benefits from the global perspective. The bottom 5 countries, with their higher quality of life and economic stability, are more likely to be chosen as models over the top 5 countries. This suggests that the theoretical framework for degrowth, when applied globally, does not produce results that would be considered successful or desirable in practice.

Figure 2 and Table 3 show the results for High Income countries only, according to the WB Income classification. The scatter plot hints at a positive relationship between the variables, although the Pearson correlation coefficient of 0.22 is still insignificant at 0.13 P-value, but approaching the acceptable threshold level of significance of 0.10. However, since the coefficient is positive, even if it is indeed somewhat close to statistical significance, it is of the wrong sign, so we cannot reject our null hypotheses in favor of the alternative.

Among the high-income countries, the combined ranking methodology shows Portugal and Saudi Arabia standing out as top performers in terms of sustainable development despite moderate economic growth rates – model degrowth countries. Notably, the United Arab Emirates also demonstrate substantial progress in sustainable development, suggesting that even high-income nations can pursue holistic development without high economic growth. Conversely, countries like Ireland, Denmark, and Norway rank low on the degrowth model paradigm, indicating that their high economic growth rates have not

translated into comparable improvements in sustainable development in the period in question.

Table 4 and Figure 3 show the results for Upper-middle-income countries only. The scatter plot again hints at a positive relationship between the variables, but the Pearson correlation coefficient of 0.20 is insignificant at 0.19 P-value, implying no rejection of the null hypothesis.

In the combined ranking of the countries, Namibia and Ecuador lead the upper-middle-income category, showcasing significant advancements in sustainable development with moderate to low economic growth, topping the degrowth best performing countries. Iraq's notable ranking also reflects its substantial progress despite political and economic challenges. In contrast, poorest degrowth performers are countries like Bulgaria and Belize, which exhibit lower sustainable development performance at higher average growth rates.

Table 5 and Figure 4 show the results for Lower-middle-income countries only. The scatter plot implies a very weak relationship between the variables, and the Pearson correlation coefficient of 0.14 is insignificant at 0.41 P-value (not close to the needed threshold level of significance of 0.10), again not leading to rejection of the null hypothesis.

The rankings show Cabo Verde and Bolivia emerging as model degrowth countries in the lower-middle-income group, excelling in sustainable development, while maintaining moderate economic growth. Bhutan's exceptional SDG Index increase further underscores the potential for holistic development in this category. On the other hand, countries like Armenia and Guyana have higher average economic growth without the comparatively large improvements in sustainable development.
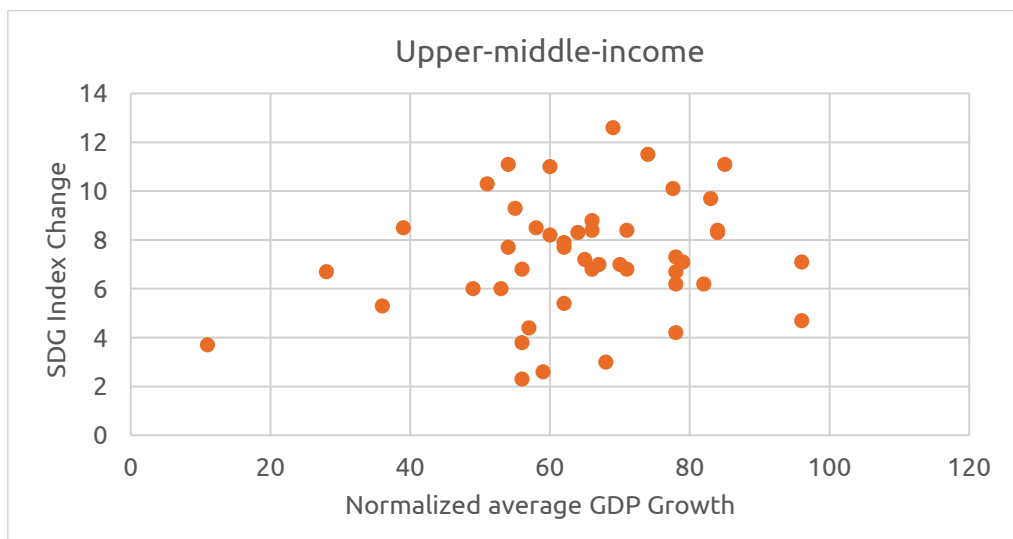
Figure 3 Scatter plot of the Upper-middle-income countries
Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Table 4 Model degrowth countries 2000–2023 globally, Upper-middle-income

Top 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Namibia	11.1	54	Upper-middle-income	27	50	38.5
Ecuador	10.3	51	Upper-middle-income	35	45	40
Iraq	8.5	39	Upper-middle-income	61	21	41
Gabon	9.3	55	Upper-middle-income	46	53	49.5
Peru	11.0	60	Upper-middle-income	29	73	51

Bottom 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Bulgaria	7.1	96	Upper-middle-income	97	166	131.5
Belize	3.0	68	Upper-middle-income	160	103	131.5
Lithuania	6.2	82	Upper-middle-income	116	152	134
Bosnia & Herzegovina	4.2	78	Upper-middle-income	145	139	142
Turkey	4.7	96	Upper-middle-income	140	167	153.5

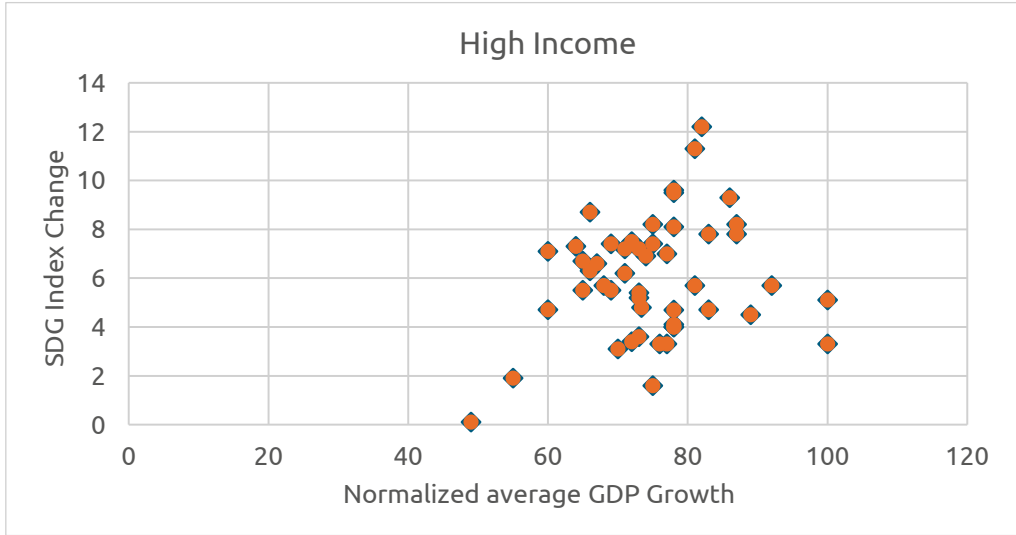*Source:* Sachs, Lafortune and Fuller 2024 and authors' own calculations.
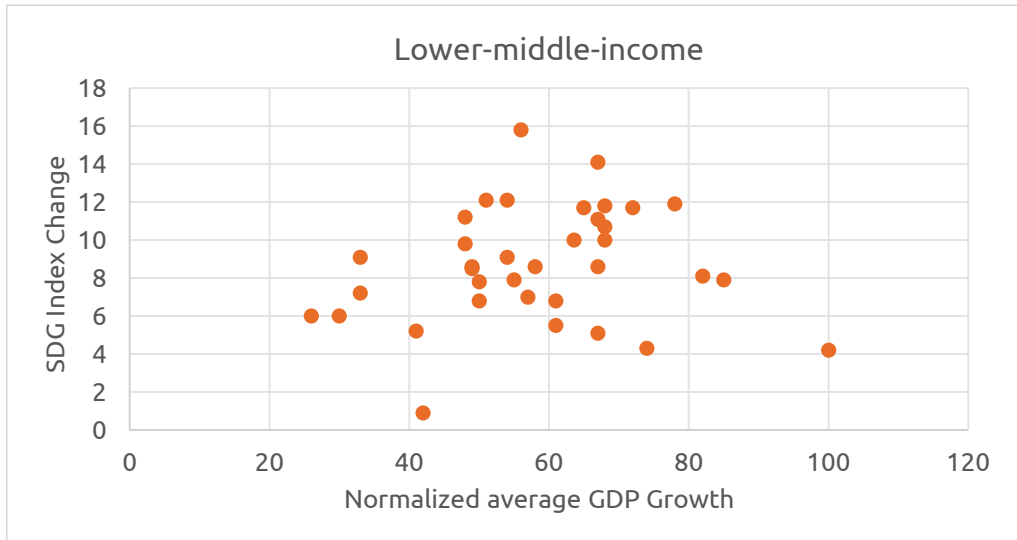
Figure 4 Scatter plot of the Lower-middle-income countries
Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Table 5 Model degrowth countries 2000–2023 globally, Lower-middle-income

Top 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Cabo Verde	11.2	48	Lower-middle-income	24	32	28
Bolivia	12.1	51	Lower-middle-income	14	42	28
Bhutan	15.8	56	Lower-middle-income	3	59	31
Morocco	12.1	54	Lower-middle-income	13	52	32.5
Lesotho	9.1	33	Lower-middle-income	52	14	33

Bottom 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Armenia	8.1	82	Lower-middle-income	72	153	112.5
Guatemala	5.1	67	Lower-middle-income	134	96	115
Georgia	7.9	85	Lower-middle-income	74	159	116.5
Egypt, Arab Rep.	4.3	74	Lower-middle-income	144	124	134
Guyana	4.2	100	Lower-middle-income	146	170	158

Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.
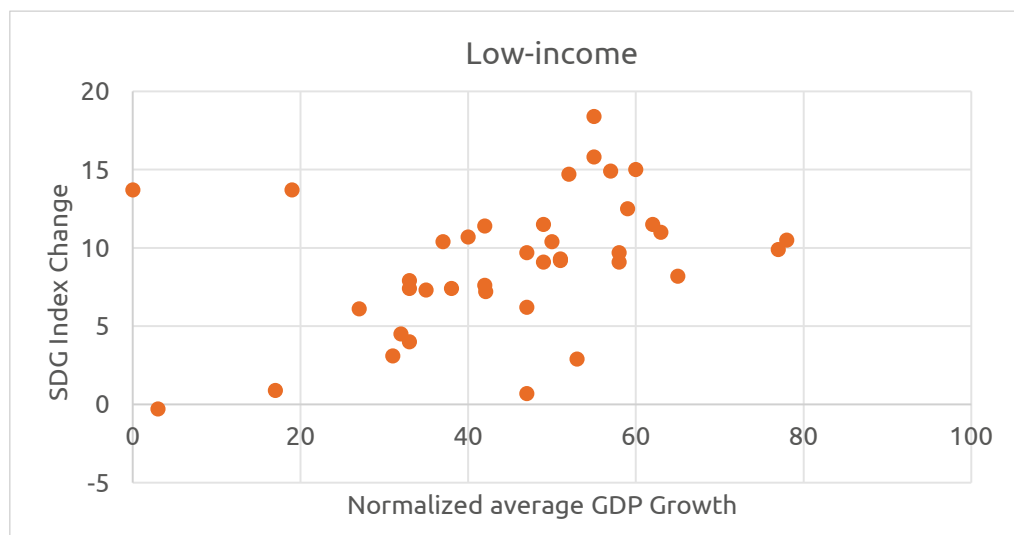
Figure 5 Scatter plot of the Low-income countries
Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Table 6 Model degrowth countries globally period 2000–2003, Low-income

Top 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Afghanistan	13.7	0	Low-income	9	1	5
Myanmar	13.7	19	Low-income	8	5	6.5
Sierra Leone	11.4	42	Low-income	22	26	24
Mali	10.7	40	Low-income	30	22	26
Mauritania	14.7	52	Low-income	6	46	26

Bottom 5 Degrowth Countries 2000–2023

Country	SDG Index increase	Average normalized growth	WB Income Group	Rank on SDG Index Increase	Rank on Normalized Average Growth	Combined (mean) Rank
Yemen, Rep.	0.9	17	Low-income	166	4	85
Bangladesh	10.5	78	Low-income	32	138	85
South Sudan	-0.3	3	Low-income	170	2	86
Zimbabwe	0.7	47	Low-income	168	28	98
Congo, Dem. Rep.	2.9	53	Low-income	161	47	104

Source: Sachs, Lafortune and Fuller 2024 and authors' own calculations.

Finally, Table 6 and Figure 5 show the results for Low-income countries only, according to the WB Income classification. The scatter plot clearly shows a positive relationship between the variables, and the Pearson correlation coefficient of 0.39 confirms that, as it is significant at 0.01 P-value (even better than the needed threshold level of significance of 0.10), leading to the rejection of the null hypothesis of zero correlation, but not to the acceptance of the alternative hypotheses of a significant negative correlation, as the correlation, albeit significant, is in fact positive.

Afghanistan and Myanmar are top performers as the model degrowth countries in the low-income category, demonstrating significant progress in sustainable development despite low economic growth. This suggests that even in the low-income settings, substantial improvements in sustainable dimensions are achievable. On the other hand, poor performing degrowth countries like Yemen and South Sudan highlight the difficulties in achieving sustainable development amidst ongoing conflicts and economic instability and also show that periodic economic growth alone is not enough for advancements in sustainable development.

We can make several conclusions on the basis of the scatter plots, correlations and ranking tables. Firstly, we can note that the global sample is the most uninformative one, for the reasons we have already discussed earlier, and that when examined within income levels, the results are better.

For the within-income categories, and in relation to our null hypothesis, which posits no negative correlation between growth and sustainable development, we should expect to observe statistical evidence of a statistically significant and negative relationship between the average growth and sustainable development outcomes, if the degrowth hypotheses were supported. However, all four scatter plots for different income categories display a positive relationship. While not all of these correlations are statistically significant, with one approaching the significance threshold level, and one being significant, all the Pearson correlation coefficients (r) are consistently positive, indicating that we cannot simultaneously reject our null hypothesis of zero correlation in favor of our alternative hypothesis of negative correlation, and thus cannot confirm the degrowth hypothesis which suggests there is a trade-off between growth and sustainable development.

In terms of the ranking tables, the idea of the degrowth model also yields more sensible results within the income classes than in the entire/global sample, indicating that some strides in sustainable development can be made even with moderate economic growth (at lower income subsamples especially). Nevertheless, these are often also countries that are suffering the consequences of conflicts and poor policy mixes of the past, rather than cases of intentionally and adequately executed degrowth policies that also support progress in other dimensions. In addition, within each income level, there are often countries classified within the group of the 5 worst performing according to the degrowth paradigm, that are still considered to have high quality of life and balanced economic, social, and environmental development, and would be much more preferable options to live in (as is shown by the migration flows or cursory quality of life estimation), than those identified as degrowth model countries. This further implies that not only globally, but

also within the income level categories, the support for the degrowth paradigm seems weak.

The analysis suggests that while the degrowth model offers an interesting theoretical framework which can benefit from more discussions in the future, its statistical support is weak. Its practical application also remains questionable, as higher-income countries with initially better quality of life and economic stability, continue to be more attractive models, and can deliver better results for the people and the environment.

5 CONCLUSION

The existing high-growth model has struggled to resolve multiple development challenges, particularly those stemming from anthropocentric approaches to human progress. Degrowth, along with similar development models, offers an alternative that prioritizes well-being and social dimensions tailored to each country's specific context.

In addressing the first three research questions through a critical examination of the literature, we started with examining the basic characteristics and differences between degrowth and similar development models. Unlike green growth, which aims to reconcile economic growth with environmental sustainability, and zero growth, which stabilizes economic output without reducing GDP, degrowth advocates for a deliberate reduction in production and consumption to achieve ecological sustainability and social well-being. Further, in considering whether the degrowth concept can resolve current development challenges, critics point out that, while the model offers theoretical appeal, its practical implementation faces significant obstacles, such as leading

to economic instability, exacerbating inequalities, and hindering technological progress if applied globally. Finally, regarding its viability, degrowth is seen as particularly challenging for developing countries, where economic growth is still necessary to meet the basic needs and reduce poverty.

Our empirical analysis of the fourth research question (and its null and alternative hypotheses), which examined the relationship between average economic growth and sustainable development progress, revealed no statistical support for the degrowth hypothesis. Across income categories, we consistently found positive correlations between economic growth and improvements in sustainable development outcomes. While not all correlations were statistically significant, the results suggest that there is no inherent trade-off between growth and sustainable development progress, challenging the theoretical foundations of the degrowth paradigm. Furthermore, countries identified as model degrowth performers were often those with poor economic performance due to conflict and instability, rather than those achieving balanced progress across economic, social, and environmental dimensions. This indicates that, in practice, the degrowth model struggles to produce favorable outcomes, as economically successful countries generally also perform well in non-economic dimensions. This weak empirical support for degrowth, both globally and within income levels, suggests that its practical application remains limited.

Despite these challenges, it remains important to continue exploring models that go beyond economic growth as the sole measure of progress, and continue this strand of research. There is a clear

need for better metrics that would capture non-economic dimensions of development, such as social outcomes and environmental sustainability. Future research should explore post-growth or sustainable/green growth alternatives, which focus on achieving environmental and social goals regardless of economic growth, and adjust these models to the specific contexts of individual countries.

REFERENCES

Acemoglu, D. (2023, April 7). In Search of a New Political Economy. *Project Syndicate*. https://www.project-syndicate.org/onpoint/shift-from-market-fundamentalism-to-economy-for-social-benefit-by-daron-acemoglu-2023-04

Chevenko, A. (2024). *Ukraine and the SDGs: How the war has influenced global development*. https://www.merit.unu.edu/ukraine-and-the-sdgs-how-the-war-has-influenced-global-development/

Daly, H. E. (1996). *Beyond Growth: The Economics of Sustainable Development*. Boston: Beacon Press. http://pinguet.free.fr/daly1996.pdf

Damijan, J. (2022). *Odrast je razvoj v vzvratno smer*. https://damijan.org/2022/08/05/odrast-je-razvoj-v-vzvratno-smer/

Daugul, L. (2020, November 27). Odrast- postopen odmik od trajne gospodarske rasti, ki izčrpava planet. Intervju z Dušanom Plutom. *MMC*. https://www.rtvslo.si/okolje/zeleni-petek/odrast-postopen-odmik-od-trajne-gospodarske-rasti-ki-izcrpava-planet/539590

Deaton, A. (2024, March 20–21). Questioning one's view as circumstances evolve can be a good thing. *Finance & Development Magazine*, International Monetary Fund. https://www.imf.org/en/Publications/fandd/issues/2024/03/Symposium-Rethinking-Economics-Angus-Deaton

Dupuy, J.-P. (2014). *Economy and the Future: A Crisis of Faith*. Michigan: Michigan State University Press. https://books.google.rs/books?id=bKyKoAEACAAJ&printsec=front_cover&redir_esc=y

Etzioni, A. (2021). Capitalism Needs to Be Re-encapsulated. *Society,* 58, 1–15. https://doi.org/10.1007/s12115-021-00565-z

Fontana, G., & Sawyer, M. (2022). Would a zero-growth economy be achievable and be sustainable? *European Journal of Economics and Economic Policies: Intervention*, 19(1), 89–102. https://doi.org/10.4337/ejeep.2022.01.07

Ghosh, J. (2024, March). Why and How Economics Must Change. *Finance& Development Magazine*. https://www.imf.org/en/Publications/fandd/issues/2024/03/Symposium-Why-and-how-economics-must-change-Jayati-Ghosh

Gilman, N. (2015). The New International Economic Order: A Reintroduction. *Humanity: An International Journal of Human Rights, Humanitarianism, and Development*, 6(1), 1–16. https://dx.doi.org/10.1353/hum.2015.0008

Global Footprint Network (2024). *Ecological Footprint*. https://www.footprintnetwork.org/our-work/ecological-footprint/

Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., … Creutzig, F. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environmental Research Letters*, 15 (6), 065003. https://iopscience.iop.org/article/10.1088/1748-9326/ab842a/pdf

Helleiner, E. (2023). The Revival of Neomercantilism. https://www.phenomenalworld.org/analysis/neomercantilism/

Hickel, J. (2018, September 12). Why Growth Can't Be Green: New data proves you can support capitalism or the environment—but it's hard to do both. *Foreign policy*. https://foreignpolicy.com/2018/09/12/why-growth-cant-be-green/

Huwe, V., & Rehm, M. (2022). The ecological crisis and post-Keynesian economics – bridging the gap? *European Journal of Economics and Economic Policies: Intervention*, 19(3), 397–414. https://doi.org/10.4337/ejeep.2022.03.08

Jackson, T. (2009). *Prosperity Without Growth: Economics for a Finite Planet*. London: Earthscan. https://www.environmentandsociety.org/mml/prosperity-without-growth-economics-finite-planet

Jaklič, A. (2024). Izzivi trajnostnega razvoja v obdobju kriz. *Teorija in praksa*, 61(3), 691–705. https://doi.org/10.51936/tip.61.3.691

Kallis, G. (2011). In Defence of Degrowth. *Ecological Economics* 70(5), 873–880. https://doi.org/10.1016/j.ecolecon.2010.12.007

Kallis, G. (2018). What is degrowth? In G. Kallis, (Eds.) *Degrowth* (pp. 1–14). Agenda Publishing. https://doi.org/10.1017/9781911116813.002

Kallis, G., Demaria, F., & D'Alisa, G. (2015). *Degrowth: A Vocabulary for a New Era*. Routledge: New York. https://www.routledge.com/Degrowth-A-Vocabulary-for-a-New-Era/DAlisa-Demaria-Kallis/p/book/9781138000773

Lancaster University. (2020, April 20). Why relying on new technology won't save the planet. *ScienceDaily*. www.sciencedaily.com/releases/2020/04/200420125510.htm

Latouche, S. (2009). Farewell to Growth. Cambridge Polity Press. https://www.wiley.com/en-us/Farewell+to+Growth-p-9780745646176

Mahatma Gandhi -- Gostiny Dvor -- First They Ignore You, Then They Laugh At You, Then They Fight You, Then You Win. -- The 31st -- 6:00 P.M. (2012–2013). Courtesy of the Richard F. Brush Art Gallery. https://jstor.org/stable/community.20405443

Mazzucato, M. (2020, October 2). Capitalism After the Pandemic: Getting the Recovery Right. *Foreign Affairs*. https://www.foreignaffairs.com/articles/united-states/2020-10-02/capitalism-after-covid-19-pandemic

Mcafee, A. (2020). *Why Degrowth Is the Worst Idea on the Planet*. https://www.wired.com/story/opinion-why-degrowth-is-the-worst-idea-on-the-planet/

Mishan, E. J. (1967). *The costs of economic growth*. London: Staples Press.

Nugent, C. (2021, January 22). Amsterdam Is Embracing a Radical New Economic Theory to Help Save the Environment. *Time*. https://time.com/5930093/amsterdam-doughnut-economics/

Priewe, J. (2022). Growth in the ecological transition: green, zero or de-growth? *European Journal of Economics and Economic Policies: Intervention*, 19(1), 19–40. https://doi.org/10.4337/ejeep.2022.01.04

Pungas, L., Kolínský, O., Smith, T. S., Cima, O., Fraňková, E., Gagyi, A., … Sovová, L. (2024). Degrowth from the East – between quietness and contention. Collaborative learnings from the Zagreb Degrowth Conference. *Czech Journal of International Relations*, 59(2), 79–113. https://doi.org/10.32422/cjir.838

Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. London and New York: Random House.

Sachs, J. D., Lafortune, G., & Fuller, G. (2024). The SDGs and the UN Summit of the Future. Sustainable Development Report 2024. Dublin: Dublin University Press. https://doi.org/10.25546/108572

Schneider, F., Kallis, G., & Martinez-Alier, J. (2010). Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. *Journal of Cleaner Production*, 18(6), 511–518. https://doi.org/10.1016/j.jclepro.2010.01.014

Shaikh, N. (2004, December 6). A More Human Theory of Development, record of an interview with Amartya Sen, New York. Asia Society http://asiasociety.org/business/development/amartya-sen-more-human-theory-development

Shapiro, J. S., & Walker, R. (2018). Why Is Pollution from US Manufacturing Declining? The Roles of Environmental Regulation, Productivity, and Trade. *American Economic Review*, 108 (12): 3814–54. https://doi.org/10.1257/aer.20151272

Steinberger, J. K., Krausmann, F., Getzner, M., Schandl, H., & West, J. (2013). Development and Dematerialization: An International Study. PLoS ONE 8(10): e70385. https://doi.org/10.1371/journal.pone.0070385

Stern, D. (2004). Environmental Kuznets Curve. In C. J. Cleveland (Ed.), *Encyclopedia of Energy* (pp. 517–525). Elsevier Inc. https://doi.org/10.1016/B0-12-176480-X/00454-X

Stiglitz, J. (2009). GDP Fetishism. *The Economists' Voice*, *6*(8). https://doi.org/10.2202/1553-3832.1651

Stratford, B. (2020, December 4). Green Growth vs Degrowth: Are We Missing the Point? *Open Democracy*. https://www.opendemocracy.net/en/oureconomy/green-growth-vs-degrowth-are-we-missing-point/

Susskind, D. (2024, September). We must change the nature of growth, *Finance & Development Magazine*, IMF. https://www.imf.org/en/Publications/fandd/issues/2024/09/we-must-change-the-nature-of-growth-daniel-susskind

Trainer, T. (2012). DE-growth: Do you realise what it means? *Futures,* 44(6), 590–599. https://doi.org/10.1016/j.futures.2012.03.020

UN (2024). SDG Progress Report 2024. https://unstats.un.org/sdgs/files/report/2024/SG-SDG-Progress-Report-2024-advanced-unedited-version.pdf

Van den Bergh, J. C. J. M. (2011). Environment versus growth: a criticism of 'degrowth' and a plea for 'a-growth', *Ecological Economics*, 70(5), 881–890. https://doi.org/10.1016/j.ecolecon.2010.09.035

Van den Bergh, J. C. J. M. (2017). A third option for climate policy within potential limits to growth. *Nature Climate Change*, 7, 107–112. https://doi.org/10.1038/nclimate3113

Van den Bergh, J. C. J. M., & Kallis, G. (2012). Growth, A-Growth or Degrowth to Stay within Planetary Boundaries? *Journal of Economic Issues*, 46(4), 909–920. https://doi.org/10.2753/JEI0021-3624460404

Varoufakis, Y. (2024). *Technofeudalism: What Killed Capitalism*. Brooklyn, NY: Melville House.

Vrečko Ilc, B. (2024). Technology and/in capitalism – the genesis and relevance of the relationship for the present ecologically unsustainable order, *Teorija in praksa*, let. 61 (2/2024), 313–339. https://doi.org/10.51936/tip.61.2.313

World Bank (2012). Green Growth Report. https://documents1.worldbank.org/curated/en/863801468337280535/pdf/667270BR0SecM20Official0Use0Only090.pdf

Zuboff, S. (2020). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs.

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Data are available in the manuscript.

Coauthor Contributions

Aljaž Kunčič: Methodology, Data Curation, Formal Analysis, Writing – Review & Editing. **Marjan Svetličič**: Conceptualization, Methodology, Formal Analysis, Validation, Writing – Original Draft, Supervision.

Odrast između normativizma i stvarnosti

PROŠIRENI SAŽETAK

Ovaj rad se bavi sve učestalijim raspravama o ograničenjima modela razvoja zasnovanog na visokom rastu i potrošnji, koji su doprineli degradaciji životne sredine i višestrukim krizama. Jedna od alternativa je model odrasta, koji prioritet daje društvenom blagostanju i održivom razvoju umesto rastu baziranom na BDP-u. U radu istražujemo održivost modela odrasta kao alternative. Na osnovu sveobuhvatne analize literature obrađujemo tri istraživačka pitanja: koje su osnovne karakteristike i razlike između odrasta i sličnih novih modela razvoja; da li koncept odrasta može rešiti trenutne razvojne izazove globalno i za različite grupe zemalja iz perspektive kritičara; i da li je model odrasta održiv unutar postojećih globalnih i lokalnih sistema.

Analiza ističe da iako odrast predstavlja teoretski privlačnu alternativu tradicionalnim modelima rasta, suočava se sa značajnim praktičnim izazovima u implementaciji, posebno zbog svoje zavisnosti od dubokih sistemskih promena i promena u javnim vrednostima. Kritičari tvrde da je odrast u velikoj meri nespojiv sa postojećim globalnim ekonomskim sistemom, a njegova primena, posebno u zemljama u razvoju, može pogoršati nejednakosti i otežati osnovni ekonomski razvoj. U empirijskom delu testiramo hipotezu da su zemlje sa jačim neekonomskim razvojnim performansama, poput napretka održivog razvoja prema Indeksu ciljeva održivog razvoja (SDG), uspešnije od onih koje prioritet daju ekonomskim ishodima.

Da bismo to postigli, grafički prikazujemo i analiziramo korelaciju između prosečnog rasta BDP-a i promena u meri održivog razvoja, koristeći Pirsonov koeficijent korelacije. Rangiramo zemlje na osnovu njihovog održivog razvoja i ekonomskih performansi, prosečno izračunavajući te rangove kako bismo identifikovali potencijalne lidere odrasta u poslednjih 20 godina. Naši nalazi ukazuju da, iako je teoretski privlačan, model odrasta se suočava sa značajnim izazovima u praksi, bez statističkih dokaza koji bi podržali negativnu korelaciju između odrasta i napretka u održivom razvoju. Zemlje koje se mogu identifikovati kao one koje prate model odrasta često su one koje ostvaruju loše ekonomske performanse usled sukoba i nestabilnosti, a ne održivog uspeha, što naglašava složenosti i ograničenja implementacije odrasta na širem nivou.

KLJUČNE REČI

odrast, nulti rast, održivi razvoj, sistem, kapitalizam

How do socio-demographic factors affect green finance growth?

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ABSTRACT

Hitherto, green finance provides lower returns as compared to their "plain" counterparts, and as such, might be less attractive to financial markets. This study aims to analyse the impact of sociodemographic factors on green finance growth at the national level. We employ a panel-pooled mean group-autoregressive distributive lag (PMG-ARDL) model to assess the long-term influence of selected sociodemographic indicators on government budget allocations for R&D (GBARD) with environmental objectives as a proxy for green finance spanning 21 European countries from 2000 to 2021. Specifically, we investigate the impact of the unemployment rate, population density, gender ratio, ratio of education expenditure to GDP, proportion of the population aged 15–64, and the Gini coefficient on the GBARD with environmental objectives. The core results demonstrate that all the examined indicators exert a positive and statistically significant long-term impact on the allocation of government budgets for the GBARD with environmental objectives, highlighting the critical role of sociodemographic contexts in shaping environmental investment strategies.

KEYWORDS

sociodemographic factors, green finance, growth, PMG-ARDL, sustainable practices

1 INTRODUCTION

As projected by international organizations, the current state of green financing is insufficient to close the so-called "one trillion gap" required to substantially decrease the carbon footprint of humankind by 2050 (Schroeder and Havers 2021). A substantial amount of green financing is required to mitigate climate change. Accordingly, green finance has attracted immense attention from both scholars and practitioners in recent years (Kumar et al. 2022).

Green finance is often defined as 'financial instruments that support the transition to a climate-resilient economy by enabling such initiatives as environmental protection through greenhouse gas (GHG) emissions and energy use reduction, and development of climate-resilient infrastructure" (Debrah, Chan and Darko 2022). This attempt to provide a universal definition of green financing is not the only one, making green finance still an amorphous term (Berrou, Ciampoli and Marini 2019). However, all definitions have one thing in common – green finance is said to support the transition towards a more sustainable, low-carbon economy. The consensus on the effects of green finance, however, has not been reached unequivocally since several cases of greenwashing have been reported recently (Das et al. 2023).

Not only that the effects are ambiguous, but the antecedents of green finance growth are still a focal point of concurrent research streams. Socio-demographic factors, in particular, are some of the most extensively elaborated factors in relation to the development and expansion of green finance products. First, gender can be an important factor in the development of a green financial ecosystem. Second, age could be attributed to green finance, keeping in mind that younger individuals often show a greater interest in environmental issues and sustainability. Third, education has a great effect, since more educated people tend to be more aware of environmental issues and the benefits of green finance. They are likely to make informed decisions about incorporating sustainability into their financial portfolios. Fourth, income plays a significant role, since people with higher incomes have more disposable funds to invest in green finance products. They may also be more concerned about the long-term environmental sustainability, and willing to allocate funds towards green investments. Finally, urbanization is said to affect the development of green finance, at least because people living in urban areas may have more access to green finance products and sustainable investment opportunities.

Socio-demographic factors at the individual level may not be such a novel topic, but their effect at the country level has still been below the research radars. This study aims to analyse the effects of various socio-demographic factors on green finance development. For this purpose, we observe panel data from 21 European countries in the period from 2000 to 2021. The European countries included in the study are Belgium, Czechia, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Lithuania, Luxembourg, Hungary, Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia, Finland, Sweden, and Norway.

Following the main aim, the hypotheses of this study are as follows:

H1: Unemployment positively affects the development of green finance.

H2: Population density positively affects the development of green finance.

H3: Gender ratio positively affects the development of green finance.

H4: Education positively affects the development of green finance.

H5: Aging structure positively affects the development of green finance.

H6: Gini index value positively affects the development of green finance.

The remainder of this paper is organized in the following order. Section 2 provides the theoretical background for the study. Section 3 thoroughly delineates the methodology – data, model, and analytical framework. Section 4 elaborates on the results. Section 5 contextualizes the findings and explains the main contributions and implications. The last section is reserved for the conclusions, limitations, and further recommendations.

2 THEORETICAL BACKGROUND

In this section, we explain the theoretical concept depicting the relationship between socio-demographic factors and green finance. While many papers examine the impact of green finance on environmental sustainability and economic growth, the existing literature lacks studies that deal with the factors that influence the volume of green finance. Only a couple of papers directly explain the influence of some economic

and socio-demographic factors on green finance. For instance, Hamurcu (2023) finds that GDP has a positive effect on green finance. Similarly, Liang et al. (2024) discovers that education has a positive impact on green finance. To the best of our knowledge, no research directly investigates the comprehensive set of socio-demographic factors and their influence on green finance.

This chapter explains the expected impact of the six independent variables—unemployment rate, population density, gender ratio, education, aging population, and GINI index—on green finance. By examining these variables, this study aims to provide a comprehensive understanding of how socio-demographic factors affect green finance. The hypothesized model is presented in Figure 1.

X1_ The unemployment rate and green finance. The relationship between unemployment and green finance is multifaceted. Generally, it might be expected that higher unemployment rates can negatively impact green investments due to reduced disposable income and lower consumer spending, which in turn can decrease the demand for green products and services. Bowen and Kuralbayeva (2015) argue that high unemployment can limit public and private sector investments in green
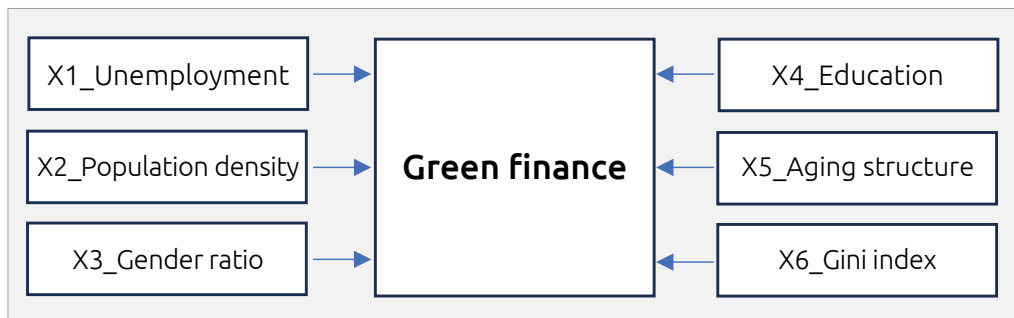
Figure 1 Hypothesized model

technologies, as economic priorities shift towards immediate job creation rather than long-term sustainability goals. However, some studies suggest that periods of high unemployment can also provide opportunities for restructuring economies towards more sustainable practices. Economic crises and high unemployment can drive policy changes that promote green investments to stimulate economic recovery and create jobs. This is supported by the findings of Barra and Ruggiero (2019) and Cui et al. (2022) who highlight that investments in green infrastructure during periods of high unemployment can lead to significant job creation and sustainable economic growth. Additionally, policies aimed at retraining unemployed workers for green jobs can also enhance the overall impact of green finance on the economy.

X2_ Population density and green finance. Population density significantly impacts green finance and green investments through various channels. Higher population density may correlate with increased environmental awareness and demand for sustainable solutions due to the concentration of people and economic activities. Hsu, Johnson and Lloyd (2013) explain that dense urban areas typically have better infrastructure for implementing green initiatives, which can attract green investments. Similarly, Lee and Min (2015) demonstrate that dense populations can stimulate green R&D and innovation, further encouraging green investments. In addition, Guillochon (2022) who researched the development of renewable energy crowdfunding, found that regions with lower population density had longer campaigns with fewer investors.

X3_ Gender ratio and green finance. To the best of our knowledge, there is no research that directly investigates the relationship between gender ratio and green finance. The existing publications only indicate that greater gender diversity, particularly the inclusion of women in leadership roles, is associated with greater environmental awareness. Consequently, we expect a positive relationship between gender ratio, measured as the proportion of women in the total population, and green finance. For instance, the research findings by Abuatwan (2023) show that gender diversity, as indicated by the presence of women in banking institutions, significantly enhances the relationship between green finance initiatives and sustainability performance in the sector. Similar conclusions are derived by Gör and Tekin (2023) who find that one of the factors influencing green financing practices in commercial banks is female representation on boards. In addition, Al Mamun et al. (2024) stress that increased female political empowerment has a positive correlation with the development and execution of green finance initiatives.

X4_ Education and green finance. Higher education levels are generally associated with greater awareness and understanding of environmental issues, which is expected to translate into a stronger demand for sustainable financial products. Ma (2022) proves that higher education is vital for advancing green finance and green economic growth. Its potential for promoting coordinated development between these areas underscores the importance of enhancing educational initiatives in fostering a more sustainable economic system. Similarly, An and Madni (2023) conclud that policymakers can support green investments using policy instruments such as grants and potential investor education. Finally, the findings of Niamir, Ivanova and Filatova (2020) show that socio-de-

mographic factors such as education and age amplify differences between households and regions in the diffusion of green investments.

X5_ The aging population and green finance. Many studies emphasize the need to consider population dynamics in environment-related topics. For instance, Olumekor and Oke (2024) highlighted the impact of demographic factors, including age, on support for sustainable finance among people in 27 EU countries. Their findings indicate that younger people are more supportive of sustainable finance than older people. The literature presents varying evidence on the impact of an aging population on support for sustainable practices, with some findings indicating no significant differences between age groups (Gray et al. 2019), while others suggesting that older individuals are less likely to engage in environmentally friendly behaviour (Blankenberg and Alhusen 2019). From a green finance perspective, it is important to notice the evidence provided by Sheng, Ding and Yang (2024) who propose that population aging affects corporate green innovation activities by boosting corporate ESG performance.

X6_ GINI index and green finance. The literature evidences the detrimental effects of the widening income gap on green growth, noting that while it promotes economic growth, it simultaneously harms people's well-being and the environment (Zhao, Dong and Taghizadeh-Hesary 2023). Further evidence shows a correlation between income inequality and lower levels of investment in green technologies and sustainable finance initiatives (Vona and Patriarca 2011), which results from a set of complex factors. These factors include prioritizing short-term financial gains over long-term investments in green technologies, or as Murshed et al. (2020) state, "growing up in the short-run and cleaning up in the long-run". Other factors include uneven affordability of green technologies among different income groups (Barbieri et al. 2023), which may also result in governments spending less on sustainable practices due to reduced overall support and funding (Arpad 2018).

3 DATA AND METHODOLOGY

This research primarily aims to examine the long-term effects of the selected sociodemographic indicators on green finance growth. For the purpose of this research, we used OECD data for the government budget allocations for R&D with environmental objectives as a proxy for green finance. OECD data on gross domestic expenditure on R&D (GBARD) by socio-economic objective is based on the NABS 2007 classification. According to the NABS classification, environmental objectives are related to the elimination and prevention of all forms of pollution in all types of environments including the protection of the atmosphere, climate, air, and water. These objectives generally align with the goals of green finance that directly support the achievement of sustainable practices. In addition, public investments in the environmental sector are particularly important, as they often provide the foundation for national energy transitions (Semieniuk and Mazzucato 2019), support the development of green technologies, and help de-risk future private investments in this area (Jaffe, Newell and Stavins 2005). Furthermore, these investments reflect government priorities in addressing environmental challenges and fostering innovation

(Popp 2019), which are important components of green finance growth.

More precisely, we investigate the impact of the unemployment rate, population density, gender ratio, ratio of education expenditure to GDP, proportion of the population aged 15–64, and the Gini coefficient on the distribution of funds for environmental research and development. To achieve this, we utilize yearly data spanning from 2000 to 2021 across 21 European countries, applying panel time series analysis. Data sources include the OECD database for government budget allocations for R&D, and the Eurostat database for the unemployment rate, population density, gender ratio, ratio of education expenditure to GDP, proportion of the population aged 15–64, and the Gini coefficient.

Definitions and basic descriptive statistics including mean, standard deviation, minimum, and maximum values of considered variables, are given in Table 1. After missing data removal, a total of 484 observations per variable

has been used for further analysis. The correlation matrix for the observed variables is presented in Appendix Table A1.

As a preliminary step, we checked for cross-sectional dependence using Pesaran's test and Friedman's test (Pesaran 2004), both of which concluded that there was no cross-sectional dependence in our data. Based on these results, we decided to use the first generation of panel unit root tests to examine the stationarity of the variables. These tests include the Levin, Lin, and Chu t* (LLC) test (Levin, Lin and Chu 2002), the Im, Pesaran, and Shin W-stat (IPS) test (Im, Pesaran and Shin 2003), the ADF – Fisher Chi-square test and the PP – Fisher Chi-square test (Maddala and Wu 1999; Choi 2001), all assuming cross-sectional independence among the units in the panel. The LLC test assumes a common unit root process across cross-sections, and uses a pooled t-statistic for evaluation. The IPS test allows for heterogeneous autoregressive coefficients and averages individual ADF t-statistics.

Table 1 The definition and descriptive statistics of considered variables

Variable name	Definition	Min	Max	Mean	St.Dev	Median	N
R&D	Government budget allocations for R&D in the environmental sector (2015 Dollars – Constant prices and PPPs)	0.00	1435.68	121.28	223.75	38.29	515
Unemp_ Rate	Unemployment rate in %	2.00	16.70	8.13	4.44	7.20	491
Pop_ Density	Population density per 1000 residents	2.80	378.90	126.14	110.47	105.45	550
Gender_ Ratio	Gender ratio	0.49	0.54	0.51	0.01	0.51	546
Edu_GDP	The ratio of education expenditure to GDP (% Education/GDP)	3.15	8.81	5.34	1.13	5.20	485
Pop_15_64	Population ages 15–64 (% of total population)	61.30	71.30	66.64	2.07	66.55	551
Gini	Gini index	10.68	22.17	16.99	2.74	17.09	484

Source: Authors' calculations

Additionally, the ADF – Fisher Chi-square and PP – Fisher Chi-square tests combine p-values from individual unit root tests, following a chi-square distribution under the null hypothesis. All the tests test the null hypothesis of the existence of a unit root.

We subsequently conduct panel coin-tegration tests to evaluate the existence of long-term relationships among the variables. For this purpose, we utilize the tests developed by Pedroni (2004) and Kao (1999), which are extensions of Engle and Granger (1987). Pedroni's methodology accommodates heterogeneous intercepts and trends across different cross-sections and tests the stationarity of the residuals. Stationary residuals would suggest rejection of the null hypothesis of no cointegration. Pedroni's framework offers seven different test statistics for the same null hypothesis. Two types of alternative hypotheses are tested: the homogeneous alternative known as the panel or within-dimension approach, which includes the panel v-statistic, ρ-statistic, PP-statistic, and ADF-statistic; and the heterogeneous alternative referred to as the group or between-dimension approach, which includes the group ρ-statistic, PP-statistic, and ADF-statistic.

After confirming the existence of a long-run relationship among the variables, we utilize the Pooled Mean Group (PMG) ARDL estimation method, developed by Pesaran and Smith (1995) and Pesaran et al. (1999), to evaluate long-term dynamics. The PMG-ARDL model combines the autoregressive distributed lag approach with panel data analysis, making it well-suited for capturing the temporal dynamics and cross-sectional variations in the data. The ARDL framework is particularly useful for dealing with variables that are integrated of different orders, i.e., I(0) or I(1). This allows for a direct estimation of both short-run and long-run effects within a single equation model. This approach eases biases in standard ARDL models when used with panel data containing fixed effects. The PMG-ARDL model is advantageous compared to other dynamic models like Generalized Method of Moments (GMM) and fixed effects models because it accounts for heterogeneity in short-run dynamics while allowing for homogeneity in long-run relationships across different cross-sections (Hotak, Islam and Kakinaka 2020). This flexibility ensures more reliable and accurate parameter estimates, even when the assumption of identical coefficients across countries does not hold. The general functional form of the model is as follows:

R&D=f (Unemp_Rate, Pop_Density, Gender_Ratio, Edu_GDP, Pop_15_64, Gini), while the specific functional form of our model is expressed as follows:

$$R\&D_{it} = \sum_{j=1}^{p} a_{it}\, R\&D_{i,t-j} + \sum_{j=0}^{q} x_{i,t-j}\, b_{ij} + \mu_i + \epsilon_{it}$$

where X_{it} represents the set of all considered independent variables. Here, p and q denote the lag lengths for the dependent and independent variables, respectively, μ_i is the cross-sectional effect, and ϵ_{it} is the error term.

Given that the variables in this model are integrated of order one and cointe-grated, the error term is expected to follow an I(0) process, ensuring a long-run equilibrium relationship among the variables. The adjustment towards this long-run equilibrium can be captured through an error correction model (ECM), where the short-run dynamics are explained by deviations from the equilibrium:

$$\Delta R\&D_{it} = \sum_{j=1}^{p-1} c_{it}\,\Delta R\&D_{i,t-j} + \sum_{j=0}^{q-1} \Delta X_{i,t-j}\,d_{it} + \epsilon_{it}$$

$$+ \gamma_i\,ECT_{it}\,.$$

In this equation, Δ denotes the first difference, ECT_{it} is the error correction term defined as $ECT_{it} = R\&D_{i,t-1} - X\_{it}\theta$. The parameter d_{it} captures short-run dynamics, while θ represents the long run.

4 EMPIRICAL RESULTS

The cross-sectional dependence tests indicate no cross-sectional dependence in our data (Table 2). These results validate the use of the first-generation panel unit root tests in our analysis.

Table 3 presents the results of the panel unit root tests conducted for each considered variable. The panel unit root tests were conducted without explicitly including an intercept or trend in the regression. The dependent variable, government budget allocations for R&D in the environmental sector (R&D) is generally non-stationary across most tests, with the exception of the PP-Fisher Chi-square test suggesting stationarity. The unemployment rate also shows mixed results; it is found to be stationary by the IPS and ADF-Fisher tests, while the LLC and PP-Fisher tests indicate non-stationarity. Population density is confirmed to be stationary by the LLC and PP-Fisher tests, but the IPS and ADF-Fisher tests

Table 2 Cross-sectional independence test

	Statistics	p-value
Pesaran's test	0.083	0.934
Friedman's test	14.366	0.916

Source: Authors' calculations

Table 3 Panel unit root

Variable	Type	Levin, Lin, and Chu		Im, Pesaran, and Shin		ADF-Fisher		PP – Fisher Chi-square	
		Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
R&D	Level	0.033	0.513	-0.478	0.316	55.134	0.084	75.173	0.001
	1st Diff	-7.496	0.000	-9.940	0.000	177.023	0.000	666.632	0.000
Unemp_Rate	Level	0.877	0.810	-5.461	0.000	111.318	0.000	40.797	0.760
	1st Diff	-5.222	0.000	-4.148	0.000	97.073	0.000	91.455	0.000
Pop_Density	Level	-3.914	0.000	1.267	0.897	43.429	0.733	71.979	0.023
	1st Diff	-4.214	0.000	-4.004	0.000	93.882	0.000	181.381	0.000
Gender_Ratio	Level	1.991	0.977	4.574	1.000	26.917	0.997	21.793	1.000
	1st Diff	-2.808	0.002	-7.293	0.000	153.078	0.000	330.595	0.000

Variable	Type	Levin, Lin, and Chu		Im, Pesaran, and Shin		ADF-Fisher		PP – Fisher Chi-square	
		Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Edu_GDP	Level	-0.473	0.318	-3.147	0.001	78.997	0.006	74.278	0.015
	1st Diff	-1.283	0.100	-7.132	0.000	145.073	0.000	283.884	0.000
Pop_15_64	Level	1.928	0.973	7.267	1.000	14.066	1.000	18.831	1.000
	1st Diff	-8.946	0.000	-11.332	0.000	201.892	0.000	568.553	0.000
Gini	Level	-0.786	0.216	-3.292	0.000	76.565	0.009	107.714	0.000
	1st Diff	-3.351	0.000	-10.381	0.000	202.099	0.000	400.337	0.000

Source: Author's research

do not support this. The gender ratio is consistently non-stationary. The education expenditure to GDP ratio is identified as stationary by the IPS, ADF-Fisher, and PP-Fisher tests, whereas the LLC test suggests non-stationarity. The percentage of the population aged 15–64 is uniformly non-stationary according to all the tests. The Gini index shows evidence of stationarity in the IPS, ADF-Fisher, and PP-Fisher tests, with the LLC test not supporting this result.

Table 3 also presents the results of the panel unit root tests for each first-differenced variable. The tests indicate that while the variables are not stationary at their levels, they become stationary upon taking their first differences. These findings confirm that all variables are integrated of order one. Consequently, we can proceed with panel cointegration tests an-d ARDL analysis.

The panel cointegration results are given in Table 4. The results of the Pedroni panel cointegration tests indicate the presence of long-term relationships among the variables, as the null hypothesis of no cointegration is rejected at the 1% significance level for most of the tests. Both within-dimension and

Table 4 Panel cointegration tests

Pedroni (1999, 2004)				
Test Within dimension	Statistics	p-value	Weighted Statistics	p-value
v-Statistic	-2.25325	0.988	-1.71459	0.957
rho-Statistic	2.251307	0.988	1.593588	0.944
PP-Statistic	-7.37721	0.000	-9.51209	0.000
ADF-Statistic	-7.19998	0.000	-9.03251	0.000
Test Between dimension	Statistics	p-value		
rho-Statistic	4.104534	1.000		
PP-Statistic	-10.5909	0.000		
ADF-Statistic	-6.36959	0.000		
Kao, 1999				
ADF	Statistics	p-value		
	-2.28658	0.0111		

Source: Authors' calculations

Table 5 A pooled mean group with dynamic autoregressive distributed lag: PMG-ARDL(1,1,1,1,1)

	Coefficients	Std. Error	Statistics	p-value
Unemp Rate	0.7422	0.082	9.076	0.000
Pop Density	1.807	0.372	4.854	0.000
Gender Ratio	1.679	0.757	8.354	0.000
Edu GDP	0.727	0.089	8.159	0.000
Pop 15–64	5.972	0.553	10.790	0.000
Gini	5.569	0.568	9.79	0.000

Source: Authors' calculations

between-dimension test statistics confirm cointegration, except for a few tests where the null hypothesis could not be rejected. This confirms the existence of a cointegrated relationship between the variables under study.

Table 5 represents the results of the Pooled Mean Group (PMG) estimation with a dynamic autoregressive distributed lag model: PMG-ARDL(1,1,1,1,1). All variables are found to be highly significant in the model, with p-values less than 0.01, indicating their significance at the 1% level. This confirms the robustness of each variable's impact within the model.

5 DISCUSSION

In this section, we first explain the key findings by delineating the relationship between the observed socio/demographic factors on green finance. Afterward, we delineate the main contributions of our study.

5.1 KEY FINDINGS

Our quantitative findings indicate a positive and statistically significant relationship between all the observed sociodemographic indicators and the growth of green finance. The summary of the key findings is given in Figure 2.

First, the unemployment rate positively affects green finance growth (0.7422).

This finding suggests a counterintuitive but positive relationship between higher unemployment rates and green finance growth. The multifaceted nature of this relationship implies that economic downturns, characterized by higher unemployment, often prompt policy interventions aimed at economic recovery. During such periods, there is also a potential shift towards sustainable practices as part of economic restructuring. The results are consistent with the previously mentioned findings of Barra and Ruggiero (2019) and Cui et al. (2022) who stressed that investments in green infrastructure during high unemployment could create jobs and stimulate economic growth. The positive effect of green policies on employment has been confirmed in other studies, at least in the short term (Naqvi, Wang and Ali 2021). Some studies find that green finance in turn decreases unemployment (Cui et al. 2022). Therefore, this result underscores the importance of strategic policymaking that leverages economic crises to promote green finance and sustainable development.

Second, population density has a positive long-term effect on green finance growth. This evidence implies that urbanization plays a crucial role in enhancing green finance through several synergistic mechanisms. Urban areas, with their higher population densities, benefit from more efficient resource

Independent variables	Coeff.	P-value
X1_Unemployment	0.742	0.000
X2_Population density	0.742	0.000
X3_Gender ratio	0.742	0.000
X4_Education	0.742	0.000
X5_Aging structure	0.742	0.000
X6_GINI index	0.742	0.000

Dependent variable

Green finance

Figure 2 Key numerical findings

use and economies of scale, reducing costs for implementing green projects. Social dynamics in densely populated areas, where greater exposure to environmental issues leads to heightened environmental awareness, combined with community-driven sustainability initiatives and peer effects, work together to further encourage green investments. Higher population density areas attract more investors and financial institutions due to their sustainable infrastructure, robust economic activity, and market opportunities, which increase the availability of capital for green projects. The findings in this paper support the previously mentioned results of Hsu, Johnson and Lloyd (2013), who explain that dense urban areas typically have better infrastructure for implementing green initiatives, which can attract green investments, and Lee and Min (2015), who demonstrate that dense populations can stimulate green R&D and innovation, further encouraging these investments. Additionally, the current body of knowledge has already provided some

empirical evidence on the statistically significant relationship between the ecologicalisation level of urban structures and green finance (Lin and Zhao 2022).

Third, a 1% increase in the ratio of education expenditure to GDP is associated with an approximately 0.72% increase in green finance in the long run. This result underscores the crucial role of education in fostering environmental awareness and driving demand for sustainable financial products. Higher education levels are generally associated with a greater understanding of environmental issues, which translates into stronger support for green finance initiatives. The result is consistent with the conclusions of Ma (2022), An and Madni (2023), and Niamir, Ivanova and Filatova (2020) who also showed that education amplified the population's awareness of environmental issues and advanced green finance and green economic growth, while our results show that this awareness is translated into a diffusion of green investments. This result highlights that increasing educa-

tional expenditure may enhance green finance, fostering a more environmentally conscious and proactive society.

Fourth, the gender ratio (i.e., female to total population ratio) is associated with an approximately 1.69% increase in green finance in the long run. This significant positive relationship indicates that gender diversity in the broad sense, as explained by Abuatwan (2023), Gör and Tekin (2023), and Al Mamun et al. (2024), i.e. the inclusion of women in leadership roles, may enhance green finance initiatives. Women in leadership roles are often more environmentally conscious, leading to the adoption of comprehensive and effective green finance strategies.

Fifth, we find a positive relationship between aging structure and green finance growth (5.972). This strong positive correlation can be attributed to several socio-economic factors. From a macroeconomic perspective, a larger proportion of the working-age population enhances the labour force, driving higher productivity and tax revenues. This increase in economic output provides governments with greater fiscal capacity, enabling higher investments in green R&D. Additionally, as the working-age population often drives innovation and consumption, their increasing demand for sustainable solutions could further incentivize government spending on environmental initiatives. Another possible explanation is that heightened environmental awareness among the aging population, driven by the long-term benefits of environmental sustainability and economic stability, may also support increased government allocations to green R&D. Although this evidence does not support the results of the previously mentioned work by Olumekor and Oke (2024) it is in line with the work of Sheng,

Ding and Yang (2024) who argue that population aging enhances corporate ESG performance, supporting green innovation activities, and promotes industrial structure changes that further encourage green innovation.

Finally, single-percent growth in the Gini index is associated with an approximately 5.57% increase in green finance in the long run. Even though this result is not consistent with the previously mentioned findings by Zhao, Dong and Taghizadeh-Hesary (2023) and Vona and Patriarca (2011), this significant positive correlation can be explained by distinct socio-economic dynamics. As income inequality increases, governments may face greater pressure to promote green investments as a means of addressing the uneven distribution of wealth and opportunities. In response, governments might increase allocations to green R&D to foster innovation and encourage sustainable development, particularly in regions or sectors less equipped to invest in green technologies. This strategy not only supports environmental goals but also aims to reduce economic disparities by ensuring that the benefits of green investments are more widely shared, contributing to greater economic and social stability. Additionally, governments in low-income countries, in which income inequality is typically higher, may implement green finance initiatives, usually funded by multilateral agencies, as a part of broader social and economic reforms aimed at addressing inequality and reducing poverty (Owen, Brennan and Lyon 2018).

5.2 CONTRIBUTIONS

The main contributions of this study are as follows. First, we incorporate a wide range of socio-demographic variables to

comprehensively analyse their impacts on green finance, going beyond the existing literature which has primarily focused on macroeconomic and institutional factors.

Then, the results of this study are to some extent counterintuitive. For instance, we find that age positively affects the development of green finance. Also, our study confirms that the higher unemployment rates create a fertile ground for green finance blossoming. Other findings are of a lower tension in terms of the statistical validation of the hypothesized relationships.

Next, our study contributes to the development of the ever-needed evidence on the main factors affecting the development of green finance. Further development of green finance is crucial for the planet and society, as it promotes sustainable development by directing investments into projects that mitigate environmental degradation, combat climate change, and foster economic resilience. By prioritizing funding for renewable energy, energy efficiency, and sustainable economic development, green finance helps reduce greenhouse gas emissions, conserve natural resources, and protect ecosystems. Additionally, it supports the transition to a low-carbon economy, driving innovation and creating green jobs, thereby contributing to social equity and economic stability. Ultimately, green finance is essential for achieving long-term environmental sustainability and enhancing the quality of life for current and future generations.

Our research enhances the understanding of the complex interaction between socio-demographic factors and technological advancements within the framework of sustainable development. By examining how variables such as population density, educational

expenditure, gender ratio, and income inequality impact green finance, our study contributes to the broader discussion on the challenges of achieving a balance between economic growth, environmental sustainability, and social equity. We provide empirical evidence on how these socio-demographic dimensions facilitate sustainable growth and align with the UN Agenda 2030 for Sustainable Development's goals of inclusivity and environmental responsibility.

Our findings suggest the importance of policies that support sustainable urban development, increase investment in education, and advance gender equality, while also implying that green finance approaches must evolve to address the particular aspects associated with demographic shifts, such as the aging of population. This approach is crucial for overcoming the socio-economic disparities that could hinder the attainment of sustainable development goals. Additionally, our research offers practical insights for policymakers and financial institutions, guiding them to incorporate socio-demographic trends into green finance strategies. In reconciling demographic trends with technological progress, our research contributes to fostering equity, resilience, and environmental responsibility, thus supporting the design of strategies that achieve long-term social, economic, and environmental sustainability, and enhance overall well-being.

5.3 POLICY RECOMMENDATIONS

This study provides several points for policymakers. The study found a positive relationship between unemployment and green finance. Governments should introduce green financial stimulus packages during periods of high un-

employment to capitalize on economic restructuring opportunities. Policymakers should design counter-cyclical fiscal policies that focus on green projects during periods of high unemployment, such as offering incentives for renewable energy projects, or providing grants for sustainable business initiatives.

The positive impact of population density on green finance indicates that urban areas are more conducive to green investments due to their infrastructure and environmental awareness. Accordingly, urban planning policies should integrate green infrastructure and prioritize dense urban areas for green finance projects. Cities should enhance infrastructure for green initiatives like electric transportation and energy-efficient buildings. Additionally, creating platforms for community engagement in urban areas can foster environmental awareness and stimulate local green investment. Such efforts can attract more investors and financial institutions interested in financing sustainable projects.

Education expenditure is another critical factor for boosting green finance. By increasing the education spending to GDP ratio, governments can foster a more environmentally conscious society that is better equipped to support and demand sustainable financial products. Environmental literacy programs at all educational levels could cultivate greater awareness of green finance opportunities, which may contribute to long-term growth in green investments.

The positive relationship between the gender ratio and green finance indicates the importance of gender diversity in decision-making processes. Policies that promote the inclusion of women in leadership roles within financial institutions, government bodies, and corporate boards can lead to a stronger focus on

sustainable practices. Governments and organizations should establish targets for gender representation in leadership positions and provide support programs for women in leadership to encourage environmentally conscious decision-making.

The significant influence of income inequality on green finance highlights the potential for addressing economic disparities through increased investment in sustainable initiatives. Policymakers, particularly in the regions with significant inequality, should prioritize green R&D funding as a means to promote environmental sustainability and reduce economic gaps. By directing resources towards green technologies, governments can stimulate innovation in sustainable industries and create opportunities for economic growth that are accessible to a wider range of communities, including those most affected by inequality. This approach ensures that the advantages of green investments such as job creation, improved infrastructure, and better quality of life are distributed more equitably across society. Additionally, multilateral support for green finance initiatives could be crucial in low-income countries, where reducing inequality and poverty remains a key focus of development strategies.

Additionally, addressing income inequality through inclusive green finance policies—such as subsidies and tax incentives for low-income households—can help make green products more accessible and drive broader adoption of sustainable technologies. Furthermore, international cooperation with multilateral agencies should be sought to fund green initiatives, ensuring that green finance becomes a tool for both sustainable development and poverty alleviation.

6 CONCLUSION

This study examined the effects of various socio-demographic factors on green finance growth taking the GBARD with environmental objectives as a proxy. For this purpose, we observed panel data from 21 European countries in the period from 2000 to 2021. Our findings indicate that population density, educational expenditure, gender ratio, aging population, and income inequality have significant positive long-term effects on the development of green finance.

The results of this research provide several important implications for policymakers and financial institutions seeking to promote and expand green finance. Governments should focus on policies that support sustainable urban planning, increase educational spending, encourage gender diversity in leadership, and consider the unique needs of aging populations when designing green finance programs.

This study has a myriad of limitations that utterly restrict the generalization of the study findings, but open an avenue for further research based on in-depth qualitative determinants of green finance development. First, the research findings presented in this paper should be interpreted considering the limitations of the PMG-ARDL model. The model assumes homogeneity in long-term relationships across countries. Additionally, its reliance on linear relationships and sensitivity to lag selection might oversimplify complex interactions and lead to biased estimates, particularly if cross-sectional dependence is present. Second, the OECD data are based on the GBARD with environmental objectives and consequently overlook private sector investments, such as green bonds and sustainable banking. This narrow scope may not fully capture the broader dynamics of green finance. Third, the NABS 2007 classification system adopted by the OECD categorizes R&D spending based on socio-economic objectives, which might not align perfectly with the diverse and evolving definitions of green finance. This can limit the ability to generalize findings to other types of green investments that go beyond R&D. Fourth, this study includes the use of socio-demographic variables at the macro level, overlooking the important micro-level factors that could influence green finance growth. Fifth, the focus on OECD countries limits the generalizability of the findings to other regions, as the economic and institutional contexts in non-OECD countries may differ significantly.

The present study is quantitative by nature. This opens an avenue for further research by exploring qualitative determinants of green finance development. It focuses on a limited set of socio-demographic factors, and future work should incorporate additional variables such as ethnicity, race, and migration. Moreover, employing alternative indicators, like employment by activity, could provide further insights, as countries with a strong presence of professionals in technology, science, engineering, and finance may be better positioned to drive green finance initiatives.

REFERENCES

Abuatwan, N. (2023). The impact of green finance on the sustainability performance of the banking sector in Palestine: The moderating role of female presence. *Economies*, 11(10), 247. https://doi.org/10.3390/economies11100247

Al Mamun, M., Boubaker, S., Hossain, M. Z., & Manita, R. (2024). Female political empowerment and green finance. *Energy Economics*, 131, 107370. https://doi.org/10.1016/j.eneco.2024.107370

An, Y., & Madni, G. R. (2023). Factors affecting the green investment and assessing sustainable performance of firms in China. *PLOS ONE*, 18(12), e0296099. https://doi.org/10.1371/journal.pone.0296099

Arpad, T. (2018) Willing to pay to save the planet? Evaluating support for increased spending on sustainable development and environmentally friendly policies in five countries. PLoS ONE 13 (11): e0207862. https://doi.org/10.1371/journal.pone.0207862

Barbieri, N., Consoli, D., Marin, G., & Perruchas, F. (2023). Green technology and income inequality: an empirical analysis of US metro areas. *Regional Studies*, 1–14. https://doi.org/10.1080/00343404.2023.2171378

Berrou, R., Ciampoli, N., & Marini, V. (2019). Defining Green Finance: Existing Standards and Main Challenges. In: M., Migliorelli, & P., Dessertine, (Eds.) *The Rise of Green Finance in Europe*. (pp. 31–51) Palgrave Studies in Impact Finance. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-22510-0_2

Bowen, A., & Kuralbayeva, K. (2015). *Looking for green jobs: The impact of green growth on employment*. Grantham Research Institute on Climate Change and the Environment. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2015/03/Looking-for-green-jobs_the-impact-of-green-growth-on-employment.pdf

Barra, C., & Ruggiero, N. (2019). Are Green Energies Employment Friendly? Empirical Evidence for Some OECD Countries over the 1985–2013 Period. *Sustainability*, 11(14), 3963. https://doi.org/10.3390/su11143963

Blankenberg, A.-K., & Alhusen, H. (2019). On the Determinants of Pro-Environmental Behavior: A Literature Review and Guide for the Empirical Economist. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3473702

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20, 249–272. https://doi.org/10.1016/S0261-5606(00)00048-6

Cui, Y., Wang, G., Irfan, M., Wu, D., & Cao, J. (2022). The effect of green finance and unemployment rate on carbon emissions in China. *Frontiers in Environmental Science*, 10, 887341. https://doi.org/10.3389/fenvs.2022.887341

Das, N., Gangopadhyay, P., Alam, M. M., Mahmood, H., Bera, P., Khudoykulov, K., … Hossain, Md. E. (2023). Does greenwashing obstruct sustainable environmental technologies and green financing from promoting environmental sustainability? Analytical evidence from the Indian economy. *Sustainable Development*, 32(1), 1069–1080. https://doi.org/10.1002/sd.2722

Debrah, C., Chan, A. P. C., & Darko, A. (2022). Green finance gap in green buildings: A scoping review and future research needs. *Building and Environment*, 207, 108443. https://doi.org/10.1016/j.buildenv.2021.108443

Engle, R.F., & Granger, C. W. J. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica,* 55(2), 251–276. https://doi.org/10.2307/1913236

Gör, Y., & Tekin, B. (2023). The determinants of green finance and effect on the banking sector. *Financial Internet Quarterly*, 19(4), 80–96. https://doi.org/10.2478/fiqf-2023-0028

Gray, S. G., Raimi, K. T., Wilson, R., & Árvai, J. (2019). Will Millennials save the world? The effect of age and generational differences on environmental concern. *Journal of Environmental Management*, 242, 394–402. https://doi.org/10.1016/j.jenvman.2019.04.071

Guillochon, J. (2022). The role of media, policy and regional heterogeneity in renewable energy project crowdfunding. *Energy Economics*, 115, 106349. https://doi.org/10.1016/j.eneco.2022.106349

Hamurcu, Ç. (2023). Relationship between the green finance index, CO2 emission, and GDP. *Financial Internet Quarterly*, 19(1), 66–77. https://doi.org/10.2478/fiqf-2023-0007

Hotak, S., Islam, M., Kakinaka, M., & Kotani, K. (2020). Carbon emissions and carbon trade balances: International evidence from panel ARDL analysis. *Environmental Science and Pollution Research,* 27, 24115–24128. https://doi.org/10.1007/s11356-020-08478-w

Hsu, A., Johnson, L., & Lloyd, A. (2013). *Measuring progress: A practical guide from the developers of the Environmental Performance Index (EPI).* Yale Center for Environmental Law & Policy. https://datadrivenlab.org/wp-content/uploads/2019/10/Measuring_Prgoress_2013.pdf

Im, K.S., Pesaran, M.H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics,* 115(1), 53–74. https://doi.org/10.1016/S0304-4076(03)00092-7

Jaffe, A. B., Newell, R. G., & Stavins, R. N. (2005). A tale of two market failures: Technology and environmental policy. *Ecological Economics*, 54(2–3), 164–174. https://doi.org/10.1016/j.ecolecon.2004.12.027

Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics,* 90 (1), 1–44. https://doi.org/10.1016/S0304-4076(98)00023-2

Kumar, S., Sharma, D., Rao, S., Lim, W. M., & Mangla, S. K. (2022). Past, present, and future of sustainable finance: insights from big data analytics through machine learning of scholarly research. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04410-8

Lee, K. H., & Min, B. (2015). Green R&D for eco-innovation and its impact on carbon emissions and firm performance. *Journal of Cleaner Production*, 108, 534–542. https://doi.org/10.1016/j.jclepro.2015.05.114

Levin, A., Lin, C-F., & Chu, J. C-S. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics,* 108(1), 1–24. https://doi.org/10.1016/S0304-4076(01)00098-7

Lin, K., & Zhao, H. (2022). The Impact of Green Finance on the Ecologicalization of Urban Industrial Structure — Based on GMM Model of Dynamic Panel System. *Journal of Artificial Intelligence and Technology,* 2(3), 123–129. https://doi.org/10.37965/jait.2022.0115

Liang, Y., Zhou, H., Zeng, J., & Wang, C. (2024). Do natural resources rent increase green finance in developing countries? The role of education. *Resources Policy*, 91, 104838. https://doi.org/10.1016/j.resourpol.2024.104838

Ma, W. (2022). Research on the coupling and coordination of green finance, higher education, and green economic growth. *Environmental Science and Pollution Research,* 29, 59145–59158. https://doi.org/10.1007/s11356-022-20026-2

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bullettin of Economics and Statistics*, 61(S1), 631–652. https://doi.org/10.1111/1468-0084.0610s1631

Murshed, M., Nurmakhanova, M., Elheddad, M., & Ahmed, R. (2020). Value addition in the services sector and its heterogeneous impacts on CO2 emissions: revisiting the EKC hypothesis for the OPEC using panel spatial estimation techniques. *Environmental Science and Pollution Research*, 27, 38951–38973. https://doi.org/10.1007/s11356-020-09593-4

Naqvi, S., Wang, J., & Ali, R. (2021). Towards a green economy in Europe: does renewable energy production has asymmetric effects on unemployment? *Environmental Science and Pollution Research,* 29(13), 18832–18839. https://doi.org/10.1007/s11356-021-17093-2

Niamir, L., Ivanova, O., & Filatova, T. (2020). Economy-wide impacts of behavioral climate change mitigation: Linking agent-based and computable general equilibrium models. *Environmental Modelling and Software*, 134, 104839. https://doi.org/10.1016/j.envsoft.2020.104839

Olumekor, M. & Oke, A. (2024). Support for sustainable finance and investment in Europe. *Journal of Cleaner Production,* 449, 1–10. https://doi.org/10.1016/j.jclepro.2024.141769

Owen, R., Brennan, G., & Lyon, F. (2018). Enabling investment for the transition to a low carbon economy: government policy to finance early stage green innovation. *Current Opinion in Environmental Sustainability*, 31, 137–145. https://doi.org/10.1016/j.cosust.2018.03.004

Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Economic Theory*, 20(3), 597–625. https://doi.org/10.1017/S0266466604203073

Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of Econometrics,* 68(1), 79–113. https://doi.org/10.1016/0304-4076(94)01644-F

Pesaran, M.H., Shin, Y., Smith, R.P., & Hashem, M. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association,* 94(446), 621–634. https://doi.org/10.1080/01621459.1999.10474156

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. University of Cambridge, Faculty of Economics, Cambridge Working Papers in Economics No. 0435. https://docs.iza.org/dp1240.pdf

Popp, D. (2019). Environmental Policy and Innovation: A Decade of Research. National Bureau of Economic Research. (Working Paper 25631) https://doi.org/10.3386/w25631

Schroeder, F. & Havers, J. (2021). Closing the trillion dollar gap to keep 1.5 degrees within reach. E3G Report. https://www.e3g.org/wp-content/uploads/Closing-the-trillion-dollar-gap-to-keep-1.5-degrees-within-reach_E3G-report.pdf

Semieniuk, G., & Mazzucato, M. (2019). Financing green growth. In: R. Fouquet (Ed.), *Handbook on green growth*, (pp. 240–259). https://doi.org/10.4337/9781788110686.00019

Sheng, J., Ding, R., & Yang, H. (2024). Corporate green innovation in an aging population: Evidence from Chinese listed companies. *Technological Forecasting and Social Change*, 202, 123307. https://doi.org/10.1016/j.techfore.2024.123307

Vona, F., & Patriarca, F. (2011). Income inequality and the development of environmental technologies. *Ecological Economics*, 70(11), 2201–2213. https://doi.org/10.1016/j.ecolecon.2011.06.027

Zhao, J., Dong, K., & Taghizadeh-Hesary, F. (2023). Moving Towards Sustainable Development: Can Narrowing Income Inequality Facilitate Green Growth in China? *Journal of Environmental Assessment Policy and Management*, 25(2), 2350011. https://doi.org/10.1142/S1464333223500114

Data Availability Statement

Data are available from the authors upon request.

Coauthor contributions

Valentina Vukmirović: Data curation, Investigation, Writing – Original Draft, Writing – Review & Editing. **Milena Kojić:** Formal Analysis, Methodology, Validation, Writing – Original Draft. **Željko Spasenić:** Data Curation, Investigation, Writing – Original Draft, Visualization. **Miloš Milosavljević:** Conceptualization, Validation, Writing – Original Draft, Writing – Review & Editing.

APPENDIX

Table A1 Correlation matrix

		R&D	Unemp_Rate	Pop_Density	Gender_Ratio	Edu_GDP	Pop_15_64	Gini
R&D	Pearson Correlation	1	.083	.196**	.016	-.171**	-.163**	.168**
	Sig. (2-tailed)		.075	.000	.722	.000	.000	.000
Unemp_Rate	Pearson Correlation	.083	1	-.205**	.268**	-.310**	.104*	.463**
	Sig. (2-tailed)	.075		.000	.000	.000	.022	.000
Pop_Density	Pearson Correlation	.196**	-.205**	1	-.224**	-.040	-.025	-.184**
	Sig. (2-tailed)	.000	.000		.000	.377	.563	.000
Gender_Ratio	Pearson Correlation	.016	.268**	-.224**	1	-.292**	.012	.526**
	Sig. (2-tailed)	.722	.000	.000		.000	.772	.000
Edu_GDP	Pearson Correlation	-.171**	-.310**	-.040	-.292**	1	-.341**	-.409**
	Sig. (2-tailed)	.000	.000	.377	.000		.000	.000
Pop_15_64	Pearson Correlation	-.163**	.104*	-.025	.012	-.341**	1	-.054
	Sig. (2-tailed)	.000	.022	.563	.772	.000		.249
Gini	Pearson Correlation	.168**	.463**	-.184**	.526**	-.409**	-.054	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.249	

Source: Author's research

Kako sociodemografski faktori utiču na rast zelenih finansija?

PROŠIRENI SAŽETAK

Ovaj rad istražuje uticaj sociodemografskih faktora na rast zelenih finansija u 21 evropskoj zemlji u periodu od 2000. do 2021. godine. Kvantitativni nalazi predstavljeni u ovom radu ukazuju na pozitivan i statistički značajan odnos između svih posmatranih sociodemografskih indikatora i rasta zelenih finansija.

Prvo, stopa nezaposlenosti pozitivno utiče na rast zelenih finansija. Ovaj nalaz sugeriše kontrain-tuitivan, ali pozitivan odnos između viših stopa nezaposlenosti i rasta zelenih finansija. Ekonomski padovi, karakterisani višom nezaposlenošću, često podstiču političke intervencije usmerene ka ekonomskom oporavku. Tokom ovih perioda može doći do prelaska na održive prakse kao deo ekonomskog restrukturiranja. Ovi rezultati su u skladu sa nalazima u literaturi koji naglašavaju da investicije u zelenu infrastrukturu tokom visoke nezaposlenosti mogu stvoriti radna mesta i stimulisati ekonomski rast. Drugo, gustina naseljenosti ima pozitivan dugoročni efekat na rast zelenih finansija. Ovi nalazi impliciraju da urbanizacija igra ključnu ulogu u unapređenju zelenih finansija kroz nekoliko sinergetskih mehanizama. Urbana područja sa većom gustinom naseljenosti odlikuju se efikasnijom upotrebom resursa. Takođe, socijalna dinamika u gusto naseljenim područjima, u kojima je veća izloženost ekološkim problemima, dovodi do povećane svesti o životnoj sredini, što dodatno podstiče zelene investicije. Nadalje, kao posledica ekonomije obima, urbana područja sa velikom gustinom naseljenosti povezuju se sa većim rastom zelenih finansija usled smanjenih troškova za implementaciju zelenih projekata.

Treće, povećanje udela izdataka za obrazovanje u odnosu na BDP povezano je sa rastom zelenih finansija na duži rok. Ovaj rezultat naglašava ključnu ulogu obrazovanja u unapređenju ekološke svesti i podsticanju potražnje za održivim finansijskim proizvodima. Viši nivoi obrazovanja su generalno povezani sa boljim razumevanjem ekoloških problema, što za posledicu ima jaču podršku zelenim finansijskim inicijativama. Četvrto, rodni odnos je povezan sa rastom zelenih finansija na duži rok. Ovaj značajan pozitivan odnos ukazuje da rodni paritet, posebno uključivanje žena u liderske uloge, može unaprediti inicijative u oblasti zelenih finansija. Žene na liderskim pozicijama često su ekološki svesnije, što dovodi do usvajanja sveobuhvatnih i efikasnih strategija zelenih finansija. Peto, utvrđen je pozitivan odnos između starosti i rasta zelenih finansija. Ova snažna pozitivna korelacija može biti pripisana nekolicini socio-ekonomskih faktora. Stariji slojevi populacije teže stabilnim i održivim investicijama, a njihova akumulirana novčana sredstva često se ulažu u zelene finansijske inicijative. Takođe, povećana ekološka svest među starijim generacijama, vođena brigom za buduće generacije i zdravstvene benefite, dodatno podstiče investicije u zelene inicijative. Na kraju, rast Ginijevog koeficijenta povezan je sa povećanjem zelenih finansija na duži rok. Ova značajna pozitivna korelacija može se objasniti specifičnim socioekonomskim dinamikama. Rani usvojitelji zelenih proizvoda često imaju veću kupovnu moć, što im omogućava da priušte inicijalno skuplje zelene tehnologije i proizvode. Njihova spremnost da investiraju u ove proizvode pomaže u pokretanju inovacija, dok ekonomija obima na duži rok čini zelene tehnologije priuštivijim i drugim dohodovnim grupama stanovništva.

U zaključku, studija ističe značaj sociodemografskih faktora u kreiranju politika zelenih finansija. Rezultati istraživanja naglašavaju potrebu za daljim ispitivanjem dodatnih sociodemografskih faktora i kvalitativnih aspekata razvoja zelenih finansija kako bi se stvorile efikasnije strategije za promovisanje održivog razvoja.

KLJUČNE REČI

sociodemografski faktori, zelene finansije, rast, PMG-ARDL, održive prakse

Impact of population ageing on fiscal balance in the European Union

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ABSTRACT

In the past two decades, the EU has experienced low fertility rates and declining mortality rates leading to population ageing. Although increasing immigration and longer life expectancy reinforced population growth, these trends could not counterbalance the negative impact of low birth rates on labour supply. Demographic transition towards an aging society is characterised by increase of public health and pension expenditures, as well as decrease of tax revenues that are triggers for fiscal imbalance. The paper aims to analyse the effects of population ageing on government fiscal balance in the EU-27 by applying modern methods of panel data analysis in the period 2001–2021. The dependent variable is general government fiscal balance, while the explanatory variables are related to demographic transition indicators (population aged over 64 in total population, old-age dependency ratio, and health expenditures) and macroeconomic control variables. The results of research show that population ageing has created a significant negative impact on fiscal balance of the EU countries, which was confirmed by all the analysed models. The fixed-effects panel threshold model did not identify a statistically significant threshold of any demographic transition indicator, concluding that population ageing has equally negatively affected fiscal balance, independent of the values of demographic transition indicators.

KEYWORDS

fiscal balance, population ageing, government expenditures, health expenditures, European Union

1 INTRODUCTION

Population ageing is a worldwide phenomenon that has an increasing trend. Older population (people 65 years of age or older) is growing globally, both in absolute numbers and as a share of the total population. Compared to 1980 the number of older people tripled and it is expected to be additionally doubled until 2050 (UN 2023). According to UN projections (United Nations 2022), the share of older population in the total population will have increased from 10% in 2022 to 16% in 2050. Even though, population ageing is faster in developed economies. According to 2022 data, while the share of older population in the total population on the global level was 10%, it was as high as 19% in the group of high income countries (World Bank database 2024). The problem of ageing population is most pronounced in Japan (30%), followed by the European Union member countries where the average share of older people is 21% (above the European Union average are Italy 24%, Greece, Finland and Portugal 23%, France, Germany, Latvia, Bulgaria and Croatia 22%).

Key drivers of population ageing in the European Union are declining fertility and increasing longevity. We had witnessed a long-term declining trend in the fertility rates since the mid-1960s, while at the beginning of 2000s the fertility rates showed signs of recovery. During the 2001–2021 period, the fertility rate increased by 8%, while the highest rise was recorded in Czech Republic (59%), followed by Romania (43%) and Slovakia and Slovenia (both 36%). Conversely, Malta (24%), Finland (16%) and Portugal (7%) recorded the highest decrease of fertility rates. The latest data for 2022 showed that the total fertility rate in the EU was 1.46 live births per woman, ranging from 1.08 in Malta to 1.79 in France (Eurostat 2024). On the other hand, statistics indicates that life expectancy has risen, on average, by more than two years per decade since the 1960s, mainly driven by improvements in healthcare and medicine and socio-economic progress (Raleigh 2019; Poças, Soukiazis and Antunes 2020).

Population ageing puts pressure on government policies and becomes a serious challenge to fiscal balance (Temsumrit 2023). The main effects are referred to be shrinking working population (who are taxpayers) and increasing age-related expenditures such as pensions, healthcare, long-term care and education (Pinkus and Ruer 2024). In order to assess the long-term sustainability of public finances and provide coordination among public policies in the European Union, the European Commission prepared projections that show how ageing expenditures might develop in the period up to 2070. It is expected that the old-age dependency ratio (the number of older persons divided by the number of working-age people 20 to 64 years) will increase from 36% in 2022 to 59% in 2070, while the ageing expenditures will rise by 1.2 percentage points of GDP by 2070 (European Commission 2024). The ageing expenditures already had the share of 24.4% of the gross domestic product (GDP) in 2022 (including 11.4% for pensions, 6.9% for health care, 4.4% for education and 1.7% for long-term care), while further decline in the working-age population would diminish tax revenues.

This trend will erode the tax base for personal income taxes and social security contributions (Bodnár and Nerlich 2022), while compensating public revenues, through higher tax rates,

may cause distortions, risks and negative effects (Crowe et al. 2022). On the other hand, in the absence of social security reforms, countries will face the problem of long-term fiscal sustainability (Ramos-Herrera and Sosvilla-Rivero 2020). Even though, there are only limited empirical studies analysing population effects on public debt (Cho and Rhee 2023; Kopecky 2022; Afflatet 2018), it seems that high debt countries are more exposed to the risk of fiscal unsustainability.

In expert discussions, immigration often appears as a solution to the fiscal burden of aging. There are empirical studies that show positive implications of immigration flows on the European Union budget (Bernardinoa, Francob and Morais 2024; Fiorio et al. 2024; Christl et al. 2022), however, immigration alone cannot solve the fiscal burden of aging. Even though migration inflows in the EU have been significant over the last five decades and have had a positive impact on employment (Noja et al. 2018), net migration flows will not offset the ageing trend in the population (European Commission 2021). What is more, their total impact depends on many a factor (Ortega-Gil, ElHichou-Ahmed and Mata-García 2022; OECD 2013) including education and age structure, employment status, etc., demonstrating that the immigrant flows' impact on unemployment rate is very weak.

Taking into account the scale and complexity of the problem, as well as the need for an urgent response by policy makers, it is essential to provide empirical evidence that will be a base for adequate policy measures. One of the key steps is to develop an adequate model and quantify the fiscal impact of demographic changes (Amaglobeli and Wei 2016), however, there is limited number of empirical research studies that analyse the overall effects of population aging on long-term fiscal balance.

Recognizing that this topic is of great interest and volatility, the authors of this paper made an effort to address the effects of population ageing on the fiscal balance of the European Union member states. The remainder of this paper is organized as follows. Section 2 of this paper introduce procedures and techniques of panel data analysis, as well as model specification, data and sample that are used in the empirical research. The results of the research are presented in section 3, while discussion is elaborated in the section 4. Finally, concluding remarks are presented in section 5.

2 METHOD

2.1 PROCEDURES AND TECHNIQUES OF PANEL DATA ANALYSIS

The initial main hypothesis of the paper claims that population ageing negatively affects fiscal balance and increases budget deficit. In order to test the stated hypothesis, econometric methods of panel data analysis will be applied. Panel data represent a combination of cross-section and time-series data. This means that all the variables in the panel data models involve two dimensions, spatial and temporal. The spatial dimension indicates that observations vary across units, in macro panels usually across countries, and the temporal dimension implies that observations change over time. Baltagi (2008) emphasised numerous benefits from using panel data, including controlling for individual heterogeneity, more informative data, less collinearity among the

variables, more variability, more degrees of freedom and more efficiency.

According to Jovičić and Dragutinović Mitrović (2011), the common procedure of panel data analysis starts with the estimation of the pooled model with constant regression parameters of the following form:

$$y_{it} = \beta_1 + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it} \qquad (1)$$

With y_{it} denoting dependent variable, i units (countries), t time (years), x_{kit} k independent variables, β_1 constant term, β_k k regression parameters, and u_{it} disturbance. In this model, all regression parameters are constant, and disturbance includes all variations by units and over time.

In the second step, the estimation of the fixed-effects model with individual effects of the following form should be carried out:

$$y_{it} = \beta_{1i} + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it} \qquad (2)$$

Where β_{1i} represents a coefficient, which varies across countries and equals:

$$\beta_{1i} = \beta_1 + \mu_i \qquad (3)$$

With μ_i denoting unobservable time-invariant individual effects.

Finally, the random-effects model of the following form is also to be considered:

$$y_{it} = \beta_1 + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it} \qquad (4)$$

Where u_{it} equals:

$$u_{it} = \mu_i + v_{it} \qquad (5)$$

With μ_i denoting unobservable time-invariant individual effects as an error component, and v_{it} remainder disturbance.

In order to choose the appropriate model and estimation method, the following econometric tests should be conducted: testing for individual effects, testing for heteroscedasticity, testing for serial correlation, specification tests and unit-root tests.

Testing for individual effects can be done by the F-test in the fixed-effects model (Baltagi 2008), and the Breusch-Pagan LM test in the random-effects model (Breusch and Pagan 1980). If individual effects are detected, the choice between the fixed and the random model specification should be made by using the Hausman's specification test (Jovičić and Dragutinović Mitrović 2011).

Heteroscedasticity can be tested by the White test in the pooled model (White 1980), the modified Wald test in the fixed-effects model (Greene 2003) and the Breusch-Pagan LM test in the random-effects model. Testing for serial correlation can be carried out by the Wooldridge test in the pooled model (Wooldridge 2010), the BFN-DW test in the fixed-effects model (Bhargava, Franzini and Narendranathan 1982) and the Baltagi-Li test in the random-effects model (Baltagi and Li 1991). If heteroscedasticity and serial correlation are present, the model with standard errors robust to violation of assumptions related to homoscedasticity and absence of serial correlation should be estimated (Arellano 1987).

Baltagi (2008) listed various unit-root tests which could be applied to panel data, such as Levin-Lin-Chu test, Im-Pesaran-Shin test, Breitung's test, combining p-value tests, residual-based LM tests, Pesaran CADF and CIPS test, etc. Stationarity of the panel data in this paper will be tested by Fisher-type ADF test proposed by Choi (2001). Only stationary

variables should be included in the final version of any model. If some variable has a unit root, than the raw data should be transformed by differencing and only its stationary differences should be used (Mladenović and Nojković 2018).

Beside the initial main hypothesis about the negative effect of population ageing on fiscal balance, the research should also check for potential structural break, or jumping character in the relation between population ageing and fiscal balance, by using the fixed-effects panel threshold model of the following form:

$$y_{it} = \begin{cases} \beta_1 + \sum_{k=2}^{K}\beta_k X_{kit} + a_1 q_{it} + \mu_i + u_{it}, \text{ if } q_{it} \leq \gamma \\ \beta_1 + \sum_{k=2}^{K}\beta_k X_{kit} + a_2 q_{it} + \mu_i + u_{it}, \text{ if } q_{it} > \gamma \end{cases}$$

$$(6)$$

With q_{it} denoting threshold variable and γ denoting threshold parameter, that divides the regression equation into two regimes with coefficients a_1 and a_2 (Hansen 1999).

2.2 MODEL SPECIFICATION, DATA AND SAMPLE

The dependent variable in this research is fiscal balance measured by percentage of GDP. The independent variables explaining population ageing and demographic transition include the old-age dependency ratio measured by the ratio of people older than 64 to the working-age population, the share of population older than 64 in total population, as well as health expenditures as an implicit proxy of demographic transition measured by percentage of GDP.

The independent macroeconomic control variables include real GDP growth rate expressed in percentage change, government revenue measured by its share in GDP, unemployment rate measured by the share of the unemployed in the total labour force, and trade openness measured by the share of exports and imports of goods and services in GDP. Table 1 provides description of all variables and used data sources.

Table 1 Description of variables and data sources

Variable name	Description	Abbreviation	Source
Dependent variable:			
Fiscal balance	Fiscal balance as % of GDP	balance	EUROSTAT database
Independent variables explaining population ageing:			
Old-age dependency	Population aged 65+ as % of working-age population	agedep	EUROSTAT database
Share of people aged 65+ in total population	Population aged 65+ as % of total population	share65	EUROSTAT database
Health expenditures	Government health expenditures as % of GDP	health	EUROSTAT database
Independent macroeconomic control variables:			
GDP growth rate	Annual real GDP growth rate in %	growth	IMF WEO database
Government revenue	Government revenue as % of GDP	revenue	EUROSTAT database
Unemployment rate	Share of the unemployed in total labour force	unemploy	IMF database
Trade openness	Share of exports and imports in GDP in %	trade	World Bank database

Source: Authors' research.

Table 2 Descriptive statistics

Variable name	Observations	Mean	Standard deviation	Minimum	Maximum
Dependent variable:					
Fiscal balance	567	-2.63	3.57	-32.1	5.6
Independent variables explaining population ageing:					
Old-age dependency	567	25.65	4.67	15.65	37.02
Share of people aged 65+ in total population	567	17.08	6.72	10.78	23.53
Health expenditures	567	6.12	1.44	2.5	10.1
Independent macroeconomic control variables:					
GDP growth rate	567	2.33	3.91	-14.84	24.48
Government revenue	567	42.41	6.39	22.2	56.4
Unemployment rate	567	8.78	4.42	1.89	27.48
Trade openness	567	120.88	64.23	45.42	393.14

Source: Authors' calculations.

The research will be carried out on a sample including 567 panel observations. The sample covers 27 countries of the European Union: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, and Sweden.

The covered period includes 21 years, from 2001 until 2021. Table 2 provides descriptive statistics for all variables.

Indicators of population ageing have changed significantly during the observed period in almost all countries. Figure 1 shows the values of the old-age dependency ratio in 2021 in EU countries, as well as the changes that have occurred in the last 20 years. For most
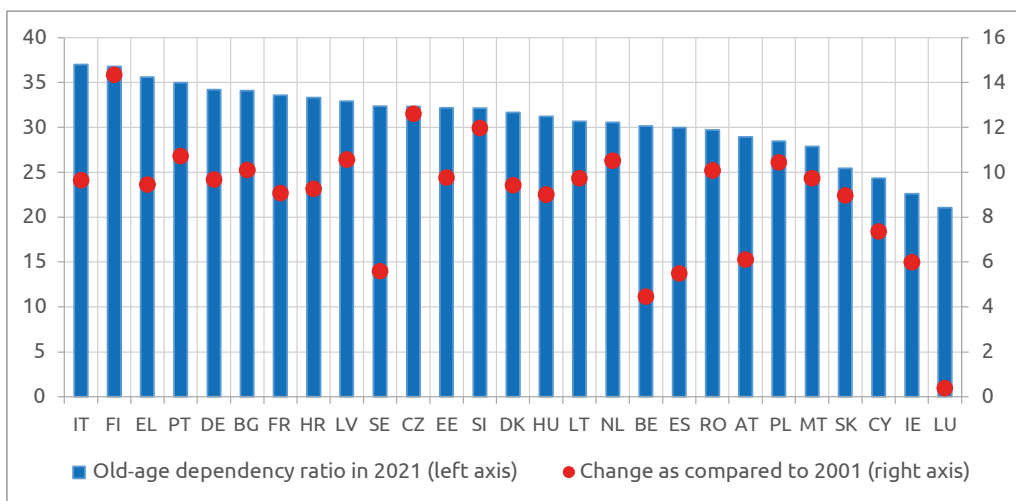
Figure 1 Old-age dependency ratio in 2021 by countries and its change as compared to 2001
Source: Authors' work based on Eurostat database (2024).
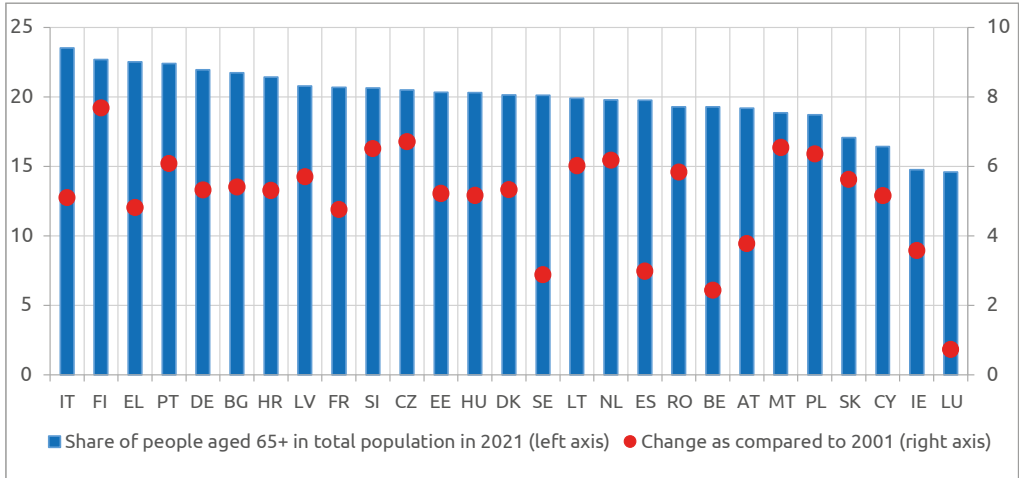
Figure 2 Share of people aged 65+ in total population in 2021 by countries and its change as compared to 2001
Source: Authors' work based on Eurostat database (2024).

countries, the population over 64 makes up more than 30% of the working age population. The old-age dependency ratio in 2021 was on average about 9 percentage points higher than just two decades ago.

The share of population older than 64 in total population amounted to about 20% in 2021 on average. Considering the presented data in Figure 1 and Figure 2, demographic transition imposes the greatest challenges on Italy, Finland, Greece and Portugal.

Given the explained procedures of panel data analysis and description of all variables, as well as the previous empirical research made by Korwatanasakul, Sirivunnabood and Majoe (2021), the following three basic models will be considered:

(1) Model 1 with old-age dependency as an independent variable of demographic transition:

$balance_{it} = \beta_1 + \beta_2 agedep_{it} + \beta_3 revenue_{it} + \beta_4 trade_{it} + \beta_5 growth_{it} + \beta_6 unemploy_{it} + u_{it}$

(7)

(2) Model 2 with the share of people aged 65+ in total population as an independent variable of demographic transition:

$balance_{it} = \beta_1 + \beta_2 share65_{it} + \beta_3 revenue_{it} + \beta_4 trade_{it} + \beta_5 growth_{it} + \beta_6 unemploy_{it} + u_{it}$

(8)

(3) Model 3 with health expenditures as an independent variable of demographic transition:

$balance_{it} = \beta_1 + \beta_2 health_{it} + \beta_3 revenue_{it} + \beta_4 trade_{it} + \beta_5 growth_{it} + \beta_6 unemploy_{it} + u_{it}$

(9)

Moreover, the following three models with threshold will also be estimated, with X_{kit} denoting independent macroeconomic control variables:

(4) Model 4 with old-age dependency as a threshold variable and an independent variable of demographic transition:

$$balance_{it} = \begin{cases} \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_1 agedep_{it} + \mu_i + u_{it}, \text{ if } agedep_{it} \leq \gamma \\ \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_2 agedep_{it} + \mu_i + u_{it}, \text{ if } agedep_{it} > \gamma \end{cases}$$

(10)

(5) Model 5 with the share of people aged 65+ in total population as a threshold variable and an independent variable of demographic transition:

$$balance_{it} = \begin{cases} \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_1 share65_{it} + \mu_i + u_{it}, \text{ if } share65_{it} \leq \gamma \\ \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_2 share65_{it} + \mu_i + u_{it}, \text{ if } share65_{it} > \gamma \end{cases}$$

(11)

(6) Model 6 with health expenditures as a threshold variable and an independent variable of demographic transition:

$$balance_{it} = \begin{cases} \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_1 health_{it} + \mu_i + u_{it}, \text{ if } health_{it} \leq \gamma \\ \beta_1 + \sum_{k=2}^{K} \beta_k X_{kit} + a_2 health_{it} + \mu_i + u_{it}, \text{ if } health_{it} > \gamma \end{cases}$$

(12)

3 RESULTS

The estimation results of the model 1 defined by the equation (7) is given in Table 3. Both the F-test and the Breusch-Pagan LM test suggest existence and statistical significance of individual effects, rejecting the pooled specification with constant regression parameters. The Hausman's specification test favours the specification with the fixed-effects. All applied econometric tests indicate that disturbances are not homoscedastic with the same variance across countries and time, as well as that serial correlation is present, which can produce consistent, but inefficient estimates.

Table 4 provides the estimation results of the model 2 defined by the equation (8). As in the model 1, the F-test

Table 3 Estimated results for the model 1 with the old-age dependency

Model specification	Pooled	Fixed-effects	Random-effects
Independent variable explaining population ageing:			
Old-age dependency	0.0244 (0.0304)	-0.1724*** (0.0472)	-0.0698* (0.0364)
Independent macroeconomic control variables:			
GDP growth rate	0.3739*** (0.0336)	0.3553*** (0.0299)	0.3619*** (0.0299)
Government revenue	0.1564*** (0.0223)	0.4470*** (0.0597)	0.2762*** (0.0409)
Unemployment rate	-0.2136*** (0.0302)	-0.2825*** (0.0357)	-0.2373*** (0.0335)
Trade openness	0.0056** (0.0022)	0.0226*** (0.0073)	0.0095** (0.0040)
Constant	-9.5663*** (1.2605)	-18.2576*** (2.4152)	-12.4628*** (1.8363)
Model significance:			
	F(5,561)=55.47 p-value=0.0000	F(5,535)=55.87 p-value=0.0000	Wald x^2(5)=266.46 p-value=0.0000
Coefficient of determination:			
	R^2=0.3308 adjusted R^2=0.3249	R^2_{within}=0.3430 $R^2_{between}$=0.2986 $R^2_{overall}$=0.2495	R^2_{within}=0.3404 $R^2_{between}$=0.3356 $R^2_{overall}$=0.3049
Testing for individual effect:			
		F(26,535)=8.70 p-value=0.0000	LM=267.49 p-value=0.0000

Model specification	Pooled	Fixed-effects	Random-effects
Testing for heteroscedasticity:			
	$x^2(20)$=34.35 p-value=0.0239	$x^2(27)$=240.22 p-value=0.0000	LM=2.69×10^4 p-value=0.0000
Testing for serial correlation:			
	F(1,26)=69.18 p-value=0.0000	BFN=0.90114 d_{PL}=1.8338 BFN<d_{PL}→H_0 rejected	LM=102.80 p-value=0.0000
Hausman's specification test:			
		$x^2(5)$=22.95; p-value=0.0003 → fixed-effects	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are reported in parentheses.
Source: Authors' calculations.

and the Breusch-Pagan LM test identify the statistical significance of individual effects, while the Hausman's specification test suggests the fixed-effects specification. The applied econometric tests indicate that the assumptions on homoscedasticity and absence of serial correlation are violated.

The estimation results of the model 3 defined by the equation (9) are presented in Table 5. As in the previous two models, econometric tests reject the pooled model with constant regression parameters, given that individual effects are found statistically significant. The Hausman's specification test favours the

Table 4 Estimated results for the model 2 with the share of people 65+ in total population

Model specification	Pooled	Fixed-effects	Random-effects
Independent variable explaining population ageing:			
Share of people aged 65+ in total population	0.0501 (0.0517)	-0.3005*** (0.0880)	-0.1037* (0.0644)
Independent macroeconomic control variables:			
GDP growth rate	0.3746*** (0.0336)	0.3534*** (0.0300)	0.3618*** (0.0300)
Government revenue	0.1561*** (0.0220)	0.4427*** (0.0598)	0.2715*** (0.0408)
Unemployment rate	-0.2136*** (0.0302)	-0.2815*** (0.0358)	-0.2354*** (0.0335)
Trade openness	0.0057*** (0.0022)	0.0235*** (0.0077)	0.0094** (0.0040)
Constant	-9.7931*** (1.3273)	-17.4700*** (2.4312)	-12.2875*** (1.8771)
Model significance:			
	F(5,561)=55.56 p-value=0.0000	F(5,535)=55.36 p-value=0.0000	Wald $x^2(5)$=264.88 p-value=0.0000
Coefficient of determination:			
	R^2=0.3312 adjusted R^2=0.3252	R^2_{within}=0.3410 $R^2_{between}$=0.2995 $R^2_{overall}$=0.2472	R^2_{within}=0.3282 $R^2_{between}$=0.3391 $R^2_{overall}$=0.3060
Testing for individual effect:			
		F(26,535)=8.59 p-value=0.0000	LM=266.40 p-value=0.0000

Model specification	Pooled	Fixed-effects	Random-effects
Testing for heteroscedasticity:			
	$x^2(20)=37.51$ p-value=0.0102	$x^2(27)=246.42$ p-value=0.0000	LM=2.68×10^4 p-value=0.0000
Testing for serial correlation:			
	F(1,26)=69.42 p-value=0.0000	BFN=0.89795 d_{PL}=1.8338 BFN<d_{PL}→H_0 rejected	LM=102.48 p-value=0.0000
Hausman's specification test:			
		$x^2(5)=21.26$; p-value=0.0007 → fixed-effects	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are reported in parentheses.

Source: Authors' calculations.

Table 5 Estimated results for the model 3 with health expenditures

Model specification	Pooled	Fixed-effects	Random-effects
Independent variable explaining population ageing:			
Health expenditures	-0.9974*** (0.1052)	-2.4370*** (0.1490)	-2.0895*** (0.1381)
Independent macroeconomic control variables:			
GDP growth rate	0.3243*** (0.0315)	0.2452*** (0.0257)	0.2659*** (0.0259)
Government revenue	0.2941*** (0.0240)	0.5413*** (0.0481)	0.4928*** (0.0385)
Unemployment rate	-0.2457*** (0.0282)	-0.3145*** (0.0288)	-0.2969*** (0.0285)
Trade openness	0.0045** (0.0020)	0.0223*** (0.0050)	0.0124*** (0.0037)
Constant	-8.1490*** (1.0540)	-11.1789*** (2.0435)	-10.2671*** (1.6743)
Model significance:			
	F(5,561)=82.12 p-value=0.0000	F(5,535)=131.33 p-value=0.0000	Wald $x^2(5)$=598.57 p-value=0.0000
Coefficient of determination:			
	R^2=0.4226 adjusted R^2=0.4175	R^2_{within}=0.5511 $R^2_{between}$=0.2995 $R^2_{overall}$=0.2472	R^2_{within}=0.5464 $R^2_{between}$=0.2968 $R^2_{overall}$=0.3815
Testing for individual effect:			
		F(26,535)=8.59 p-value=0.0000	LM=495.06 p-value=0.0000
Testing for heteroscedasticity:			
	$x^2(20)$=47.77 p-value=0.0005	$x^2(27)$=864.65 p-value=0.0000	LM=2.85×10^4 p-value=0.0000
Testing for serial correlation:			
	F(1,26)=43.35 p-value=0.0000	BFN=1.0758 d_{PL}=1.8338 BFN<d_{PL}→H_0 rejected	LM=74.80 p-value=0.0000
Hausman's specification test:			
		$x^2(5)$=54.03; p-value=0.0000 → fixed-effects	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are reported in parentheses.

Source: Authors' calculations.

fixed-effects over the random-effects specification. All applied econometric tests indicate the presence of hetero-scedasticity and serial correlation.

The stationarity of all the variables is tested by Fisher-type ADF test proposed by Choi (2001). The optimal number of lags is defined by the Akaike information criterion (AIC). Time trend or drift term are included where needed, in order to describe the process by which the series is generated. The results of the unit-root tests given in Table 6 suggest that all the variables are stationary, and that there is no need for transformation of data through differencing.

Given the identified heteroscedasticity and serial correlation and consequently inefficient estimates in all three estimated models, as well as suggestion of the Hausman's specification test for the specification with the fixed individual effects, Table 7 provides the estimation results for the final models with robust

Table 6 Unit root test results

Variable	Number of lags (AIC)	Trend or drift	Statistic	P-value
Fiscal balance	0	none	106.1054	0.0000
Old-age dependency	1	time trend included	88.9161	0.0019
Share of people aged 65+ in total population	1	time trend included	92.3037	0.0009
Health expenditures	0	drift term included	111.7805	0.0000
GDP growth rate	0	none	384.1095	0.0000
Government revenue	0	drift term included	157.8390	0.0000
Unemployment rate	1	none	103.2621	0.0001
Trade openness	0	time trend included	95.4920	0.0004

Source: Authors' calculations.

Table 7 Estimated results for the final fixed-effects models with robust standard errors

	Model 1	Model 2	Model 3
Independent variable explaining population ageing:			
Old-age dependency	-0.1724** (0.0785)		
Share of people aged 65+ in total population		-0.3005** (0.1494)	
Health expenditures			-2.0895*** (0.1381)
Independent macroeconomic control variables:			
GDP growth rate	0.3553*** (0.0269)	0.3534*** (0.0275)	0.2659*** (0.0259)
Government revenue	0.4470*** (0.1051)	0.4427*** (0.1037)	0.4928*** (0.0385)
Unemployment rate	-0.2825*** (0.0860)	-0.2815*** (0.0861)	-0.2969*** (0.0285)
Trade openness	0.0226** (0.0109)	0.0235* (0.0118)	0.0124*** (0.0037)
Constant	-18.2576*** (5.3600)	-17.4700*** (5.3333)	-10.2671*** (1.6743)

*Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are reported in parentheses.*

Source: Authors' calculations.

standard errors. Coefficients for all the independent variables explaining population ageing are negative and statistically significant, which means that the population ageing negatively affects the fiscal balance.

The estimation results of the models 4, 5 and 6 defined by the equations (10), (11) and (12) are shown in Table 8. Given the results of the threshold effects tests in all three models, we can conclude that the threshold is not significant in any of the considered models. Although there is a negative relation between population ageing and fiscal balance, there cannot be defined any critical threshold after which population ageing affects fiscal balance and fiscal sustainability more intensely.

4 DISCUSSION

The conducted research provided valuable results. As expected, demographic transition characterized by population ageing have created significant negative impact on the fiscal balance of European countries at the beginning of the 21st century, which was demonstrated by all three models we analysed.

In the model 1, the old-age dependency, as the independent variable explaining population ageing, is statistically significant at the 5% level. The value of the coefficient of -0.1724 means that the increase of the old-age dependency by one-percentage point causes the decrease of the fiscal balance by 0.1724 percentage points.

Table 8 Estimated results for the fixed-effects threshold models

		Model 4		Model 5		Model 6
Independent variable explaining population ageing:						
Old-age dependency (threshold value: 19.87)	≤19.87	-0.3074*** (0.0591)				
	>19.87	-0.1929*** (0.0469)				
Share of people aged 65+ in total population (threshold value: 11.18)			≤11.18	0.0849 (0.1476)		
			>11.18	-0.2843*** (0.0874)		
Health expenditures (threshold value: 3.1)					≤3.1	-4.3305*** (0.5244)
					>3.1	-2.5644*** (0.1511)
Independent macroeconomic control variables:						
GDP growth rate		0.3611*** (0.0296)		0.3691*** (0.0298)		0.2368*** (0.0254)
Government revenue		0.4701*** (0.0594)		0.3715*** (0.0632)		0.5362*** (0.0475)
Unemployment rate		-0.2622*** (0.0357)		-0.2515*** (0.0367)		-0.3186*** (0.0284)
Trade openness		0.0125 (0.0077)		0.0302*** (0.0079)		0.0201*** (0.0049)
Threshold effect test:						
		F-stat=15.30 p-value=0.3500		F-stat=10.72 p-value=0.6733		F-stat=15.30 p-value=0.1333

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are reported in parentheses.

Source: Authors' calculations.

The similar conclusion can be drawn from the estimation results for the model 2. The share of population older than 64 in the total population, as the independent variable explaining population ageing, is also significant at the 5% level. The value of the coefficient of -0.13005 means that the increase of the share of population older than 64 in the total population by one-percentage point is associated with the decrease of the fiscal balance by 0.3005 percentage points.

Health expenditures, as an implicit proxy of population ageing, which is the independent variable in the model 3, is statistically significant even at the 1% level. The value of the coefficient for the health expenditures is the highest, as compared with other independent variables explaining demographic transition, and amounts to -2.0895. That means that one-percentage point higher health expenditures imply fiscal balance lower by 2.0895 percentage points.

The fixed-effects threshold models identified the thresholds of demographic transition indicators, but these thresholds are not found to be statistically significant. That means that population ageing negatively affects the fiscal balance at all levels of population ageing indicators. It is not necessary that population ageing indicators reach a certain level to be able to create a negative impact on the fiscal balance. For instance, the increase of the old-age dependency by one-percentage point will negatively affect the fiscal balance regardless of whether the ratio of people older than 64 to the working-age population is at the level of 20%, or at the level of 30%.

When comparing the estimated models, it can be noticed that the model 3, with health expenditures as the independent variable explaining population ageing, describes the relation between population ageing and fiscal balance in the best way, considering the values of the coefficients of determination and the fact that this model explains up to 55% of variations.

The independent macroeconomic control variables, which are used in the models, are all statistically significant, mostly at the 1% level, except trade openness whose significance varies from the level of 1% to the level of 10%, suggesting that the models are well defined and that appropriate variables are included. All coefficients are with the expected sign, concluding that fiscal balance is positively correlated with economic growth, government revenues and trade openness, but negatively correlated with unemployment rate.

One such empirical research based on panel data was conducted on a sample of 178 countries for the time span of 1991 to 2019 (Korwatanasakul, Sirivunnabood and Majoe 2021). The results are consistent since both studies showed that health expenditures are negatively related to the government balance. The authors also analysed the impact of old-age dependency ratio and the share of the old population, and found a significant positive relationship with health expenditure. Besides, there is an empirical confirmation based on a panel of 26 OECD countries in the period 1970–1997, showed that population ageing is the main force driving the growth of government that could undermine the sustainability of public finance and have important (negative) implications for economic growth (Sanz and Velázquez 2007). There are many empirical studies that analyzed the impact of ageing

on economic growth, however, Nagarajan, Teixeira and Silva (2016) classified them depending on different channels of impact such as: social expenditures (Thiébaut, Barnay and Ventelou 2013), taxation, and consumption and saving patterns (Imam 2013).

The number of empirical studies focusing on analysis of the population aging in the European Union on its fiscal balance is surprisingly small considering that the topic is widely discussed in public. Focusing analysis on 14 European countries for the period from 1970 to 2014, Cho and Le (2022) tested the effects of population aging on long-term fiscal sustainability. Using novel methodology based on solvency test (Bohn 2005) and the PSTR model (González et al. 2017), and the old-age dependency ratio as a proxy transition variable, they empirically confirmed that the public pension and health spending have a systematic relationship with the old-age dependency ratio. The cointegration relations and error-correction models record that population aging increases the public pension and health spending; however, this effect is more pronounced in the countries that have recently experienced fiscal crises.

It is evident that population ageing is posing a significant burden on fiscal policy, through upward pressure on age-related expenditures. Additionally, the increase of the old-age dependency ratio is adversely affecting the tax bases and the structure of public revenues (Prammer 2019; Dougherty, de Biase and Lorenzoni 2022; Rouzet et al. 2019). Therefore, demographic transition poses significant challenges for the European Union fiscal sustainability, where policy makers are facing with limiting fiscal policy space.

5 CONCLUSION

The European Union countries are facing the trend of population aging resulting in strong pressure on the fiscal balance. Aiming to provide quantitative confirmation of this relation, the authors carried out a panel data analysis on the sample of 27 the European Union member countries for the period 2001–2021. The empirical research was based on three models where the government fiscal balance, measured as percentage of GDP, was used as dependent variable while as an explanatory variables were used: the old-age dependency ratio (model 1), the share of population older than 64 in total population (model 2) and health expenditures (model 3).

All the models confirmed that population ageing in the EU has significant negative effect on the fiscal government budget. In other words, the increase of: 1) the old-age dependency by one-percentage point causes the decrease of the fiscal balance by 0.1724 percentage points; 2) share of population older than 64 in the total population by one-percentage point is associated with the decrease of the fiscal balance by 0.3005 percentage points; and 3) health expenditures by one-percentage point imply lower fiscal balance by 2.0895 percentage points. What is more, this negative impact is evident for all the levels of population ageing indicators, confirming that it is not necessary for any population ageing indicator to reach a certain level to create a negative impact on the fiscal balance. For ensuring robustness of the results, independent macroeconomic control variables (the real GDP growth rate, government revenue, unemployment rate and trade openness) were used, and the test confirmed that all three models are well

defined and that appropriate variables are included.

Since all the projections are pointing to a growing trend of population ageing in the European Union, and empirical results confirm the negative effects of the demographic transition on the government budget, it is necessary to take certain measures in the domain of public policy. Although it is to be expected that interventions will be undertaken in terms of strengthening the fiscal policy, the following limitations should be kept in mind. First, the fiscal space is significantly limiting because of an increase in aging-related expenditures (where pension spendings have the largest share) and decrease of the tax base related to the smaller number of working population who are taxpayers. This problem becomes even more pronounced in countries that already have a high level of public debt (Italy, Portugal, Belgium, Spain). Second, the room for manoeuvring and the effectiveness of fiscal policy is further narrowed in the recession period because the older population is more difficult to increase aggregate consumption (due to risk aversion, personal consumption and investments will decrease). As a result, fiscal policy activities that have a higher fiscal multiplier are reduced, which negatively affects economic growth in the long term. Third, the effectiveness of automatic stabilizers, which have been widely applied since the 2000s in order to prevent macroeconomic fluctuations, will be decreasing in the future. Hence, it can be concluded that the debt dynamic and available fiscal space largely depend on the interest rate growth differential. While members of the European Union previously benefited from a favourable, i.e. negative, interest rate growth differential, impact of aging on public debt will largely depend on further movements of the interest rate and growth rate (which is expected to stagnate).

Although the fiscal space for interventions is narrowing, there are always available measures related to enhancing the efficiency of health care provision, incentivising private savings and well-targeted pension reforms that will stimulate older workers to remain active for longer. Besides, labour market reforms should be considered in order to increase the participation of older workers in the labour market, as well as better inclusion of women and youth. Although the inflow of migration alone cannot solve the problem of the aging population, all possibilities for their faster integration into the labour market should be considered. There should be continuity in work on improving public finances and give priority to the so-called "growth-enhancing public spending".

In addition, it should be kept in mind that the dynamics of population aging differs from one country to another, and consequently all projections across Member States, for both the time profile and the projected change in spending, are different, and therefore the effects of population aging also differ in their fiscal sustainability. What is more, demographic transition can lead to growing differences between countries and increasing economic instability in the European Union as an economic and political integration region. Hence, it is very important to find an answer to the questions such as how to tailor the assessment to country-specific circumstances. Certainly, searching for an answer to that question requires a deeper analysis and may be the subject of research in a subsequent paper.

The limitations of the paper mainly relate to the scope of variables used

and the time covered. The coefficient of determination ranges from about 30 percent to the maximum of 55 percent, indicating that there is a solid amount of variation in the fiscal balance that is not sufficiently explained by the model. For example, some important data on private health expenditure were not included in the analysis due to unavailability of data. The period of the analysis was limited to 20 years, because for a longer period, it has not been possible to collect comparable and balanced data for all variables and countries, which would certainly contribute to higher quality results of the analysis.

REFERENCES

Afflatet, N. (2018). The Impact of Population Ageing on Public Debt: A Panel Data Analysis for 18 European Countries. *International Journal of Economics and Financial Issues*, 8(4), 68–77. https://www.econjournals.com/index.php/ijefi/article/view/6512

Amaglobeli, D., & Wei., S. (2016). How to Assess Fiscal Implications of Demographic Shifts: A Granular Approach. Washington: International Monetary Fund. https://www.imf.org/external/pubs/ft/howtonotes/2016/howtonote1602.pdf

Arellano, M. (1987). Computing robust standard errors for within-groups estimators. *Oxford Bulletin of Economics and Statistics*, 49(4), 431–434. https://doi.org/10.1111/j.1468-0084.1987.mp49004006.x

Baltagi, B. (2008). *Econometric Analysis of Panel Data*. (4th ed.). West Sussex: John Wiley & Sons Ltd. https://books.google.rs/books/about/Econometric_Analysis_of_Panel_Data.html?id=oQdx_70Xmy0C&redir_esc=y

Baltagi, B. H., & Li, Q. (1991). A Joint Test for Serial Correlation and Random Individual Effects. *Statistics and Probability Letters*, 11(3), 277–280. https://doi.org/10.1016/0167-7152(91)90156-L

Bernardinoa, T., Francob, F., & Morais, L. T. (2024). The Costs of Building Walls: Immigration and the Fiscal Burden of Aging in Europe. The Center for Growth and Opportunity at Utah State University. https://www.thecgo.org/wp-content/uploads/2024/02/CGO-2024-Immigration-WorkingPaper-Feb-CostsofBuildingWalls.pdf

Bhargava, A., Franzini, L., & Narendranathan, W. (1982). Serial Correlation and the Fixed Effects Model. *The Review of Economic Studies*, 49(4), 533–549. https://doi.org/10.2307/2297285

Bodnár, K., & Nerlich, C. (2022). The macroeconomic and fiscal impact of population ageing. European Central Bank (ECB Occasional Paper Series No 296). https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op296~aaf209ffe5.en.pdf

Bohn, H. (2005). The sustainability of fiscal policy in the United States. (CESifo Working Paper, No. 1446). https://www.ifo.de/DocDL/cesifo1_wp1446.pdf

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies,* 47(1), 239–253. https://doi.org/10.2307/2297111

Cho, D., & Lee, K. (2022). Population aging and fiscal sustainability: Nonlinear evidence from Europe. *Journal of International Money and Finance*, 126, 102665. https://doi.org/10.1016/j.jimonfin.2022.102665

Cho, D., & Rhee, D-E. (2023). Government debt and fiscal multipliers in the era of population aging. *Macroeconomic Dynamics,* 28(5), 1161–1181. https://doi.org/10.1017/S1365100523000421

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20(2), 249–272. https://doi.org/10.1016/S0261-5606(00)00048-6

Christl, M., Bélanger, A., Conte, A., Mazza, J., & Narazani, E. (2022). Projecting the fiscal impact of immigration in the European Union. *Fiscal Studies*, 43(4), 365–385. https://doi.org/10.1111/1475-5890.12314

Crowe, D., Haas, J., Millot, V., Rawdanowicz, L., & Turban, S. (2022). Population ageing and government revenue: expected trends and policy considerations to boost revenue economics. OECD: Paris (Department Working Papers No. 1737). https://doi.org/10.1787/18151973

Dougherty, S., de Biase, P., & Lorenzoni, L. (2022). Funding the Future: The Impact of Population Ageing on Revenues across Levels of Government. Paris: OECD (No. 39). https://www.oecd.org/content/dam/oecd/en/publications/2022/08/funding-the-future_3fcedfd6/2b0f063e-en.pdf

European Commission (2021). The 2021 Ageing Report. Economic and Budgetary Projections for the EU Member States (2019–2070). European Commission (Institutional paper 148). https://economy-finance.ec.europa.eu/document/download/58bcd316-a404-4e2a-8b29-49d8159dc89a_en?filename=ip148_en.pdf

European Commission (2024). The 2024 Ageing Report. Economic and Budgetary Projections for the EU Member States (2022–2070). European Commission (Institutional paper 279). https://economy-finance.ec.europa.eu/document/download/971dd209-41c2-425d-94f8-e3c3c3459af9_en?filename=ip279_en.pdf

Eurostat database (2024). *Eurostat database*. https://ec.europa.eu/eurostat/data/database

Eurostat (2024). *Fertility statistics*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Fertility_statistics

Fiorio, C. V., Frattini, T., Riganti, A., & Christl, M. (2024). Migration and public finances in the EU. *International Tax and Public Finance*, 31(3), 635–684. https://doi.org/10.1007/s10797-023-09787-9

González, A., Teräsvirta, T., van Dijk, D., & Yang, Y. (2017). Panel smooth transition regression models. (CREATES Research Paper 2017–36). https://repec.econ.au.dk/repec/creates/rp/17/rp17_36.pdf

Greene, W. H. (2003). *Econometric Analysis*. (8th ed.). New York: Pearson.

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing and inference. *Journal of Econometrics*, 93(2), 345–368. https://doi.org/10.1016/S0304-4076(99)00025-1

Imam, P. (2013). Demographic shift and the financial sector stability: the case of Japan. *Population Ageing*, 6(4), 269–303. https://doi.org/10.1007/s12062-013-9089-9

International Monetary Fund database (2024). *World Economic Outlook database*. https://www.imf.org/en/Publications/WEO/weo-database/2024/April

Jovičić, M., & Dragutinović Mitrović, R. (2011). *Ekonometrijski metodi i modeli*. Beograd: Univerzitet u Beogradu, Ekonomski fakultet.

Kopecky, J. (2022). The age for austerity? Population age structure and fiscal consolidation multipliers. *Journal of Macroeconomics*, 73, 103444. https://doi.org/10.1016/j.jmacro.2022.103444

Korwatanasakul, U., Sirivunnabood, P., & Majoe, A. (2021). Demographic Transition and its Impacts on Fiscal Sustainability in East and Southeast Asia. Tokyo: Asian Development Bank Institute (ADBI Working Paper 1220). https://www.adb.org/publications/demographic-transition-impacts-fiscal-sustainability-east-southeast-asia

Mladenović, Z., & Nojković, A. (2018). *Primenjena analiza vremenskih serija*. Univerzitet u Beogradu – Ekonomski fakultet.

Nagarajan, N. R., Teixeira A. A., & Silva, S. T. (2016). The impact of an ageing population on economic growth: an exploratory review of the main mechanisms. *Análise Social*, 51(218), 4–35. https://doi.org/10.31447/AS00032573.2016218.01

Noja, G. G., Cristea, S. M., Yüksel A., Pânzaru, C., & Drăcea, R. M. (2018). Migrants' Role in Enhancing the Economic Development of Host Countries: Empirical Evidence from Europe. *Sustainability*, *10*(3), 894. https://doi.org/10.3390/su10030894

OECD (2013). *The fiscal impact of immigration in OECD countries*. International Migration Outlook 2013. Paris: OECD. https://doi.org/10.1787/migr_outlook-2013-en

Ortega-Gil, M., ElHichou-Ahmed, C., & Mata-García, A. (2022). Effects of Immigrants, Health, and Ageing on Economic Growth in the European Union. *International Journal of Environmental Research and Public Health*, 20(1), 224. https://doi.org/10.3390/ijerph20010224

Pinkus, D., & Ruer, N. (2024). Beyond retirement: a closer look at the very old. Brussels: Bruegel. https://www.bruegel.org/analysis/beyond-retirement-closer-look-very-old

Poças, A., Soukiazis, E., & Antunes, M. (2020). Factors Explaining Life Expectancy at Age 65: A Panel Data Approach Applied to European Union Countries. *Social Indicators Research,* 150, 265–288. https://doi.org/10.1007/s11205-020-02290-2

Prammer, D. (2019). How does population ageing impact on personal income taxes and social security contributions? *The Journal of the Economics of Ageing,* 14, 100186. https://doi.org/10.1016/j.jeoa.2018.12.005

Raleigh V. (2019). *Trends in Life Expectancy in EU and Other OECD Countries: Why Are Improvements Slowing?* Paris: OECD. https://doi.org/10.1787/18152015

Ramos-Herrera, M., & Sosvilla-Rivero, S. (2020) Fiscal Sustainability in Aging Societies: Evidence from Euro Area Countries. *Sustainability,* 12(24):10276. https://doi.org/10.3390/su122410276

Rouzet, D., Sánchez, A. C., Renault, T., & Roehn, O. (2019). Fiscal challenges and inclusive growth in ageing societies. OECD: Paris (OECD Economic Policy Papers, No. 27). https://doi.org/10.1787/c553d8d2-en

Sanz, I., & Velázquez, F. J. (2007). The role of ageing in the growth of government and social welfare spending in the OECD. *European Journal of Political Economy*, 23(4), 917–931. https://doi.org/10.1016/j.ejpoleco.2007.01.003

Temsumrit N. (2023). Can aging population affect economic growth through the channel of government spending? *Heliyon*, 9(9), e19521. https://doi.org/10.1016/j.heliyon.2023.e19521

Thiébaut, S. P., Barnay, T., & Ventelou, B. (2013). Ageing, chronic conditions and the evolution of future drugs expenditure: a five-year micro-simulation from 2004 to 2029. *Applied Economics*, 45, 1663–1672. https://doi.org/10.1080/00036846.2011.633895

United Nations (2022). World Population Prospects 2022: Summary of Results. New York: United Nations (UN DESA/POP/2022/TR/NO. 3). https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf

United Nations (2023). Leaving No One Behind In An Ageing World. New York: United Nations (World Social Report 2023). https://desapublications.un.org/publications/world-social-report-2023-leaving-no-one-behind-ageing-world

White, H. (1980). A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica,* 48(4), 817–838. https://doi.org/10.2307/1912934

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data.* (2dn ed.). Cambridge: MIT Press. https://mitpress.mit.edu/9780262232586/econometric-analysis-of-cross-section-and-panel-data/

World Bank database (2024). *Development indicators*. Statistical database. https://data.worldbank.org/country

Data Availability Statement

Data are available from the authors upon request.

Coauthor contributions

Sanja Filipović: conceptualisation, resources, investigation and writing. **Marko Miljković**: methodology, formal analysis, software, writing.

Uticaj starenja stanovništva na fiskalni bilans Evropske unije

PROŠIRENI SAŽETAK

Zemlje Evropske unije (EU) se suočavaju sa problemom starenja stanovništva i posle Japana imaju najveće učešće starih u ukupnoj populaciji. Procenjuje se da će se broj stanovnika, uprkos prilivu migranata, nakon 2035. godine smanjivati, dok će koeficijent starosne zavisnosti (odnos broja starijih od 65 godina i ukupnog broja radno sposobnih) rasti. Cilj ovog rada je da utvrdi efekte starenja stanovništva na fiskalni bilans EU. Uprkos važnosti ovog pitanja, broj empirijskih radova koji istražuju pomenutu relaciju na primeru zemalja EU je zanemarljiv.

Empirijsko istraživanje je sprovedeno primenom ekonometrijskih metoda na bazi panela podataka za 27 zemalja EU za period 2001–2021. godine. Primenjena su tri modela gde je kao zavisna varijabla korišćen fiskalni bilans države, meren kao procenat bruto domaćeg proizvoda (BDP), a kao nezavisne varijable korišćeni su: koeficijent starosne zavisnosti (model 1), udeo stanovništva starijeg od 64 godine u ukupnoj populaciji (model 2) i izdaci za zdravstvo (model 3). Svi modeli su potvrdili da starenje stanovništva značajno negativno utiče na fiskalni bilans, odnosno da porast: 1) koeficijenta starosne zavisnosti za jedan procentni poen (p. p.) smanjuje fiskalni bilans za 0,1724 p. p.; 2) učešća stanovništva starijeg od 64 godine za jedan p. p. smanjuje fiskalni bilans za 0,3005 p. p. i 3) izdataka za zdravstvo za jedan p. p. impliciraju niži fiskalni bilans za 2,0895 p. p. Štaviše, ovaj negativan uticaj je evidentan na svim nivoima indikatora starenja stanovništva, potvrđujući da nije neophodno da bilo koji indikator starenja stanovništva dostigne određeni nivo da bi stvorio negativan uticaj na fiskalni bilans. Provera na bazi nezavisnih makroekonomskih kontrolnih varijabli je potvrdila da su sva tri modela dobro definisana i da su uključene odgovarajuće varijable.

Kako bi se obezbedila održivost javnih finansija, kreatori ekonomske politike treba da preduzmu određene mere. Međutim, u domenu fiskalne politike prostor se sužava iz nekoliko razloga: a) rastu rashodi za starenje stanovništva (gde penzije imaju najveće učešće), a poreska osnovica se smanjuje zbog manjeg broja radno aktivnog stanovništva; b) kako starija populacija teži povećava agregatnu potrošnju, smanjuju se i aktivnosti fiskalne politike koje imaju veći fiskalni multiplikator, što dugoročno negativno utiče na privredni rast, c) smanjuje se efikasnost tzv. automatskih stabilizatora, tako da će uticaj starenja stanovništva na javni dug zavisiti od odnosa nivoa kamatne stope i stope rasta BDP. Pa ipak, na raspolaganju su mere koje se odnose na povećanje efikasnosti pružanja zdravstvene zaštite, podsticanje privatne štednje i dobro ciljane penzione reforme. Osim toga, treba razmotriti reforme tržišta rada kako bi se povećalo učešće starijih radnika, žena, mladih i migranata.

KLJUČNE REČI

fiskalni bilans, starenje stanovništva, javni rashodi, troškovi zdravstva, Evropska unija

The influence of demographic characteristics on the effectiveness of public administration training programs

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ABSTRACT

This paper examines the influence of demographic characteristics on the effectiveness of the training programs in public administration in the Republic of Serbia. Specifically, the aim is to evaluate the effectiveness of the training programs in public administration and to analyse how factors such as age, gender, educational level, years of work experience and job title influence the outcomes of training initiatives. The sample of the study includes 1,040 public administration employees in Serbia who participated in at least one training program organized by the National Academy of Public Administration in 2022. The primary data was collected through a survey questionnaire administered in October 2023. The effectiveness of the training programs is assessed according to the extent to which they contribute to achieving the desired objectives. The statistical analyses involve descriptive statistics, reliability assessments and statistical tests to identify differences between demographic groups. The research results indicate that age, gender and education level have no influence on the effectiveness of the training programs in public administration. However, training effectiveness is significantly influenced by professional experience and job titles in public administration. Respondents with up to 15 years of work experience rated the effectiveness of the training programs higher than those with more than 15 years of work experience. In addition, government officials rated the effectiveness of the training programs they participated in significantly higher than other employees and managers in public administration. The key policy recommendations that emerge from the research relate to matching training programs to job experience, differentiating training for different job titles, leveraging experienced employees and an inclusive training environment.

KEYWORDS

public administration, demographic characteristics, training program, training effectiveness

1 INTRODUCTION

Training programs in public administration are essential for efficient and effective governance, smooth adaptation to change and fostering continuous professional development. They improve decision-making, ensure effective policy implementation and reinforce ethical standards and accountability. In addition, training encourages innovation, improves community engagement, prepares administrators for crisis management and supports the Sustainable Development Goals.

Public sector training is critical to the development of competent and effective public servants equipped with the necessary knowledge, skills and attitudes to provide quality public services (Cohen 2021). These programs aim to offer government employees a deep understanding of the context in which public administration operates, ensuring that the courses provided are relevant to their daily experiences (Haruna 2004). By investing in education and training, civil servants can enhance their competencies, ultimately improving the operational and administrative capacity of organizations (Lavdas, Papadakis and Rigopoulou 2012; Spreen, Afonso and Gerrish 2020).

Theory and practice have shown that training programs play a crucial role in fostering sustainable practices within public organizations. The connection between sustainable development and public administration training is evident in various studies that highlight the importance of developing human resources through education and training to drive sustainable practices and innovation within public administration (Bisogno et al. 2023; Rahman et al. 2020). Investing in human resources through education and training programs is essential for sustaining public service motivation and improving the competencies of employees to drive ethical-oriented processes of innovation and change within public administration (Rahman et al. 2020).

The continuous education and training of human resources in the public sector not only ensures better service delivery to citizens, but also increases employee satisfaction and performance (Stavrakaki et al. 2023), as well as the positive attitude towards working in the public sector (Chen, Hsieh and Chen 2021). Effective training programs help employees to develop new skills and improve their performance, which can lead to increased confidence and a sense of accomplishment. Additionally, training programs can provide opportunities for career advancement, which can motivate employees and increase their satisfaction with their work. They also demonstrate an organization's investment in its employees' professional development, which can improve morale and foster a positive work environment.

The main objectives of this paper are twofold: firstly, to assess the overall effectiveness of training programs in public administration and secondly, to examine the impact of demographic characteristics on the effectiveness of these programs. Through this dual focus, the research seeks to provide a comprehensive understanding of how training programs can be optimized to meet the diverse needs of public administration professionals in the Republic of Serbia.

In the context of this study, the effectiveness of training programs refers to the extent to which the implementation of the training program has led to the achievement of the planned objectives (improvement of the relevant competencies). It implies learning out-

comes, i.e. changes that have occurred in the learning process, such as learning effects, acquired skills, expanded knowledge, adopted positive attitudes, behavioural changes.

Following the main objectives of the research and the definition of effectiveness, two research questions (RQ) are posed:

RQ1: How effective are the training programs in public administration?
RQ2: Which demographic characteristics have the greatest influence on the effectiveness of the training programs in public administration?

The structure of the paper is as follows. The theoretical part of the paper focuses on the effectiveness of training, different approaches to evaluating it and previous studies that have examined the role of demographic variables in training outcomes. The data and methods section describes the methodology and data sources used in the study, including a description of the survey conducted. The research findings section presents the main results, while the discussion section details the empirical findings. Finally, the paper summarizes the key findings and implications of the study and makes recommendations for the future development of training programs.

2 TRAINING PROGRAMS IN PUBLIC SECTOR: EFECTIVENESS AND DEMOGRAPHY

Public administration training programs encompass a wide range of topics designed to enhance the skills and knowledge of public sector employees. These programs include general topics such as personal development, technical skills, policy analysis, ethics and integrity or inclusion. There are also specialized programs that focus on customer service, crisis management, financial management, human resource management, project management, international relations and sustainability. Nguyen, Nguyen and Vo (2022) emphasize the importance of including courses such as leadership development, public service motivation and learning goal orientation, as they foster innovative behaviour among public sector employees.

Although learning is an important goal, the central purpose of training initiatives is to put the acquired knowledge into practice (Card, Kluve and Weber 2015; Lebedinski and Pavlovic 2023). Zumrah (2015) highlighted that the transfer of training mediates the relationship between training and service quality in the public sector, suggesting that training not only improves employees' skills and knowledge, but also directly impacts service quality through the application of learned skills in the workplace.

The training effectiveness is usually defined as the extent to which the training achieves its intended results. Training is generally considered effective when employees are satisfied with the training experience, show increased motivation and enhance their knowledge in a particular area. As a result, the training transfer leads to significant improvements in job performance (Sitzmann and Weinhardt 2018). Therefore, training effectiveness encompasses multiple dimensions, including participant satisfaction, motivation, knowledge and skills enhancement. A comprehensive approach that addresses all these factors is essential for effective training programs.

Evaluations of training programs are essential for improving their efficiency, providing valuable insights for decision-making processes and enhancing decision-makers' commitment

to training initiatives (Lee et al. 2017). Measuring the effectiveness of training programs in public administration is crucial for assessing their impact and identifying areas for improvement.

Various studies provide insights into different approaches and methodologies for evaluating the impact of training programs in public administration (Mei, Burgess and Xiao 2018; Berg-Cloete et al. 2020; Mohamad et al. 2023). One effective method involves conducting competency-based assessments to determine the extent to which employees have acquired the necessary knowledge and skills from the training (Dunning 2014). Employing the Kirkpatrick training evaluation model can offer a structured framework for evaluating training effectiveness by assessing reactions, learning, behaviour and results (Upadhyay, Goel and John 2023). This model enables a comprehensive analysis of the training program's impact on participants' knowledge, skills and behaviour. Additionally, developing capacity-building training models with innovative learning methodologies and utilizing the success case method can help in evaluating the effectiveness of training initiatives (Muhan 2023; Qureshi et al. 2004).

The success of training programs for both managerial and non-managerial staff in public sector depends on factors such as course design, trainer qualifications and the overall structure of the training program (Fernando 2023; Hajjar and Alkhanaizi 2018). The effectiveness of training initiatives in the public sector is also influenced by the contextual factors, especially the training environment and motivation of the trainees (Yaqoot, Noor and Isa 2017; Mohamad et al. 2023).

Research has shown that demographic factors can significantly influence learning and training outcomes. Factors such as age, educational background and prior work experience can shape how individuals engage with and benefit from public administration training. Demographic characteristics of the employees have a very important impact on how individuals engage with and absorb concrete training content. This includes elements such as learning preferences and style, motivation, cultural sensitivity and gender dynamics (Ismail et al. 2015).

The influence of demographic factors on learning outcomes has been studied primarily in the context of student achievement (El Refae, Kaba and Eletter 2021; Schreiber, Agomate and Oddi 2017) and online learning (Jawthari and Stoffa 2022; Rizvi, Rienties and Khoja 2019; Islam et al. 2011). However, there is a lack of studies examining the influence of demographic characteristics on employee training programs, especially in the public administration sector. Cowman and McCarthy (2016) conducted an analysis in the public health care sector and concluded that position in organization has a significant impact on training transfer in terms of direction, while age and years of work experience influence the training transfer complexity. McMillan and Fenwick (2008) concluded that although there is no direct evidence that gender affects learning processes in public organizations, in combination with cultural factors or organizational hierarchy, gender can influence learning patterns. Arulampalam, Bryan and Booth (2004) investigated work-related training programs in the EU over a period of five years. The results showed that people with higher education and those working in the public sector were more likely to start a training course. On the other hand, there is no significant difference between men and women in their decision to enrol in a training program.

These studies provide valuable insights but are limited in scope and do not fully address the complex interplay of multiple demographic factors. Therefore, comprehensive research is needed to understand how a broader range of demographic characteristics collectively impact the effectiveness of public administration training programs. This study aims to fill this gap by examining the effects of various demographic factors on training outcomes in a holistic manner.

3 DATA AND METHODS

The research was conducted in October 2023 using an online questionnaire targeted at public administration employees and managers in the Republic of Serbia. With the support of the National Academy for Public Administration, all 9,073 individuals who participated in at least one training course organized by the Academy in 2022 were invited to complete the survey. This approach ensured a representative sample across various institutions and local self-government units.

The questionnaire was distributed via an online survey platform, accompanied by a cover letter explaining the study's purpose and ensuring confidentiality and anonymity of responses. Participants provided informed consent before completing the survey, and two reminders were sent to enhance the response rate. In total, 1,040 complete responses were received, representing 11.46% of the population.

In 2022, civil servants from Serbia took part in 737 training courses organized by the National Academy of Public Administration. The training programs were focused on improving behavioural, general functional, specific functional or coaching skills. Therefore, public admin-

istration employees had the opportunity to participate in training courses from different areas: personal development, digital competences, data management, strategic management, public relations, public procurement, business communication and many others.

Respondents rated seven statements about the effectiveness of the training programs on a five-point Likert scale (1-Strongly disagree; 2-Disagree; 3-Neither agree nor disagree; 4-Agree; 5-Strongly agree). The statements in the questionnaire were formulated on the basis of widely recognized Kirkpatrick's four-level evaluation model, which has been extensively validated in the literature and in previous studies. These statements were then adapted specifically for the public administration sector. According to the Kirkpatrick model, training effectiveness is measured using four categories: 1) participants' reactions to the program, 2) changes in attitudes, knowledge, or skills, 3) changes in work behaviours, and 4) changes in organizational outcomes (Kirkpatrick and Kirkpatrick, 2009). The adaptation involved adjusting the evaluation criteria to the unique context and objectives of public administration training programs. The arithmetic mean of the answers to these seven questions represents the evaluation of the effectiveness of the training programs given by the respondent.

In order to determine what demographic characteristics most influence the effectiveness of training programs in public administration, the respondents were sorted by their gender (two groups), age (three groups), education achieved (three groups), work experience attained in public administration (three groups) and position (three groups). The collected data was processed and analysed using the Statistical

Software for Social Sciences (SPSS). The statistical analysis included descriptive statistics, reliability analysis and non-parametric tests (Kruskal Wallis and Mann-Whitney tests) to compare the differences between the groups.

4 RESULTS

The results of the study indicate that around 38% of the respondents work in central government, while 50% work in local government. The remaining 12% are employed in other government institutions (i.e. public agencies, the judiciary or state auditing institutions). Regionally, the majority (51%) are employed in Belgrade, followed by Vojvodina (19%), Šumadija and Western Serbia (15%), Southern and Eastern Serbia (14%) and Kosovo and Metohija (1%).

About 75% of the respondents are female. Most of the respondents (53%) are between 36 and 50 years old. The average age is 47. In terms of education level, most respondents have a universi-

ty degree. It is interesting to note that 21 respondents (2% of the sample) have a doctorate. The average work experience in public administration is 15 years.

As far as job titles in public administration are concerned, the respondents are categorised as administrative officers (junior administrative officers, administrative officers and senior administrative officers), advisors (junior advisors, advisors, independent advisors, and senior advisors) and government officials. Administrative officers generally do not require a university degree, while advisors are required to have at least a bachelor's degree. Government officials are employees of the public administration who are appointed by the government to take on management tasks. Our sample consists of 12% administrative officials, 83% advisors and 6% government officials.

The respondents' attitudes towards the effectiveness of the training programs in which they participated are shown in Table 1. It presents the per-

Table 1 Descriptive analysis of programs' effectiveness

Effectiveness	M	SD	1	2	3	4	5
1. Thanks to the training courses I attended, I was able to improve my knowledge and skills.	4.26	0.75	0%	2%	10%	47%	41%
2. I have applied the knowledge and skills acquired in the training courses and improved my daily work.	4.05	0.86	1%	3%	17%	47%	32%
3. The training courses I have attended have helped me to have a positive attitude towards my work.	3.94	0.94	3%	4%	20%	43%	30%
4. The training courses I have attended have had a positive impact on my behaviour at work.	3.69	1.00	4%	5%	28%	42%	21%
5. The training courses I have attended have had a positive effect on improving my formal position at work.	3.13	1.26	15%	13%	30%	27%	15%
6. Participation in the training courses has had a positive effect on my personal development.	4.17	0.88	2%	2%	13%	42%	41%
7. After participating in the training, I work more successfully in a team with colleagues.	3.73	1.02	5%	4%	28%	39%	24%

Note: M – Mean; SD – Standard deviation. Cronbach's alpha = 0.899

Source: Authors' research

centage structure of the respondents' evaluations together with the mean and standard deviation of the answers.

From the data in Table 1, it can be concluded that the vast majority of the respondents agree or strongly agree that thanks to the training courses they have improved their knowledge and skills (88%), that they apply the knowledge and skills acquired in the training courses in their daily work (79%), that these training courses have influenced the adoption of a positive attitude towards their work (73%) and that participation in the training courses has had a positive impact on their personal development (83%).

However, the majority of the respondents (58%) state that they do not agree that the training they attended had a positive impact on improving their formal position in the workplace. Furthermore, 38% of the respondents do not agree that the training they attended has had a positive impact on their behaviour in the workplace and 37% of them do not believe that they work more successfully in a team with colleagues after attending the training. Cronbach's alpha for effectiveness is 0.899, which means that the measurement instruments used (seven statements) have a satisfactory reliability (Field 2009).

Table 2 shows the descriptive statistics for the effectiveness of training programs as the mean value of the respondents' evaluation of the seven statements on effectiveness. The respondents were

Table 2 Descriptive statistics with the test of normality for the effectiveness of training programs

Effectiveness	N	%	M	SD	Mdn	Shapiro-Wilk	
						Statistic	Sig.
Gender							
Female	785	75%	3.87	0.75	4.00	0.96	0.00*
Male	255	25%	3.80	0.81	4.00	0.94	0.00*
Age							
21–35	108	10%	3.87	0.88	3.86	0.95	0.00*
36–50	552	53%	3.88	0.75	4.00	0.96	0.00*
51–67	379	36%	3.80	0.75	3.86	0.95	0.00*
Education							
High school diploma	100	10%	3.91	0.71	4.00	0.92	0.00*
Bachelor's degree	645	62%	3.85	0.78	4.00	0.95	0.00*
Master's or doctorate degree	295	28%	3.83	0.75	4.00	0.96	0.00*
Work experience							
1–15	551	53%	3.93	0.75	4.00	0.96	0.00*
16–30	453	44%	3.76	0.77	3.86	0.95	0.00*
31–44	36	3%	3.82	0.83	4.00	0.94	0.09
Job title							
Administrative officer	105	12%	3.94	0.76	4.00	0.91	0.00*
Advisor	745	83%	3.83	0.75	3.86	0.96	0.00*
Government official	52	6%	4.10	0.58	4.00	0.93	0.01*
Total	1040	100%	3.85	0.77	4.00	0.95	0.00

The results are significant* at the 0.05 level.
Note: M – Mean; SD – Standard deviation; Mdn – Median.
Source: Authors' research

categorised according to their demographic characteristics, i.e. they were divided into two groups according to their gender, three groups according to their age, three groups according to their level of education, three groups according to the number of years of work experience in public administration and three groups according to their job title in public administration.

The mean values (M) for the effectiveness of the training programmes are above 3 for all subsamples. As the effectiveness can take on values from 1 to 5, the mean values indicate that the effectiveness is rated highly by all demographic groups. However, different demographic groups rated the effectiveness of the training programmes differently. To determine whether these differences are significant, statistical tests are carried out to compare the differences between the groups.

In addition to the descriptive statistics on the effectiveness of the training programs, Table 2 shows the results of the Shapiro-Wilk test for normality. The test is significant ($p<0.05$) for the entire sample as well as for each of the subsamples (except for the work experience 31–44 subsample), indicating that the data are not normally distributed. As the assumption of normality is required for parametric tests, non-parametric tests such as Mann-Whitney and Kruskal-Wallis tests were used to determine which demographic characteristics influence the effectiveness of training programs in public administration.

The Kruskal-Wallis test was used to determine whether there are significant differences in the effectiveness of the training programs in public administration between participants of different ages, educational levels, professional experience in public administration and job titles in public administration (Table 3).

The results show that the age and educational level of the participants have no influence on the effectiveness of the training programs in public administration. There are no significant ($p>0.05$) differences in the effectiveness of training programs between participants of different ages and educational levels. However, the differences between participants with different work experience and job titles in public administration are significant ($p<0.05$). To follow up on this result, Mann-Whitney tests were used.

Table 4 shows the results of the Mann-Whitney test for the effectiveness of the training programs. The grouping variables are work experience in public administration, job title in public administration, and gender. For work experience and job title, Bonferroni correction was applied so that the reported results are significant at the 0.025 level.

The results indicate that the training programs in public administration are more effective for the participants with less professional experience in public administration. For example,

Table 3 Kruskal Wallis Test

	Age	Education	Work experience	Job title
Chi-Square	2.66	0.67	14.08	7.83
df	2.00	2.00	2.00	2.00
Asymp. Sig.	0.26	0.72	0.00*	0.02*

The results are significant* at the 0.05 level.

Source: Authors' research

Table 4 Mann-Whitney Test

	Work experience: 1–15 vs. 16–30	Work experience: 16–30 vs. 31–44	Job title: administrative officer vs. advisor	Job title: advisor vs. government official	Gender
Mann-Whitney U	107711.00	7622.00	35126.00	15567.00	96230.50
Wilcoxon W	210542.00	110453.00	313011.00	293452.00	128870.50
Z	-3.75	-0.65	-1.70	-2.38	-0.93
Asymp. Sig. (2-tailed)	0.00*	0.51	0.09	0.02*	0.35

Note: For gender, the results are significant* at the 0.05 level. For work experience and job title, the results are significant* at the 0.025 level.

Source: Authors' research

the respondents with between 1 and 15 years of professional experience (M=3.93) rated the effectiveness of the training programs they attended significantly higher (p<0.05) than the respondents with between 16 and 30 years of professional experience (M=3.76). On the other hand, there are no significant differences (p>0.05) between the respondents with between 16 and 30 years of professional experience (M=3.76) and the respondents with between 31 and 41 years of professional experience (M=3.82) in their assessment of the effectiveness of the training programs they have attended. In summary, it can be concluded that the respondents with up to 15 years of professional experience rate the effectiveness of the training programs they have attended significantly higher than the respondents with more than 15 years of professional experience. To further substantiate this finding, the Spearman correlation coefficient between the effectiveness of training programs and years of work experience in public administration was calculated and a statistically significant (p<0.01) negative correlation (ρ=-0.11) was found.

The results also indicate there are no significant differences (p>0.05) between administrative officers (M=3.94) and advisors (M=3.83) in their assessment

of the effectiveness of the training programs they attended. However, government officials (M=4.10) rated the effectiveness of the training programs they attended significantly higher (p<0.05) than advisors (M=3.83). In summary, it can be stated that government officials rate the effectiveness of the training programs they attend significantly higher than other employees and managers in public administration.

Finally, the results show that the gender of the participants has no influence on the effectiveness of training programs in public administration. There are no significant (p>0.05) differences in the effectiveness of the training programs between female (M=3.87) and male (M=3.80) participants.

5 DISCUSSION

5.1 EFFECTIVENESS OF TRAINING PROGRAMS IN PUBLIC ADMINISTRATION

The empirical study carried out showed that the effectiveness of the training programs in public administration was relatively high in 2022 (between 3.13 and 4.26). However, there are slight differences between the different aspects of effectiveness.

Civil servants in Serbia who participated in the training programs in 2022 gave the highest average score for the elements of effectiveness that include improvement of knowledge and skills, application of acquired knowledge and personal development. The average score for these elements is above 4, which indicates that the training content is well aligned with the current tasks and responsibilities of the respondents.

A slightly lower average score (between 3.69 and 3.94) is given for improving positive attitude to work, positive impact on behaviour and teamwork. The lowest average score is given for improving formal position at work (3.13). This suggests that participation in training programs is only one factor in improving formal position in public administration. However, in some cases this result could also indicate a lack of organizational support or inadequate recognition and reward systems in the public administration. Therefore, policy makers in the public administration should focus on improving organizational support for the application of new skills, promoting merit-based promotion and creating clear career paths for civil servants.

5.2 DEMOGRAPHIC VARIABLES AND EFFECTIVENESS OF TRAINING PROGRAMS

The research results show that there are no significant differences in the effectiveness of training programs between participants of different age, gender and educational level. These findings offer several implications related to the training content and training methods. Namely, they imply that the content of the training courses is standardized and therefore equally accessible and relevant to all participants, regardless of their demographic characteristics. Moreover, it may suggest that the use of inclusive training methods and materials that cater to diverse learning styles and backgrounds can ensure that all participants benefit equally. In addition, certain training programs of National Academy of Public Administration focus on general professional competencies that are not significantly influenced by demographic factors, such as communication, leadership and technical skills.

A particularly interesting result is that education level does not affect the effectiveness of the training programs. This indicates that the training programs are designed with clear objectives tailored to address specific job-related competencies regardless of prior education levels. Moreover, it implies that the training courses are more focused on practical skills and application than on academic knowledge. Therefore, although education provides a foundation, the design and delivery of training programs are crucial for ensuring effectiveness, making them accessible and beneficial to all participants, regardless of their educational background.

These results suggest that there could be other factors influencing the effectiveness of the training programs in public administration. The effectiveness of training is probably more strongly influenced by the participants' motivation, engagement and willingness to learn and apply new skills. Another important factor is a supportive organizational environment that encourages the application of new skills and continuous learning.

On the other hand, there are significant differences between participants with different work experience and job titles in public administration when

measuring the effectiveness of the training programs. The respondents with up to 15 years of professional experience rated the effectiveness of the training programs they have attended significantly higher than those with more than 15 years of professional experience. These results imply that less experienced employees consider the training programs to be more relevant, as they are still in the process of developing their skills and knowledge. They are also more open and eager to learn new concepts and methods and see training as a valuable opportunity for growth. Training programs can have a greater impact on the career development of less experienced employees who are at an earlier stage of their professional development. On the other hand, experienced professionals often believe that they already have the expertise and autonomy required for their role, so they are less likely to recognise the value of additional training.

Government officials rate the effectiveness of the training programs they have attended significantly higher than other employees and managers in public administration. This result is expected because government officials often have the authority and resources to implement new knowledge and skills gained from training, leading to a more positive evaluation of its effectiveness. This group of employees in public administration is usually more engaged and motivated during training due to their position, leading to a greater perceived benefit. Moreover, some training programs are often tailored to their specific needs and responsibilities, providing relevant and impactful content.

6 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Although the study provides valuable insights, it is limited by its exclusive focus on public administration employees in Serbia, which may not allow generalization to other contexts. The reliance on self-reported data introduces potential bias and the cross-sectional design restricts the ability to infer causality. Furthermore, the study did not consider other influential factors such as organizational culture and personal motivation, training program content, duration and delivery methods. Future research should include longitudinal studies to assess long-term impacts and comparative studies across different countries to understand demographic influences in diverse contexts. Including variables such as organizational culture, personal motivation and previous training experiences would provide a more comprehensive understanding. Qualitative research methods could offer deeper insights into participants' perspectives, and program-specific analyzes could identify the most effective training types for various groups.

7 CONCLUSION

The results of the study, in which 1,040 public sector administrators and managers in Serbia participated, show that the effectiveness of the training programs is relatively high, especially in terms of personal development, improvement and application of knowledge and skills. Demographic factors such as age, gender, and education level do not significantly affect the training effectiveness. However, the training effectiveness is strongly influenced by the professional experience and job title of the public

administration employees. These findings have several implications for improving professional development outcomes, particularly in relation to: tailoring training programs to professional experience, differentiating training for different job titles, leveraging experienced staff and an inclusive training environment.

To further increase the effectiveness of public administration training programs, it is crucial to tailor training to different levels of professional experience and job roles. Customized modules for new, mid-level, and experienced employees, along with role-specific training, ensure relevance and practical application. Mentoring programs, where experienced employees guide less experienced colleagues, can promote knowledge sharing and improve the overall learning experience. Cross-functional training also helps employees understand the tasks and challenges of other departments, fostering a collaborative work environment. Involving experienced staff in leading training sessions and sharing best practices enriches the learning process.

Although age, gender, and education level do not significantly impact training effectiveness, creating an inclusive training environment in public administration ensures that programs remain accessible to all employees. By incorporating diverse perspectives, training is enriched, leading to greater individual development and enhanced organizational performance. Inclusive measures, such as equal participation opportunities and addressing different learning needs, foster a culture of equality and respect, ultimately strengthening the organization through a diverse workforce.

REFERENCES

Arulampalam, W., Bryan, M., & Booth, A. (2004). Training in Europe. *Journal of the European Economic Association*, 2(2–3), 346–360. http://www.jstor.org/stable/40004909

Berg-Cloete, S., Olorunju, S., White, J., & Buch, E. (2020). The Albertina Sisulu Executive Leadership Programme enhancing the competencies and performance of public health service managers in South Africa. *Leadership in Health Services*, 33(2), 163–183. https://doi.org/10.1108/lhs-08-2019-0053

Bisogno, M., Cuadrado-Ballesteros, B., Rossi, F., & Miguel, N. (2023). Sustainable development goals in public administrations: enabling conditions in local governments. *International Review of Administrative Sciences*, 89(4), 1223–1242. https://doi.org/10.1177/00208523221146458

Card, D. E., Kluve, J., & Weber, A. (2015). *What Works? A Meta Analysis of Recent Active Labor Market Program Evaluations*. Bochum: Ruhr-Universität Bochum (Ruhr Economic Papers no. 572). http://dx.doi.org/10.2139/ssrn.2706536

Chen, C.-A., Hsieh, C.-W., & Chen, D.-Y. (2021). Can Training Enhance Public Employees' Public Service Motivation? A Pretest–Posttest Design. *Review of Public Personnel Administration*, 41(1), 194–215. https://doi.org/10.1177/0734371X19872244

Cohen, G. (2021). Public administration training in basic police academies: a 50-state comparative analysis. *The American Review of Public Administration*, 51(5), 345–359. https://doi.org/10.1177/0275074021999872

Cowman, M., & McCarthy, A. (2016). The impact of demographic and situational factors on training transfer in a health care setting. *The Irish Journal of Management*, 35(2), 129–142. https://doi.org/10.1515/ijm-2016-0009

Dunning, P. (2014). Developing a competency-based assessment approach for student learning. *Teaching Public Administration*, 32(1), 55–67. https://doi.org/10.1177/0144739414522480

El Refae, G., Kaba, A., & Eletter, S. (2021). The Impact of Demographic Characteristics on Academic Performance: Face-to-Face Learning Versus Distance Learning Implemented to Prevent the Spread of COVID-19. *The International Review of Research in Open and Distributed Learning*, 22(1), 91–110. https://doi.org/10.19173/irrodl.v22i1.5031

Fernando, R. (2023). Human resource management practices and organizational performance in public sector organizations: with reference to development officers in the Colombo district in Sri Lanka. *International Journal of Governance and Public Policy Analysis*, 5(01), 68–86. https://doi.org/10.31357/ijgppa.v5i01.6563

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). SAGE Publications Ltd.

Hajjar, S., & Alkhanaizi, M. (2018). Exploring the factors that affect employee training effectiveness: a case study in Bahrain. *Sage Open*, 8(2), 215824401878303. https://doi.org/10.1177/2158244018783033

Haruna, P. (2004). Training public administrators in Africa: a case study of civil service employees in Ghana. *International Journal of Public Administration*, 27(3–4), 171–195. https://doi.org/10.1081/pad-120028659

Islam, M. A., Rahim, N. A. A., Tan, C. L., & Hasina, M. (2011). Effect of demographic factors on e-learning effectiveness in a higher learning institution in Malaysia. *International Education Studies*, 4 (1), 112–121. https://doi.org/10.5539/ies.v4n1p112

Ismail, A., Foboy, N., Abdullah, N., Mat, N., & Makhbul, Z. (2015). Effects of administrator's role in training programmes and trainees' motivation on training maintenance. *South East European Journal of Economics and Business*, 9(2), 54–65. https://doi.org/10.2478/jeb-2014-0002

Jawthari, M., & Stoffa, V. (2022). Relation between Student Engagement and Demographic Characteristics in Distance Learning Using Association Rules, *Electronics,* 11(5), 724. https://doi.org/10.3390/electronics11050724

Kirkpatrick, J., & Kirkpatrick, W. K. (2009). The Kirkpatrick Four Levels: A Fresh Look After 50 Years, 1959–2009. https://openspaceconsulting.com/wp-content/uploads/2019/06/Kirkpatrick-Four-Levels-wp-updated.pdf

Lavdas, K., Papadakis, N., & Rigopoulou, Y. (2012). Learning organizations and policy transfer in the EU: Greece's state scholarships foundation in a reform-resistant context. *Journal of Education and Learning*, 1(2), 95–108. https://doi.org/10.5539/jel.v1n2p95

Lebedinski, L., & Pavlovic, D. (2023). Professional Traineeship Programme as a Tool Facilitating Participation of Unemployed Youth in the Labour Market: Case Study of the Republic of Serbia. *Ekonomika preduzeća*, 71(3–4), 202–212. https://doi.org/10.5937/EKOPRE2303202L

Lee, C., Jeon, D., Woo-Seok, K., & Lee, J. (2017). Evaluating training for new government officials: a case study using the success case method. *Public Personnel Management*, 46(4), 419–444. https://doi.org/10.1177/0091026017730382

McMillan, J., &Fenwick, J. (2008). Learning, compliance and gender in public management. *Public Policy and Administration*, 23(3), 247–261. https://doi.org/10.1177/0952076708089975

Mei, W., Burgess, J., & Xiao, Y. (2018). Literature analysis of the evaluation of public training programmes in the USA, Europe and China: implications for the evaluation of farmer training programmes in China. *Pacific Economic Review*, 24(1), 69–91. https://doi.org/10.1111/1468-0106.12280

Mohamad, N., Othman, A., Ismail, A., Hasan, H., & Erhan, T. (2023). Relationship between supervisors' roles in the administration of training programmes, learning motivation and in-role behaviour. *Academic Journal of Interdisciplinary Studies*, 12(1), 51. https://doi.org/10.36941/ajis-2023-0005

Muhani, U. (2023). Identification of HR management training approaches on sustainable public service administration skills in Indonesia. *International Journal of Business Economics & Management*, 6(1), 78–87. https://doi.org/10.21744/ijbem.v6n1.2094

Nguyen, N., Nguyen, D., & Vo, N. (2022). Fostering public sector employees' innovative behavior: the roles of servant leadership, public service motivation, and learning goal orientation. *Administration & Society*, 55(1), 30–63. https://doi.org/10.1177/00953997221100623

Qureshi, K., Gershon, R., Merrill, J., Calero-Breckheimer, A., Murrman, M., Gebbie, K., … Sherman, M. (2004). Effectiveness of an Emergency Preparedness Training Program for Public Health Nurses in New York City. *Family & community health*, 27(3), 242–249. https://doi.org/10.1097/00003727-200407000-00011

Rahman, M., Ahmed, M., Ali, M., & Adnan, S. (2020). How does the foundation training course enhance the capacity of the young civil servants to achieve Sustainable Development Goals (SDGs)? a study on Bangladesh public administration training centre. In M. A., Alam, F. Alam, & D. Begum, (Ed.), *Knowledge Management, Governance and Sustainable Development: Lessons and Insights from Developing Countries* (pp. 345–362). http://dx.doi.org/10.2139/ssrn.3785154

Rizvi, S., Rienties, B., & Khoja, S.A. (2019). The role of demographics in online learning; A decision tree based approach. *Computers & Education*, 137, 32–47. https://doi.org/10.1016/j.compedu.2019.04.001

Schreiber, D., Agomate, J.C, & Oddi, B. (2017). The Impact of Demographic Influences on Academic Performance and Student Satisfaction with Learning as Related to Self-Esteem, Self-Efficacy and Cultural Adaptability within the Context of the Military. *International Journal of Learning, Teaching and Educational Research*, 16(4), 67–90. https://ijlter.myres.net/index.php/ijlter/article/view/827/832

Sitzmann, T., & Weinhardt, J. M. (2018). Training Engagement Theory: A Multilevel Perspective on the Effectiveness of Work-Related Training. *Journal of Management*, 44(2), 732–756. https://doi.org/10.1177/0149206315574596

Spreen, T., Afonso, W., & Gerrish, E. (2020). Can employee training influence local fiscal outcomes? *The American Review of Public Administration*, 50(4–5), 401–414. https://doi.org/10.1177/0275074020911717

Stavrakaki, G., Moustakis, V., Kyriakogkonas, P., & Giannopoulos, P. (2023). Human resources training in the greek public administration: case study region of Crete. *Theoretical Economics Letters*, 13(2), 265–283. https://doi.org/10.4236/tel.2023.132017

Upadhyay, K., Goel, S., & John, P. (2023). Developing a capacity building training model for public health managers of low and middle income countries. *Plos One*, 18(4), e0272793. https://doi.org/10.1371/journal.pone.0272793

Yaqoot, E. S. I., Noor, W. S. W. M., & Isa, M. F. M. (2017). Factors Influencing Training Effectiveness: Evidence from Public Sector in Bahrain. *Acta Universitatis Danubius. OEconomica*, 13(2), 31–44. https://journals.univ-danubius.ro/index.php/oeconomica/article/view/3991/3956

Zumrah, A. (2015). How to enhance the impact of training on service quality? *Journal of Workplace Learning*, 27(7), 514–529. https://doi.org/10.1108/jwl-06-2014-0048

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Data are available from the authors upon request.

Coauthor contributions

Dijana Štrbac: Conceptualization, Methodology, Formal Analysis, Validation, Writing – Original Draft, Supervision. **Mihailo Paunović**: Methodology, Data Curation, Formal Analysis, Writing – Review & Editing, Supervision. **Dejana Pavlović**: Writing – Original Draft, Writing – Review & Editing.

Uticaj demografskih karakteristika na efektivnost programa obuka u javnoj upravi

PROŠIRENI SAŽETAK

Programi obuka u javnoj upravi su od suštinskog značaja za efikasno i efektivno upravljanje, nesmetano prilagođavanje promenama i podsticanje kontinuiranog profesionalnog razvoja. Oni poboljšavaju donošenje odluka, osiguravaju efikasnu implementaciju politika i jačaju etičke standarde i odgovornost. Pored toga, obuke podstiču inovativnost, povećavaju angažovanje lokalne zajednice, pripremaju državne službenike za krizne situacije i doprinose ostvarivanju ciljeva održivog razvoja.

U radu se ispituje uticaj demografskih karakteristika na efektivnost programa obuka u javnoj upravi u Republici Srbiji. Cilj rada je procena efektivnosti programa obuka u javnoj upravi i analiza uticaja faktora kao što su starost, pol, nivo obrazovanja, godine radnog iskustva i pozicija u organizaciji na rezultate obuka. Efektivnost je posmatrana kao mera u kojoj programi obuka doprinose postizanju planiranih ciljeva. U pitanju su različiti ishodi učenja, uključujući promene u znanju, sticanje veština, promene u stavovima i promene u ponašanju.

Istraživački uzorak čini 1.040 zaposlenih iz sektora javne uprave u Srbiji koji su učestvovali u najmanje jednom programu obuke u organizaciji Nacionalne akademije za javnu upravu u 2022. godini. Primarni podaci su prikupljeni anketnim istraživanjem sprovedenim u oktobru 2023. godine. Statistička analiza je obuhvatila deskriptivnu statistiku, procenu pouzdanosti i statističke testove za identifikaciju razlika između demografskih grupa. Prikupljeni podaci su obrađeni i analizirani korišćenjem Statističkog softvera za društvene nauke (SPSS).

Rezultati istraživanja su pokazali da starost, pol i stepen obrazovanja nemaju uticaja na efektivnost programa obuka u javnoj upravi. S druge strane, postoje statistički značajne razlike u oceni efektivnosti između učesnika sa različitim nivoima profesionalnog iskustva i zvanja u javnoj upravi. Sveobuhvatnim istraživanjem interakcije između demografskih karakteristika i efektivnosti programa obuke, ovaj rad doprinosi unapređenju naučnog razmatranja rezultata učenja zaposlenih u javnoj upravi. Osim toga, empirijsko istraživanje nudi i praktične uvide relevantne za optimizaciju dizajna i sprovođenja programa obuka u javnoj upravi u Srbiji i šire. Najvažnije preporuke za kreatore politika odnose se na prilagođavanje programa obuke profesionalnom iskustvu zaposlenih, diferenciranje obuka za različite poslove u organizaciji, uključivanje zaposlenih sa značajnim radnim iskustvom u sprovođenje programa obuka i stvaranje inkluzivnog okruženja za obuke. Ovi nalazi imaju implikacije na poboljšanje rezultata profesionalnog razvoja i jačanje organizacionih kapaciteta koji su ključni za promovisanje održivog upravljanja i razvoja.

KLJUČNE REČI

javna uprava, demografske karakteristike, program obuke, efektivnost obuke

On the economic sustainability of Russian households at a socially acceptable level

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ABSTRACT

The paper is focused on determination and analysis of the thresholds for socially acceptable criteria of economic sustainability for households of different composition. The paper shows the key methodological aspects of determining the economic sustainability of households and its socially acceptable criterion. The main macroeconomic conditions for the formation of economic sustainability of households in Russia are also considered. Besides, the characteristics of employment for the people living in economically (un)sustainable households have been identified and analysed. The basis for the household economic sustainability, according to the authors, is self-sufficiency that enables using its own resources to support the socially acceptable level of consumption of socially significant goods and to accumulate savings subject to the resources' limitations and social risks. The socially acceptable consumer budget is used as the criterion for identification of the household economic sustainability, including the specifics of the consumption of the main socio-demographic groups of the population (population of working age, pensioners, children) and savings in consumption due to cohabitation. Differentiating features of the threshold values for the households of different types are determined in the paper. It is shown that the threshold values of the criterion for economic sustainability of households per household member decrease as the number of minor children per 1 adult increases. However, the income position of such households worsens and, in conditions of unsustainability, the income deficit increases relative to the threshold value. It is revealed that there are no unemployed individuals among the people from economically sustainable households (unlike those living in economically unsustainable ones), while the situation regarding the share of the employed and the level of income from employment varies, depending on the composition of households, indicating different "strategies" for achieving sustainability of their households.

KEYWORDS

household, economic sustainability, the threshold of economic sustainability, socially acceptable consumer budget, Russia

1 INTRODUCTION

The issue of sustainability is part of the global agenda. Under the UN 2030 Agenda for Sustainable Development, the achievement of the Sustainable Development Goals is monitored in both developed and developing countries (SDSN 2015). Sustainability in this context means to meet "the needs of the present without compromising the ability of future generations to meet their own needs" (UNECE 2014: 96). At the same time, it is emphasized that sustainability needs to be measured not only at the countries' level, but also at other levels, including the household level (UNECE 2014). Micro-level sustainability can be interpreted in different ways, for example, in the context of sources (resources, activities required to support them) and ability to "cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation […]" (Chambers and Conway 1991: 6; Natarajan et al. 2022).

Outlining the research field, it is possible to specify several "vectors" for the development of research issues that correlate with the topic of this study. One of these "vectors" is related to employment, which is essential for the formation of households' income sources and the sustainability of their position. The availability and level of income from employment determine (taking into account the number of dependents) the ability of households to achieve self-sufficiency, without engaging social support (e.g., to overcome poverty) (Rzhanitsyna 2019; Bobkov and Odintsova 2023). In this context, the employment situation in households will affect their position. Implementation of job decision can be influenced by a different circumstances (e.g., Jensen and Blundell 2024; Chen, Kuo and Zhao 2023; Martinoty 2022; de Brauw et al. 2015), that can be divided into "internal" and "external" ones. The first group can include, e.g. the number of people employed in a household and the level of their income from employment, availability and level of other incomes in the household, and the life cycle of the household (e.g., a young family with a child), etc. "External" circumstances are related to socio-economic policies in the field of labour and income support (the amount of scholarships, pensions, benefits), as well as the proposed employment conditions (working hours, wages, etc.).

The employment situation in households is reflected in their financial status. Research results indicate that jobless households are at a risk of relative income poverty or deprivation, which varies depending on the household type (de Graaf-Zijl and Nolan 2011). With the increase in the number of unemployed, the position of households is expected to worsen (Korchagina and Prokofieva 2023). Some household types are more vulnerable: large families (e.g., Grishina 2024) with a higher burden for workers; single-parent families, in which the burden falls entirely on one parent, where the risks are higher in the families of single mothers (e.g., Korchagina and Prokofieva 2023; Calegari, Fabrizi and Mussida 2024; McErlean and Glass 2024). In addition, for women after childbirth, there are barriers in returning to employment, related to the break in employment (maternity leave and child care) (e.g., Pishnyak and Nadezhdina 2020).

The quality of employment also plays a role in shaping the household sustainability. As follows from the research results, the fact of having employment

may not be enough if this employment is precarious. It was revealed that the risks of negative consequences for the households (material deprivation) are observed in the cases of job instability and temporary jobs (Figari 2012; Cheung, Chan and Chou 2019; Pérez-Corral, Bastos and Casaca 2024). Precarious employment, due to the lower income it generates for households, is associated with a less favourable financial situation of such households (e.g., Lewchuk et al. 2015). As a result, the economic sustainability of the precarious workers' households decreases, while the consequences differ by the category of workers – for the older age group and the youth, the situation is worse compared to the middle age group (Bobkov and Odintsova 2023), which may be important in terms of "combination" workers in certain households. Besides, as noted in (Toshchenko 2022), precarious employment is increasingly spreading into the way of life and lifestyle of workers.

Due to various problems arising in the field of employment (such as unemployment, low income from employment, etc.), as well as other life situations (disability, loss of a breadwinner, etc.), the share of social transfers in the total household income may increase. Their impact on the "economy" of households is one of the key "vectors" of research. As follows from the papers, social transfers play an important role in reducing the risks of poverty, especially in households with children, where some household members are obviously unable to enter the labour market (e.g., Korchagina and Prokofieva 2022; Andreeva, Bychkov and Feoktistova 2021). The reduction of poverty risks is also determined by the number and amounts of various social benefits (such as family, children, old-age, survivor, and unemployment benefits, etc.) that a household receives (e.g., Bárcena-Martín, Blanco-Arana and Pérez-Moreno 2023; Bonanno, Chies and Podrecca 2023). At the same time, an important research aspect is the "balance" between the social transfers received and employment activity, and their reflection in the "economy" of households (e.g., Nishiyama 2019; Kaygusuz 2015).

The resources available to households determine their ability to meet needs at various levels corresponding to a certain model of living standards (ranging from poverty to high security). In this context, the sustainability of the household position can be considered in the (static, structural) aspect of its ability to overcome the conditions of poverty and low security, meeting the needs at a higher level, for example, close to the standards of the middle-income (Bobkov and Odintsova 2023). In this sense, the problem considered in this paper is linked with a large segment of research devoted to issues of socio-economic stratification, based on the assessment of income, expenses, consumption, and other criteria for identifying the socio-economic structure as a whole, or its particular strata (layers, classes) (e.g., Milanovic and Yitzhaki 2002; Ravallion 2010; Atkinson and Brandolini 2013; Chen and Ravallion 2013; Gorshkov and Tikhonova 2016; Bobkov 2018; Anikin and Lezhnina 2018). There is also a "dynamic" aspect of the household position associated with its stability, i.e. the ability to maintain it at a certain level. In this context, the "vector" of research related to the dynamics of socio-economic situations throughout life and across generations is of interest (e.g., Vosters and Nybom 2017; Gentili and Hoekstra 2021; Hsu 2021; Colagrossi, Geraci and Mazzarella 2023; Rohenkohl 2023).

The aim of the research is to determine the methodological foundations for the formation of a socially acceptable criterion for the economic sustainability of households, analysing its thresholds for different types of households, taking into account savings on consumption and dependency burden, as well as identifying the employment characteristics of the persons living in economically (un)sustainable households.

Empirically, the study focuses on the situation in Russia, but the methodological solutions used by the authors are not spatially limited and can be applied in further studies to identify the situation in other countries (taking into account adaptation to national peculiarities), or to develop cross-country comparisons.

The instrumental basis of the study is the consumer budget, which is well-established for the research and social policy purposes (e.g., Goedemé et al. 2015; Rzhanitsyna 2019; Penne, Cornelis and Storms 2020; Bobkov, Gulyugina and Odintsova 2020; Deeming 2020). This research complements the practice of developing and using this expert analytical tool, which operates not only with a minimum budget standard associated with limited resources, but with a budget standard of a qualitatively different, higher, socially acceptable level.

2 METHOD

2.1 THEORETICAL AND METHODOLOGICAL BASIS OF THE RESEARCH

The Russian research methodology concerning household economic sustainability is based on fundamental statistical assumptions, which define a household as a group of persons "cohabiting in the same living residence or its part jointly ensuring for themselves food and all necessities for living" (Rosstat 2008). The household sustainability, in its specific systemic meaning, refers to the ability to support the functioning in the presence of stabilizing and destabilizing factors (Yarin 2014: 14). In relation to households, functioning is generally considered from the viewpoint of satisfying the needs "in food, housing, health care, mobility, education, social security, bringing up children, and safety" (Golubova 2012: 25).

Amartya Sen, an Indian economist, evaluated the interconnection between consumption and well-being as considered from the perspective of functioning and possibilities, emphasizing that "having certain commodities at one's disposal is not enough to generate well-being. People should be free and able to use these commodities in such a way that their needs are truly satisfied" (UNECE 2014: 6). Representatives of the European statistics, having considered the consumption as a subsystem of general human well-being, draw attention to the importance of the aspects of the current households' well-being and its sustainability.

In the post-Soviet Russia, the economic situation of low-income households is maintained based on the established state guarantees of minimum monetary income, using the subsistence minimum as a minimally acceptable consumer budget[1] (Ukaz Prezidenta Rossijskoj Federacii No. 210 1992; Federal'nyj zakon No. 134-FZ 1997).

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[1] The consumer budget is define as "a set of concrete income and expenditures of the consumers in natural and monetary terms" and serves as "a key normative and analytical tool for the assessment, forecasting and regulation of sizes, structure and dynamics of quality of life and living standards and the system of distribution relations" (Bobkov et al. 2007: 191).

The use of consumer budgets is a well-known practice (Deeming 2020; Saunders and Bedford 2017). Consumer budgets can be aimed at meeting the needs associated with living standards at various levels, ranging from poverty to high security. This tool is most developed for low-income and poor groups of the population: with the minimum financial resources required to participate adequately in society (e.g. Goedemé et al. 2015), with incomes below poverty threshold and determining the right to social assistance (e.g. Guggisberg, Häni and Fleury 2013), etc. These budgets take into account different needs (such as food, clothing, health, etc.), target various types of households in terms of their type (a single person, single parent with one child, couple without children, couple with two children, etc.), consider household composition (e.g., a 40 year-old man, 35 year-old woman, boy of about 10, girl of about 14), and account for the economic activity of adults (e.g., employed in low-paid jobs, unemployed, not in the labour force), etc. Meeting the needs of such budgets is limited to a minimum level: minimum cost of healthy eating, minimum level of spending for personal care, modest but adequate dwelling which meets some minimum quality criteria, minimal level of leisure activity and social participation, etc. (Goedemé et al. 2015; Saunders and Bedford 2017).

In Russia, the methodology for determining the subsistence minimum (SM) until 2021 was associated with the formation of its two components – the minimum consumer basket (the first component, which includes minimum sets of food, non-food products and services) and mandatory payments and fees (the second component). The regular review (envisaged once in five years) of the consumption volumes and the composition of the consumer basket for the SM was accompanied by partial adjustments, taking into account the changes in the actual consumption patterns of the low-income population and the development of scientific recommendations on healthy lifestyle issues.

The methodology for forming a minimum normative consumer basket has aroused great scientific interest and many a discussion. In 2013, a transition was made from the normative approach to determining the sets of the minimum consumer basket to the normative and statistical one, in which only the food set remained normative (accounting for 50% of the cost of the minimum consumer basket), while the cost of the sets of non-food products and sets of paid services was determined through calculations (each accounting for 25% of the cost of the minimum consumer basket) (Federal'nyj zakon No. 227-FZ 2012). Since 2021, the average value of the SM per capita in Russia as a whole has been determined based on the ratio of 44.2% to the average per capita money income (Federal'nyj zakon No. 134-FZ 1997). Since 2022, this provision has been temporarily suspended and the all-Russian SM has been established by the federal law on the federal budget. The official calculations of the poverty line still use the SM calculated according to the 2013–2020 methodology. The value of the indicator for the 4th quarter of 2020 is indexed in accordance with the level of inflation.

Despite the discussions that have unfolded in the scientific community about the change in the methodology for determining the SM in 2021, scientists have acknowledged the shortcomings of the previous methodology (Bobkov et al. 2022). In the conditions of rising

incomes, socio-economic differentiation, and risks to living standards (Bobkov et al. 2024), the focus of Russian scientists has shifted to higher quality-of-life standards (than the SM) and economic sustainability (e.g., Bobkov et al. 2007; Ochirova, Bobkov and Grigorieva 2008; Rzhanitsyna 2019; Bobkov, Loktyukhina and Shamaeva 2022).

The methodological approach used in this paper to determine the economic sustainability of households is based on a socially acceptable consumer budget, which reflects a higher quality of life than the SM (by accounting for a wider list of socially significant needs). It corresponds to modern conditions for maintaining a healthy lifestyle and human development, but with limited income. This approach is based on scientific developments related to consumer budgets of different income levels, including socially acceptable consumer budget.[2] The basic one is the SM, the methodology of which is evolving to take into account the increasing availability of consumer goods. For scientific purposes, and to ensure comparability of dynamic time series, researchers carry out their own calculations of the SM according to the methodology of 2013–2020.

Indicative of a socially acceptable quality of life, based on the sample surveys of household budgets conducted by Rosstat[3], are the results of households' assessment of their financial situation, which are distributed among 20% income groups. The group with socially acceptable economic opportunities includes those who provided the following response – "there is enough money for food and clothes, but they cannot afford to buy durable goods." The share of such responses among households as a whole (49.7% in 2022, 48.7% in 2023 (Rosstat 2024a) dominates other responses. The 4th quintile group is the representative, in which most of the answers were also concentrated (46.4% in 2022 and 46.0% in 2023), close to the average values. This makes it possible to consider household consumption of the 7th-8th decile groups in a 10% distribution, depending on the level of disposable resources, as characteristics of a socially acceptable lifestyle.

The representativeness of the 4th quintile income group for the average values of the indicator can also be traced according to the macroeconomic picture of the distribution of the total volume of monetary income by 20% of the population groups. The average per capita income in the 4th quintile group (53906 RUB in 2022, 60277 RUB in 2023) is closest to the average for Russia as a whole (47386 RUB and 53139 RUB, respectively) (see Table 1 below).

The formation of a socially acceptable consumer budget is based on the following methodological principles (Bobkov et al. 2019: 16—22):

1) the principle of matching current income to the satisfaction of needs for the basic socially significant consumer goods and services involves limitations

[2] The monitoring surveys of the income and living standards of the population in Russia, currently being carried out by the scientists at the Institute of Economics of the Russian Academy of Sciences, serve as an example of the scientific work on the development of the consumer budgets (Bobkov and Gulyugina 2023). The methodological basis for construction of the consumer budget system as a scientific tool was developed in 1990-s by the scientists from the All-Russian Center for Living Standards (under the guidance of Pr. V.N. Bobkov). With the economy growth and consumer market saturation, the original studies have been further developed and are being updated (Bobkov and Gulyugina, 2020: 15).

[3] The survey is shifted towards less well-off households.

on the purchase of expensive items and paid services that require significant additional financial investments;

2) the principle of the normative method for forming the sets of food (taking into account the official norms of physiological energy and nutritional needs for various groups of the Russian population, vitamin and mineral complexes, and eating out), as well as non-food products and services (using an expert method, which takes into account current widespread needs);

3) the principle of continuity in methodology for updating the composition and consumption standards;

4) the principle of self-sufficiency provides for the payment of housing and utilities without external subsidies. It also includes financial self–insurance through the formation of targeted savings to maintain a lifestyle in unforeseen or unfavourable circumstances by creating a financial reserve, purchasing passenger transport (passenger car), and improving housing conditions. These components are calculated based on the analysis of the existing characteristics, such as, for example, the period of job search, the cost of housing, etc.

This article presents calculations of the socially acceptable consumer budget for 2022, based on the latest published annual data from the sample surveys conducted by Rosstat during the calculation period. Previously, calculations of the cost of a socially acceptable consumer basket were carried out taking into account the 2018 prices. In particular, they showed that the cost of a socially acceptable consumer basket based on the normative sets in Russia as a whole (average monthly per capita) was 3.24 times higher than the cost of the consumer basket of the SM. The cost of home food was 1.4 times

higher, the non-food products cost was 2.39 times more, and the cost of services was 6.05 times higher than in the current consumer basket of the SM (Bobkov et al. 2019: 22).

Due to the specificities of consumption patterns by age, the consumption habits of the working age population, unemployed pensioners, and children (up to and including 15 year-olds, in accordance with the methodology of the SM) are taken into account when forming the socially acceptable consumer budget. Two stages of the aggregation of the consumer budgets for different population categories are used at the household level. At the first stage, the consolidated consumer budget for the specific household is calculated based on its demographic portrait and numeric composition. At the second stage, the consolidated consumer budget is transformed into the equivalent socially acceptable consumer budget, where the savings in consumption due to cohabitation are accounted for, including the equivalence scales (Bobkov, Gulyugina and Odintsova 2019: 13).

Savings on consumption are realized when living together, for example, through the shared use of dishes and furniture, household equipment, etc. This arrangement lowers the overall cost of the consumer budget. In world practice, equivalence scales are used for various purposes, particularly for statistical analysis, such as measuring poverty by the US Bureau of Labour Statistics or the OECD (Bobkov, Gulyugina and Odintsova 2019: 12–14). In Russia, the equivalence scale is used in scientific research. This paper utilizes the author's equivalence scale, which has been developed during the implementation of a pilot project aimed at strengthening the targeting of social support for poor families with children.

The household *economic sustainability* is defined as its ability, through income from labour activity and other sources, to maintain the satisfaction of needs at a level not lower than the level of socially acceptable consumer budget for the household, including savings in consumption due to cohabitation.

The households with an income level lower than the threshold value are *economically unsustainable*. The depth of unsustainability is defined by the amount of the income deficit, which is the difference between the actual household income and the corresponding threshold criterion.

2.2   THE RESEARCH TASKS

This research aims to consider the following issues:

(I)   Characteristics of the main macroeconomic conditions for the formation of economic sustainability of Russian households;

(II)   Analysis of the level and composition of thresholds of the socially acceptable criteria regarding the economic sustainability of the main socio-demographic groups and households of different composition, taking into account savings on consumption;

(III)   Evaluation of the household income deficit in the conditions of economic unsustainability at a socially acceptable level;

(IV)   Identification of the employment characteristics of individuals living in the economically sustainable and unsustainable households.

The hypothesis is as follows: the threshold values of the socially acceptable criterion for economic sustainability

of households per household member decrease as the number of minor children per 1 adult increases. However, the income position of such households worsens. In the conditions of unsustainability, the income deficit relative to the threshold value increases.

2.3   TYPES OF HOUSEHOLDS

This research focuses on the households with children (up to and including 15 year-olds) and considers their following types and compositions:

Type I – single-parent families: 1 adult and 1 child, 1 adult and 2 children,

Type II – two-parent families: 2 adults and 1 child, 2 adults and 2 children,

Type III – family with many children: 1 adult and 3 children, 2 adults and 3 children.

The number of children (up to three) in households is determined in line with the actual situation. According to the data of the All-Russian Population Census in 2020, the share of the family units with 1–3 children was 97.9% of the total number of family units with children under the age of 16 (Rosstat 2020).

2.4   DATA

The macroeconomic data, including the cash income, income inequality, unemployment level, and monetary poverty published by the Federal State Statistics Service of Russia (Rosstat), formed the information database for the research. Also included are the results of the sample surveys of the labour force[4] conducted by Rosstat, as well as the results of the sample surveys of

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[4] The results of the sample surveys of the labour force are published on the Rosstat web site (Rosstat 2024c).

socio-demographic problems (Rosstat 2024b) (comprehensive monitoring of living conditions, statistical survey of income and participation in social programs, and the sample survey of the dietary structure of the population), household budgets (Rosstat 2024a), which reveal the overall picture of the financial situation of the population, as well as the consumption structure and living conditions.

Additionally, the data from 31th round[5] of the Russia Longitudinal Monitoring survey (RLMS-HSE) were used. The RLMS-HSE is a series of nationally representative surveys monitoring the health and socio-economic situation of households and individuals in the Russian Federation.[6] For the analysis, the individuals aged 15 years and older living in households with children of the considered composition were selected from the RLMS-HSE dataset (RLMS-HSE 2023): 1 adult and 1 child (7.3%), 1 adult and 2 children (2.6%), 2 adults and 1 child (44.8%), 2 adults and 2 children (35.8%), 1 adult and 3 children (0.5%), 2 adults and 3 children (9.0%) (N=1333). The data were weighted to correct for the population parameters (gender, age, type of settlement) by the weight variable (included in the RLMS-HSE dataset). For the persons from these households, the employment characteristics were taken into account: a) availability of employment (employed, unemployed); b) the ratio of income from basic em-

ployment to the threshold of economic sustainability (< 50% or ≥ 50%). These characteristics were considered based on the economic sustainability of the households: a) those households with money incomes below the threshold of economic sustainability; and b) those households with money incomes not lower than the threshold of economic sustainability.

The variational series of individual statistical parameters cover the period from 2019 to 2023. The analytical work was performed using the economics-statistics analysis methods.

3 RESULTS

3.1 MAIN MACROECONOMICS CONDITIONS FOR THE FORMATION OF ECONOMIC SUSTAINABILITY OF HOUSEHOLDS IN RUSSIA

The opportunities forming the conditions for the household economic sustainability are defined by the level and trend of Gross Domestic Product (GDP), which is the key indicator of a country's economic resources. According to Russian statistics, the GDP per capita at purchasing power parity (PPP) is characterized by the growing trend. In 2023, it increased by 42.3% compared to 2019, reaching 44071 USD (Table 1). At the same time, the volume index of the GDP per capita, excluding the price factor, showed a reduction of 2.5% in 2020 during COVID-19 and 0.9% in 2022. In contrast, in other years of the period under review, the indicator grew by more than 2%, with 2021 being particularly successful at +6.2%.

The main source of the Russian household income is the labour remuneration. Within the structure of the total volume of money income of the population,

[5] Collected in the period 09.2022-01.2023, the most relevant at the time of the analysis.
[6] "Russia Longitudinal Monitoring Survey, RLMS-HSE", conducted by National Research University "Higher School of Economics" and Ltd "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Centre of Theoretical and Applied Sociology of the Russian Academy of Sciences (RLMS-HSE 2023).

labour remuneration accounted for 57.2 − 60.2% in 2019–2023, while the share of income from entrepreneurial and other production activities ranged from 5.2 to 6.7%. Other sources are social payments (18.5–21.4%), property income (5.1–7.2%), and other income (8.1–12.9%) (Rosstat 2024h).

Average monthly nominal accrued wages of employees for the economy as a whole in 2023 increased by 56.4% in 2023 compared to 2019, reaching 74854 RUB. The unemployment rate for the population aged 15 to 72, according to sample surveys of the labour force conducted by Rosstat, was comparatively low in 2023 – below 6%, with an actual rate of 3.2% (a decrease of 1.4 percentage points compared to 2019) (Table 1).

Nominal average per capita money income in Russia has been steadily rising. In 2023, compared to 2019, it increased by 50.8% to 53139 RUB per month (Table 1).

The World Bank divides countries into categories, based on the income level: high income, upper-middle, lower-middle and low. In 2023, it included Russia into the list of countries with the high income level, while in 2022, Russia was in the list of the countries with the upper-middle income level (Anisimova 2024).

Serious risk factor for the household economic sustainability is inequality in money income. According to the Russian statistics on distribution of the population by 20-percent groups, the first three lower income groups have the income per capita which is lower than in Russia as a whole. At the same time, the income equalization process is observed. During the period from 2019 to 2023, the income of the lowest 20-percent groups showed outstripping growth rates. For example, while in the 1st 20-percent group (with the lowest income) the growth rate amounted

Table 1 The Russian Federation: GDP, income, unemployment, inequality from 2019 to 2023

	Years					Growth, % (2019=100%)
	2019	2020	2021	2022	2023	
GDP per capita at PPP, USD	30964	31491	38938	40999	44071	+42.3
GDP per capita volume indices, as a percentage to the previous year	102.1	97.5	106.2	99.1	103.9	+6.6
Average monthly nominal accrued wage of employees of organizations for the economy as a whole, RUB/month	47867	51344	57244	65338	74854	+56.4
Unemployment level for the population of 15–72 years of age, %	4.6	5.8	4.8	4.0	3.2	-1.4 p.p.
Average per capita money income of population, RUB/month	35233	35934	39934	47386	53139	+50.8
Incl. for 20-percent groups of population						
1 group (with the lowest income)	9375	9817	10778	13387	14564	+55.3
2 group	17662	18317	20200	24672	27142	+53.7
3 group	26472	27264	30162	36397	40365	+52.5
4 group	39846	40747	45228	53906	60277	+51.3
5 group (with the highest income)	82811	83523	93301	108567	123349	+49.0
Gini index (income concentration index)	41.2	40.6	40.9	39.8	40.5	

Source: compiled based on Rosstat 2023: 113; Rosstat 2024d, 2024e, 2024f, 2024h.

Table 2 The Russian Federation: monetary poverty indicators from 2019 to 2023

	Years					Change (2019=100%)
	2019	2020	2021	2022	2023	
The share of the population with money income below the subsistence minimum level (2019–2020) / poverty line (2021–2023), established at the national level for the population as a whole	12.4	12.2	11.1	9.0	8.5	-3.9 p.p.
The share of the population with the average per capita money income below the international poverty line subject to the Purchase Power Parity						
1.90$ /day	0	0	0	0	-	-
3.20$ /day	0.1	0.1	0.1	0	-	-0.1 p.p.
5.50$ /day	0.8	0.6	0.6	0.3	-	-0.5 p.p.
10.00$ /day	5.1	4.3	4.5	2.7	-	-2.4 p.p.

Source: compiled on the basis of Rosstat 2024e.

to 55.3% (to 14564 RUB), in the 5th 20-percent group (with the highest income) it was 49.0% (to 123349 RUB). The difference in the average per capita income between the highest and lowest 20-percent groups amounted to 8.5 times in 2023 and 8.8 times in 2019.

The Gini index (income concentration index where «0» indicates full equality, «1» indicates absolute inequality) has ranged from 39.8% to 41.2% in 2019–2023 (Table 1). Compared to other countries, the indicator for Russia, based on the 2019–2021 data, was about the same as that of the United States (39.8% in 2021) and Turkey (41.9% in 2019), noticeably lower than in, for example, Mexico (45.4% in 2020), Brazil (52.9% in 2021), or Chile (44.9% in 2020), and higher than in Italy (35.2% in 2020), Spain (34.9% in 2020), China (37.1% in 2020), and India (34.2% in 2021) (Rosstat 2023: 123–124). The lowest values of the indicator (ranging from 22.5% to 24.05%) for the period 2009–2022 were in Kyrgyzstan, Slovakia, Armenia, Slovenia, while the highest value was in the Republic of South Africa (63.0%) (Rosstat 2023: 119–120).

The income inequality problem is closely linked to that of monetary poverty. Despite the gradual reduction in the poverty rate, the problem remains relevant. Based on the national criterion, the share of the population with the money income below the poverty line in Russia in 2023 amounted to 8.5%. In 2019, the share of the population with the income below the subsistence minimum level was 12.4% (Table 2).

The measurement of the Russian monetary poverty using the international lines based on purchasing power parity (Table 2) shows that in Russia, in 2019–2022, there was no extreme poverty problem calculated by the criterion of 1.9 USD per person per day[7] (for the poorest countries). In 2022, for the first time, "zero" poverty was recorded at the international line of 3.2 USD per person per day (for countries with lower-middle income) (RIA Novosti 2018). According to the higher international poverty margins of 5.50$ per day (for the countries with

[7] In 2022 the World Bank adopted the new extreme poverty indicator – at the level of 2.15 USD per person/day instead of 1.90 USD (The World Bank 2022).

the upper-middle income level) (RIA Novosti 2018), and 10.00$ per day (for the countries with higher income levels), the poverty problem in Russia still remains. However, the trend towards reduction of the indicator allows for hope of the positive results in the coming years. So, from 2019 to 2022, the share of the population with the income below 5.50$ per day amounted to less than 1% and by 2022 it decreased to 0.3% (by -0.5 p.p. against 2019), while with the income below 10.00 USD/day, it equalled not more than 5.1%, and by 2022 reduced to 2.7% (a decrease of 2.4 percentage points compared to 2019).

Threats to economic sustainability, which can be caused by unforeseen adverse life circumstances (job loss, illness, etc.), are carried by the observed interest of households in bank loans related to debt load. According to the Bank of Russia, the number of borrowers in the country with three or more loans in the banks increases, while credit cards are gaining popularity (Bank of Russia 2023). However, at the same time there is a growing interest among the households in financial saving strategies, enabling them to ensure their own economic security due to the saved resources. In 2022, household savings amounted in average to 13.9% of disposable resources. As prosperity increases, so does the amount allocated to savings. Thus, 2.6 % of savings made in their total volume for the households belonged to the 1st 20-percent group (with the lowest disposable resources) in 2022, and 64.3% belonged to the 5th 20-percent group (with the highest disposable resources) (Rosstat 2024h).

3.2 THRESHOLD VALUES FOR A SOCIALLY ACCEPTABLE CRITERION OF ECONOMIC SUSTAINABILITY

The calculation of the socially acceptable consumer budget (SACB) for the main social and demographic groups of the population shows that in 2022 it amounted to the following: for the population of working age – 61725 RUB/month, for pensioners – 36183 RUB, for children – 38673 RUB (Table 3). The SACB differ not only in terms of level, but also in terms of composition. The SACB components for the working age population are the consumer basket (88.6%) and compulsory payments and dues (tax component) (11.4%). The SACB for the pensioners and children coincides with the cost of the consumer basket, while the compulsory payments and dues are lacking.

In the SACB consumer basket (SACB CB), the cost of the set of food for the population of working age amounted to 18425 RUB/month (33.7% in the SACB CB); it is lower for pensioners and

Table 3 The Russian Federation: level and basic composition of the SACB of the main socio-demographic groups (population of working age, pensioners, children) in 2022

	Population of working age	Pensioners	Children
SACB, RUB/month	61725	36183	38673
Incl. (%)			
Consumer basket (SACB CB)	88.6	100.0	100.0
Compulsory payments and dues	11.4	0	0

Source: Authors' calculation of the SACB based on Rosstat 2024g, 2024i.

children – 10632 RUB (29.4%) and 11080 RUB (28.7%) respectively (Table 4). The share of the cost of food sets is significantly less than in the structure of the SM in the 2013–2020 methodology (50% is the cost of a set of food), which is evidence of a higher standard of living. As you know, with an increase in income, the share of food costs decreases (Engel's law).

The cost of the non-food goods for children is higher, amounting to 8523 RUB per month (22.0% of the consumer basket of the SACB) compared to 7268 RUB (13.3%) for the working age population and 7450 RUB (20.6%) for pensioners. For children, higher standards of clothing and shoes, as well as educational goods, are taken into account. For pensioners, increased needs for medicines and medical services are taken into account.

Services dominate the SACB consumer basket. The cost of the services set for the working age population is much higher – 28984 RUB per month (53.0% in the SACB consumer basket) compared to 18101 RUB (50.0%) for pensioners

and 19070 RUB (49.3%) for children. The expenditures of the bank services for savings are included in the services set. They amounted to 40.4% of the services set's cost for the working age population, 21.4% for pensioners and 20.4% for children. In the calculations, the savings expenditures include three areas: financial reserve for self-insurance in case of social risk occurrence, savings for the car purchase and housing for the future, taking into account the growing up of children.

On a per capita basis, the value of the SACB consumer basket increased by 52% in 2022 compared to 2018. At the same time, the share of the cost of a set of food products decreased by 2.9 percentage points, the share of non-food products by 2.4 percentage points, while the share of the cost of a set of services increased by 5.3 percentage points. This indicates that the consumer interest in the service sector was developing quite actively during this period. As of January 1, the population increased compared to January 1, 2018, but slightly – by 0.07% (to 146980

Table 4 The Russian Federation: level and structure of the SACB Consumer Basket for the main socio-demographic groups (population of working age, pensioners, children) in 2022

	Population of working age	Pensioners	Children
Consumer Basket (SACB CB), RUB/month	54676	36183	38673
Incl.			
Food	18425	10632	11080
Non-food goods	7268	7450	8523
Services	28984	18101	19070
Incl. services on savings	11706	3973	3886
Consumer Basket (SACB CB), %	100.0	100.0	100.0
Incl.			
Food	33.7	29.4	28.7
Non-food goods	13.3	20.6	22.0
Services	53.0	50.0	49.3
Incl. services on savings in the cost of a set of services	40.4	21.4	20.4

Source: Authors' calculation of the SACB based on Rosstat 2024g, 2024i.

thousand people). Meanwhile the share of the working-age population increased by 1.4 percentage points (to 57.4%), the share of the working age population decreased by 1.4 percentage points (to 24.0%), and the share of people under the working age (0–15 years) remained at the level of 18.6%.

Using families with adult working age persons and children younger than 15 as an example, Table 5 shows the differences in the size of family's socially acceptable consumer budget. In a family with 1 adult and 1 child, it will amount to 100398 RUB/month, for a family with 2 adults and 1 child – 162123 RUB, and for a family of 2 adults and 3 children – 239469 RUB.

The savings in the consumption due to cohabitation, calculated on the basis of the equivalence scale, are presented in Table 5. As a result of its use, the socially acceptable consumer budget is transformed into the equivalent socially acceptable consumer budget serving as the threshold criterion when evaluating the household economic sustainability.

For example, for a family with 1 adult and 1 child, the equivalent socially acceptable consumer budget went down to 92868 RUB (-7530 RUB), for a family of 2 adults and 1 child to 149153 RUB (-12970 RUB), and for a family of 2 adults and 3 children to 207859 RUB (-31610 RUB). The amount of savings on consumption in large families is the most significant, exceeding 13% in the examples under consideration, while in the single-parent and two-parent families, it ranged from 7.5% to 11.0%.

3.3 INCOME DEFICIT IN ECONOMICALLY UNSUSTAINABLE HOUSEHOLDS

The average per capita socially acceptable consumer budget for Russia as a whole, according to the authors' calculations, amounted to 51313 RUB/month in 2022 with an average per capita money income of 47386 RUB/month, as per statistics data (Rosstat 2024h). The income deficit amounted to 3927 RUB or 7.7%.

Table 5 The Russian Federation: SACB without and including (SACB equiv.) the savings in consumption for the families of different types and composition in 2022

	SACB of a family without savings in consumption*, RUB/month	SACB equiv. of a family with savings in consumption*, RUB /month	Equivalence scale **	The amount of savings on consumption, %
Single-parent family				
1 adult+1 child	100398	92868	1.85	-7.5
1 adult+2 children	139071	123773	2.67	-11.0
Two-parent families				
2 adults+1 child	162123	149153	2.76	-8.0
2 adults +2 children	200796	178708	3.56	-11.0
Families with many children				
1 adult +3 children	177744	153749	3.46	-13.5
2 adults +3 children	239469	207859	4.34	-13.2

Notes: * Authors' calculations. Adults include the working age persons. The SACB for a family without savings in consumption is defined as an arithmetic sum of the SACB of all family members with accounting for its demographic portrait. The SACB equiv. is calculated using the equivalence scale. ** *Source:* Bobkov, Gulyugina and Odintsova 2019: 13.

Table 6 The Russian Federation: the income deficit of the economically unsustainable families in 2022

Family composition*	Dependency burden**	Money income, RUB/month***		SACB equiv. RUB/month****		Income deficit*****, %
		Family	Per capita	Family	Per capita	
Single-parent family						
1 adult +1 child	0.50	65338	32669	92868	46434	-29.6
1 adult+2 children	0.33	65338	21779	123773	41258	-47.2
Two-parent families						
2 adults+1 child	0.67	130676	43559	149153	49718	-12.4
2 adults +2 children	0.50	130676	32669	178708	44677	-26.9
Families with many children						
1 adult +3 children	0.25	65338	16335	153749	38437	-57.5
2 adults+3 children	0.40	130676	26135	207859	41572	-37.1

Note: * Adults include persons of working age who are employed by organizations. ** Authors' calculations. Indicator of the dependency burden was calculated as a ratio of the number of working adults to the total number of the families' members. *** The income of each adult corresponds to the average monthly accrued wage of the employees of organizations for Russia as a whole in 2022 (65338 RUB/month). **** Authors' calculations. ***** Income deficit is defined as the family SACB equivalent surplus over the family income.

At the household level, general picture, whether with or without income deficit, is formed in relation to the *equivalent* socially acceptable consumer budget that accounts for the savings in consumption and also includes the dependency burden. Table 6 shows the models of the families of different types and compositions, with adults working as employees in the organizations that offer the salaries corresponding to the average nominal accrued wage for employees in Russia as a whole in 2022 (65338 RUB/month (Rosstat 2024f). With accounting for dependency burden, the set conditions predefine the considered models of the families as economically unsustainable with incomes lower than the threshold criterion.

The data in Table 6 show that there is the most significant income deficit in the economically unsustainable families with a high dependency burden coefficient (to 0.33). In 2022, in such families, with 1 adult and 2 children, or 1 adult with 3 children, the income deficit in the given example amounted to 47.2–57.5%.

With the reduction of the dependency burden coefficient to 0.40–0.50, the income deficit was reduced to 26.9–37.1%. With the low dependency burden coefficient amounting to 0.67, the income deficit went down to 12.4%. This shows that with a decrease in the dependency burden coefficient (fewer adults per 1 child), families' risks to economic sustainability increase, and in the conditions of income deficit, this leads to an increase in the depth of unsustainability, worsening their situation. But this worsening is less severe, given the effect of savings on the consumption in the threshold values of the criterion of economic sustainability.

3.4 EMPLOYMENT CHARACTERISTICS FOR THE PERSONS LIVING IN THE ECONOMICALLY (UN)SUSTAINABLE HOUSEHOLDS

With labour remuneration as the main source of income (see Section 3.1), the employment situation in households can be considered as an important factor in the formation of their economic

position. In order to consider the situation from this perspective, taking into account the availability of data, the employment characteristics were identified for the persons living in economically sustainable and unsustainable households with children, based on household types and composition considered in this paper. Table 7 shows that there are no unemployed persons among the people living in economically sustainable households (B), while in the other group (A), the share of unemployed varies from 1.1% to 16.7%, taking into account the composition of the household. The situation with the share of employed is less clear and varies, depending on the type and composition of household. For example, in the case of a two-parent family with 1 child (III) and 2 children (IV), when it comes to the households' economic sustainability (B), the share of employed is 100% and 85.7% respectively, and with economically unsustainable households (A) – 86.1% and 85.8%.

The income from basic employment of the persons from the economically unsustainable households, (A) in most cases (from 75.6% to 100%, taking into account the type and composition of the household) are less than 50% of the economic sustainability threshold. In the economically sustainable households (B), the situation is different. In case of two-parent families (III, IV, VI), the ratio (share of persons with the employment income < 50%/≥ 50% of the economic sustainability threshold) is 50%/50% or 78%/22%. For single-parent families (I, II) – 0%/100% or 100%/0%.

4 DISCUSSION

The dynamics of the gross domestic product (GDP) in Russia, the most important macroeconomic indicator that determines the resource opportunities achieved in the society, creates favourable conditions for positive changes in the economic situation of households.

Table 7 Distribution of persons aged 15 and over living with children in households of different composition, according to the employment characteristics, depending on the economic sustainability of their households for 2022.

Employment characteristics	Households with children*					
	I	II	III	IV	V	VI
Household money income below the economic sustainability threshold (A)						
Employed, %	84.9	81.8	86.1	85.8	83.3	69.6
Unemployed, %	1.1	6.3	2.7	2.2	16.7	3.4
With incomes from basic employment, which is in relation to the economic sustainability threshold, %:						
< 50%	75.6	92.0	92.8	96.4	100.0	100.0
≥ 50%	24.4	8.0	7.2	3.6	0.0	0.0
Household money income is not lower than the economic sustainability threshold (B)						
Employed, %	100.0	50.0	100.0	85.7	-	66.7
Unemployed, %	0.0	0.0	0.0	0.0	-	0.0
With incomes from basic employment, which is in relation to the economic sustainability threshold, %:						
< 50%	0.0	100.0	50.0	77.8	-	50.0
≥ 50%	100.0	0.0	50.0	22.2	-	50.0

Notes: Authors' calculation based on data of the 31th round the RLMS-HSE. * Households with children: I – 1 adult and 1 child, II – 1 adult and 2 children, III – 2 adults and 1 child, IV – 2 adults and 2 children, V – 1 adult and 3 children, VI – 2 adults and 3 children. "-" – not enough observations for evaluations.

GDP per capita at purchasing power parity in 2023 (44071 USD) increased by 42.3% compared to 2019, and the volume index of GDP per capita increased by 6.6 percentage points (Table 1). This made it possible, in the context of a decrease in unemployment (to 3.2% in 2023), to ensure an increase in wages – the main source of household income – by 56.4% (to 74854 RUB in 2023), and an increase in nominal per capita money incomes of the population by 50.8% (to 53139 RUB) in 4 years. In 2023, Russia was included in the group of high-income countries by the World Bank, while one year earlier it had been classified as an upper-middle-income country (Anisimova 2024).

The results received confirm the importance of taking into account the level of employment income (e.g., Bobkov and Odintsova 2023; Korchagina and Prokofieva 2023). At the same time, the revealed variability of situations, including involvement in employment and the level of income generated from it for persons from economically (un)sustainable households, indicates the role of other sources and different income "contributions" for the employed living in households. Thus, as follows from the data obtained by the authors, for single-parent families in the conditions of economic sustainability, there may be cases when income from employment does not reach 50% of the threshold of economic sustainability, i.e. there is a role of income not related to employment, which covers the existing deficit up to the threshold. In the case of two-parent economically sustainable families, employment may not be 100%, i.e. to meet the threshold for such families it is "sufficient" to have income from the employment of one parent, or other sources. In addition, differences in the

levels of income from the employment of parents in such families can be "balanced", where a lower income of one of the parents is compensated for by a higher income of the other parent, thus bringing the family to the necessary threshold of sustainability. This suggests the need for further study of the economic sustainability of households in terms of its sources and their structure, with the identification of "strategies" for achieving sustainability with different levels of employment in households, and its efficiency (level of income from it).

The main risk factors for the household economic sustainability are concentrated in the field of income inequality. The index of income concentration – the Gini index (40.5% in 2023) – remains relatively high compared to the widespread cross-country values of the indicator (29–37%, according to data for 2009–2022). However, the downward trend for this indicator shows positive processes in the distribution of income of the population. Statistical data indicate the outstripping growth rates of per capita money income of the lower income population.

The most severe manifestation of the economic unsustainability of households is monetary poverty. Based on the national criterion, in 2023, the poverty rate, defined as the share of the population with per capita money incomes below the poverty line, amounted to 8.5% in the context of a downward trend. According to the international criteria of 3.2 USD, poverty rate in Russia is "zero", and calculations of the poverty rate according to higher international threshold values show that the scale of poverty is relatively low and steadily decreasing.

In the conditions of lack of funds for both maintaining the usual way of life and for other purposes, households tend

to turn to bank loans. This phenomenon has become widespread in Russia, despite the fact that it leads to a debt burden. At the same time, households are becoming more actively involved in financial savings strategies. It is indicative that in 2022 the share of the funds allocated in households for savings increased by 1.8 percentage points (to 13.9%) compared to 2019. At the same time, the fact stands out that the lower the income security, the less the share of funds allocated for saving. This bears the potential risks for the economically (un)sustainable households.

The income deficit of economically unsustainable households is directly influenced by the dependency burden. In families with a high dependency burden – up to 0.33 – the income deficit is close to 50% and can reach even greater share. In contrast, with a low dependency burden, such as 0.67, the income deficit is significantly reduced (up to 12% in the examples considered).

The threshold criterion of economic sustainability of households, which is a socially acceptable consumer budget equivalent, taking into account savings in consumption due to cohabiting, forms a system of threshold values, with the following differentiating features:

– type of households (two-parent families, single-parent families, families with many children);

– demographic portrait of the household (working age population, pensioners, children – their presence in the household and numerical composition);

– dependency burden;

– normative socially acceptable standard of consumption in different categories of the population;

– the amount of savings in the consumption, due to cohabiting, according to the equivalence scale.

5 CONCLUSION

The growth of economic resources in Russia and the steady reduction of monetary poverty create prerequisites for expanding and deepening the research in the field of economic sustainability of households.

The results of the study provide evidence in favour of the proposed hypothesis, which states that the threshold values of the criterion of economic sustainability of households per household member decrease as the number of minor children per adult increases. However, the income position of such households worsens. In the conditions of unsustainability, the income deficit relative to the threshold value increases. The consequences of the economic unsustainability of households entail lower living standards and associated problems, such as unbalanced nutrition, risks to health, education, mental and physical development.

The scientific significance of this paper lies in the study of theoretical and methodological issues related to the economic sustainability of households, the basic concepts of this phenomenon, the features of the formation of threshold values for income and employment characteristics for individuals living in economically (un)sustainable households, factors of influence and differentiating features.

The results obtained allow us to outline the directions for further detailed research to create a more comprehensive picture. Firstly, this concerns the composition (type) of households. The authors' calculations showed that the threshold of economic sustainability differs depending on the type and composition of households. This means that households with the given parameters

– the number of children and the ability to share the burden of their maintenance – will require different amounts of resources that should meet this threshold, which can be comprised of different sources (income from employment and non-employment income). In the conditions where the main source of income is employment, a deeper analysis with respect to this will be important. As indicated by other studies (e.g., Chen et al. 2023; Grishina 2024), household composition is an important determinant of the employment situation in it (the number of adults capable of work and the number of adults actually working). Furthermore, detailed analysis at the household level, of the features of economic activity of the adult household members, depending on the type and composition of their households, will give depth to the consideration of the economic sustainability of households, identifying various "strategies" for achieving it, related to participation in employment. In particular, it will allow us to clarify the differences in the level of employment and unemployment in different types of economically (un)sustainable households, the underlying relationship between the "internal" (household composition, labour potential of household members, etc.) and "external" (labour market, social support, etc.) causes that determine the emerging "strategies" for households.

REFERENCES

Andreeva, Ye. I., Bychkov, D. G., & Feoktistova, O. A. (2021). COVID-19 i antikrizisnaya social'naya podderzhka [COVID-19 and Anti-Crisis Social Support]. *Financial Journal,* 13(1), 28–38. https://doi.org/10.31107/2075-1990-2021-1-28-38

Anikin, V., & Lezhnina, Y. (2018). Ekonomicheskaya stratifikaciya: ob opredelenii granitz dohodnyh grupp [Income Stratification: Putting a Spotlight on the Boundaries]. *The Russian Sociological Review*, 17(1), 237–273. https://sociologica.hse.ru/en/2018-17-1/217766818.html

Anisimova, N. (2024, Jul 2). Vsemirnyj bank vklyuchil Rossiyu v spisok stran s vysokim urovnem dohodov [The World Bank has included Russia in the list of high-income countries]. *RBC*. https://www.rbc.ru/economics/02/07/2024/66830f369a7947347cf3a3da

Atkinson, A. B., & Brandolini, A. (2013). On the Identification of the Middle Class. In J. Gornick & M. Jantti (Eds.), *Income Inequality: Economic Disparities and the Middle Class in Affluent Countries* (pp. 77–100). Stanford: Stanford University Press.

Bank of Russia (2023, October 30). Number of retail borrowers increases to 47 million. https://cbr.ru/eng/press/event/?id=17166

Bárcena-Martín, E., Blanco-Arana, M. C., & Pérez-Moreno, S. (2023). Evaluating the Effectiveness of Social Transfer Policies on Poverty for Children with Previous Experience in Poverty. *Journal of Family and Economic Issues*. https://doi.org/10.1007/s10834-023-09939-3

Bobkov, V. N., Gorlov, I. S., Gulyugina, A. A., Denisov, N. A., Zubrilin, Yu. V., Kanaev, I. M., ... Smirnova, N. A. (2007). *Kachestvo i uroven' zhizni naseleniya v novoj Rossii (1991–2005 gg.) [The quality and standard of living of the population in the new Russia (1991–2005)]*. Moscow: VCUZH.

Bobkov, V. N. (2018). *Srednie klassy v kapitalisticheskoj Rossii [Middle Classes in the Capitalist Russia]*. Moscow: KNORUS.

Bobkov, V. N., Gulyugina, A. A. & Odintsova, Y. V. (2019). Metodologicheskie podhody k usileniyu adresnosti social'noj podderzhki maloimushchih semej s det'mi [Methodological Approaches to Strengthening Addressed Social Support for Indigent Families with Children]. *Living Standards of the Population in the Regions of Russia,* 15(1), 9–19. https://doi.org/10.19181/1999-9836-2019-10049

Bobkov, V. N., Gulyugina, A. A., Safronova, A. M., & Odintsova, Y. V. (2019). Social'no priemlemaya potrebitel'skaya korzina [The Socially Acceptable Consumption Basket]. *Living Standards of the Population in the Regions of Russia*, 15(2), 8–26. https://doi.org/10.19181/1999-9836-2019-10060

Bobkov, V. N., & Gulyugina, A. A. (2020). 25 Let Monitoringa dohodov i urovnya zhizni naseleniya Rossii [25 Years of Monitoring Income and Living Standards of the Russian Population]. *Living Standards of the Population in the Regions of Russia*, 16(3), 9–23. https://doi.org/10.19181/lsprr.2020.16.3.1

Bobkov, V. N., Gulyugina, A. A., & Odintsova, Ye. V. (2020). Minimal'naya potrebitel'skaya korzina: kakoj ej byt' v nyneshnej Rossii? [Minimum consumer basket: What should it be in today's Russia?]. *Russian Economic Journal*, 1, 54–73. https://doi.org/10.33983/0130-9757-2020-1-54-73

Bobkov, V. N., Gulyugina, A. A., Dolgushkin, N. K., & Odintsova, E. V. (2022). Monitoringovyj instrumentarij regulirovaniya urovnya zhizni v Rossii: osnovnye ocenki 2021 g. [Monitoring tools for regulating the standard of living in Russia: Main estimates of 2021]. *Menedzhment i biznes-administrirovanie [Management and Business administration]*, 4, 31–48. https://doi.org/10.33983/2075-1826-2022-4-31-48

Bobkov, V. N., Loktyukhina, N. V., & Shamaeva, E. F. (2022). Uroven' i kachestvo zhizni naseleniya Rossii: ot real'nosti k proektirovaniyu budushchego [The level and quality of life of the Russian population: from reality to designing the future]. Moscow: FCTAS RAS. https://doi.org/10.19181/monogr.978-5-89697-388-1.2022

Bobkov, V. N., & Odintsova, E. V. (2023). The employment quality potential of generation groups of workers and the economic sustainability of their households. *Economic and Social Changes: Facts, Trends, Forecast,* 16(3), 196–211. https://doi.org/10.15838/esc.2023.3.87.10

Bobkov, V. N., & Gulyugina, A. A. (2023). *Monitoring dohodov i urovnya zhizni naseleniya Rossii – 2022 god* [*Monitoring of incomes and living standards of the Russian population – 2022*]. Moscow: IE RAS.

Bobkov, V. N., Gulyugina, A. A. & Odintsova, E. V. (2024). O riskah v sfere urovnya zhizni naseleniya Rossii, vozmozhnostyah i resheniyah po ih snizheniyu [About the Risks in the Sphere of Living Standards of the Russian Population, Opportunities and Solutions to Reduce them]. *Living Standards of the Population in the Regions of Russia*, 20(1), 59–75. https://doi.org/10.52180/1999-9836_2024_20_1_6_59_75

Bonanno, G., Chies, L., & Podrecca, E. (2023). The determinants of poverty exits and entries and the role of social benefits: the Italian case. *Economia Politica*, 40, 931–969. https://doi.org/10.1007/s40888-023-00305-y

Calegari, E., Fabrizi, E., & Mussida, C. (2024). State Dependence in Material and Social Deprivation in European Single-Parent Households. *Social Indicators Research*, 172, 481–498. https://doi.org/10.1007/s11205-024-03317-8

Chambers, R., & Conway, G. (1991). Sustainable rural livelihoods: Practical concepts for the 21st century. Sussex: Institute of Development Studies (IDS Discussion Paper no 296). https://www.ids.ac.uk/download.php?file=files/Dp296.pdf

Chen, C., Kuo, Y.- M., & Zhao, W. (2023). Family size, labor supply, and job prestige: Evidence from three decennial censuses in China. *China Economic Review*, 80, 101986. https://doi.org/10.1016/j.chieco.2023.101986

Chen, S., & Ravallion, M. (2013). More Relatively–Poor People in a Less Absolutely-Poor World. *Review of income and wealth*, 59(1), 1–28. https://doi.org/10.1111/j.1475-4991.2012.00520.x

Cheung, K. C.-K., Chan, W.-S., & Chou, K.-L. (2019). Material deprivation and working poor in Hong Kong. *Social Indicators Research*, 145, 39–66. https://doi.org/10.1007/s11205-019-02093-0

Colagrossi, M., Geraci, A., & Mazzarella, G. (2023). Intergenerational mobility in the Netherlands: models, outcomes and trends. *The Journal of Economic Inequality*, 21, 775–788. https://doi.org/10.1007/s10888-023-09569-7

de Brauw, A., Gilligan, D. O., Hoddinott, J., & Roy, S. (2015). Bolsa Família and Household Labor Supply. *Economic Development and Cultural Change*, 63(3), 423–457. https://doi.org/10.1086/680092

de Graaf-Zijl, M., & Nolan, B. (2011). Household joblessness and its impact on poverty and deprivation in Europe. *Journal of European Social Policy*, 21(5), 413 431. https://doi.org/10.1177/0958928711418854

Deeming, C. (2020). *Minimum Income Standards and Reference Budgets: International and Comparative Policy Perspectives*. Bristol: Bristol University Press. https://doi.org/10.51952/9781447352976

Federal'nyj zakon No. 134-FZ ot 24.10.1997 *O prozhitochnom minimume v Rossijskoj Federacii* [Federal Law No. 134-FZ (1997, October 24) *On the Subsistence Minimum in the Russian Federation*]. http://www.kremlin.ru/acts/bank/11590

Federal'nyj zakon No. 227-FZ ot 03.12.2012 *O potrebitel'skoj korzine v celom po Rossijskoj Federacii* [Federal Law No. 227-FZ (2012, December 3) *On the consumer basket as a whole in the Russian Federation*] (invalid on January 1, 2021)

Figari, F. (2012). Cross-national differences in determinants of multiple deprivation in Europe. *The Journal of Economic Inequality*, 10(3), 397–418. https://doi.org/10.1007/s10888-010-9157-9

Gentili, M., & Hoekstra, J. (2021). Homeownership out of reach? Intergenerational transfers and homeownership reproduction in middle class families in Rome, Italy. *Cities,* 116, 103277. https://doi.org/10.1016/j.cities.2021.103277

Goedemé, T., Storms, B., Stockman, S., Penne, T., & Van den Bosch, K. (2015). Towards Cross-Country Comparable Reference Budgets in Europe: First Results of a Concerted Effort. *European Journal of Social Security*, 17(1), 3–30. https://doi.org/10.1177/138826271501700101

Golubova, M. I. (2012). K voprosu o sushchnosti potrebnostej cheloveka v sisteme zhizneobespecheniya [On the Essence of Human Needs in the System of Life Support]. *Izvestiya of the Urals State University of Economics*, 5(43), 22–25.

Gorshkov, M. K., & Tikhonova, N. E. (2016). *Srednij klass v sovremennoj Rossii. Opyt mnogoletnih issledovanij [The middle class in modern Russia. Long-term research experience]*. Moscow: Ves Mir Publishing House.

Grishina, E. E. (2024). Material'noe polozhenie mnogodetnyh semej i faktory rosta ih dohodov [Financial Situation of Large Families and Factors of Their Income Growth]. *Financial Journal*, 16(1), 45–60. https://doi.org/10.31107/2075-1990-2024-1-45-60

Guggisberg, M., Häni, S., & Fleury, S. (2013). *Poverty Measurement in Switzerland*. Swiss Federal Statistical Office. https://www.bfs.admin.ch/bfs/en/home/statistics/economic-social-situation-population/economic-and-social-situation-of-the-population/poverty-deprivation/poverty.assetdetail.303358.html

Hsu, H.-F. (2021). Intergenerational persistence in latent socioeconomic status: evidence from Taiwan. *The Journal of Economic Inequality*, 19, 753–772. https://doi.org/10.1007/s10888-021-09484-9

Jensen, M. F., & Blundell, J. (2024). Income effects and labour supply: Evidence from a child benefits reform. *Journal of Public Economics*, 230, 105049. https://doi.org/10.1016/j.jpubeco.2023.105049

Kaygusuz, R. (2015). Social security and two-earner households. *Journal of Economic Dynamics and Control*, 59, 163–178. https://doi.org/10.1016/j.jedc.2015.07.006

Korchagina, I. I., & Prokofieva, L. M. (2022). Sem'i s det'mi starshego shkol'nogo vozrasta: potrebnost' v social'noj podderzhke [Families with high school children: the need for social assistance]. *Population*, 25(3), 153–162. https://doi.org/10.19181/population.2022.25.3.12

Korchagina, I. I., & Prokofieva, L. M. (2023). Nezanyatost' roditelej: odna iz prichin bednosti v sem'yah s det'mi [Unemployment of parents — one of the poverty causes in families with children]. *Population*, 26(2), 40–51. https://doi.org/10.19181/population.2023.26.2.4

Lewchuk, W., Laflèche, M., Procyk, S., Cook, Ch., Dyson, D., Goldring, L., (…) Viducis, P. (2015). *The Precarity Penalty: The Impact of Precarious Employment on Individuals, Households and Communities – And What to Do About It*. Toronto: PEPSO, McMaster University, United Way Toronto. https://pepso.ca/documents/precarity-penalty.pdf

Martinoty, L. (2022). Partner's income shock and female labor supply. Evidence from the repeal of Argentina's convertibility law. *World Development*, 159, 106039. https://doi.org/10.1016/j.worlddev.2022.106039

McErlean, K., & Glass, J.L. (2024). How Do Households Fare Economically When Mothers Become Their Primary Financial Support? *Journal of Family and Economic Issues*, 45, 395–409. https://doi.org/10.1007/s10834-023-09922-y

Milanovic, B., & Yitzhaki, S. (2002). Decomposing World Income Distribution: Does the World Have a Middle Class? *Review of Income and Wealth*, 48(2), 155–178. https://doi.org/10.1111/1475-4991.00046

Natarajan, N., Newsham, A., Rigg, J., & Suhardiman, D. (2022). A sustainable livelihoods framework for the 21st century. *World Development*, 155, 105898. https://doi.org/10.1016/j.worlddev.2022.105898

Nishiyama, S. (2019). The joint labor supply decision of married couples and the U.S. Social Security pension system. *Review of Economic Dynamics*, 31, 277–304. https://doi.org/10.1016/j.red.2018.08.001

Ochirova, A. V., Bobkov, V. N., & Grigorieva, N. S. (2008). *Social'nye standarty kachestva zhizni: sbornik statej [Social standards of quality of life: a collection of articles]*. Moscow: Maks Press.

Penne, T., Cornelis, I., & Storms, B. (2020). All we need is….Reference Budgets as an EU Policy Indicator to Assess the Adequacy of Minimum Income Protection. *Social Indicators Research*, 147, 991–1013. https://doi.org/10.1007/s11205-019-02181-1

Pérez-Corral, A. L., Bastos, A., & Casaca, S. F. (2024). Employment Insecurity and Material Deprivation in Families with Children in the Post-Great Recession Period: An Analysis for Spain and Portugal. *Journal of Family and Economic Issues*, 45, 444–457. https://doi.org/10.1007/s10834-023-09905-z

Pishnyak, A. I., & Nadezhdina, E. V. (2020). Zanyatost' rossijskih zhenshchin posle rozhdeniya detej: stimuly i bar'ery [Employment of Russian Women after Childbirth: Incentives and Barriers]. *The Journal of Social Policy Studies*, 18(2), 221–238. https://doi.org/10.17323/727-0634-2020-18-2-221-238

Ravallion, M. (2010). The Developing World's Bulging (but Vulnerable) Middle Class. *World Development*, 38(4), 445–454. https://doi.org/10.1016/j.worlddev.2009.11.007

RIA Novosti (2018, October 17). *Vsemirnyj bank vyyasnil, skol'ko lyudej v mire zhivut menee chem na $5,5 v den' [The World Bank has found out how many people in the world live on less than $5.5 a day]*. https://ria.ru/20181017/1530821422.html?ysclid=lyevz2xos7926429532

RLMS-HSE (2023). *Russia Longitudinal Monitoring survey – HSE database.* https://www.hse.ru/rlms/spss

Rohenkohl, B. (2023). Intergenerational income mobility: New evidence from the UK. *The Journal of Economic Inequality*, 21, 789–814. https://doi.org/10.1007/s10888-023-09577-7

Rosstat (2008). *Metodicheskie poyasneniya [Methodological explanations]*. https://rosstat.gov.ru/bgd/regl/b08_69/IssWWW.exe/Stg/01-00.htm#:~:text=%D0%94%D0%BE%D0%BC%D0%BE%D1%85%D0%BE%D0%B7%D1%8F%D0%B9%D1%81%D1%82%D0%B2%D0%BE%20%2D%20%D1%8D%D1%82%D0%BE%20%D0%B3%D1%80%D1%83%D0%BF%D0%BF%D0%B0%20%D0%BB%D1%8E%D0%B4%D0%B5%D0%B9%2C%D0%BB%D0%B8%D0%B1%D0%BE%20%D0%B8%20%D1%82%D0%B5%D0%BC%D0%B8%20%D0%B8%20%D0%B4%D1%80%D1%83%D0%B3%D0%B8%D0%BC%D0%B8

Rosstat (2020). Chislo i sostav domohozyajstv [Number and composition of households]. *Population Census 2020*. https://rosstat.gov.ru/vpn/2020/Tom8_Chislo_i_sostav_domohozyajstv

Rosstat (2023). *Rossiya i strany mira [Russia and the countries of the world]*. Statistical book. Moscow: Rosstat.

Rosstat (2024a). *Dohody, raskhody i potreblenie domashnih hozyajstv [Household income, expenditure and consumption]*. Statistical Database. https://rosstat.gov.ru/compendium/document/13271

Rosstat (2024b). *Federal'nye statisticheskie nablyudeniya po social'no-demograficheskim problemam [Federal statistical observations on socio-demographic problems]*. Statistical Database. https://rosstat.gov.ru/itog_inspect

Rosstat (2024c). *Itogi vyborochnogo obsledovaniya rabochej sily [Results of a sample survey of the labor force]*. Statistical Database. https://rosstat.gov.ru/compendium/document/13265

Rosstat (2024d). *Nacional'nye scheta [National Accounts]*. Statistical Database. https://rosstat.gov.ru/statistics/accounts

Rosstat (2024e). *Neravenstvo i bednost' [Inequality and poverty]*. Statistical Database. https://rosstat.gov.ru/folder/13723

Rosstat (2024f). *Rynok truda, zanyatost' i zarabotnaya plata [Labor Market, Employment, and Salaries]*. Statistical Database. https://rosstat.gov.ru/labor_market_employment_salaries

Rosstat (2024g). Srednie potrebitel'skie ceny (tarify) na prodovol'stvennye, neprodovol'stvennye tovary i uslugi [Average consumer prices (tariffs) for food, non-food goods and services]. *Unified interdepartmental information and statistical system.* https://www.fedstat.ru/indicator/31448

Rosstat (2024h). *Uroven' zhizni [Living standards]*. Statistical Database. https://rosstat.gov.ru/folder/13397

Rosstat (2024i). *Komponenty izmeneniya chislennosti naseleniya Rossijskoj Federacii [Components of population change in the Russian Federation]*. Statistical Database. https://rosstat.gov.ru/folder/12781

Rzhanitsyna, L.S. (2019). Standart ekonomicheskoj ustojchivosti sem'i – novyj orientir politiki dohodov [Standard of economic sustainability of family a new orientation of income policy]. *Population*, 22(1), 122–127. https://doi.org/10.19181/1561-7785-2019-00009

Saunders, P., & Bedford, M. (2017). *New Minimum Income for Healthy Living Budget Standards for Low-Paid and Unemployed Australians.* (SPRC Report 11/17). Sydney: Social Policy Research Centre, UNSW Sydney. http://doi.org/10.4225/53/5994e0ca804a4

SDSN (2015). Indicators and a Monitoring Framework for the Sustainable Development Goals. Launching a data revolution for the SDGs. https://sdgs.un.org/sites/default/files/publications/2013150612-FINAL-SDSN-Indicator-Report1.pdf

The World Bank (2022). *Fact Sheet: An Adjustment to Global Poverty Lines.* https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines

Toshchenko, Zh. T. (2022). *Ot prekarnoj zanyatosti k prekarizacii zhizni [From precarious employment to precarious quality of life]*. Moscow: Ves Mir Publishing House. https://doi.org/10.55604/9785777708861

Ukaz Prezidenta Rossijskoj Federacii No. 210 ot 02.03.1992 *O sisteme minimal'nyh potrebitel'skih byudzhetov naseleniya Rossijskoj Federacii* [Decree of the President of the Russian Federation No. 210 (1992, March 2) *On the system of minimum consumer budgets of the population of the Russian Federation*]. http://kremlin.ru/acts/bank/984

UNECE (2014). Conference of European Statisticians Recommendations on Measuring Sustainable Development. New York and Geneva: United Nations. https://unece.org/DAM/stats/publications/2013/CES_SD_web.pdf

Vosters, K., & Nybom, M. (2017). Intergenerational persistence in latent socioeconomic status: evidence from Sweden and the United States. *Journal of Labor Economics*, 35(3), 869–901. https://www.journals.uchicago.edu/doi/10.1086/690827

Yarin, G. A. (2014). *Povyshenie ustojchivosti ekonomicheskih sistem na osnove metodologii fanki-menedzhmenta (na primere promyshlennyh predpriyatij Ural'skogo regiona) [Improving the sustainability of economic systems based on the funky management methodology (using the example of industrial enterprises in the Ural region)]*. Ekaterinburg: Publishing House of the Ural State University of Economics.

Data Availability Statement

Data are available in the manuscript.

Coauthor Contributions

Aleftina Gulyugina: Conceptualization, Methodology, Formal Analysis, Investigation, Validation, Visualization, Writing. **Elena Odintsova**: Conceptualization, Methodology, Formal Analysis, Investigation, Validation, Visualization, Writing.

O ekonomskoj održivosti ruskih domaćinstava na društveno prihvatljivom nivou

PROŠIRENI SAŽETAK

Naučna pitanja ekonomskog položaja domaćinstava postaju sve relevantnija u kontekstu savremenih globalnih izazova i socioekonomske nejednakosti. Ova studija posvećena je problemima ekonomske održivosti domaćinstava. Podaci korišćeni u radu obuhvataju makroekonomske podatke iz statistike Ruske Federacije, rezultate ankete o radnoj snazi koju su sproveli statistički organi, kao i podatke iz istraživanja Longitudinalnog praćenja Rusije (*The Russia Longitudinal Monitoring Survey – Higher School of Economics* – RLMS-HSE). Članak pruža teorijsku i metodološku osnovu za određivanje ekonomske održivosti domaćinstava i definiše osnovne pojmove. Prema autorima, osnov ekonomske održivosti domaćinstava je samodovoljnost, koja im omogućava da održe socijalno prihvatljiv nivo trenutne potrošnje koristeći sopstvene resurse i da formiraju štednju, uzimajući u obzir ograničene resurse i socijalne rizike. Granični kriterijum za određivanje ekonomske održivosti domaćinstava je društveno prihvatljiv potrošački budžet, koji uzima u obzir specifičnosti potrošnje glavnih sociodemografskih grupa stanovništva (stanovništvo u radnoj dobi, penzioneri, deca) i transformisan u ekvivalent uključivanjem ušteda u potrošnji usled zajedničkog stanovanja. Ekonomski održiva domaćinstva su ona koja su sposobna, zahvaljujući prihodima od rada i drugih izvora, da zadovolje svoje potrebe barem na nivou ekvivalentnog društveno prihvatljivog potrošačkog budžeta. Domaćinstva sa nivoom prihoda ispod definisanog praga su ekonomski neodrživa. Intenzitet neodrživosti određen je veličinom deficita prihoda. Rad identifikuje diferencijalne karakteristike graničnih vrednosti domaćinstava različitih tipova i demografskih profila, koje zajedno čine sistem graničnih vrednosti. U članku se, na primerima, prikazuju granične vrednosti za domaćinstva sa različitim karakteristikama, određuje se uticaj opterećenja zavisnih članova i pokazuje kako to utiče na deficit prihoda u uslovima ekonomske neodrživosti. Pored toga, analizirane su karakteristike zaposlenosti za osobe koje žive u ekonomski održivim i neodrživim domaćinstvima sa decom, prema njihovim tipovima i sastavu. Rezultati istraživanja pružaju sveobuhvatniju sliku ekonomskog položaja ruskih domaćinstava. Usmereni su ka unapređenju efikasnosti državne socijalne politike u obezbeđivanju pozitivnih trendova u mogućnostima i ograničenjima koja utiču na ekonomsku održivost domaćinstava.

KLJUČNE REČI

Crossroads of aspiration: unveiling the migration intentions among university students in North Macedonia

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ABSTRACT

In our work, we analysed the migration intentions of university students from North Macedonia. We used data from a survey with 412 students from the Ss. Cyril and Methodius University in Skopje, the country's largest and oldest university. The results showed that about two-thirds of the respondents (67 per cent) intend to emigrate. To identify the determinants of the migration intentions, we used logistic regression models, where the migration intention was the dependent variable. We used different sets of socio-demographic and educational variables, the economic status of the respondents, and other factors as independent variables. Exploratory factor analysis was used to identify the following factors: Housing, environment, and public services; Social activities and community engagement; Advanced and developed society; Enhanced educational and career opportunities; Public services; Economic and social progress; and Family and social well-being. All of them, except the last one, had a statistically significant impact on the students' intentions to emigrate. Moreover, the students with more educated parents, students with higher academic performance and the students who worked had higher odds of emigrating than the students with parents with lower educational levels, students with lower academic performance and the students who didn't work while they studied, respectively. The other socio-demographic, educational and economic variables were not statistically significant.

KEYWORDS

migration, migration intentions, university students, logistic regression, North Macedonia

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1 INTRODUCTION

The United Nations member states adopted the 2030 Agenda for Sustainable Development in 2015, as a collaborative framework to promote peace and prosperity. The Agenda has formulated 17 Sustainable Development Goals (SDGs) that cover various aspects of advancing societies and quality of life, including improving health and education, reducing inequality, promoting economic growth, eliminating poverty, addressing climate change, and conserving oceans and forests (United Nations n.d.). However, the fulfilment of the SDGs nowadays is compromised by significant challenges. The latest report on SDGs' attainment shows that almost 50% of the 140 SDGs objectives exhibit substantial deviations from the intended trajectory, either mildly or severely (UN 2023).

The 2030 Agenda for Sustainable Development recognizes the migration as a powerful driver of the sustainable development for migrants and their communities. According to the World Migration Report 2024 (McAuliffe and Oucho 2024), the total number of international migrants in 2020 was approximately 3.6% of the global population, equivalent to 281 million people. Individuals leave their home countries for different reasons, including employment, earning opportunities, family reunification, or educational pursuits. Understanding the motivations behind this movement and its implications on the origin and host countries is crucial in the context of achieving the SDGs. However, the relationship between migrations and the fulfilment of the SDGs is very complex and dynamic (Aniche 2020; Janker and Thieme 2021). On one hand, the migration can contribute to the attainment of several SDGs by enhancing economic empowerment (Noja et al. 2018), fostering social cohesion (Cheong et al. 2007; Taran et al. 2009), and promoting environmental sustainability (Millock 2015; Bildirici 2022). The migration process is beneficial for filling the gaps in the labour market, resulting in increased productivity (Drinkwater et al. 2003). From a societal standpoint, migration provides a unique chance to promote cultural variation (Esses 2018). Furthermore, migrations result in enhanced economic prospects and improved living standards for individuals, creating opportunities for increased income and enhanced career options (International Monetary Fund 2016).

On the other hand, the benefits of migration are often accompanied by challenges, such as loss of human capital and reduced productivity which can hinder economic growth and development of the origin country (Drinkwater et al. 2003; Adger et al. 2024; Abbas, Nejati and Taleghani 2024). The emigration of highly skilled and educated individuals, referred to as the brain drain process, presents significant challenges, particularly for developing countries. These countries invest limited resources in educating their young people, only to see them leave, resulting in a shortage of skilled workers and future entrepreneurs, which hampers the countries' economic progress. Consequently, global migration trends tend to create more disadvantages than advantages for developing countries (Sohaee 2023).

In this context, the migration is especially significant and relevant topic for North Macedonia, given its status as a developing country with small and open economy. According to Eurostat (2024c), over 220,000 individuals from North Macedonia, accounting for roughly 10

per cent of the total population, have emigrated to various European countries over the past two decades. In addition, the young people aged 20 to 30 have the highest emigration rates, representing one-third of the total number of emigrants. As a result, the number of young individuals in North Macedonia has declined from approximately 480,000 in 2002, which accounted for 24 per cent of the overall population, to 330,000 individuals in 2021, i.e. around 18 per cent of the overall population (Reactor – Research in Action 2022).

This paper focuses on a specific subset of the young population in the country – university students. It aims to empirically explore the determinants of migration intentions of the students from the oldest and largest university in North Macedonia, Ss. Cyril and Methodius University in Skopje. More specifically, we use exploratory factor analysis and logistic regression to explore the effect of a set of socio-demographic determinants, including educational characteristics and economic status of the students, and potential driving factors for their emigration, as well as

factors that make them decide to stay in the country. We analyse a broad set of potential factors of migration, such as housing, environment, and public services; social activities and community engagement opportunities; enhanced educational and career opportunities; family and social well-being; etc.

The rest of the paper is structured as follows. In Section 2, we provide a brief overview of the migration processes in recent years in North Macedonia, focusing on youth migration. Section 3 of the paper reviews the relevant literature on migration and migration intentions. Section 4 explains the methodological issues and the used data. Section 5 and Section 6 describe the sample's main statistics and the results of the analysis, respectively. Section 7 contains the conclusion.

2 MIGRATION IN NORTH MACEDONIA

North Macedonia is a small country with a long-standing history of emigration. The contemporary emigration process began in the post-World War II period
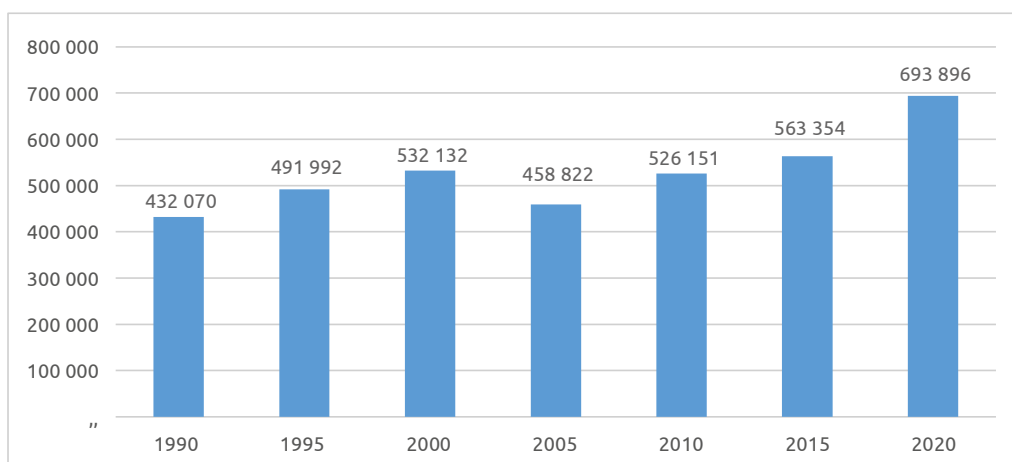

Figure 1 International migrant stock, North Macedonia 1990–2020.
Source: UN DESA 2020.

and has been on the rise ever since. In the past few decades, particularly during the 1990s, the country witnessed a fresh wave of emigration due to systemic transition challenges. This trend was further amplified after 2009 when visa liberalization agreements with the European Union enhanced the mobility of Macedonian citizens. As a result, according to UN migration data, the total number of citizens of North Macedonia residing abroad increased from 432,000 in 1990 to nearly 700,000 by 2020, representing almost a third of the nation's domestic population.

In just three decades after the country declared its independence in 1991, more than 260 thousand nationals, or 14.2% of the total resident population emigrated from their homeland. The UN gration trends. According to the State Statistical Office of the Republic of North Macedonia (2024), only 12,766 citizens of North Macedonia moved from the country from 2008 to 2022. On the other hand, international data sources (UN DESA, EUROSTAT, etc.) provide more accurate and much larger figures on the country's migration process. For example, according to the Eurostat (2024a), 117,868 citizens of North Macedonia immigrated to the European countries over the analysed period 2008–2022.[1] However, these data are also incomplete as it does not include the number of immigrants in all European countries and omits the data for several countries where Macedonians migrate to a large extent, such as Germany, Malta, Belgium, the United Kingdom, and others.

Table 1 Annual number of immigrants from North Macedonia in European countries

	2008	2010	2012	2014	2016	2018	2020	2022
North Macedonia	6864	3920	6527	7053	8718	10750	9636	9949

Source: Eurostat 2024a.

World Migration Report 2020 placed North Macedonia within the top 20 nations globally for the highest emigration rates (Ritchie and Spooner 2022). Regarding the geographic distribution of emigrants, one-third have relocated to countries within Europe, i.e. Germany, Italy, Switzerland, Austria, and Slovenia are the most common European destinations for migrants from North Macedonia. The remaining two-thirds have moved to countries outside of Europe, mainly to Australia, the United States, and Canada (IOM 2022).

Even though it represents a traditional migration area, the country lacks a comprehensive migration database regarding its historical and modern mi-

Therefore, a slightly more realistic picture of the country's migration patterns can be obtained by examining the data on residence permits granted to Macedonian citizens over the same timeframe. According to Eurostat (2024b), over the analysed period 2008–2022, European countries granted 261,122 first residence permits to Macedonian citizens. In 2022, 29,630 Macedonian citizens received a residence permit in one of the European countries. Germany was the leading country, issuing nearly half of these permits (12,670), followed by Croatia (3,570), Italy (2,532), Slovenia

[1] EU 27 member states including United Kingdom, Norway, Switzerland and Turkey.

(2,478) and Switzerland (1,874). Of the total number of permits issued in 2022, about 60% were valid for 12 months or more. Regarding the purpose, while education accounted for 4% of the permits, most permits were for family (43%) or employment purposes (37%).

young individuals, thereby intensifying brain drain from the country.

Next, we analyse the age structure of the emigrants to show the emigration of young people aged 20 to 24 (the same age as the students who are the focus of our research). In this context, Figure 2

Table 2 Annual number of initial residence permits granted to Macedonian citizens from European countries

	2008	2010	2012	2014	2016	2018	2020	2022
North Macedonia	20979	13195	11232	11611	16165	26377	16601	29630

Source: Eurostat 2024b.

According to the UN International Organization for Migration (IOM 2022), the primary motivations driving people to leave North Macedonia are the socio-economic factors. These factors include high unemployment rate, particularly long-term and youth unemployment; low wages and bad living conditions; low valuation of specific jobs and limited career growth; established migration trends and diaspora networks that ease the transition; and finally, recipient countries' welcoming migration policies. All these factors contribute to high emigration rates, especially related to skilled workers and well-educated

illustrates the age distribution of the immigrants from North Macedonia in European countries in 2022. Most individuals emigrating from the country in this period are young individuals, specifically those aged 20 to 24, who are typically of university age.

In 2022, a significant 17% of all the individuals who emigrated from North Macedonia to European countries were in the age group of 20 to 24 year-olds, and together with the individuals aged 25 to 29, represented one-third of the total number of emigrants. Moreover, the number of people aged 20 to 24 who leave the country has been continuously
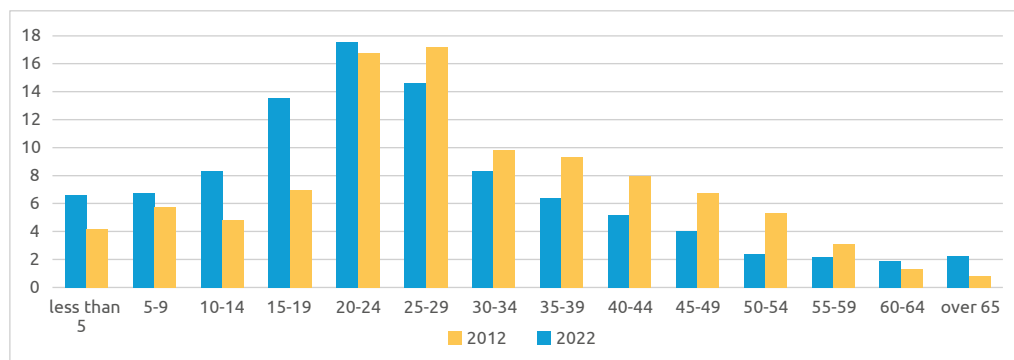

Figure 2 Age group distribution of immigrants from North Macedonia in European countries.
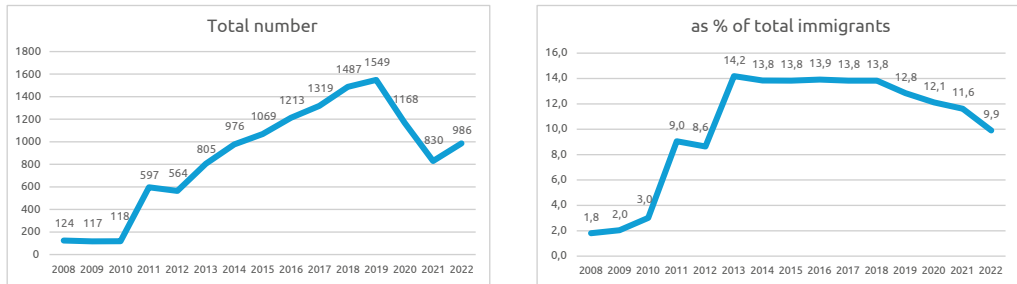*Source:* Authors' calculation based on data Eurostat 2024a.

Figure 3 Immigrants aged 20 to 24 from North Macedonia to European countries.
Source: Authors' calculation based on data Eurostat 2024a.

increasing, from 124 in 2008 to 1,549 in 2019, thereby increasing their share in the total number of the emigrants, from 1.8% to 12.8%, respectively. However, the COVID-19 crisis from 2020 slightly reversed the trend of young people leaving the country, resulting in smaller numbers of emigrants aged 20 to 24, i.e. 830 and 986 in 2021 and 2022, respectively.

3 LITERATURE REVIEW

The determinants of migration can be observed on micro, meso and macro levels (King et al. 2016). The micro-approach to migration focuses on individualistic decision-making, encompassing various sociology and economics theories to explain the reasons behind migration (Schmitter-Heisler 2000). Micro factors relate to the personal characteristics of the individual and personal attitudes towards migration. Meso factors include factors that are closely related to the individual, but not under his/her control, such as the social networks or communication technologies (Castelli 2018). Different economic, political, social and environmental circumstances that influence migratory patterns, such as presence of violence and conflict, human rights violations, institutions, economic opportunities,

poverty and development, migration governance and policies, environmental change etc., are considered macro factors (Kuhnt 2019).

The significance and impact of different migratory factors are explained through various, frequently conflicting theoretical frameworks. One of the leading theories in this area is the rational choice theory, which posits that migration processes can be attributed to an individual's behaviour (Coleman 1990; Opp 1999; Voss and Abraham 2000) and that the sum of the individual decisions leads to results on a macro level (Schelling 1978), i.e. generate collective social behaviour (Kalerante et al. 2022: 45). This theory has foundations in microeconomic theories and relies on the subjective expected utility model (Esser 1999). It integrates the benefits maximization assumption (Todaro 1976), or household income maximization concept (Stark 1991). The aim is to understand the economic and social behaviour of the individuals. According to this framework, individuals opt for different alternatives, while being restricted by different constraints and opportunity structures (Haug 2008: 586). When making decisions, they employ the cost-effectiveness principle to assess the relevance of their choices. At the micro level, three broad sets of

determinants of mobility can be identified: demographic, socio-economic, and psychological factors (King et al. 2016).

An alternative theory, the social networks theory (Boyd 1989; Massey et al. 1987), includes households, families, kinship networks, and social networks as structures in individual decision-making (Faist 1997; Haug 2000). Informal networks help migrants to finance their travel, to find a job or accommodation, and to cross the borders easily (Böcker 1994; Haug 2008). According to this framework, the social and cultural factors, in addition to economic factors, affect an individual's decision to migrate. Moreover, demographic characteristics, such as the family size, age, or gender of the individual, also influence the expectations, intentions, motives, and incentives to migrate (Harbison 1981).

The macro-level approach towards migration has a longer tradition of describing the reasons for and the spatial and temporal structures of labour mobility. Pioneers of this approach are considered Lewis (1954), Kindleberger (1967), Frank (1969), Wallerstein (1974), etc. From a neoclassical macro perspective, what drives the international migration are the geographical discrepancies between the labour supply and the labour demand between different countries (Massey et al. 1993: 433). In countries with low equilibrium market wage, labour supply is abundant relative to the capital, while in countries with high equilibrium wages, labour supply is scarce relative to capital. The differences in the wages motivate workers to move from the countries with lower wages to the countries with higher wages. According to this theory, the disappearance of wage differentials between countries will discourage migration and movement of labour.

The neoclassical macro theory aims to explain international movements of population as labour migration resulting from differences in economic development (Lewis 1954; Ranis and Fei 1961; Harris and Todaro 1970).

In addition to the theoretical relevance, the examination of migration drivers has generated considerable interest in empirical research. A significant portion of empirical research focuses specifically on comprehending the youth's motivations, intentions, and migration patterns. From a European perspective, youth mobility has been assessed in a large body of research (King 2002; King and Ruiz-Gelices 2003; Balaz, Williams and Kollár 2004; Findlay et al. 2006). More recent research analyses the difference between the intentions, motivations, intensity, and self–assessment of migration motivations between the youth from the old and the new European Union (EU) member states (Sandu and Tufis 2018). Herz et al. (2018) analyse the factors for youth migration on different levels (individual, family, social networks, and macro structures), while Van Mol (2016) focuses only on the individual and contextual factors of migration aspiration of youth from the EU. There is also considerable research on the difference between migration intentions among youth in urban versus rural areas (Garasky 2002; Thissen et al. 2010; Stockdale 2006; Bednaríkova, Bavorova and Ponkina 2016).

Over the past two decades, numerous publications have been published on migration intentions of a particular subgroup of young people: university students. Most of them target students at a national level (Cairns and Smyth 2011; Ciarniene and Kumpikaite 2011; Alberts and Hazen 2005) or a sub-national level (Bednaríkova, Bavorova and

Ponkina 2016; Lu, Zong and Schissel 2009). Some papers examine the migration intentions of students with a specific background, such as medical students (Dohlman et al. 2019; Suciu et al. 2017; Nguyen et al. 2008; Santric-Milicevic et al. 2014; Krajewski-Siuda et al. 2012), engineering students (Wazir et al. 2017; Gherheş, Dragomir and Cernicova-Buca 2020) or students in economics (Plopeanu et al. 2018). In addition, the literature review discovers an interest in the transition from temporary to permanent migration (Finn 2003; Hawthorne 2005; Ziguras and Law 2006). Also, some studies try to identify the intentions and plans for permanent migration (Khoo, Hugo and McDonald 2008).

The students' intentions of migration have been examined in several empirical studies in the countries from South-Eastern Europe. Particular interest is invested in understanding the migration intentions of medical students. The studies have shown that a high proportion of medical students consider working abroad, with a higher proportion of more than 80% in Serbia and Romania (Santric-Milicevic et al. 2014; Suciu et al. 2017). Dominant motive for emigration is opportunity to earn higher wages and access better working conditions. In these countries, the migration intentions are higher compared to other countries from South-Eastern or Central Europe. For instance, in Poland, 26–36% of medical students plan to emigrate (Krajewski-Siuda et al. 2012), while in Croatia, 35% want to emigrate due to better quality of life, healthcare organization, professional challenges, and job search (Kolčić et al. 2014). In addition, a number of studies examine the intentions of a student population or youth in general. For example,

in Albania, 70% of students see university as a step to residing abroad after graduation, with 49% not intending to return, causing devastating consequences for the Albanian economy and society (Gëdeshi and King 2018; King and Gëdeshi 2020). In Bosnia and Herzegovina, high emigration intentions of youth population can be explained with the higher dissatisfaction with public services and corruption (Begović et al. 2020). Several types of statistical methods were used to analyse the migration intentions of students. These techniques include sequential logistic regression (Santric-Milicevic et al. 2014), multivariate logistic regression (Krajewski-Siuda et al. 2012; Kolčić et al. 2014), probit regression (Alili, King and Gëdeshi 2022), analysis of the variance (Begović et al. 2020), and analysis of qualitative data from focus groups or interviews (Gëdeshi and King 2018).

A study on youth migration in North Macedonia (Topuzovska Latkovikj et al. 2019) reveals that the main reasons for migration include better living standards, salaries, employment opportunities, and education. Several papers have been published on migration intentions of university students in the country. Dragović, Drakulovska-Chukalevska and Dragović (2017) analysed migration intentions of first- and second-year students of the Faculty of Philosophy in Skopje in the academic 2014–2015 year by using logit regression. They also used logistic regression model and confirmed that family size, age, emigration experience and readiness to move for longer period increased the readiness to emigrate. Alili, King and Gëdeshi (2022) used survey data from 2022 about the migration intentions of students from private and public universities in the field of economics,

medicine, technology and languages. Using multinomial logistic regression, they found that older undergraduate students, students who did not plan to continue studies and students with prior migration history were more inclined to emigrate. Parker et al. (2022) implemented qualitative analysis based on several focus-group interviews to understand students' reasons to emigrate from North Macedonia. They identified three sub-themes as factors for emigration: lack of professional opportunities, institutional system and cultural tightness. On the other hand, they confirmed community, culture and social responsibility as sub-themes or factors for staying. All these studies confirm high intentions of Macedonian student to emigrate abroad (above 55%). Moreover, the results suggest that the family size; previous personal and family emigration experience and academic record are important factors that influence the decision to move abroad.

We decided to use a different approach in our research, starting with more complex questionnaire that, besides the usual demographics, tries to delve more into the subtle issues of living conditions, motives for emigration and motives for staying. We applied exploratory factor analysis, which, to our best knowledge, has not been used in previous studies on student migration in North Macedonia to identify the underlying factors that potentially influence the migration intention. Exploratory factor analysis provides latent constructs that summarize the essence of the underlying data, with theoretical meaning, making the applied logistic regression model easier to interpret in a practical sense compared to using raw variables or dummies.

4 METHODOLOGY

4.1 SAMPLE

Our target population were students enrolled in first, second and third cycle of studies at the Ss. Cyril and Methodius University in Skopje. The latest available data for the academic 2022/2023 show that the total number of students was 21,386 (State Statistical Office of the Republic of North Macedonia 2023). We conducted an online survey during the period June – July 2024. The questionnaire was distributed through official student organizations. The survey was anonymous and confidential and was completed by 412 students (most of them enrolled in the first cycle) from all the university's faculties and various study fields (natural sciences, social sciences, technical sciences, medicine, humanities, arts). Most of the students studied technical sciences (mostly information technologies), medicine, and economics.

4.2 QUESTIONNAIRE

To investigate the migration intentions of students and the drivers of those intentions, we developed a questionnaire based on previous studies that have explored the migration intentions of students or young people from the region (Alili, King and Gëdeshi 2022; Soldo, Spahić and Hasić 2021; Gherhes et al. 2020). Our goal was to examine the socio-demographic characteristics of the students intending to leave North Macedonia, their preparedness to leave, the push and pull factors for emigrating, and what factors could influence them to stay in their home country. The intent was to assess what individual characteristics,

personal motivations and ambitions and other factors (such as family ties and contextual conditions – educational, health-related, political, social) significantly influence the intention to migrate, which comprised the dependent variable in the model.

The questionnaire consisted of 50 questions, divided into five sections: 1) Socio-demographic and educational characteristics of students, including their economic status (age, gender, faculty, work status, parent's education level, family income etc.); 2) Students' intentions to migrate to another country; travel history; destination country; undertaken activities related to their potential migration etc.; 3) Living conditions (housing, environment, education, healthcare, social life, recreation, etc.); 4) Motives for emigration (quality education, employment opportunities, public services, family ties etc.); 5) Motives for staying home (improved economic conditions, family and social well-being, higher certainty for EU accession). All questions were multiple choice, allowing for the performing of a quantitative analysis. Likert scale with 5 points was used in section 3 (living conditions) and section 4 (motives for emigration), while Likert scale with 3 points was used in section 5 (motives for remaining in the country). The analysis was performed using the IBM SPSS Statistics 25 software package.

4.3 EMPIRICAL MODEL

For data analysis of the potential determinants of migration intention exploratory factor analysis, reliability analysis and logistic regression have been applied. Exploratory factor analysis is commonly used in social sciences to measure constructs that are known as latent variables that cannot be measured directly. Such latent variables should be discovered under the three sets of questions in the survey regarding the living conditions, motives for emigration and staying in the native country. This technique was used because we tried to explore the underlying structure of the data without the previous notion of the number or the nature of the factors. In contrast, confirmatory factor analysis tests predefined factor structure based on theoretical expectations, and it is recommended for hypothesis testing of the structures of the latent variables and their relationships to each other (Tinsley and Tinsley 1987). It also confirms whether the data fits a specified factor model.

When several variables are measured, there could be clusters of large correlations between subsets of variables, indicating that those variables could measure aspects of same underlying dimensions known as factors or latent variables (Field 2005). The mathematical representation of a factor has the following form:

$$Factor_i = b_1 Variable_1 + b_2 Variable_2 + \ldots + b_n Variable_n + \varepsilon_i$$

Where b_i represents the factor loadings, and the ε_i represent the residuals.

For factor extraction, the chosen method is maximum likelihood. This method is advantageous because it provides precise estimates, evaluates model fit comprehensively and handles complex factor structures. It is more reliable with large sample size (survey provided with 412 observations) since it produces stable estimates and accurate fit indices. Factor rotation is also applied to enhance the clarity and interpretability of the factor structure in the data.

Varimax rotation is preferred to simplify the factor structure and interpret factors as distinct and independent.

Exploratory factor analysis is followed by reliability analysis to ensure a consistent and dependable measurement instrument. It ensures that the collected data are accurate and trustworthy, paramount to credential research outcomes. It uses Cronbach's Alpha as a statistical measure to assess the internal consistency of a set of questions in a survey. The formula incorporates the mean inter-item correlation and number of items (questions):

$$a = \frac{k}{k-1}\left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right)$$

where k is the number of items, $\sum \sigma_i^2$ is the sum of variances of each item and σ_t^2 is the variance of the total score. According to George and Mallery (2003), Cronbach's Alpha of 0.7 or higher is acceptable, while values higher than 0.6 are deemed questionable. Values under 0.5 are not acceptable.

The last part of the analysis is the logistic regression – a multiple regression model with an outcome variable that is a categorical dichotomy and predictor variables that are continuous and categorical (Field 2005). The logistic regression model can be represented as:

$$logit(p) = log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n$$

where p is the probability of the outcome being 1, and the β coefficients represent the change in the log odds of the outcome for a one-unit change in the predictor variable. The estimated logistic regression models should confirm the statically significant determinants of young people's migration intentions.

5 SAMPLE CHARACTERISTICS AND DESCRIPTIVE ANALYSIS

The total of 412 students from Ss Cyril and Methodius University in Skopje completed the questionnaire. The socio-demographic characteristics of the respondents are provided in Table 3. Approximately two-thirds of the respondents were female, and one-third male. This almost entirely reflects the distribution of the enrolled undergraduate students at the university. The dominant number were undergraduates (94%), so the analysis captures mostly the attitudes of undergraduate students. Most of the respondents were between the age of 19 and 22 (73.5%). Even though diverse faculties were included, almost a third (28%) of the respondents were students of the Faculty of Computer Sciences and Engineering, followed by the Faculty of Economics, Faculty of Medicine, Faculty of Philosophy and the Faculty of Law. Most lived in an urban area, mainly in the Skopje region (42%), followed by the Pelagonia and Vardar regions. Around 40% of the respondents had parents with secondary education, around a third had both parents with a university degree, and one quarter had one parent with a university degree. Considering their financial situation, almost half of the students (46%) reported having a monthly average family income between 40,000 and 80,000 denars, and the other two quarters below 40,000 and above 80,000 denars equally. Interestingly, only 14% perceived their family income to be sufficient for a comfortable life, while 13% considered they did not have enough for basic needs.

Table 3 Socio-demographic characteristics of the respondents

		Frequency (no.)	Percentage (%) *
Age	19–20	139	33.8
	21–22	163	39.7
	23–24	68	16.5
	25 and more	41	10.0
Gender	Male	142	34.7
	Female	265	64.8
	Prefers not to answer	2	0.5
Place of residence	Urban	354	86.8
	Rural	54	13.2
Region of origin	Skopje	172	41.8
	North-East	27	6.6
	East	40	9.7
	South-East	19	4.6
	Vardar	42	10.2
	Pelagonia	48	11.7
	South-West	40	9.7
	Polog	23	5.6
Faculty	Computer Science and Engineering	116	28.2
	Economics	65	15.8
	Medicine	60	14.6
	Philosophy	48	11.7
	Law	45	10.9
	Other	78	18.9
Study cycle	First	386	94.1
	Second	18	4.4
	Third	6	1.5
Average grade	6–7	30	7.3
	7–8	149	36.3
	8–9	124	30.2
	9–10	107	26.1
Highest level of education of parents	Both with higher education	124	30.2
	One with higher education	109	26.5
	Both with secondary education	162	39.4
	Other	16	3.9
Work status	Full time	46	11.2
	Part time	22	5.3
	Freelancer	111	26.9
	Not employed	233	56.6
Average monthly family income	Less than 40,000 denars	100	25.3
	40,000 – 80,000 denars	184	46.5
	80,000 – 160,000 denars	86	21.7
	Above 160,000 denars	26	6.6
Perception on monthly family income	Enough for a comfortable life	57	14.0
	Enough for a decent life	155	38.0
	Enough for a humble life	143	35.0
	Not enough for subsistence	53	13.0

Note: Percentage of valid number of answers.

Source: Authors' calculations.

Table 4 depicts the travelling history of students and their migration intentions, which has been the central focus of our research. A staggering 67% of students reported that they intended to leave the country. This is quite a higher percentage than what Alili, King and Gëdeshi (2022) found – 55.6% of students, but lower than Ivanovska, Mojsovski andKacarska (2019) which contained estimations for a more specific study field – science, technology and engineering (approximately 80%). Gender is not found to be a decisive factor in the migration aspirations of students. A large proportion of undergraduate students (68%) and master students (67%) are interested in migrating, whereas none of the PhD students reported intending to leave the country.

Table 4 Migration intention of students

	Frequency (no)	Percentage (%)
How many of your close family members or friends live abroad?		
None	34	8.3
One or two	94	22.8
Three or more	284	68.9
In the last five years, have you stayed abroad for longer than a month, not considering touristic travels?		
Yes	91	22.1
No	320	77.9
Do you intend to emigrate from the country?		
Yes	273	66.6
No	137	33.4
If you intend to migrate, that would be		
Temporary	65	15.8
Permanently	116	28.2
I am not sure	162	39.3
I don't intend to migrate	69	16.7
The main reason for emigrating		
Education	79	19.2
Employment	207	50.4
Family reasons	24	5.8
I am not sure	46	11.2
I don't intend to migrate	55	13.4
If you intend to migrate, when would that be?		
Within the next six months	13	3.2
Within the next year or two	95	23.1
Within the next five to ten years	178	43.3
I am not sure	60	14.6
I don't intend to migrate	65	15.8
What country would be your preferred destination?		
Germany	48	11.8
Switzerland	50	12.3
Italy	28	6.9
Slovenia	20	4.9
Another EU country	84	20.6
Great Britain	16	3.9
USA or Canada	25	6.1
Australia or New Zealand	12	2.9
Other	72	17.6
I don't intend to migrate	53	13.0

Note: Percentage of valid number of answers.

Source: Authors' calculations.

Notably, all PhD respondents work full-time, so their employment could be a contributing factor. On the contrary, 59% of the first-cycle students do not work but are dedicated solely to studying. Around a quarter of respondents work as freelancers, which makes it easier to move abroad and still keep their job. As expected, 85% of students with very low perceived monthly income have migration intention, whereas such intentions are expressed by 56% of the students with high perceived family income.

The massive emigration from North Macedonia is reflected in the fact that almost 70% of the respondents have three or more close family members or friends living in another country. The larger the number of one's close people who have emigrated, the more interested the students are in trying their luck abroad. However, most of them have not spent a long time abroad. A larger share would emigrate permanently than temporarily; however, almost half of those who intend to do so are still not sure, and the same share wants to move within the next five to ten years, which is considerably far in the future to be taken as a strong determination. The most quoted main reason (by half of respondents) for emigration is the search for employment abroad, followed by continuing education. The European countries are most attractive for students, as more than half of those who intend to migrate would choose a European country as their migration destination, mainly Germany, Switzerland, or another EU country.

Figure 4 presents the activities students have undertaken to realize or get closer to realizing their migration plan. However, only a small fraction has applied for education or a job, or have already been admitted/employed (only 8%). There are also 6.2% that do not require any permits due to possessing dual citizenship. However, the students have primarily been getting information about possibilities and conditions in their aspirational country, but on the other hand, almost half have not undertaken any of the mentioned concrete steps.

6 RESULTS AND DISCUSSION

The questionnaire comprised the total of 50 questions, out of which 30 were grouped in three categories 1: living conditions, 2 – motives for emigration and 3 – motives for staying. Each category contained ten questions, and separate
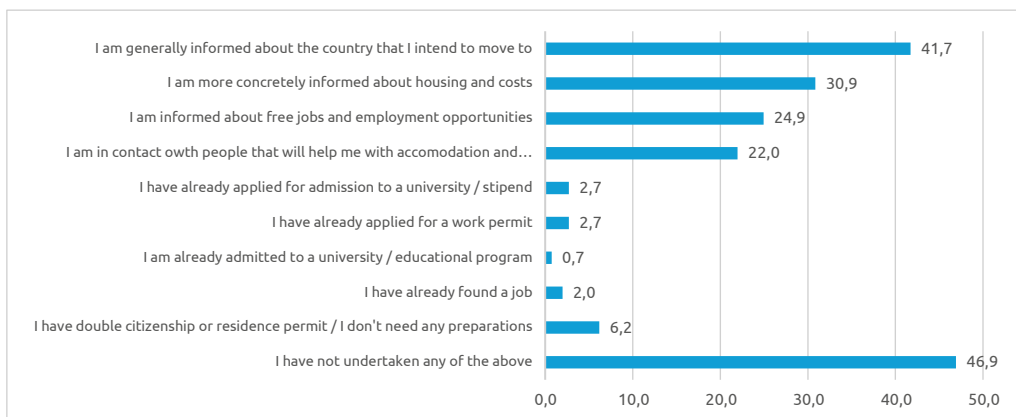

Figure 4 Undertaken activities related to the potential migration (in percentage of respondents)

exploratory factor analysis was performed for each group. The results from the exploratory factor analysis for the three groups of questions are presented in the following tables.

Exploratory factor analysis of the first group of questions revealed two factors related to living conditions. Initial eigenvalues were used to determine the number of factors to retain, or factors with eigenvalues greater than 1, based on Kaiser criterion, for all three groups of questions (living conditions, motives for emigration and motives for staying). Regarding the variance explained after the rotation of factors, 27.07% were distributed to the first factor, 18.17% for the second factor, or the cumulative value of 45.24%.

The variable "Availability of public transport" was excluded due to a low factor loading (<0.4). The Kaiser-Meyer-Olkin (KMO) (Kaiser 1970) value was 0.85, indicating adequate sampling, and Bartlett's Test of Sphericity (p<0.01) confirmed that relationships between variables existed, justifying factor analysis. The first factor, "Housing, environment, and public services," and the second, "Social activities and community engagement," both had Cronbach's Alpha values above 0.6, ensuring reliability (DeVellis 1991), and confirmed that the used scale for variables measuring consistently reflected the construct that it was measuring (Field 2005). These factors can be used as new variables in subsequent regression models.

Table 5 Exploratory factor analysis and reliability analysis for group 1 – living conditions

Rotated component matrix		
Variables	**Factor 1**	**Factor 2**
Possibility of resolving the housing issue for young people	0.41	
Quality of air, water, and the environment as a whole	0.53	
Availability of sports and cultural activities and events		0.58
Opportunity to meet new people and make friends		0.79
Possibility of volunteering and contributing to better conditions in the local community		0.60
Quality of the education system	0.64	
Quality of the healthcare system	0.76	
Quality of institutions and functionality of the system as a whole	0.74	
Quality of life, overall	0.60	

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.85	
Bartlett's Test of Sphericity	Approx. x^2	1050.26
	p	0.00

Reliability analysis		
	Factor 1	**Factor 2**
Cronbach's Alpha	0.81	0.71

Note: Extraction Method: Maximum Likelihood; Rotation Method: Varimax with Kaiser Normalization.
Source: Authors' calculations.

Table 6 Exploratory factor analysis and reliability analysis for group 2 – motives for emigration

Rotated component matrix		
Variables	**Factor 1**	**Factor 2**
I would move abroad to gain access to higher-quality education (better universities, formal and informal study programs, and specializations)		0.53
I would move abroad to obtain better employment opportunities, professional advancement, and career development		0.97
I would move abroad to gain access to better public services and a higher-quality public sector	0.53	
I would move abroad because I want to live in a society with a richer cultural and social life	0.63	
I would move abroad to gain new experiences and learn about different cultures	0.52	
I would move abroad because I want to live in an environment where I do not feel discriminated against and where my rights are not violated	0.66	
I would move abroad because I want to live in a less corrupt society	0.64	
I would move abroad because I want to live in a stable society without interethnic and political tensions	0.67	
I would move abroad to live closer to my relatives and/or friends abroad	0.29	
I would move abroad because I believe it would allow me to contribute more to my family		0.37

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.87	
Bartlett's Test of Sphericity	Approx. x^2	1441.84
	p	0.00

Reliability analysis		
	Factor 1	**Factor 2**
Cronbach's Alpha	0.84	0.74

Note: Extraction Method: Maximum Likelihood; Rotation Method: Varimax with Kaiser Normalization.
Source: Authors' calculations.

Table 6 shows the exploratory factor analysis' results for the second group of questions on emigration motives. Regarding the variance explained after the rotation of factors, 25.35% was distributed to the first factor, 20.27% for the second factor, or the cumulative value of 45.61%. The Kaiser-Meyer-Olkin (KMO) value of 0.87 indicates reliable factors, and Bartlett's Test of Sphericity (p<0.01) confirms the analysis is appropriate. Two factors were identified: the first, "Advanced and developed society," reflects societal aspects like a strong public sector, rich cultural life, low level of corruption and discrimination and an absence of political and ethnic conflicts. The second, "Enhanced educational and career opportunities," focuses on education and professional growth. Both factors are reliable, with Cronbach's Alpha values of 0.84 and 0.74, respectively, supporting their use in further analysis.

Table 7 Exploratory factor analysis and reliability analysis for group 3 – motives for staying

Rotated component matrix			
Variables	Factor 1	Factor 2	Factor 3
Improving student standards and greater benefits for students		0.56	
Suitable employment, high salary, and good working conditions		0.54	
Starting a family			0.45
Taking care of parents and close family members			0.72
Social life and relationships with friends			0.40
Improving the quality and access to public services	0.80		
Modernizing road infrastructure and public transportation	0.48		
Improving living standards and economic conditions in the country		0.45	
Desire to personally contribute to improving the situation in the country		0.42	

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.79	
Bartlett's Test of Sphericity	Approx. x^2	564.41
	p	0.00

Reliability analysis			
	Factor 1	Factor 2	Factor 3
Cronbach's Alpha	0.63	0.62	0.56

Note: Extraction Method: Maximum Likelihood; Rotation Method: Varimax with Kaiser Normalization.

Source: Authors' calculations.

The third group of questions explores motives for staying in the native country, revealing three factors. Regarding the variance explained after the rotation of factors, 13.29% was distributed to the first factor, 12.57% for the second factor, 11.22% for the third factor or the cumulative value of 37.08%. The KMO statistic of 0.79 and significant Bartlett's Test confirmed the reliability of the analysis. Nine of ten questions were used, with "Increased confidence in EU accession" excluded as it formed a separate factor. The first factor, named "Public services," relates to services, transportation, and infrastructure. The second, "Economic and social progress," covers living standards, employment, and economic conditions. The third, "Family and social well-being," concerns family and social interactions. Factors 1 and 2 have acceptable reliability (Cronbach's Alpha of 0.63 and 0.62), while Factor 3 (0.56) should be used cautiously in further analysis.

Table 8 presents the results of logistic regressions with the binary dependent variable, "Do you intend to emigrate?" (yes/no). Continuous variables were derived from exploratory factor analysis, while categorical variables included age, gender, residence, university department, academic performance, parents' education, employment status, income, income adequacy, number of close people abroad, and foreign stays in the last five years. Various logistic regression models were estimated, due to brevity,

Table 8 Estimated logistic regressions

Variables	Logistic regression odds ratios			
	(1)	(2)	(3)	(4)
Housing, environment, and public services	0.75**	0.76**	0.71**	0.70**
Social activities and community engagement	0.76*	0.74**	0.79	0.76*
Advanced and developed society	2.40***	2.01***	2.39***	2.43***
Enhanced educational and career opportunities	2.91***	2.53***	3.14***	3.07***
Public services	0.77*		0.78*	0.78*
Economic and social progress	0.55***		0.54***	0.54***
Family and social well-being	0.80*		0.83	0.83
Parents education level (0 – both parents finished secondary education)			***	***
Parents education level (1 – one parent is university graduate)			4.75**	5.19**
Parents education level (2 – both parents are university graduates)			9.61***	10.22***
Parents education level (3 – other)			9.01***	10.15***
Current average academic performance (0 – from 6 to 7)			*	*
Current average academic performance (1 – from 7 to 8)			1.27	1.40
Current average academic performance (2 – from 8 to 9)			1.77	1.83*
Current average academic performance (2 – from 9 to 10)			2.80***	2.97***
Working status besides studies (0 – doesn't work)				
Working status besides studies (1 – works occasionally)				1.89
Working status besides studies (2 – part time work)				2.26*
Working status besides studies (0 – full time work)				2.04
Constant	2.52***	2.36***	0.25**	0.12**
Observations	392	396	389	389
Omnibus test of model coefficients ($p-value$)	0.00	0.00	0.00	0.00
Cox and Snell R^2	0.29	0.25	0.33	0.33
Nagelkerke R^2	0.40	0.34	0.45	0.46
Hosmer and Lemeshow test ($p-value$)	0.62	0.94	0.33	0.83

Note: *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively.

Source: Authors' calculations.

the results presented in Table 8 refer only to variables that are statistically significant.

The presented coefficients refer to the odds ratio Exp(b), showing how the odds of the outcome change with a one-unit increase in the predictor, holding all else constant. Before interpreting the odds ratio, model fit is assessed.

The Omnibus Test checks if any predictors significantly relate to the outcome, with $p = 0$ for all models, rejecting the null hypothesis that coefficients are zero and that that at least one predictor significantly affects the outcome.

Cox and Snell R^2 values (Cox and Snell 1989) (0.25–0.33) indicate that 25–33% of the outcome variance is explained,

suggesting moderate explanatory power and that other model fit metrics should be considered. Nagelkerke R^2 values (Nagelkerke 1991) (0.34–0.46) indicates a better fit, with 0.46 showing a reasonably good model fit. The Hosmer-Lemeshow test (1989) confirms a good fit for all models, as the null hypothesis is accepted.

We interpret the significant results from the regression model (4) as follows: The latent variables or factors confirmed by the exploratory factor analysis, which are novelty in our research, prove to be statistically significant. These findings significantly contribute to identifying new underlying factors that have the most prominent impact on the migration intention in North Macedonia. Those factors are an advanced and developed society and enhanced educational and career opportunities, which increase the chances of migration by almost three times, compared to other factors such as housing, environment, and public services, social activities and community engagement, public services and economic and social progress, which also have influence on the migration intention, yet with much less intensity. This conforms with the notion from the descriptive analytics that students in North Macedonia value mostly the numerous and diversified opportunities for education and professional growth and development and the advantages of the modern and developed societies when making one of the most important decisions in their life, to emigrate or stay in the country. On the other hand, students who are more satisfied with the living conditions in the country are less likely to consider moving abroad. Improving the quality of life appears to draw students to think about remaining in the country, i.e.

improvements in national public services lower migration intentions.

Education plays a key role in students' decision to migrate. It is very important to point out that students with highly educated parents are significantly more likely to emigrate (for instance, if both parents have university degrees, the odds increase to 10.22 times). These findings were not confirmed in previous studies and are a valuable contribution to understanding the key motives behind emigration. The influence of highly educated parents can be explained by higher educational expectations, where they tend to emphasize the importance of pursuing higher academic and professional achievements. These parents are usually more informed about global opportunities and encourage their children to seek professional and educational opportunities abroad. They also tend to have higher incomes, which makes it easier for them to provide financial resources to support international education. Educated parents have a global mindset and they are used to international exposure through their own careers, which makes them more familiar and comfortable with the idea of their children studying and working abroad.

Also, the odds of intention to migrate increase for students with very high academic performance (students averaging 8–9 and 9–10 having around 2 and 3 times the odds, respectively, compared to lower-performing students). High-performing students are more likely to be aware of the superior educational opportunities and career options available in developed countries and they aspire to work in industries with advanced infrastructure and plenty of opportunities to show their knowledge and talent. Some of them may also feel driven to compete on the global stage.

These students are also more likely to have access to information about opportunities abroad, application processes and benefits of migrating.

Additionally, part-time student workers are two times more likely to consider migration compared to non-working students. Working students already have practical work experience and are more likely to be thinking about the long-term career growth and see migration as a way to access better professional networks, industries, or markets that align with their ambitions.

7 CONCLUSION

The research in this paper is inspired by the persistent problem that North Macedonia has been facing with youth emigration in recent years, especially when it comes to highly educated youth. The paper contributes to the academic debate on the driving factors of student migration intentions, which has significant implications for small and developing economies, such as the Macedonian. The findings could also be relevant in a regional context, as students' migration decisions may follow similar patterns and be driven by similar factors in other Western Balkan countries.

The results from our conducted survey showed that around two thirds of Macedonian students considered moving abroad. This worrisome result is in line with previous studies that also found a relatively high willingness to live and work abroad among Macedonian students (Topuzovska Latkovikj et al. 2019; Dragović, Drakulovska-Chukalevska and Dragović 2017; Alili, King and Gëdeshi 2022). However, compared to them, we applied exploratory factor analysis to further investigate the impact of living conditions, the motives for emigration abroad, as well as the motives for staying home.

The results from the logistic regression showed that socio-demographic factors, such as gender, age or place of origin, and the field of study were not statistically significant. However, the latent variables capturing the living conditions, and the motives for leaving and staying, play an important role in shaping students' intentions to migrate. Students who are more satisfied with the living conditions are less likely to consider moving abroad. Improving the quality of life, for example by improving national public services, is also suggested to be lowering migration intentions. The numerous and diversified opportunities for education and professional development are also crucial for students when making the life-defining decision of whether to emigrate or stay in the country.

The most important consideration that arises from our results is that education background plays a key role in students' decision to migrate. Students with highly educated parents are significantly more likely to intend to emigrate. Even more importantly, students with high academic performance are also more inclined to migrate. This is a worrisome finding that outlines the brain drain problem that country faces, with detrimental impact on labor market, productivity and economic growth. Therefore, understanding migration intentions and their determinants might be of particular interest to policymakers in designing empirically supported strategies and measures to address the migration and brain drain problem. Investments in enhancing the quality of the education in the country are highly important to reduce the need for students to migrate in search of better educational opportunities abroad. Collaboration with renowned

foreign universities (developing joint study programmes) can help retain talented young people home and attract international students. In addition, the policies that would encourage students who have already migrated to continue their studies abroad to return home after their studies are crucial. These can include incentives such as grants for startups, facilitating the process for recognition of foreign qualifications etc. Other policies aimed at improving the institutional quality, government effectiveness, quality of public services, and most importantly healthcare, are also beneficial for retaining students and reverse migration.

The main limitation of our study is the selected sample that only included students from the oldest and largest university of Ss. Cyril and Methodius. To make the sample nationally representative, students from other universities are to be included in further research. It is also noteworthy that, although our results indicate that two thirds of the respondents intend to migrate, almost half of them have not undertaken any concrete steps regarding leaving the country. Therefore, in addition to migration intentions, further studies focused on real preparedness (willingness) of students for moving abroad, would be beneficial.

REFERENCES

Abbas, S., Nejati, M., & Taleghani, F. (2024). Impact of skilled labour migration on energy, environment and economic growth in home and host countries: A computable general equilibrium analysis. *OPEC Energy Review*, 48(2), 78–95. https://doi.org/10.1111/opec.12296

Adger, W. N., Fransen, S., Safra de Campos, R., & Clark, W. C. (2024). Migration and sustainable development. *Proceedings of the National Academy of Sciences*, 121(3), e2206193121, https://doi.org/10.1073/pnas.2206193121

Alberts, H. C., & Hazen, H. D. (2005). There are always two voices…: International students' intentions to stay in the United States or return to their home countries. *International Migration*, 43(3), 131–152. https://doi.org/10.1111/j.1468-2435.2005.00328.x

Alili, M. Z., King, R., & Gëdeshi, I. (2022). Potential Migration of Educated Youth from North Macedonia: Can Brain Drain be Averted? *Migration Letters*, 19(1), 67–81. https://doi.org/10.33182/ml.v19i1.2093

Aniche, E. T. (2020). Migration and Sustainable Development: Challenges and Opportunities. In: I. Moyo, C. Nshimbi & J. Laine (Eds.), *Migration Conundrums, Regional Integration and Development. Africa's Global Engagement: Perspectives from Emerging Countries* (pp. 37–61). Singapore: Palgrave Macmillan. https://doi.org/10.1007/978-981-15-2478-3_3

Balaz V., Williams, A. M., & Kollár, D. (2004). Temporary versus permanent youth brain drain: economic implications. *International Migration*, 42(4), 3–34. https://doi.org/10.1111/j.0020-7985.2004.00293.x

Bednaríkova, Z., Bavorova, M., & Ponkina E. (2016). Migration motivation of agriculturally educated rural youth: The case of Russian Siberia. *Journal of Rural Studies*, 45, 99–111. https://doi.org/10.1016/j.jrurstud.2016.03.006

Begović, S., Lazović-Pita, L., Pijalović, V., & Baskot, B. (2020). An investigation of determinants of youth propensity to emigration from Bosnia and Herzegovina. *Economic Research–Ekonomska Istraživanja*, 33(1), 2574–2590. https://doi.org/10.1080/1331677X.2020.1754267

Bildirici, M. (2022). Refugees, governance, and sustainable environment: PQARDL method. *Environmental Science and Pollution Research,* 29, 39295–39309. https://doi.org/10.1007/s11356-022-18823-w

Böcker, A. (1994). Chain migration over legally closed borders: settled immigrants as bridgeheads and gatekeepers. *The Netherlands Journal of Social Science*, 30(2), 87–106.

Boyd, M. (1989). Family and personal networks in international migration: recent developments and new agendas. *International Migration Review*, 23(3), 638–670. https://doi.org/10.1177/019791838902300313

Cairns, D., & Smyth, J. (2011). I wouldn't mind moving actually: Exploring Student Mobility in Northern Ireland. I*nternational Migration,* 49(2), 135 – 161. https://doi.org/10.1111/j.1468-2435.2009.00533.x

Castelli, F. (2018). Drivers of migration: Why do people move? *Journal of Travel Medicine*, 25(1), tay040. https://doi.org/10.1093/jtm/tay040

Cheong, P. H., Edwards, R., Goulbourne, H., & Solomos, J. (2007). Immigration, social cohesion and social capital: A critical review. *Critical social policy*, 27(1), 24–49. https://doi.org/10.1177/0261018307072206

Ciarniene, R., & Kumpikaite, V. (2011). International Labour Migration: Students Viewpoint. *Inžinerinė ekonomika = Engineering economics*, 22(5), 527–533. http://dx.doi.org/10.5755/j01.ee.22.5.971

Coleman, J. S. (1990). *Foundations of Social Theory*. Cambridge: Belknap Press.

Cox, D. R., & Snell, E. J. (1989). *Analysis of binary data* (2nd ed.). London: Chapman and Hall.

DeVellis, R. F. (1991). S*cale development: Theory and applications.* New York: Sage Publications. https://psycnet.apa.org/record/1991-98125-000

Dohlman, L., DiMeglio, M., Hajj, J., & Laudanski, K. (2019). Global Brain Drain: How Can the Maslow Theory of Motivation Improve Our Understanding of Physician Migration? *International journal of environmental research and public health*, 16(7), 1182. https://doi.org/10.3390/ijerph16071182

Dragović, A., Drakulovska-Chukalevska, M., & Dragović, J. (2017). Some aspects of youth attitudes towards emigration: case of Republic of Macedonia. In: M. Bobić & S. Janković (Eds.) *Towards Understanding of Contemporary Migration: Causes, Consequences, Policies, Reflections* (pp. 107–127). Belgrade: Institute of Sociological Research, University of Belgrade.

Drinkwater, S. J., Levine, P., Lotti, E., & Pearlman, J. (2003). The economic impact of migration: A survey. Guildford: University of Surrey (Discussion Papers in Economics No 0103). https://repec.som.surrey.ac.uk/2003/DP01-03.pdf

Esser, H. (1999). *Soziologie. Spezielle Grundlagen, Band 1: Situationslogik und Handeln.* Frankfurt: Campus.

Esses, V. (2018). Immigration, Migration, and Culture. *Oxford Research Encyclopedia of Psychology.* https://doi.org/10.1093/acrefore/9780190236557.013.287

Eurostat (2024a). Immigration by age group, sex and country of birth. https://doi.org/10.2908/MIGR_IMM3CTB

Eurostat (2024b). First permits by reason, length of validity and citizenship. https://doi.org/10.2908/MIGR_RESFIRST

EUROSTAT (2024c). *Statistics explained. Enlargement countries – statistics on migration, residence permits, citizenship and asylum.* https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Enlargement_countries_-_statistics_on_migration%2C_residence_permits%2C_citizenship_and_asylum#Population_change:_natural_change_and_net_migration

Faist, T. (1997). The crucial meso-level. In T. Hammar, G. Brochmann, K. Tamas & T. Faist, (Eds.), *International Migration, Immobility and Development* (pp. 187 – 217). Oxford: Berg. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003136125-7/crucial-meso-level-thomas-faist

Field, A. (2005). *Discovering Statistics Using SPSS* (2nd ed.). London: SAGE Publications.

Findlay, A., King, R., Stam, A., & Ruiz-Gelices, E. (2006). Ever Reluctant Europeans: The Changing Geographies of UK Students Studying and Working Abroad. *European Urban and Regional Studies,* 13(4), 291–318. https://doi.org/10.1177/0969776406065429

Finn, M. G. (2003). *Stay rates of foreign doctorate recipients from US universities.* Oak Ridge: Oak Ridge Institute for Science and Education. https://core.ac.uk/download/pdf/71322481.pdf

Frank, A.G. (1969). *Capitalism and Underdevelopment in Latin America.* New York: Monthly Review Press.

Garasky, S. (2002). Where are they going? Comparison of urban and rural youths' locational choices after leaving the parental home. *Social Science Research*, 31(3), 409–431. https://doi.org/10.1016/S0049-089X(02)00007-8

Gëdeshi, I., & King, R. (2018). *Research Study into Brain Gain: Reversing Brain Drain with the Albanian Scientific Diaspora*. Tirana: UNDP. https://www.undp.org/albania/publications/reversing-brain-drain-albanian-scientific-diaspora

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference* (4th ed.). Boston: Allyn & Bacon.

Gherheș, V., Dragomir, G.-M., & Cernicova-Buca, M. (2020). Migration Intentions of Romanian Engineering Students. *Sustainability*, 12(12), 4846. https://doi.org/10.3390/su12124846

Harbison, S. F. (1981). Family structure and family strategy in migration decision making. In G. F. DeJong & R. W. Gardner (Eds.), *Migration Decision Making* (pp. 225 – 251). New York: Pergamon.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment, and development: A two-sector analysis. American Economic Review, 60, 126–142. https://www.aeaweb.org/aer/top20/60.1.126-142.pdf

Haug, S. (2000). *Soziales Kapital und Kettenmigration. Italienische Migranten in Deutschland*. Opladen: Leske & Budrich.

Haug, S. (2008). Migration Networks and Migration Decision-Making. *Journal of Ethnic and Migration Studies,* 34(4), 585–605. https://doi.org/10.1080/13691830801961605

Hawthorne, L. (2005). Picking winners: The recent transformation of Australia's skilled migration policy. *International Migration Review,* 39(3), 663–696. https://doi.org/10.1111/j.1747-7379.2005.tb00284.x

Herz, A., Chorne, L. D., Catalan, C. D., Altissimo, A., & Carignani, S. S. (2018). Are you mobile, too? The role played by social networks in the intention to move abroad among youth in Europe. *Migration Letters*, 16, 93–104. https://doi.org/10.59670/ml.v16i1.622

Hosmer, D. W., & Lemeshow, S. (1989). *Applied logistic regression.* New York: Wiley. https://doi.org/10.1002/sim.4780100718

International Monetary Fund (2016). *Impact of migration on income levels in advanced economies* (IMF Spillover Notes No. 8). https://www.imf.org/en/Publications/Spillover-Notes/Issues/2016/12/31/Impact-of-Migration-on-Income-Levels-in-Advanced-Economies-44343

International Organization for Migration (2022). *Migration in North Macedonia: A Country Profile 2021*. Skopje: IOM. https://publications.iom.int/books/migration-north-macedonia-country-profile-2021

Ivanovska A., Mojsovski, A., & Kacarska, S. (2019). *Youth Employment in the Republic of North Macedonia.* Skopje: European Policy Institute.

Janker, J., & Thieme, S. (2021). Migration and justice in the era of sustainable development goals: a conceptual framework. *Sustainability Science*, 16, 1423–1437. https://doi.org/10.1007/s11625-021-00958-3

Kaiser, H. F. (1970). A second-generation Little Jiffy. *Psychometrika*, 35(4), 401–415. https://doi.org/10.1007/BF02291817

Kalerante, E., Oudatzis, N., Tzikas K., Tsantali, C., & Poulos C. (2022). Approach and Application of the Rational Choice Theory in Decisions, Interests and Preferences of the Active Players in the Migration Crisis (2014–18): the Interactive Role of the European Union and the Turkish Policy. *Asian Journal of Advanced Research and Reports,* 16(6), 43–61. https://doi.org/10.9734/AJARR/2022/v16i630480

Khoo, S. E., Hugo, G., & McDonald, P. (2008). Which skilled temporary migrants become permanent residents and why? *International Migration Review*, 42(1), 193–226. http://dx.doi.org/10.1111/j.1747-7379.2007.00118.x

Kindleberger, C. P. (1967). *Europe's Postwar Growth: The Role of Labor Supply.* Cambridge: Harvard University Press.

King, R. (2002). Towards a new map of European migration. *International Journal of Population Geography,* 8(2), 89–106. https://doi.org/10.1002/ijpg.246

King, R., & Ruiz-Gelices, E. (2003). International student migration and the European year abroad: effects on European identity and subsequent migration behavior. *International Journal of Population Geography,* 9(3), 229–252. https://doi.org/10.1002/ijpg.280

King, R., Lulle, A., Moroşanu, L., & Williams, A. (2016). *International Youth Mobility and Life Transitions in Europe: Questions, Definitions, Typologies and Theoretical Approaches.* Brighton: University of Sussex, Sussex Centre for Migration Research (Working Paper 86). https://hdl.handle.net/10779/uos.23430644.v1

King, R., & Gëdeshi, I. (2020). *The Actual and Potential Migration of Students from Albania: A Putative Brain Drain?* Tirana: Friedrich-Ebert-Stiftung. https://library.fes.de/pdf-files/bueros/albanien/17258.pdf

Kolčić, I., Čikeš, M., Boban, K., Bućan, J., Likić, R., Ćurić, G., … Polašek, O. (2014). Emigration-related attitudes of the final year medical students in Croatia: A cross-sectional study at the dawn of the EU accession. *Croatian Medical Journal*, 55(5), 452–458. https://doi.org/10.3325/cmj.2014.55.452

Krajewski-Siuda, K., Szromek, A., Romaniuk, P., Gericke, C. A., Szpak, A., & Kaczmarek, K. (2012). Emigration preferences and plans among medical students in Poland. *Human Resources for Health*, 10(1), 8. https://doi.org/10.1186/1478-4491-10-8

Kuhnt, J. (2019). Literature review: drivers of migration. Why do people leave their homes? Is there an easy answer? A structured overview of migratory determinants Bonn: German Development Institute (Discussion Paper No. 9/2019). https://doi.org/10.23661/dp9.2019

Lewis, W. A. (1954). Economic development with unlimited supplies of labor. *The Manchester School of Economic and Social Studies*, 22, 139–191. https://doi.org/10.1111/j.1467-9957.1954.tb00021.x

Lu, Y., Zong, L., & Schissel B. (2009). To Stay or Return: Migration Intentions of Students from People's Republic of China in Saskatchewan, Canada. Journal of *International Migration & Integration*, 10, 283–310. https://doi.org/10.1007/s12134-009-0103-2

Massey, D. S., Alarco, R., Durand, J., & Gonzalez, H. (1987). *Return to Aztlan. The Social Process of International Migration from Western Mexico*. Berkeley: University of California Press. http://www.catedrajorgedurand.udg.mx/sites/default/files/studies_in_demography_douglas_s._massey_rafael_alarcon_jorge_durand_humberto_gonzalez_-_return_to_aztlan_the_social_process_of_international_migration_from_western_mexico_1990_university_of_california_press.pdf

Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., & Taylor, J. E. (1993). Theories of International Migration: A Review and Appraisal. Population and Development Review, 19(3), 431–466. https://doi.org/10.2307/2938462

McAuliffe, M., & Oucho, L. A. (2024). *World Migration Report 2024*. Geneva: International Organization for Migration. https://publications.iom.int/system/files/pdf/pub2023-047-l-world-migration-report-2024_0.pdf

Millock, K. (2015). Migration and environment. *Annual Review of Resource Economics,* 7(1), 35–60. https://doi.org/10.1146/annurev-resource-100814-125031

Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika*, 78(3), 691–692. https://www.cesarzamudio.com/uploads/1/7/9/1/17916581/nagelkerke_n.j.d._1991_-_a_note_on_a_general_definition_of_the_coefficient_of_determination.pdf

Nguyen, L., Ropers, S., Nderitu, E., Zuyderduin, A., Luboga, S., & Hagopian, A. (2008). Intent to migrate among nursing students in Uganda: Measures of the brain drain in the next generation of health professionals. *Human Resources for Health*, 6(1), 5. https://doi.org/10.1186/1478-4491-6-5

Noja, G. G., Cristea, S. M., Yüksel, A., Pânzaru, C., & Drăcea, R. M. (2018). Migrants' role in enhancing the economic development of host countries: Empirical evidence from Europe. *Sustainability*, 10(3), 894. https://doi.org/10.3390/su10030894

Opp, K.D. (1999). Contending conceptions of the theory of rational action. *Journal of Theoretical Politics,* 11(2), 171–202. https://doi.org/10.1177/0951692899011002002

Parker, K. A., Hester, E. B., Geegan, S. A., Ciunova-Shuleska A., Palamidovska-Sterjadovska N., & Ivanov, B. (2022). Reflections on the Emigration Aspirations of Young, Educated People in Small Balkan Countries: A Qualitative Analysis of Reasons to Leave or Stay in North

Macedonia. *Central and Eastern European Migration Review,* 11(1), 69–84. https://doi.org/10.54667/ceemr.2022.07

Plopeanu, A. P., Homocianu, D., Mihaila, A. A., Crisan, E. L., Bodea, G., Bratu, R.D., & Airinei, D. (2018). Exploring the Influence of Personal Motivations, Beliefs and Attitudes on Students' Post-Graduation Migration Intentions: Evidence from Three Major Romanian Universities. *Applied Sciences*, 8(11), 2121. https://doi.org/10.3390/app8112121

Ranis, G., & Fei, J. C. H. (1961). A theory of economic development. *American Economic Review*, 51, 533–565. https://www.depfe.unam.mx/actividades/11/desarrollo-crecimiento/11-2_catcdejr_04_ranis_fei_1961.pdf

Reactor – Research in Action (2022). Mladi na popis / Млади на попис. [Youth on census] https://reactor.org.mk/dataviz-all/%D0%BC%D0%BB%D0%B0%D0%B4%D0%B8-%D0%BD%D0%B0-%D0%BF%D0%BE%D0%BF%D0%B8%D1%81/

Ritchie, H., & Spooner, F. (2022). *Migration data: our sources and definitions*. Our world in data. https://ourworldindata.org/migration-definition

Sandu, D., & Tufiş, P. (2018). *Spheres of Life in Youth Migration Processes: a Multicountry and Multilevel Approach*, section in the research report of H2020 project YMOBILITY, Youth mobility: maximizing opportunities for individuals, labour markets and regions in Europe, 2015–2018.

Santric-Milicevic, M. M., Terzic-Supic, Z. J., Matejic, B. R., Vasic, V., & Ricketts, T. C. (2014). First- and fifth-year medical students' intention for emigration and practice abroad: A case study of Serbia. *Health Policy*, 118(2), 173–183. https://doi.org/10.1016/j.healthpol.2014.09.018

Schelling, T. C. (1978). *Micromotives and Macrobehavior.* New York: Norton & C.

Schmitter-Heisler, B. (2000). The sociology of immigration. In C. B. Brettell & J. F. Hollifield (Eds.), *Migration Theory: Talking across Disciplines* (pp. 77 – 96). New York: Routledge.

Sohaee, N. (2023). Leveraging International Student Mobility to Enhance the Competitiveness of Developing Countries in the Global Market. In: F. A. Yamoah & A. U. Haque (Eds.), *Corporate Management Ecosystem in Emerging Economies*. London: Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-41578-4_5

Soldo, A., Spahić, L., & Hasić, J. (2021). *Survey on youth emigration in Bosnia and Herzegovina*. UNFPA EECARO. https://ba.unfpa.org/sites/default/files/pub-pdf/youth_emigration_survey_in_bih_eng_final_0_0.pdf

Stark, O. (1991). *The Migration of Labour.* Oxford: Blackwell. http://class.povertylectures.com/Stark1991MigrationofLaborChapts1-3.pdf

State Statistical Office of the Republic of North Macedonia (2023). *Enrolled students in under-graduate studies, 2022/2023.* https://www.stat.gov.mk/publikacii/2023/2.4.23.02.920.pdf

State Statistical Office of the Republic of North Macedonia (2024). *Total Immigrated and Emigrated citizens in the Republic of North Macedonia, annually.* Statistical Database. https://makstat.stat.gov.mk/PXWeb/pxweb/en/MakStat/MakStat__Naselenie__VnatresniMigracii/725_Migracii_VkDosOts_ml.px/table/tableViewLayout2/

Stockdale, A. (2006). Migration: pre-requisite for rural economic regeneration? *Journal of Rural Studies*, 22, 354–366. https://doi.org/10.1016/j.jrurstud.2005.11.001

Suciu, Ş. M., Popescu, C. A., Ciumageanu, M. D., & Buzoianu, A. D. (2017). Physician migration at its roots: A study on the emigration preferences and plans among medical students in Romania. *Human Resources for Health*, 15(1), 6. https://doi.org/10.1186/s12960-017-0181-8

Taran, P. A., Ivakhnyuk, I., da Conceição Pereira Ramos, M., & Tanner, A. (2009). *Economic migration, social cohesion and development: Towards an integrated approach*. Council of Europe. https://book.coe.int/en/migrants-rights/4133-economic-migration-social-cohesion-and-development-towards-an-integrated-approach.html

Thissen, F., Fortuijn, J.D., Strijker, D., & Haartsen, T. (2010). Migration intentions of rural youth in the Westhoek, Flanders, Belgium and the Veenkolonien. *The Netherlands. J. Rural Studies,* 26, 428–436. https://doi.org/10.1016/j.jrurstud.2010.05.001

Tinsley, H. E. A., & Tinsley, D. J. (1987). Uses of factor analysis in counseling psychology research. *Journal of Counseling Psychology,* 34(4), 414–424. https://doi.org/10.1037/0022-0167.34.4.414

Todaro, M. P. (1976). *Internal Migration in Developing Countries: A Survey.* Geneva: International Labor Office.

Topuzovska Latkovikj, M., Borota Popovska, M., Serafimovska, E., Cekikj, A. & Starova, N. (2019). *Youth Study North Macedonia 2018/2019*. Berlin: Friedrich-Ebert-Stiftung. https://library.fes.de/pdf-files/id-moe/15266.pdf

UN (2023). *The Sustainable Development Goals Report 2023: Special Edition.* https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf

UN DESA (2020). International Migration 2020 Highlights (ST/ESA/SER.A/452). New York: United Nations Department of Economic and Social Affairs, Population Division. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/undesa_pd_2020_international_migration_highlights.pdf

United Nations (n.d.). The 17 Goals. United Nations. https://sdgs.un.org/goals

Van Mol, C. (2016). Migration aspirations of European youth in times of crisis. *Journal of Youth Studies,* 19(10), 1303–1320. https://doi.org/10.1080/13676261.2016.1166192

Voss, T., & Abraham, M. (2000). Rational choice theory in sociology: a survey. In S. S. Quah & A. Sales (Eds.), *The International Handbook of Sociology (*pp. 50–83). London: Sage.

Wallerstein, I. (1974). *The Modern World System, Capitalist Agriculture and the Origins of the European World Economy in the Sixteenth Century.* New York: Academic Press.

Wazir, F., Jani, R., Othman, A., & Shahabudin, M. (2017). Factors Influencing the Intention To Migrate Among Engineering Students In Malaysia: An Exploratory Study. Paper presented at "International Business Management Conference (IBMC 2017)" Kedah, Malaysia.

Ziguras, C., & Law, S. F. (2006). Recruiting international students as skilled migrants: The global' skills race' as viewed from Australia and Malaysia. *Globalization, Societies and Education*, 4(1), 59–76. https://doi.org/10.1080/14767720600555087

Data Availability Statement

Data are available from the authors upon request.

Coauthor contributions

Katerina Shapkova Kocevska: Conceptualization, Investigation, Methodology, Writing – Original Draft. **Biljana Tashevska:** Conceptualization, Investigation, Formal Analysis, Writing – Original Draft. **Marija Trpkova – Nestorovska:** Conceptualization, Data Curation, Formal Analysis, Methodology, Writing – Original Draft. **Suzana Makreshanska Mladenovska:** Conceptualization, Investigation, Writing – Original Draft.

Raskršće aspiracija: istraživanje migracionih namera studenata u Severnoj Makedoniji

PROŠIRENI SAŽETAK

Veza između migracija i ostvarivanja ciljeva održivog razvoja je složena i odvija se kroz različite mehanizme, uključujući ekonomsko osnaživanje, društvenu koheziju i ekološku održivost. S obzirom na to da je Severna Makedonija mala i otvorena ekonomija sa dugom istorijom emigracija, a da mladi čine otprilike trećinu svih emigranata, neophodno je istražiti faktore koji utiču na odluku mladih da napuste zemlju.

U radu su analizirane migracione namere studenata u Severnoj Makedoniji. Sprovedeno je anketno istraživanje koje je obuhvatilo 50 pitanja i 412 studenata Univerziteta Sv. Ćirila i Metodija u Skoplju. Ova obrazovna institucija predstavlja najveći i najistaknutiji univerzitet u zemlji. Rezultati ankete su pokazali da oko dve trećine ispitanika (67%) namerava da emigrira. Kako bi se identifikovale determinante migracionih namera, primenjeni su modeli logističke regresije, pri čemu su migracione namere bile zavisna varijabla. Korišćene su sociodemografske varijable (starost, pol, mesto stanovanja, broj bliskih osoba koje žive u inostranstvu i prethodni boravak u inostranstvu), obrazovne varijable (smer studija, trenutni prosečni uspeh, nivo obrazovanja roditelja), ekonomski status (radni status pored studija, prosečna mesečna primanja, percepcija adekvatnosti prihoda) i dodatnih sedam faktora identifikovanih eksploratornom faktorskom analizom kao nezavisne varijable.

Rezultati su pokazali da prethodno identifikovani faktori, poput stanovanja, životne sredine i javnih usluga, društvenih aktivnosti i angažovanja u zajednici, razvijenosti društva, poboljšanih obrazovnih i karijernih mogućnosti, javnih usluga i ekonomskog i društvenog napretka, imaju statistički značajan uticaj na migracione namere makedonskih studenata. Pored toga, nivo obrazovanja roditelja, trenutni akademski uspeh i radni status takođe značajno utiču na ove namere. Studenti sa obrazovanijim roditeljima, boljim akademskim uspehom i oni koji rade imaju veće šanse da emigriraju u poređenju sa studentima čiji roditelji imaju niži nivo obrazovanja, koji postižu slabiji akademski uspeh i ne rade tokom studija. Ostale sociodemografske karakteristike, obrazovanje i ekonomski status nisu se pokazali statistički značajnim. Rad se završava preporukama za politike usmerene na ublažavanje negativnih efekata migracija i promovisanje održivog razvoja zemlje.

KLJUČNE REČI

migracije, migracione namere, studenti, logistička regresija, Severna Makedonija

Environmental attitudes among Serbian university students

Aida Hanić [1] ⓘ Jelena Minović [1] ⓘ Slavica Stevanović [1] ⓘ Petar Mitić [1] ⓘ

ABSTRACT

This article aims to analyse the attitudes of Serbian university students towards environmental issues and risks, as it is crucial to understand these attitudes to shape future environmental policies and promote sustainability initiatives. The survey, which covered socio-demographic, economic, and environmental variables, gathered insights for understanding environmental awareness and important factors promoting pro-environmental behaviour among youth. In total, 165 responses were obtained. A Chi-square test of independence and a logistic regression model was employed for analysis. The survey results show university students perceive inadequate recycling habits (65%) and limited green spaces (73%) in their cities. They consider the environmental risks considerable, possibly leading to migration (66%) and urban depopulation (47%). They advocate for increased awareness campaigns (66.7%) and greater use of renewable energy (64.2%), as well as stricter penalties for environmental violations (61.8%). The analysis revealed a significant relationship between self-assessed environmental awareness and actual environmental behaviour, with students who reported higher awareness being more likely to engage in environmentally friendly actions. Gender and family recycling habits were significant predictors of environmental behaviour, with females and students from the families with recycling practices more likely to exhibit pro-environmental behaviour. These results indicate that the surveyed university students have developed environmental habits and awareness. Supporting youth is central to tackling environmental issues and promoting sustainable behaviour. In addition to educational efforts in Serbia, this requires comprehensive government and civil society initiatives.

KEYWORDS

Serbian university students, environmental awareness, sustainable development, environmental attitudes, risks

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1 INTRODUCTION

Environmental issues and related risks have become a global concern, affecting every aspect of human life (Stevanović, Jovanović and Hanić 2019). One such effect can be seen in climate migrations since only in 2021, natural disasters displaced 23.7 million people globally (European Migration Network Inform 2023). Given that this trend is expected to continue, a paradigm shift in individual behaviour towards the environment is necessary, particularly regarding environmental attitude. In the literature, environmental attitude (EA) is defined as "the collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally-related activities or issues" (Schultz et al. 2004: 31). As one of its very strong predictors, EA affects people's pro-environmentalism (Rosa and Collado 2019; Miller et al. 2022), environmental habits, culture (Asan, Mile and Ibraim 2014), and ability to solve environmental problems in the long term (Gurbuz and Ozkan 2019). At the same time, an individual's EA is influenced by various factors, primarily education, which significantly affects their environmental knowledge and behaviour (Kirbiš 2023).

When discussing EA, it is important to note that, according to Yapici et al. (2017), the attitude consists of three components: cognitive (knowledge and beliefs), affective (emotional response), and behavioural (past and present actions). In practice, this means considering what individuals know about environmental issues, their beliefs regarding them, the emotional responses they have towards them, and the actions they are likely to take in response. In line with this, EA is related to risk perception since perceiving environmental risks affects environmental behaviour where according to Bradley et al. (2020), the higher the environmental risk perception is, the higher risk response behaviours are.

To comprehensively understand current environmental issues, it is essential to explore the environmental attitudes held by various stakeholders, as these attitudes shape future environmental policies and sustainability initiatives and, as pointed out by Petrović, Nikolić and Ostojić (2018), affect human behaviour patterns. One specific group of stakeholders is university students, who not only live in very different environmental conditions than their parents but also actively participate in the current social and environmental paradigm. In general, numerous studies highlight the positive effects of nature on university students' health and well-being, especially due to their technologically focused lives (Puhakka 2021). This group of stakeholders is also important since they are future leaders, decision-makers, environmental educators and creators of future environmental educational strategies (Zwickle et al. 2014; Shafiei and Maleksaeidi 2020; Piscitelli and D'Uggento 2022; Cvetković et al. 2024) who have the potential to facilitate the transition from a human-centred to an ecosocial society (Chang et al. 2022). Moreover, university students' individual environmental attitudes can impact wider community environmental performances such as universities (Bonhi et al. 2024).

To understand university students' environmental behaviour, different authors explored several factors affecting it. For instance, Chuvieco et al. (2018) examined university students from Spain, Brazil, and the UAE to analyze their real environmental practices. The authors found that students' self-perception of environmental concerns was most clearly

related to their sustainability practices. Gurbuz and Ozkan (2019) explored the environmental consciousness levels of university students from Turkiye, finding that most of the students couldn't describe environmental pollution. This lack of understanding was followed by the lack of punishment and sanctions, as the two most rated reasons for problematic environmental behaviour in Turkiye. Another research study by Shafiei and Maleksaeidi (2020) explored the pro-environmental behaviour of university students through the protection motivation theory. Their study, involving Iranian students, identified several key determinants of pro-environmental behaviour: environmental attitude, self-efficacy, perceived costs of pro-environmental behaviour, and perceived intrinsic and extrinsic rewards associated with current environmentally unfriendly behaviours. Shutaleva et al. (2022) focused on youth between 14 to 34 years living in Ekaterinburg, Russia and found that eco-behaviour was encouraged and that the ecological behaviour of their parents had no influence on their environmental behaviour. However, women were more likely to be environmentally oriented. At the same time, the influence of socio-demographic characteristics on environmental behaviour practices revealed no significant statistical relationships. At the same time, it was found that if the income was increasing, the environmentally friendly behaviour should improve as well. Additionally, Torroba Diaz et al. (2023) found a direct and significant impact of ambient intelligence on the environmental knowledge of Spanish university students, indicating that students with higher ambient intelligence also possessed greater environmental knowledge. Similarly, Torres et al. (2023) explored the General Ecological

Behavior (GEB), including data on the environmental connection, awareness, and behaviours of students from Portugal, aged between 18 and 65 years. The authors found that the majority of Portuguese university students believed that environmental issues were not a primary concern for Portugal, where climate changes were a result of natural processes.

To determine the environmental attitudes and perceived risks that are associated with environmental factors among university students in Turkiye, Yapici et al. (2017) researched this relationship. The results indicate that environmental education is a lifelong process and can't depend only on educational institutions, as evidenced by the varying results among different faculties. For instance, university students in health-related faculties exhibited significantly higher environmental attitudes than those in social science. Varah et al. (2020) examined the environmental attitudes and behaviours of Indian university students by focusing on three core factors regarding their relationship with the environment: ecocentric (the earth is fragile and human activities can have detrimental effects on humans survival); technocentric (technology is altering the laws of nature); and dual-centric (humans' dual nature towards the environment). The study included students from both urban and rural areas. The authors found that most university students, both from urban and rural areas, were well-informed about the current critical status of our natural resources. However, university students from rural areas tended to have better environmental attitudes. Additionally, those with ecocentric views were more likely to engage in environmental activism and recycling activities. Conversely,

university students with technocentric attitudes were more into promotional activism and consumerism behaviours, but were less likely to support recycling efforts. Finally, university students studying life sciences exhibited better environmental attitudes compared to those studying physical sciences.

In a similar study, Değerli and Sunal (2022) explored the level of knowledge and environmental attitudes of university students in Turkiye. They found a positive relationship between students' environmental attitude scores and their perception of environmental risks, although the correlation between these factors was not strong. However, a study conducted by Evert, Coetzee and Nell (2022) on students from a South African university found that students' environmental attitudes tended more towards utilisation, an anti-environmental factor, rather than the pro-environmental factor of preservation.

According to findings in the literature review by Li et al. (2019), factors influencing individuals' environmental behaviour can be divided into individual and external. Individual variables include socio-demographic factors such as gender, age, education, marital status, place of residence, and personal economic situation, alongside psychological variables such as attitudes, beliefs, and norms. For instance, in a meta-study by Gökmen (2021) based on 257 publications and an overall sample of 12,188 females and 9,915 males, it was found that gender variables affected environmental attitudes in favour of females, but at a low level. In a similar study done by Wang, Hao and Liu (2021) regarding the effects of individual and population ageing on pro-environmental behaviour, data from 31 countries revealed a positive relationship between ageing and

pro-environmental behaviour. At the individual level, this means that older people are more interested in participating in environmental behaviour. At the national level, society which has a greater share of older persons encourages individuals to behave in a more sustainable way. However, research by Verachtert (2023) on Flemish pupils from Belgium found that although the older generation acts more sustainably, the transmission of sustainability attitudes and behaviour was not just a top-down process where parents influenced children; children also actively contributed. When talking about external factors such as norms, Piscitelli and D'Uggento (2022) found that respondents were more conscientious in recycling those elements required by law such as plastic, paper and glass compared to non-mandatory such as waste oil, proper disposal of batteries and electric cables.

Following this division, some research focused on socio-demographic factors, such as the studies by Yapici et al. (2017), Gurbuz and Ozkan (2019), Piscitelli and D'Uggento (2022), and Değerli and Sunal (2022), since university students' behaviour is shaped by their environment, including variables like family income, parental education, parental occupations, place of residence, etc. It is important to note that studies gave different results. For instance, Yapici et al. (2017) found no significant correlation with participant age, educational background of parents, occupation of parents, or family monthly income, while Gurbuz and Ozkan (2019) concluded that as the mothers' education levels increased, the environmental awareness of their children increased as well, while fathers' education 'did not reveal any significance. However, Değerli and Sunal (2022) found that university students coming from households with

a medium income were more positively oriented towards the protection of the environment.

Given that socio-demographic factors differ within a specific country context, it is important to examine environmental attitudes with a focus on individual countries, as human-environment interactions are often influenced by cultural factors (Tam and Milfont 2020). In that aspect, we chose to focus on Serbia for several reasons. First, previous research, including studies by Chuvieco et al. (2018) and Cvetković et al. (2024), points to culturally driven differences in environmental attitudes among university students. Second, Serbia faces a range of environmental challenges that make it a particularly relevant case for studying these attitudes. According to the Environmental Performance Index (EPI) in 2022, which assesses the extent to which a country addresses climate change mitigation, ensures ecosystem vitality, and maintains environmental health, out of 180 countries, Serbia is ranked 45th, while in some categories such as Air Quality, it is positioned 108th. This is in line with the research done by Mitić et al. (2023) which finds that economic growth is often prioritised over environmental concerns in countries like Serbia. Thirdly, few studies comprehensively approached this issue in Serbia focusing on students. For instance, Stanišić and Maksić (2014) explored environmental education in Serbian primary schools while Srbinovski and Stanišić (2020) explored the dimensionality of the revised New Environmental Paradigm Scale in Serbian and Macedonian culture in elementary and secondary schools. Additionally, Stanišić, Maksić and Nenadić (2023) focused on predictors of environmental awareness among primary school students in Serbia.

To better understand the relationship between humans and the natural environment, in terms of its effects on sustainability and environmental awareness, studies on the process of learning about natural disasters are also relevant. Additionally, disaster education serves as a cost-effective tool for risk management and reducing the long-term socioeconomic effects of disasters (Rakuasa and Latue 2023; Torani et al. 2019). In this context, a brief overview of related studies conducted in Serbia is provided. For instance, on a sample of secondary school students from Belgrade, Cvetković et al. (2015) analysed students' perceptions related to earthquakes as a natural disaster and security threat and found that while most students claimed to understand the definition of an earthquake, their knowledge remained incomplete, as 45.9% of respondents were unsure of how to respond during an earthquake. In a similar research, Cvetković (2016) focused on the relationship between educational level and the preparedness of citizens to respond to a natural disaster caused by a flood. On a sample of 2500 respondents from 19 municipalities, 23 cities and Belgrade, the author found that there was a statistically significant relationship between the educational level of respondents and their preparedness for responding to a natural disaster. On a sample coprising both students and teachers in 10 municipalities in Serbia in the Western Morava Basin, Cvetković, Nikolić and Lukić (2024) explored disaster risk reduction. The results showed that there was a notable lack of collaboration between schools, professional institutions, and parents in disaster education. A significant number of respondents felt that introducing disaster-related subjects in schools was unnecessary, so schools and parents did

not prioritize disaster preparedness. Based on the previous, we can conclude that this gap in disaster preparedness of students in Serbia highlights the need for a more robust approach to integrating environmental education into school curricula, enhancing environmental awareness among youth.

Regarding university students, Major et al. (2017) focused on the pedagogy of sustainability at the University of Novi Sad, i.e. the Hungarian Language Teacher Training Faculty in Subotica. Results of this longitudinal survey for the period between 2012 and 2015 showed that the environmental attitudes of university students had significantly increased by the end of their undergraduate education. On the other hand, Nikolic et al. (2020) studied students from the University of Novi Sad, specifically those in humanities and technological sciences. The research aimed to understand their behaviour towards integrating education for sustainable development into higher education. Their research was focused on several components of the concept of sustainable development including the understanding of the concept, its position in the system of higher education, what the sources of information about this concept and who the entities responsible for it were. The results indicate that university students don't think of higher education institutions or themselves as mainly responsible for sustainable development. This could be caused by their feeling of marginalization and doubt that their actions could impact the local community's development.

When observing research done on Serbia's neighbouring countries that share very similar environmental patterns, Cvetković et al. (2024) investigated environmental awareness, knowledge, and safety among university students in Montenegro and North Macedonia focusing on how the educational system, cultural, and socioeconomic factors influenced these aspects. The results show that gender, age, year of study, and study rate have a significant impact on students' attitudes toward environmental awareness, safety, and knowledge. Additionally, socio-cultural and environmental contexts in both countries strongly influence these factors. At the same time, university students from Montenegro demonstrated a higher awareness of the importance of natural resources for human survival and national security compared to those from North Macedonia who were more aware of the direct effects of human activities on climate change. Although university students from both countries showed strong recognition of the importance of biodiversity preservation, the study revealed gaps in environmental education and socio-economic contexts in each country.

Considering the above mentioned aspects, based on the socio-demographic, economic, and environmental variables this research aims to explore university students' attitudes in Serbia towards environmental issues and risks, in terms of whether they are aware of environmental issues in their society, do they recognise the impacts of a deteriorating environment, and understand how these issues might affect their lives, including potential demographic changes such as migrations. These questions are important because research indicates that while university students generally understand environmental problems and hold positive attitudes towards them, there is still a gap when it comes to translating these attitudes into behaviour (Wyss, Knoch and Berger 2022). This can be explained by considering

three main reasons: individuals are not directly affected by environmental issues; they avoid thinking about the negative consequences of certain environmental issues and have no belief that their actions can change anything in society (Kim and Kim 2024).

For the purposes of this research, we examined the factors influencing surveyed university students' environmental behaviour. The main hypothesis is that there is a significant relationship between the selected socio-demographic variables and the environmental behaviour of university students.

This paper is structured as follows: after the introduction, the second part is dedicated to the methods used in the research. The results of the research and discussion are presented in the third part, while the fourth part explains limitations of the study, and the fifth part presents the conclusion.

2 METHOD

After carefully observing the existing literature, a structured questionnaire was prepared for the research presented in this paper. The questionnaire consisted of 15 questions relying on Gurbuz and Ozkan (2019) and Piscitelli and D'Uggento (2022) with certain adjustments due to cultural differences, as discussed in the previous section. The questionnaire was distributed by online services during the winter semester of the 2023/2024 academic year. A survey was conducted among students of state (66.7%) universities, as well as one private (33.3%) university. The surveyed students were from undergraduate and master's studies at the following faculties: Faculty of Organizational Sciences, University of Belgrade; Faculty of Transport and Traffic Engineering, University of Belgrade;

Faculty of Technical Sciences, University of Novi Sad; Faculty of Economics, University of Priština with its seat in Kosovska Mitrovica; Faculty of Hotel Management and Tourism in Vrnjačka Banja, University of Kragujevac; and Belgrade Banking Academy, Union University.

The total number of respondents was 165. The first group of questions related to the socio-demographic and economic characteristics of the students, such as gender, parents' level of education, and family income. The other group of questions focused on the students' ecological attitudes towards environmental risks and conservation. The questionnaire was anonymous since this type of survey method enables more openness in sharing information than non-anonymous methods (Murdoch et al. 2014). These questions were selected since they were bound to give a broader picture of whether the surveyed university students' environmental attitudes were affected by family setup. Two questions included a 5-point Likert scale, with 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

The socio-demographic variables we examined are family income, parents' educational levels, gender, university type (public or private), and family recycling habits. Two environmental variables were created based on the university students' self-reported environmental attitudes. The first environmental variable captures self-assessed environmental awareness, while the second measures environmental behaviour, reflecting students' environmentally conscious actions and practices. Both variables were subsequently transformed into binary variables using an appropriate threshold, with the unitary scores indicating stronger environmental awareness and behaviour.

This study aims to assess the effects of socio-demographic factors on university students' environmental attitudes. Moreover, we aimed to test whether there was an alignment between self-assessed environmental awareness and actual environmental behaviour. Specifically, we sought to examine whether students who reported a higher level of environmental awareness also demonstrated environmentally conscious actions and practices. This analysis allows us to determine whether self-perceptions of environmental awareness corresponds with real-world environmental behaviours.

environmental consciousness. The SPSS software was employed for the analysis.

3 RESULTS AND DISCUSSION

Of the 165 responses, 67.9% were filled out by female university students, and 32.1% were filled out by male university students. The majority of the surveyed students study at state universities and are aged 19 to 24 (84.85%), with most of them (27.27%) being in their second year of study. The remaining surveyed university students are aged 25 to 30 (10.3%) and 31 to 40 (4.85%) as presented in Table 1.

Table 1 Gender, age and year of studies

Gender	n	Frequencies (%)
Female	112	67.88
Male	53	32.12
Age		
19–24	140	84.85
25–30	17	10.30
31–40	8	4.85
Year of study		
I	20	12.12
II	45	27.27
III	37	22.42
IV	40	24.24
Master	23	13.94
Type of University		
State	110	66.67%
Private	65	33.33%

Source: Authors' calculation

A Chi-square test of independence was employed to examine the association between key socio-demographic variables and respondents' environmental behaviour. Additionally, a logistic regression model was built to model and further explore the factors influencing environmental behaviour. This method allowed for identifying potential predictors and deterrents affecting students'

Table 2 presents the demographic data for the surveyed variables, such as the education level of the mother and father, as well as the family income. According to the latest census held in 2022, 53.1% of the population aged 15 and over in Serbia have completed secondary school, 17.8% have eight years of education, while 6.3% have no formal education, or have completed

Table 2 Demographic characteristics

Mothers' education	n	Frequencies (%)
Primary school	6	3.64
High school	87	52.73
Faculty	48	29.09
Master	21	12.73
Ph.D.	3	1.82
Fathers' education		
Primary school	4	2.42
High school	98	59.39
Faculty	41	24.85
Master	19	11.52
Ph.D.	3	1.82
Family income (RSD)		
40,000–90,000	44	26.67
90,000–150,000	53	32.12
150,000–300,000	35	21.21
300,000+	33	20.00

Source: Authors' calculation

less than eight years of primary school. At the same time, 24.03% of females, compared to 20.73% men, have obtained higher education or a university degree (Statistical Office of the Republic of Serbia 2023). Our findings align with this data, showing that the majority of mothers and fathers have a high school education, with a notable proportion of mothers (29.09%) holding a university degree compared to 24.85% of fathers.

Regarding family income, most of the surveyed university students (32.12%) reported their family income to be in the range of 90,000–150,000 RSD (approximately 769–1,281 EUR), which is above the minimum average monthly income reported in Serbia for 2023, which was 87,973 RSD (Statistical Office of the Republic of Serbia 2023). The highest family income of over 300,000 RSD (approximately 2,562 EUR) was reported by 20% of the surveyed university students.

In Table 3, university students assessed levels of environmental risks in the city where they studied using a 5-point Likert scale (1 − strongly disagree, 2 − disagree, 3 − no opinion, 4 − agree, 5 − strongly agree). According to their opinions, air pollution represents the greatest environmental risk (rated 5 in approximately 42% of the responses). This finding aligns with the findings of Piscitelli and D'Uggento (2022) for Southern Italy. In Serbia, approximately 27% of the surveyed university students rated waste pollution 5, and around 26% rated noise pollution 5. These results diverge from those of Piscitelli and D'Uggento (2022), where, after air pollution, students' highest concerns were global warming, deforestation, depletion of natural resources and water pollution. In Serbia, approximately 38% of the surveyed university students rated soil pollution 3, while about 34% rated waste pollution 4. Approximately 24% of university students rated unplanned

Table 3 The participants' rating of the levels of environmental risks in the city where they study (%)

	1	2	3	4	5
Air pollution	5.45	7.27	18.79	26.67	41.82
Water pollution	7.88	20.61	29.70	27.27	14.55
Land pollution	6.67	15.76	38.18	24.85	14.55
Waste pollution	3.03	10.91	24.85	33.94	27.27
Deforestation	13.33	21.21	24.24	24.24	16.97
Climate change (Global warming)	7.88	13.94	26.67	28.48	23.03
Noise pollution	8.48	18.18	26.06	21.21	26.06
Other	24.24	12.12	35.15	15.15	13.33

Source: Authors' calculation

deforestation 4. Shutaleva et al. (2022) found that the main environmental issues in Russia were waste, dirtiness, landfills, unsanitary conditions (82%), deforestation (73.5%), water pollution, poor drinking water (73%), and air quality (71%). Considering these results, it can be said that our findings partially coincide with those of Shutaleva et al. (2022) for Russian cities.

When asked whether there were sufficient green spaces in the city where they studied, approximately 74% of the surveyed university students responded negatively, while only about 26% responded positively. This is in line with the high level of urbanisation in Serbia where in Belgrade, the country's capital city and university centre, the level of green area fell from 19% to 9% leading to what is locally known as concretosis. This can also be related to the research done by Cvetković et al. (2024) where the students from Montenegro and North Macedonia rated biodiversity preservation as vital for humanity. When asked whether their families developed recycling habits, over 65% of the surveyed university students responded negatively, while over 34% responded affirmatively. This result is in contrast with the findings of Piscitelli and D'Uggento (2022) for Southern Italy, where 86% of students reported that their families had developed recycling habits, with the remaining 16% giving a negative response.

Table 4 summarizes the responses regarding the types of waste university students recycle. Plastic is the most recycled (71.4%), followed by paper and cardboard (57.1%), and then glass (35.7%). All these results are consistent with those obtained in the study by Piscitelli and D'Uggento (2022) for Southern Italy, although the percentages differ. Specifically, in Piscitelli and D'Uggento (2022), plastic is recycled the most (98.8%), followed by paper (96.3%), and then glass (93.8%). Varah et al. (2020) for Delhi reported that 23.1% of students usually recycle paper, glass, and cans. Shutaleva et al. (2022) found that 62.5% of respondents recycled plastic and paper waste in Russian cities, a result close to ours. Additionally, Shutaleva et al. (2022) found that 62.5% of the respondents also recycled batteries and electrical appliances, which is not consistent with our finding that only 27.1% of the students recycle electrical and electronic devices.

Table 4 Types of waste that the respondents recycle

	n	Frequencies (%)
Plastic	50	71.43
Glass	25	35.71
Paper and cardboard	40	57.14
Metal	11	15.71
Electric and electronic devices	19	27.14
Other	19	27.14

Source: Authors' calculation

In Table 5, university students evaluated the development of their environmental awareness using a 5-point Likert scale. A significant proportion of the surveyed university students prefer public transport over automobiles (approximately 47% rated it 5), and they also conserve resources such as water and electricity (about 30% rated it 5). Shutaleva et al. (2022) found for Russian cities that 57% of the respondents used public transport over automobiles, and 43% were mindful of the consumption of resources such as water and electricity. Therefore, our findings regarding these two attitudes in Serbia are consistent with the Shutaleva et al. (2022) findings for Russian cities. When asked whether their environmental awareness was fully developed, 43% of respondents gave a neutral response (rated as 3). This is in line with Nikolic et al. (2020) who also confirmed that Serbian students did not convert their environmental awareness into practice. The surveyed university students also gave a neutral response (rate 3) when asked if they actively participated in environmental protection (41%). Regarding the importance of purchasing products made from recycled materials, 30% of university students disagreed (rated as 2), while approximately 20.6% strongly disagreed (rated as 1). Conversely, 4.85% of the surveyed university students strongly agreed (rate 5) with this statement. This result partially aligns with the findings of Varah et al. (2020) for Delhi, where 12.32% of the students reported usually buying products made from recycled materials. However, it contrasts with Cvetković et al. (2024), who discovered that university students from Montenegro and North Macedonia recognized individual behaviour as a key factor in influencing the environment, including collective action in environmental protection.

Table 5 The respondents' assessment of environmental awareness development (%)

	1	2	3	4	5
My environmental awareness is fully developed.	1.82	10.91	43.03	27.27	16.97
When purchasing products, it is important to me that recycled materials are used.	20.61	30.30	28.48	15.76	4.85
I avoid the unnecessary use of printed materials.	13.33	24.24	24.24	16.36	21.82
I actively participate in environmental protection.	9.09	21.82	41.21	15.15	12.73
I use public transport more than a car.	15.76	7.27	15.76	13.94	47.27
I am mindful of resource consumption (water, electricity, etc.).	6.06	7.88	27.88	27.88	30.30

Source: Authors' calculation

Table 6 Attitudes of the respondents on demographic factors influenced by environmental risks

	n	Frequencies (%)
Family planning	76	46.06
Rural area depopulation	68	41.21
Urban area depopulation	79	47.88
Ageing population	57	34.55
Migrations	109	66.06

Source: Authors' calculation

Table 6 provides a summary of the surveyed university students' perspectives on demographic factors influenced by environmental risks. The majority (66%) believes that environmental risks can impact population migration, while approximately 48% think these risks can lead to urban depopulation. Furthermore, 46% of the university students perceive an influence on family planning due to environmental risks. Additionally, around 41% and 34.6% of the university students believe that environmental risks can respectively contribute to rural depopulation and population ageing.

The surveyed university students responded affirmatively that sustainable development entailed societal development meeting human needs with available resources without compromising natural systems and the environment, with 71.5% agreeing and 21.8% unsure about this definition. These results are in line with Nikolic et al. (2020) in terms that university students in Serbia are mostly familiar with the meaning of sustainable development.

Table 7 summarises university students' attitudes towards key practices and policies for reducing environmental risks and promoting sustainable development. Most of the surveyed university students (66.7%) believe in raising awareness among citizens about environmental protection, followed by 64.2% advocating for promoting the use of renewable energy sources. Additionally, 61.8% think stricter environmental protection penalties should exist, while 58.8% support stronger legal regulations. Furthermore, 50.3% of the surveyed university students endorse initiatives that promote recycling and waste reduction.

The relationship between self-assessed environmental awareness and actual environmental behaviour was examined using a Chi-square test of independence. The cross tabulation revealed that among the surveyed uni-

Table 7 Attitudes of the respondents toward key policies for reducing environmental risks and promoting sustainable development

	n	Frequencies (%)
Encouraging the use of renewable energy sources	106	64.24
Stricter penalties for environmental protection	102	61.82
Stricter legislative regulations	97	58.79
Initiatives promoting recycling and waste reduction	83	50.30
Raising awareness among citizens about environmental protection	110	66.67

Source: Authors' calculation

versity students who did not engage in environmentally friendly behaviour, 73.3% reported low self-assessed environmental awareness, while only 26.7% reported high awareness. Conversely, among the surveyed university students who did engage in environmentally friendly behaviour, 65.3% reported high self-assessed environmental awareness, compared to 34.7% who reported low awareness. This suggests that the surveyed university students who engaged in environmentally conscious actions were more likely to perceive themselves as having higher environmental awareness. The Chi-square test confirmed this association, yielding a statistically significant result, $x^2(1, N = 165) = 24.794$, $p < 0.001$. This strong significance indicates that there is a meaningful relationship between the way that university students assess their own environmental awareness and their actual behaviour.

The Chi-square test revealed a significant association between gender and environmental behaviour, $x^2(1, N = 165) = 5.64$, $p = 0.018$. Female university students were more likely to engage in environmentally friendly behaviour (77.3%) than male university students (22.7%). On the other hand, the Chi-square test did not reveal a significant association between university type (public vs. private) and environmental behaviour, $x^2(1, N = 165) = 1.76$, $p = 0.185$. This suggests that the type of university attended does not significantly influence university students' likelihood of engaging in environmentally friendly behaviour. The Chi-square test did not reveal a significant association between income levels and environmental behaviour, $x^2(3, N = 165) = 4.83$, $p = 0.185$. However, the Linear-by-Linear Association test approached marginal significance ($p = 0.062$), suggesting a weak

trend that higher income levels may be associated with reduced engagement in environmentally friendly behaviour, though this result is not statistically conclusive. Regarding parents' education, we first re-categorized both variables to have only three groups. For the mother's education, the Chi-square test did not reveal a significant association between the education level of the mother and environmental behaviour, $x^2(2, N = 165) = 1.845$, $p = 0.397$. This indicates that the mother's education level does not significantly influence whether a university student engages in environmentally friendly behaviour. In contrast, the Chi-square test revealed a significant association between the father's education level and environmental behaviour, $x^2(2, N = 165) = 9.446$, $p = 0.009$. This suggests that the father's education level has a statistically significant impact on whether a university student engages in environmentally friendly behaviour. The Chi-square test of independence was also used to examine the association between the family's recycling habits and university students' environmental behaviour. The results were significant, $x^2(1, N = 165) = 13.298$, $p < 0.001$, i.e. indicated a significant relationship between the family's recycling habits and environmental behaviour. The surveyed university students from the families with recycling habits were more likely to engage in environmentally friendly behaviour (64.9%) compared to those from the families without recycling habits (35.2%).

A binary logistic regression analysis was conducted to examine the factors influencing the university students' environmental behaviour. The independent variables considered were gender, university type, income, education of mother, education of father, and family

recycling habits, with variables selected using the forward stepwise (likelihood ratio) method.

The final model included gender and family recycling habits as significant predictors. The model was statistically significant, $x^2(2) = 20.651$, $p < 0.001$, indicating that it reliably distinguished between the university students who engaged in environmentally friendly behaviour and those who did not. Hosmer and Lemeshow test suggests that the model's predictions are consistent with the actual observed outcomes ($x^2(2) = 8.695$, $p=0.369$). The model correctly classified 77.8% of the cases. Gender was found to be a significant predictor, with the females being more likely to engage in environmental behaviour ($B = -0.975$, $p = 0.009$). The odds ratio for gender ($Exp(B) = 0.377$) indicates that males are 0.377 times as likely as females to engage in environmental behaviour, or conversely, that females are more likely than males to engage in environmentally friendly behaviour. This suggests that being female increases the odds of engaging in environmental behaviour. Family recycling habits were also significant, with the university students from the families without recycling habits being 0.264 times less likely to engage in environmentally friendly behaviour ($B = -1.333$, $p < 0.001$). These results suggest that gender and family recycling practices significantly influence university students' likelihood of engaging in environmental behaviour.

Relating to the literature, Gurbuz and Ozkan (2019) found a statistically significant difference between their mothers' education level and the university students' environmental attitudes. This result does not align with our findings. Contrary to our results, Gurbuz and Ozkan (2019) did not find a statistically significant difference between the fathers' education level and the university students' environmental attitudes in Turkiye. However, Gurbuz and Ozkan (2019) concluded that family income significantly impacted students' environmental attitudes. This result is consistent up to some level with our findings for Serbia. Our results are also in line with Cvetković et al. (2024) in terms of gender emerging as the most significant predictor in the domain of contributions to environmental safety, and families playing a key role in environmental awareness.

By considering the above, we can determine that the surveyed university students in Serbia are aware of environmental issues in their society and recognize the impacts of a deteriorating environment, particularly regarding air pollution. This affects their decision to prefer public transport over cars. They are also in favour of raising awareness among citizens about environmental protection, with the majority of them believing that environmental risks can impact population migration. However, few respondents prioritized recycled materials when purchasing products,

Table 8 Logistic regression result

	B	Wald	df.	Sig.	Exp(B)
Gender	-0.975	6.829	1.000	0.009	0.377
Family recycling habits	-1.333	13.925	1.000	0.000	0.264
Constant	3.294	15.188	1.000	0.000	26.942

Source: Authors' calculation

or actively participated in environmental protection. This leads to the conclusion that there is still a gap when it comes to translating these attitudes into behaviour, which is in line with Nikolic et al. (2020) and Wyss, Knoch and Berger (2022).

4 LIMITATIONS

This study has several limitations. The first one is the sample size. While the sample provides useful findings, the relatively small size limits the generalizability of the results. Given the importance of the topic, it would be beneficial for future research to include a larger and more diverse sample that covers a wider demographic spectrum, such as students from different regions, countries or fields of study. This could lead to a more comprehensive understanding of the factors that influence the environmental behaviour of different student populations.

The second limitation relates to the self-reported data. The study relies on participants' self-assessment of their environmental awareness and behaviour, which may be subject to bias due to social desirability or inaccuracies in personal perception. Participants may overestimate or underestimate their actual environmental behaviour, which could distort the results. A more objective measure of behaviour, such as observational data or verified actions, like recycling logs, could provide a more reliable analysis of actual environmental practices.

Another limitation concerns the cross-sectional nature of the study. The data were collected at a single point in time, which limits the ability to draw conclusions about causal relationships between environmental awareness,

behaviour, and influencing factors. A longitudinal study could provide more insight into the way in which these variables interact over time and whether certain behaviours or attitudes change due to external influences, such as policy changes or environmental education programs.

Future research should aim to build on these limitations to gain a more holistic view of the determinants of environmentally friendly behaviour.

5 CONCLUSION

Given the climate change era we are currently living in, it is important to highlight the significance of environmental attitudes in addressing those global environmental issues. This paper focuses on university students as future leaders, decision-makers and educators relating to environmental issues.

The analysis identified several significant relationships regarding the factors influencing university students' environmental behaviour. A strong association was found between the self-assessed environmental awareness and actual behaviour, with the university students who engaged in environmentally friendly behaviour being more likely to report high self-assessed awareness. Gender was also a significant factor, as female university students were more likely to engage in environmentally friendly behaviour compared to male university students. Family recycling habits were found to have a significant impact as well, with the university students from the families that recycled being more likely to engage in environmentally friendly behaviour. However, no significant associations were found between public and private universities, income levels, or the mothers' education and

environmental behaviour. In contrast, the fathers' education level did show a significant influence. These results indicate that self-assessed awareness, gender, and family recycling habits are key predictors of university students' environmentally friendly behaviour, with further confirmation being provided by binary logistic regression.

Faculties, as key promoters of societal change, should lead efforts to raise awareness of environmental issues among students and in the surrounding communities. Integrating sustainability into formal and informal education is in line with the Serbian National Strategy for Environmental Protection. These measures will create future leaders who are aware of their societal and environmental responsibilities (de Andrade et al. 2018). Additionally, given that more than 65% of the surveyed university students' families did not have established recycling habits, it is important to improve recycling infrastructure and education. Schools and universities should develop peer education programs and provide social and material incentives to encourage collective participation in recycling (Levy and Marans 2012). This is also in line with the goals of the National Environmental Protection Program, which, following the Aarhus Convention, provides for greater public participation in decision-making on environmental issues. Faculties should also raise awareness of resource conservation and sustainable behaviour through various educational channels, in order to ensure broad societal engagement.

While many university students already prefer public transportation and conserve water and electricity, their overall environmental awareness is still underdeveloped. By incorporating environmental sustainability into higher education, faculties can provide students with a deeper knowledge and empower them to advocate for sustainable change. Policies should also target other groups, such as older adults, rural populations, and low-income families, who may have less access to educational resources. Outreach programs, in collaboration with educational institutions, can improve environmental knowledge in these populations. In addition, policies should promote affordable and accessible public transportation and resource conservation campaigns to achieve positive behavioural change.

Socio-demographic factors, such as gender, parental education and family habits significantly influenced the surveyed university students' environmental attitudes. Faculties and schools can reinforce these influences by encouraging peer education and volunteer programs to promote sustainability. Educational institutions should support informal education programs that encourage participation in decision-making, to ensure that socio-demographic factors do not limit environmental engagement.

REFERENCES

Asan, I., Mile, S., & Ibraim, J. (2014). Attitudes of Macedonian High School Students towards the Environment. *Procedia – Social and Behavioral Sciences*, 159, 636–642. https://doi.org/10.1016/j.sbspro.2014.12.439

Bonhi, T. C., Karim, R. A., Sharmin, S., Jahan, N., & Chowdhury, F. (2024). Fostering pro-environmental behavior of university students through goal framing theory: the mediating role of environmental knowledge. *Global Knowledge, Memory and Communication,* ahead-of-print. https://doi.org/10.1108/gkmc-12-2023-0516

Bradley, G., Babutsidze, Z., Chai, A., & Reser, J. (2020). The role of climate change risk perception, response efficacy, and psychological adaptation in pro-environmental behavior: A two nation study. *Journal of Environmental Psychology*, 68, 101410. https://doi.org/10.1016/j.jenvp.2020.101410

Chang, E., Sjöberg, S., Turunen, P., & Rambaree, K. (2022). Youth Empowerment for Sustainable Development: Exploring ecosocial work discourses. *Sustainability*, 14(6), 3426. https://doi.org/10.3390/su14063426

Chuvieco, E., Burgui-Burgui, M., Da Silva, E. V., Hussein, K., & Alkaabi, K. (2018). Factors affecting environmental sustainability habits of university students: Intercomparison analysis in three countries (Spain, Brazil and UAE). *Journal of Cleaner Production*, 198, 1372–1380. https://doi.org/10.1016/j.jclepro.2018.07.121

Cvetković, V. M. (2016). The relationship between educational level and citizen preparedness to respond to natural disasters. *Journal of the Geographical Institute "Jovan Cvijic" SASA*, 66(2), 237–253. https://doi.org/10.2298/ijgi1602237c

Cvetković, V., Dragićević, S., Petrović, M., Mijalković, S., Jakovljević, V., & Gačić, J. (2015). Knowledge and Perception of Secondary School Students in Belgrade about Earthquakes as Natural Disasters. *Polish Journal of Environmental Studies*, 24(4), 1553–1561. https://doi.org/10.15244/pjoes/39702

Cvetković, V. M., Nikolić, N., & Lukić, T. (2024). Exploring students' and teachers' insights on School-Based Disaster Risk Reduction and Safety: a case study of Western Morava Basin, Serbia. *Safety*, 10(2), 50. https://doi.org/10.3390/safety10020050

Cvetković, V. M., Sudar, S., Ivanov, A., Lukić, T., & Grozdanić, G. (2024). Exploring environmental awareness, knowledge, and safety: A comparative study among students in Montenegro and North Macedonia. *Open Geosciences*, 16(1), 20220669. https://doi.org/10.1515/geo-2022-0669

de Andrade, J. B. S. O., Garcia, J., de Andrade Lima, M., Barbosa, S. B., Heerdt, M. L., & Berchin, I. I. (2018). A proposal of a Balanced Scorecard for an environmental education program at universities. *Journal of Cleaner Production*, 172, 1674–1690. https://doi.org/10.1016/j.jclepro.2016.11.179

Değerli, M. A., & Sunal, N. (2022). Investigation of environmental risk perception and environmental attitudes of university students. *Balıkesir Sağlık Bilimleri Dergisi*, 12(3), 628–638. https://doi.org/10.53424/balikesirsbd.1081021

European Migration Network Inform (2023). Displacement and migration related to disasters, climate change and environmental degradation. https://home-affairs.ec.europa.eu/system/files/2023-05/EMN_Inform_climate_related_migration_final_May2023_090523.pdf

Evert, M., Coetzee, H., & Nell, W. (2022). Environmental attitudes among undergraduate students at a South African university. *Interdisciplinary Journal of Environmental and Science Education*, 18(1), e2260. https://doi.org/10.21601/ijese/11330

Gökmen, A. (2021). The effect of gender on environmental attitude: A meta-analysis study. *Journal of Pedagogical Research*, 5(1), 243–257. https://doi.org/10.33902/jpr.2021167799

Gurbuz, I. B., & Ozkan, G. (2019). What's going on at the universities? How much has the research revealed university students' attitudes towards the environment? A case study of Bursa, Turkey. *Applied Ecology and Environmental Research,* 17(2), 5109–5138. https://doi.org/10.15666/aeer/1702_51095138

Kim, D., & Kim, J. (2024). Mere presence effect on pro-environmental behavior: exploring the role of social influence. *Social Influence*, 19(1), 2323718. https://doi.org/10.1080/15534510.2024.2323718

Kirbiš, A. (2023). Environmental Attitudes among Youth: How Much Do the Educational Characteristics of Parents and Young People Matter?. *Sustainability*, 15(15), 11921. https://doi.org/10.3390/su151511921

Levy, B. L., & Marans, R. W. (2012). Towards a campus culture of environmental sustainability: Recommendations for a large university. *International Journal of Sustainability in Higher Education*, 13(4), 365–377. https://doi.org/10.1108/14676371211262317

Li, D., Zhao, L., Ma, S., Shao, S., & Zhang, L. (2019). What influences an individual's pro-environmental behavior? A literature review. *Resources, Conservation and Recycling*, 146, 28–34. https://doi.org/10.1016/j.resconrec.2019.03.024

Major, L., Namestovski, Ž., Horák, R., Bagány, Á., & Krekić, V. P. (2017). Teach it to sustain it! Environmental attitudes of Hungarian teacher training students in Serbia. *Journal of Cleaner Production*, 154, 255–268. https://doi.org/10.1016/j.jclepro.2017.03.163

Miller, L. B., Rice, R. E., Gustafson, A., & Goldberg, M. H. (2022). Relationships among environmental attitudes, environmental efficacy, and Pro-Environmental behaviors across and within 11 countries. *Environment and Behavior*, 54(7–8), 1063–1096. https://doi.org/10.1177/00139165221131002

Mitić, P., Hanić, A., Kojić, M., & Schlüter, S. (2023). Environment and economy interactions in the Western Balkans: Current situation and prospects. In Tufek-Memišević, T., Arslanagić-Kalajdžić, M., & Ademović, N. (Eds.), *Interdisciplinary advances in sustainable development: ICSD 2022* (Vol. 529, pp. 3–21). Springer. https://doi.org/10.1007/978-3-031-17767-5_1

Mónus, F. (2022). Environmental education policy of schools and socioeconomic background affect environmental attitudes and pro-environmental behavior of secondary school students. *Environmental Education Research*, 28(2), 169–196. https://doi.org/10.1080/13504622.2021.2023106

Murdoch, M., Simon, A. B., Polusny, M. A., Bangerter, A. K., Grill, J. P., Noorbaloochi, S., & Partin, M. R. (2014). Impact of different privacy conditions and incentives on survey response rate, participant representativeness, and disclosure of sensitive information: a randomized controlled trial. *BMC Medical Research Methodology*, 14(1), 1–11. https://doi.org/10.1186/1471-2288-14-90

Nikolic, V., Vukic, T., Maletaski, T., & Andevski, M. (2020). Students' attitudes towards sustainable development in Serbia. *International Journal of Sustainability in Higher Education*, 21(4), 733–755. https://doi.org/10.1108/ijshe-11-2019-0336

Petrović, P., Nikolić, G., & Ostojić, I. (2018). Emissions of CO2 in the European Union: Empirical analysis of demographic, economic and technological factors. *Stanovništvo*, 56(1), 63–82. https://doi.org/10.2298/stnv180614005p

Piscitelli, A., & D'Uggento, A. M. (2022). Do young people really engage in sustainable behaviors in their lifestyles?. *Social Indicators Research,* 163(3), 1467–1485. https://doi.org/10.1007/s11205-022-02955-0

Puhakka, R. (2021). University students' participation in outdoor recreation and the perceived well-being effects of nature. *Journal of Outdoor Recreation and Tourism*, 36, 100425. https://doi.org/10.1016/j.jort.2021.100425

Rakuasa, H., & Latue, P. C. (2023). Role of Geography Education in Raising Environmental Awareness: A Literature review. *Journal of Education Method and Learning Strategy*, 2(01), 1–7. https://doi.org/10.59653/jemls.v2i01.293

Rosa, C. D., & Collado, S. (2019). Experiences in Nature and environmental attitudes and Behaviors: setting the ground for future research. *Frontiers in Psychology,* 10, 763. https://doi.org/10.3389/fpsyg.2019.00763

Schultz, P., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology,* 24(1), 31–42. https://doi.org/10.1016/s0272-4944(03)00022-7

Shafiei, A., & Maleksaeidi, H. (2020). Pro-environmental behavior of university students: Application of protection motivation theory. *Global Ecology and Conservation*, 22, e00908. https://doi.org/10.1016/j.gecco.2020.e00908

Shutaleva, A., Martyushev, N., Nikonova, Z., Savchenko, I., Abramova, S., Lubimova, V., & Novgorodtseva, A. (2022). Environmental behavior of youth and sustainable development. *Sustainability*, 14(1), 250. https://doi.org/10.3390/su14010250

Srbinovski, M., & Stanišić, J. (2020). Environmental worldviews of Serbian and Macedonian school students. *Australian Journal of Environmental Education*, 36(1), 20–43. https://doi.org/10.1017/aee.2020.1

Stanišić, J., & Maksić, S. (2014). Environmental education in Serbian primary schools: challenges and changes in curriculum, pedagogy, and teacher training. *Journal of Environmental Education*, 45(2), 118–131. https://doi.org/10.1080/00958964.2013.829019

Stanišić, J., Maksić, S., & Nenadić, F. (2023). Predictors of environmental awareness among primary school students in Serbia. *Zbornik Instituta za pedagoška istraživanja*, 55(1), 51–72. https://doi.org/10.2298/zipi2301051s

Statistical Office of the Republic of Serbia (2023). *2022 Census of population, households and dwellings. Educational attainment, literacy and computer literacy – Data by municipalities and cities*. https://publikacije.stat.gov.rs/G2023/PdfE/G20234006.pdf

Stevanović, S., Jovanović, O., & Hanić, A. (2019). Environmental and financial performance: Review of selected studies. *Economic Analysis*, 52(2), 113–127. https://doi.org/10.28934/ea.19.52.2.pp113-127

Tam, K., & Milfont, T. L. (2020). Towards cross-cultural environmental psychology: A state-of-the-art review and recommendations. *Journal of Environmental Psychology*, 71, 101474. https://doi.org/10.1016/j.jenvp.2020.101474

Torani, S., Majd, P. M., Maroufi, S. S., Dowlati, M., & Sheikhi, R. A. (2019). The importance of education on disasters and emergencies: A review article. *Journal of Education and Health Promotion*, 8(1), 85. https://doi.org/10.4103/jehp.jehp_262_18

Torres, A., Carvalho, P., Costa, J., Silva, C., Afonso, R. M., Nascimento, C., & Loureiro, M. (2023). Environmental Connection, Awareness, and Behaviors in University Students: an Exploratory Portuguese study. *Sustainability*, 15(18), 13763. https://doi.org/10.3390/su151813763

Torroba Diaz, M., Bajo-Sanjuan, A., Callejón Gil, Á. M., Rosales-Pérez, A., & López Marfil, L. (2023). Environmental behavior of university students. *International Journal of Sustainability in Higher Education*, 24(7), 1489–1506. https://doi.org/10.1108/ijshe-07-2022-0226

Varah, F., Mahongnao, M., Francis, D. J., & Shimrah, T. (2020). Measuring environmental attitudes and behaviors: a study of undergraduate students in Delhi. *Natural Hazards*, 103, 1291–1306. https://doi.org/10.1007/s11069-020-04035-3

Verachtert, S. (2023). Family congruence in sustainability attitudes and behaviour; an analysis of a household survey in Belgium. *Environment, Development and Sustainability*, 25(11), 12467–12493. https://doi.org/10.1007/s10668-022-02575-1

Wang, Y., Hao, F., & Liu, Y. (2021). Pro-Environmental Behavior in an Aging World: Evidence from 31 Countries. *International Journal of Environmental Research and Public Health*, 18(4), 1748. https://doi.org/10.3390/ijerph18041748

Wyss, A. M., Knoch, D., & Berger, S. (2022). When and how pro-environmental attitudes turn into behavior: The role of costs, benefits, and self-control. *Journal of Environmental Psychology*, 79, 101748. https://doi.org/10.1016/j.jenvp.2021.101748

Yapici, G., Ögenler, O., Kurt, A. Ö., Koçaş, F., & Şaşmaz, T. (2017). Assessment of Environmental Attitudes and Risk Perceptions among University Students in Mersin, Turkey. *Journal of Environmental and Public Health*, 2017(1), 5650926. https://doi.org/10.1155/2017/5650926

Zwickle, A., Koontz, T. M., Slagle, K. M., & Bruskotter, J. T. (2014). Assessing sustainability knowledge of a student population: Developing a tool to measure knowledge in the environmental, economic and social domains. *International Journal of Sustainability in Higher Education*, 15(4), 375–389. https://doi.org/10.1108/ijshe-01-2013-0008

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Data are available from the authors upon request.

Coauthor Contributions

Aida Hanić: Conceptualization, Writing – Review & Editing. **Jelena Minović:** Methodology, Formal Analysis. **Slavica Stevanović:** Conceptualization, Investigation. **Petar Mitić:** Validation, Visualization, Writing.

Stavovi o zaštiti životne sredine među studentima univerziteta u Srbiji

PROŠIRENI SAŽETAK

Problem klimatskih promena utiče na svaki aspekt društva, uključujući i sve izraženiji problem klimatskih migracija, s obzirom na to da su samo u 2021. godini prirodne katastrofe raselile 23,7 miliona ljudi širom sveta. S obzirom na to da se očekuje da će se ovaj trend nastaviti, neophodna je promena paradigme u individualnom ponašanju prema životnoj sredini, posebno u pogledu ekoloških stavova. U tom domenu, na osnovu sociodemografskih, ekonomskih i ekoloških promenljivih, ovaj rad ima za cilj da istraži stavove univerzitetskih studenata u Srbiji u pogledu problema i rizika kada je u pitanju životna sredina, pre svega analizirajući da li su studenti svesni postojanja određenih ekoloških problema, da li mogu da prepoznaju buduće tokove kretanja tih problema i da li razumeju kako ovi problemi mogu uticati na njihove živote, uključujući potencijalne demografske promene kao što su migracije.

Kao budući lideri, donosioci odluka i edukatori u oblasti životne sredine, studenti predstavljaju vrlo važnu grupu zainteresovanih strana koji će biti lideri procesa primene i razvoja održivog razvoja. U ovom radu, istraživanje je sprovedeno na ukupnom uzorku od 165 studenata, sa većim učešćem studentkinja (67,9%) u odnosu na studente (32,1%). Većina ispitanika imala je između 19 i 24 godine, pretežno studirajući na državnim univerzitetima. Rezultati istraživanja pokazuju da studenti univerziteta imaju neadekvatne reciklažne navike (65%) i ograničen broj zelenih površina (73%) u svojim gradovima. Oni smatraju da su ekološki rizici značajni, što bi moglo dovesti do migracija (66%) i depopulacije urbanih područja (47%). Zalažu se za povećanje kampanja za podizanje svesti (66,7%) i veću upotrebu obnovljivih izvora energije (64,2%), kao i za strožije kazne za kršenje ekoloških propisa (61,8%). Analiza je pokazala značajnu povezanost između samoprocene ekološke svesti i stvarnog ekološkog ponašanja, pri čemu su studenti koji prijavljuju viši nivo svesti verovatnije angažovani u ekološki prihvatljivim akcijama. Pol i reciklažne navike u porodici bili su značajni prediktori ekološkog ponašanja, pri čemu su žene i studenti iz porodica koje praktikuju reciklažu skloniji ispoljavanju proekološkog ponašanja. Ovi rezultati ukazuju na to da su studenti univerziteta obuhvaćeni istraživanjem razvili ekološke navike i svest. Podrška mladima je ključna za rešavanje ekoloških problema i podsticanje održivog ponašanja. Pored obrazovnih napora u Srbiji, ovo zahteva sveobuhvatne inicijative vlade i civilnog društva.

KLJUČNE REČI

studenti u Srbiji, ekološka svest, održivi razvoj, stavovi prema životnoj sredini, rizici

Osvrt

Review

Collection of papers

Disaster, construction, and reconstruction: Essays on ethical and social perspectives

Editors: Veselin Mitrović & Dónal O'Mathúna

Zbornik radova

Katastrofa, izgradnja i rekonstrukcija: Eseji o etičkim i društvenim perspektivama

Urednici: Veselin Mitrović & Dónal O'Mathúna

The edited volume, *Disaster, Construction, and Reconstruction: Essays on Ethical and Social Perspectives* is a product of the international conference held at the Institute of Social Sciences, Belgrade in May 2023. Overall, this international and multidisciplinary collection of essays offers a thought-provoking examination of the ethical and social dimensions of disasters, with a timely focus on the COVID-19 pandemic. Edited by Veselin Mitrović and Dónal O'Mathúna, this volume brings together diverse voices to explore various aspects of disaster studies, providing valuable insights for navigating future challenges. Scholars, policymakers, and practitioners will find this edited volume to be a valuable resource in their quest to address the complex issues surrounding disasters and their aftermaths.

Besides the introduction, the edited volume is divided into two main parts. One of them focuses on disaster studies from a social and ethical perspective regarding COVID-19. The other part examines discourses and concepts of law and politics related to COVID-19.

The multifaceted nature of disasters and their implications across various scientific disciplines have been explored in the introduction. It includes the social sciences, medicine, ethics, and geophysics. The main emphasis is placed on the methodologies and perspectives brought forth by these disciplines, underscoring the epistemological and ethical differences in defining basic concepts within disaster studies. The discussion is introduced by framing disasters as events that disrupt societal norms and have significant impacts on human lives, regardless of whether they are caused by natural phenomena or human actions. The unexpected and shocking nature of disasters often necessitates revisiting and revising the conceptual frameworks to comprehend their complexity adequately. The onset of the COVID-19 pandemic serves as a

contemporary example that prompts a reconsideration of the conventional notions of disaster. The global spread of the SARS-CoV-2 virus and the resulting pandemic challenged traditional understandings of disaster by blurring the boundaries between normalcy and crisis.

While disasters are typically perceived as events diverging from everyday life, the pandemic highlighted how certain social groups, such as the homeless and marginalized communities, experience ongoing catastrophes as a part of their daily reality. Moreover, the chapter explores how disasters unveil underlying socio-political dynamics, questioning the legitimacy of political systems and governance structures. Inadequate preparation and response to disasters can expose systemic weaknesses and prompt authoritarian measures that encroach upon individual freedoms. By tracing the emergence and spread of the COVID-19 pandemic, the chapter underscores the global scale and interconnectedness of modern disasters. Overall, this chapter serves as a thought-provoking exploration of the evolving nature of disasters in the modern world, highlighting the need for interdisciplinary collaboration and ethical reflection to navigate the complex realities of disaster management and response. The introductory section provides a comprehensive overview, laying the groundwork for the subsequent discussions.

The second part of the volume incorporates scientific papers related to the ethical and social perspectives on important questions such as vaccination, clinical studies, the position of the marginalized groups, and human security during the pandemic. One of the standout contributions in these fields is the paper "A Scoping Review of Ethical Arguments about COVID-19 Vaccine Mandates" by Zia Haider (Ministry of Health, Saudi Arabia), Annie Silleck (The Ohio State University, USA), and Dónal O'Mathúna (College of Nursing and Center for Bioethics, The Ohio State University, USA), which examines ethical arguments surrounding the COVID-19 vaccine mandates. This essay navigates the intricate ethical terrain of public health policies, shedding light on the tensions between individual autonomy and collective responsibility. Authors explained that vaccines stand as pivotal public health tools, crucial in averting diseases and combating pandemics. The development of COVID-19 vaccines amidst the throes of the pandemic's most intense and devastating phase represents a monumental scientific milestone. However, the availability of these vaccines has precipitated intricate public health and ethical deliberations concerning their equitable distribution. The initial morbidity and mortality rates upon vaccine availability underscored the imperative for the COVID-19 vaccine mandates to attain maximal vaccination coverage. Ethical discourse emerged both in favor and against such mandates. To shed light on these ethical dilemmas, the authors conducted a scoping review encompassing articles published in English between January 2020 and September 25, 2021. Their analyses extracted pertinent ethical considerations, which were subsequently scrutinized to elucidate the overarching, principal ethical arguments surrounding the mandates for and against COVID-19 vaccines.

Miroslav Radenković's (University of Belgrade, Faculty of Medicine) paper "Ethical Challenges and Hesitancy Associated with (Mandatory) Vaccination against COVID-19" tackles the ethical challenges and hesitancy associated with COVID-19 mandatory vaccination

policies, offering critical insights into the complexities of public health decision-making. It begins by acknowledging the World Health Organization's recognition of vaccination hesitancy as a significant global health hazard, juxtaposed against the crucial role vaccines play in preventing serious illness and death. Against the backdrop of the COVID-19 pandemic's declaration as a global health emergency, the text examines the ethical justifications for mandatory vaccination, emphasizing the importance of balancing public health imperatives with individual rights and autonomy. A key point raised is the role of misinformation and misconceptions in fueling vaccine hesitancy, underscoring the need for robust public health communication efforts to address concerns regarding vaccine efficacy, safety, and duration of protection. The text advocates for a nuanced approach to understanding vaccination hesitancy.

Similarly, Zoran Todorović (the University of Belgrade, Faculty of Medicine, University Medical Center "Bežanijska kosa", Belgrade) and Dragan Hrnčić (the University of Belgrade, Faculty of Medicine) delve into research ethics issues during the pandemic in the paper "Research Ethics Issues in Basic and Clinical Studies during the COVID-19 Pandemics", highlighting the ethical considerations inherent in basic and clinical studies. The COVID-19 pandemic has brought to light numerous research ethics challenges. Initially, investigations into the virus's origin raised questions of moral responsibility that were analyzed in this paper. Authors indicate that the concerns over the safety of medicines and vaccines persist, fueled by ongoing clinical trials and relaxed trial standards. This balance between speed and reliability has been scrutinized, prompting a reevaluation of bioethical principles in public health research. Both basic and clinical studies unrelated to COVID-19 have also faced disruptions, from funding shortages to shifts in research priorities. Ethical debates surrounding resources' allocation and termination of the studies have emerged, while the demand for rapid knowledge production has led to flexibility in the peer-review process. These developments underscore the critical role of research ethics in guiding biomedical research during the pandemic and beyond, which is one of the main points of this paper.

Veselin Mitrović's (Institute of Social Sciences, Belgrade) contribution to detecting resilience issues among marginalized groups underscores the importance of a bioethical approach in addressing the disparities exacerbated by disasters, as presented in his scientific paper "Detecting Resilience Issues among Marginal Groups as a Bioethical Goal". The article delves into the intricate interplay between ethical judgments, medical and political practices, and the living conditions of marginalized groups, particularly amidst the backdrop of the COVID-19 pandemic. Through a dual lens of normative bioethics and empirical analysis, the author explores the resilience of marginalized social groups, hypothesizing that vulnerability is exacerbated by structural inequalities, rather than by pre-existing medical issues. The author highlights the profound impact of racism and discrimination on the resilience of marginalized communities, elucidating how these factors render them more susceptible to disasters such as the COVID-19 pandemic. The article underscores the imperative of addressing systemic inequalities to enhance the resilience of marginalized groups and prevent their profound suffering during

crises. With a nuanced examination spanning five sections, the author's valuable insight is valuable to bioethicists and clinicians alike, emphasizing the pressing need for a holistic approach to address the ongoing challenges faced by marginalized populations.

In a similar vein, Slađana Ćurčić's (Institute of European Studies, Belgrade) essay "Rethinking Human Security in the Post-COVID-19 World-Lessons Learned from the Human-centric Approach to Health Security" reimagines human security in the post-COVID-19 world within the framework of the health-security nexus, a topic gaining increasing prominence in security studies. Focusing on the human-centric approach to health security, the paper aims to examine the relevance of this perspective in understanding COVID-19 as a health threat and its implications for future health security challenges. Methodically structured, the paper opens with an overview of academic perspectives on health security before delving into the analysis of COVID-19's impact on human security through seven dimensions of the human security concept. Drawing on academic literature and secondary data analysis, including the Human Development Index, the paper offers a nuanced understanding of how COVID-19 has threatened various aspects of human security. Furthermore, the paper concludes by advocating for a rethinking of the human security concept in the post-COVID-19 era, arguing that this could enhance our understanding of health security and lead to meaningful policy and strategic solutions.

The third part of the edited volume focuses on the discourses and concepts of law and politics in COVID-19. Michael Buckley (Lehman College, City University of New York) delves into the discourses

and concepts of law and politics amidst the COVID-19 crisis in his paper "Constructivism in Times of Political Crisis", providing valuable insights into the evolving nature of governance during times of uncertainty. The text addresses the profound impact of the COVID-19 pandemic on societal structures and the necessity for political philosophers to reevaluate traditional approaches to justice and stability. It argues that human-induced risks, exemplified by the pandemic, are no longer distant threats, but integral components of contemporary societal functioning. The paper contends that prevailing concepts of stability, such as overlapping consensus, lack resilience in the face of such hazards, particularly when exacerbated by pernicious polarization. By elucidating how human-induced risks contribute to societal destabilization and the breakdown of consensus, the text advocates for a reconceptualization of social resilience to fortify existing notions of stability. The author provides thought-provoking insights into the evolving dynamic of societal resilience and stability in the context of contemporary challenges.

Karen da Costa (School of Global Studies, Gothenburg University, Sweden) and Shlomit Zuckerman (Department of Emergency and Disaster Management & Bioethics and Law Center Faculty of Medicine, Tel Aviv University, Israel) examine the intersections of human rights and ethics in the management of the pandemic in their paper "Human Rights and Ethics in the Management of the COVID-19 Pandemic: the Experiences of Brazil and Israel", drawing on the experiences of both countries to illuminate the ethical dilemmas inherent in public health policymaking. The paper offers a comparative analysis of Brazil and Israel's responses to the

COVID-19 pandemic, focusing on human rights and ethical considerations. Through meticulous documental analysis of primary and secondary sources, it explores how these nations navigated the pandemic while upholding human rights and ethical conduct. In Brazil, the paper highlighted a confluence of health emergencies and governance crises, resulting in a high death toll and the need for learning from past mistakes. This underscores the recent shifts in rhetoric towards a more human rights-friendly approach under President Lula's new government, emphasizing dialogue and lessons learned from the pandemic. In contrast, Israel's trajectory is marked by a right-wing government's proposed judicial reform, raising concerns about democratic principles and sparking public protests, particularly from healthcare professionals. The reform is criticized for potentially undermining human rights, notably the right to health, and disproportionately affecting vulnerable groups. The paper underscores the global impact of COVID-19, emphasizing the interconnectedness of humanity and the need for global cooperation in pandemic management. Despite differing national experiences, the study advocates for global collaboration in addressing future pandemics, offering valuable insights into the complex interplay between pandemic management, human rights, and ethical considerations.

Pavle Nedić's (Institute of International Politics and Economics, Belgrade) and Marko Mandić's (Institute of Social Sciences, Belgrade) paper "Between Securitization and Desecuritization: The Shifting Discourse on the COVID-19 Pandemic in Serbia" explore the shifting discourse on the COVID-19 pandemic in Serbia, navigating the complexities of securitization and de-securitization

in the context of public health emergencies. The text analyzes the Serbian government's response to the COVID-19 pandemic through the lens of securitization theory, which suggests that issues were framed as security threats to garner support for emergency measures. It outlines how the government had initially downplayed the pandemic's severity but later declared a state of emergency, which coincided with the parliamentary elections in June 2020. The text highlights a pattern of shifting between securitization and desecuritization processes, with attempts to secure the issue losing momentum after an unsuccessful move in July 2020 (first unsuccessful securitization process). The authors argue that these fluctuations in the security discourse led to a loss of authority for the government, confusion among citizens, and were influenced by the political context, particularly the upcoming elections. Overall, the text provides insights into the complex interplay between political decision-making, security framing, and public perception during a global crisis.

Mirjana Dokmanović's (Institute of Social Sciences, Belgrade) contribution raises critical questions about global health governance and the implications of pandemic responses for state sovereignty and individual liberties in her paper "Toward Global Health Governance or Toward Global Control of States and People?". This paper critically examines the ongoing reform efforts aimed at establishing a binding Pandemic Treaty and revising the International Health Regulation within the global health regime. Through a human rights perspective, the analysis reveals potential negative implications of the proposed regulation for both individual human rights and sovereign decision-making in health-related

issues, as well as the potential strengthening of corporate influence through the inclusion of the corporate sector in the Global Health Treatises Council. The author cautions against the proposed centralized global health governance, warning of potential abuses and the concentration of decision-making power in the hands of a select few.

Jovo Bakić's (University of Belgrade, Faculty of Philosophy) analysis of far-right organizations' attitudes towards the pandemic measures in Serbia offers valuable insights into the intersections of politics, ideology, and public health, highlighting the challenges posed by extremist movements in times of crisis. In his paper "The Attitude of Far-Right Organizations towards Measures against the COVID-19 Pandemic in Serbia 2020–2022", the attitudes of far-right organizations towards the measures implemented by the Serbian authorities in response to the COVID-19 pandemic are explored. Drawing on previous research indicating a general skepticism among right-wing groups towards the virus, the text examines how these organizations reacted to the government's pandemic containment efforts. While one might expect harsh criticism from the far-right groups toward the strict measures, the reality is more nuanced. Some organizations, such as "Srpska desnica" and "Levijatan", either welcomed the measures or remained silent, while others, like "Srpska akcija" and "Narodne patrole", harshly criticized them. This reveals a complex interplay between political ideology, authoritarianism, and pandemic response, highlighting the diverse responses within the far-right spectrum.

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Thematic section: Science and education for sustainable development

Tematski odeljak: Nauka i obrazovanje zarad održivog razvoja

Svet se drastično menja pred našim očima, a ključno je pitanje da li ćemo biti spremni za buduće izazove. Jedini način da se istinski razumeju savremene globalne transformacije i njihovi uticaji jeste nekonvencionalno razmišljanje i kreativno pristupanje problemima. Časopis *European Journal of Transformation Studies* (izdavač *Europe Our House* iz Tbilisija u Gruziji, e-ISSN 2298-0997) je rezultat saradnje naučnika iz Centralne i Istočne Evrope i fokusira se na socijalna, kulturna, politička i ekonomska pitanja koja su važna za zajednicu i tiču se aktuelnih dešavanja. U poslednjem objavljenom broju, časopis sadrži tematski odeljak *Nauka i obrazovanje zarad održivog razvoja* (*Science and education for sustainable development*) koji obuhvata sedam članaka. Konstantna isprepletanost ekonomskih i socijalnih pitanja, uz očuvanje prirodnih resursa, negovanje zdravih navika i načina života, naglašava važnost kontinuirane edukacije za održivi razvoj. Ova tema postaje jedna od najaktuelnijih na globalnom i lokalnom nivou, kao i na nivou pojedinca.

Prvi rad pod naslovom *Femininity, consumptionism and illness* govori o velikom uticaju konzumerizma na individualni identitet, posebno kod žena. Identitet kao merilo pripadnosti pojedinca određenoj društvenoj grupi značajno utiče na ponašanje tog pojedinca. Iako se smatra osećajem pripadnosti, ima dublje efekte na život jedne osobe. Konzumerizam je faktor koji je doživeo ogromnu ekspanziju u 21. veku i predstavlja se kao ultimativna sreća. Ljudi teže boljim, lakšim i vizuelno privlačnijim proizvodima, želeći da idu u korak sa vremenom, prate aktuelne trendove i neprestano rade na samousavršavanju. Danas, konzumerizam je toliko 'napredovao' da se neki proizvodi kupuju samo zbog svog izgleda ili zbog društvenog statusa koje donose. Poseban uticaj ima na žene i na koncept ženstvenosti, gde se nameće kao dužnost da žena 'bude lepa', 'uvek doterana' i 'bez mana'.

Obaveza da budete lepi sve je prisutnija u propagandnim medijima i na društvenim mrežama. Autorka naglašava da se u društvu žene gledaju kroz prizmu sopstvenog tela, i to po njegovom izgledu, ne po sposobnosti delovanja. Procenjuje se, analizira i komentariše oblik, veličina, struktura tela i da li je ona usklađena sa standardima ženstvenosti koje su odredili muškarci. Snaga i spretnost tela, čak i zdravlje, potpuno se zanemaruju. Bitno je 'pakovanje' – kao kada u prodavnici kupujemo nešto u najlepšem pakovanju, ili biramo knjigu po koricama, ne obazirući se šta je unutra. Nakon procene i analize, nastupa prihvatanje i vrednovanje. Ukoliko žena ne ispunjava nametnute kriterijume, to joj može predstavljati pretnju u društvenom okruženju, može uticati na društveni status, dok se nedostatak privlačnosti može shvatiti kao nameran izbor. Proizvodi za očuvanje mladosti promovišu se na brojne načine, uključujući različite dijete, tretmane, suplemente i hirurške intervencije. To nas navodi da uzimamo zdravo za gotovo činjenicu da svakim danom starimo. Težnja za mladošću i mladalačkom lepotom pogađa žene više nego muškarce, koje se često trude da se prilagode standardima koje postavljaju televizija i društveni mediji. Pored navedenog, briga o izgledu postala je važna tema u kontekstu različitih bolesti, posebno raka. Sve češće se otvaraju namenski kozmetički saloni sa tretmanima za žene koje se bore protiv raka, a dostupna su i uputstva o tome kada i koja procedura se može obaviti. Takođe, sve je više specijalizovanih veb stranica i profila na društvenim mrežama koji pružaju savete ljudima tokom i posle hemoterapije kako da se osećaju i da izgledaju isto kao i pre tretmana. Ove veb stranice se fokusiraju na pokazivanje i opisivanje lepote žena bez obzira na bolest. Dakle, primećuje

se pritisak na žene u vidu konstantne izgradnje ženstvenosti, kao i pružanje podrške ženama sa dijagnozom raka nudeći im načine da izgledaju privlačno dok se bore protiv bolesti. Pozitivan efekat koji konzumerizam ostvaruje može se iskazati u situacijama kada se pojedinac suočava sa bolešću, posebno rakom. Cilj članka je da podigne svest i uvede u društveni diskurs negativne (društveni pritisak) i pozitivne (pomoć u slučaju bolesti – poboljšanje kvaliteta života) aspekte konzumerizma na žene.

Drugi rad, *SMETA standard as a tool to support sustainable development goal and food safety. A case study,* kroz različite metode istraživanja analizira suštinu SMETA standarda pri identifikaciji u kojoj meri odabrana organizacija lanca snabdevanja hranom, usaglašena sa zahtevima standarda, ispunjava ciljeve održivog razvoja i podržava sistemsko upravljanje bezbednošću hrane u praksi. SMETA (*Sedex Members Ethical Trade Audit*) jedan je od najvećih i najšire korišćenih formata etičke provere društvene odgovornosti u svetu. Preduzeća koriste SMETA da bi razumela i poboljšala uslove rada i ekološke performanse u svom poslovanju i lancu snabdevanja, kombinujući najbolje prakse u navedenim oblastima. Standardi održivosti postali su sastavni deo omogućavanja zelenog konzumerizma i promovisanja zelene ekonomije i rasta, predstavljajući obećavajući način upravljanja za promovisanje održive proizvodnje i potrošnje u globalnim lancima vrednosti. Kompanije koje su uključene u lanac masovnog snabdevanja hranom svojim operativnim aktivnostima izrazito negativno utiču na životnu sredinu. Zabrinjavajući podaci dobijeni su pri analizi emisije gasova. Dekarbonizacija Evrope mora biti hitno sprovedena, što uključuje i modernizaciju prehrambenih pogona. Negativni efekti mogu se dvojako izraziti:

industrija negativno utiče na životnu sredinu, dok se ti negativni efekti kroz životnu sredinu ispoljavaju na bezbednost i sigurnost hrane. Standardi koji su usmereni na upravljanje sistemima, i opštim i specifičnim (jedan od njih je i SMETA), olakšavaju organizacijama proces pri ispunjavanju većinu ciljeva održivog razvoja (SDG – *Sustainable Development Goals*). Postizanje usaglašenosti sa SMETA standardom zahteva procenu svih faza rada organizacije. U radu je analizirana organizacija koja pripada lancu snabdevanja hranom i koja je svoje funkcionisanje uskladila sa šesnaest od sedamnaest SDG-a. Dubljom analizom došlo se do rezultata da je pomoću SMETA standarda bilo omogućeno ispunjavanje čak trinaest ciljeva održivog razvoja organizacije. Implementacijom SMETA standarda promoviše se briga i poboljšanje pri upravljanju životnom sredinom, bezbednošću hrane i klimatskim promenama.

Treći rad bavi se analizom knjige *Eating animals* od Džonatana Safrana Fora (*Jonathan Safran Foer*). Životinjska ishrana je sada postala nezaobilazan deo socio-kulturne refleksije, prisutna u različitim vrstama tekstova, od novinarskih do akademskih istraživanja, posebno u diskursima izgrađenim oko ciljeva održivog razvoja, novih humanističkih nauka, veganskih studija ili antropocena. Knjiga je napisana tako da može pomoći pri odluci da li bi autorovo (pa i drugo) novorođeno dete trebalo ili ne bi trebalo da je jede meso. Današnja deca rođena su u svetu industrijalizovane hrane (poljoprivrednih i prerađivačkih proizvoda). Izbor da li jesti meso ili ne više se ne odnosi samo na pitanje ukusa. Pored negativnih efekata koje industrijalizovana hrana može da ima na zdravlje pojedinca, ona može imati negativne efekte i na floru i faunu, životnu sredinu i klimatske

promene. Takođe, u knjizi je napravljena analiza 'za i protiv' koja je pokazala da su štete od fabričkih farmi i prerađenog mesa veće od prednosti ukusa i sastojaka istog. Zaključak do kojeg autor dolazi jeste da je životinjska ishrana, naročito ona koja prolazi industrijske metode obrade (fabrička poljoprivreda, industrijski ribolov i slično) loša. Predlozi dati u knjizi imaju potencijal da inspirišu potragu za poboljšanjem društveno-političko-kulturnog sistema na individualnom nivou. Takođe, knjiga se uklapa u literaturu o održivom razvoju i donosi sadržaje koji se odnose i uklapaju u SDG i Agendu 2030.

Četvrti rad, *Energy transition in Slovakia – destiny in/and change*, prikazuje diskusiju o položaju Slovačke u procesu energetske tranzicije. Članak analizira glavne faktore koji doprinose energetskoj tranziciji u cilju postizanja energetskih i klimatskih ciljeva, sa fokusom na obnovljive izvore energije. Različiti uzroci poput tehnoloških, ekonomskih ili regulatornih, često ometaju proces punog prihvatanja energetske tranzicije. Rad analizira različite aspekte energetske tranzicije, kao što je trenutna geopolitička situacija koja donosi posebne izazove i prepreke, kao i njihovo bolje razumevanje. Energetska tranzicija predstavlja fundamentalni proces u evoluciji ljudskog društva koji pokreće tehnološke, ekonomske i društvene promene. Stvaranje energetske nezavisnosti postaje jedan od glavnih ciljeva energetske tranzicije. Cilj rada je da pruži pregled trenutnog stanja brzo rastuće literature na temu energetske tranzicije – energetska geopolitika, energetska pravda ili energetska demokratija i uz to prednosti, mane, mogućnosti i ograničenja energetske tranzicije. Zaključak rada naglašava da je za energetsku tranziciju ključna uloga političkih izbora i stepen uključenosti vlade, a da budućnost energetske tranzicije

zavisi od uspešne implementacije održive energetske i klimatske politike, kao i političke i javne podrške.

Regional Considerations in the National Energy-Mix Transformation je peti rad i rad koji govori o transformaciji energetskog miksa, na osnovu ekonomskih i društvenih aspekata. U radu se analizira situacija u kojoj se javno razmatraju mnoga ulaganja u elektroprivredu koja koristi nove energetske tehnologije, nepoznate široj javnosti − nuklearna energija i vetroelektrane na moru. Prvo je predstavljen sažet pregled literature o transformaciji energetskog miksa i društvenim aspektima energetske tranzicije. Drugo, pokušava da se pokaže ekonomičnost izbora u vezi sa razvojem novih mogućih lokacija za priobalne vetroelektrane i u vezi sa potencijalnim povećanjem nuklearne energije. Na kraju, članak govori o višestrukim društvenim razmatranjima relevantnim za uspešnu energetsku tranziciju. Dugoročne odluke su ključne u razmatranju i odnose se na važan uticaj na nacionalnu energetsku bezbednost, kao i na konkurentnost nacionalne privrede. Pored navedenog, socijalna dimenzija je jako važna. Dosadašnja iskustva govore da se uspešno primenjuju samo ona rešenja koja su priželjkivana od strane javnosti i za koja je javnost spremna da plati. Javno mnjenje poslednjih godina znatno je promenilo svoje stavove i svest o klimatskim pretnjama, životnoj sredini i uticaju zelenih energetskih izvora. Energetska pitanja, transformacija energetskog miksa i smanjenje zavisnosti od uglja postali su svakodnevna tema u javnoj debati. Velika većina stanovništva ima pozitivne stavove po pitanju napuštanja energije zasnovane na uglju. Analiza pokazuje da negativne *eksternalije* poput pogoršanja zdravlja zbog zagađenja vazduha izazvanog sagorevanjem fosilnih goriva,

treba uzeti u obzir pri odlučivanju o kombinovanju izvora energije. Kao i u slučaju prethodnog rada koji se bavi energetskom tranzicijom, rat u Ukrajini i njegove posledice utiču na proces transformacije energetskog miksa. Svetsko energetsko tržište i energetska bezbednost stavljeni su pred velike izazove usled burnih geopolitičkih dešavanja. Strategija energetske transformacije EU predviđa usklađenost između ekoloških, ekonomskih i društvenih ciljeva. Iz tog razloga, posebna pažnja mora biti usmerena na suzbijanje energetskog siromaštva kako najsiromašniji ne bi snosili troškove transformacije. Pored cene, socijalne kalkulacije odnose se i na zdravstvena i politička pitanja. Nema sumnje da će društvena podrška za uspeh transformacije zavisiti od dobre komunikacije i finansijske podrške tranziciji.

Šesti rad, *The Mobility Choices in Poland is There a Chance to Transition From Owned Cars to a Shared Ones?*, daje inovativan pristup štednji energije, zaštiti životne sredine i poboljšanju kvaliteta života stanovnika. Rad ispituje da li postoji potencijal za prelazak sa vlasništva automobila na zajedničko korišćenje u velikim gradovima kako bi se ostvarili ciljevi održive mobilnosti. Automobili proizvode *eksternalije* koje narušavaju kvalitet života, posebno u urbanim područjima. Pokreću se razni nacionalni projekti i projekti finansirani od strane EU koji se posvećuju poboljšanju održive mobilnosti i podizanju ekološke prihvatljivosti transporta. Istraživanje u radu bavi se odgovorom na pitanje da li postoji šansa za prelazak iz društva orijentisanog na automobile u društvo koje daje prioritet održivoj mobilnosti. U onim sredinama u kojima je javni prevoz nepostojeći ili je u lošem stanju, mobilnost je uglavnom zasnovana na automobilima. Takođe, u velikim gradovima je velika

zastupljenost mobilnosti automobilima što ugrožava zdravlje njegovih stanovnika. U malim i srednjim gradovima situacija je malo bolja, ali nedovoljno, jer je fokus i dalje na prevozu automobilima. U ovim oblastima, osećaju se manji negativni efekti transporta u pogledu zagađenja vazduha. Ipak, pored svega navedenog, broj automobila na 1000 stanovnika najveći je u Centralnoj i Istočnoj Evropi i konstantno raste. Prema Evropskom indeksu kvaliteta vazduha koji obezbeđuje Evropska agencija za životnu sredinu, kvalitet vazduha u tim gradovima je loš ili veoma loš, posebno u „špicu" svakog dana, čak i leti. Prema analizi sprovedenoj u radu, stanovnici velikih gradova otvoreni su da koriste alternativna rešenja, ali nisu voljni da odustanu od korišćenja automobila kao glavnog prevoza. Ispitanici prepoznaju probleme zagađenja i njegov uticaj na životnu sredinu, i spremni su da promene svoje navike ka održivijem korišćenju automobila – deljenju automobila. Međutim, nisu voljni da napuste vlasništvo nad automobilima. Prepoznaju i koristi *carpooling*-a i u ekonomskom i u ekološkom smislu. Zaključak rada pokazuje mogućnost primene obrasca održive mobilnost i zajedničke mikromobilnosti. Evropska komisija ulaže velike napore u promociju održive mobilnosti – bicikle, e-skutere i trotinete, dok istovremeno stvara okvire za multimodalne obrasce mobilnosti.

Sedmi i poslednji rad, pod nazivom *e-Culture for all: an Initiative to Broaden Horizons. Creating Convergences out of a Fragmented Global Scenario,* rezimira ključne tačke u oblasti e-kulture kako bi angažovao publiku u podizanju svesti o aktuelnim pitanjima – klimatske promene, životna sredina, društvena asimetrija i mnoga druga. Sve više se sprovode različiti projekti i inicijative sa ciljem

negovanja svesti o održivom razvoju i održivoj budućnosti, sa akcentom na informisanje i edukaciju. Živimo u vremenu koji preti da radikalno preoblikuje suštinu ljudskog postojanja. Od čovečanstva se očekuje potpuna kulturna transformacija. Povećava se potrebna za zajedničkim kreiranjem (ko-kreiranjem), očuvanjem i umnožavanjem ko-kreativnih prostora e-kulture kako bi se podstakla nova svest čovečanstva. Predatorske navike, oličene globalizmom, obeležavaju današnje društvo i predstavljaju promenu koju je potrebno izvršiti u pozitivnom smeru. Postoje razne e-inicijative koje za cilj imaju stvaranje, obnavljanje i edukaciju e-kulture, sa posebnim fokusom na teme klimatske krize. Ove inicijative uključuju analizu problema i zajedničko kreiranje globalnih rešenja. Ljudsko obogaćivanje u e-kulturi neophodno je za razumevanje globalnih transformacionih procesa. E-kultura je od velikog značaja za prosvetne radnike i ljude iz kulturnog menadžmenta. Iz tog razloga, obuka sadašnjih i budućih prosvetnih radnika treba da bude snažno orijentisana na kulturno obrazovanje i obrazovnu kulturu u multidisciplinarnim procesima ko-kreativnog osnaživanja. Obrazovanje nastavnika u svojoj obrazovnoj i kulturnoj ulozi, potrebno je da se zasniva na prirodi digitalnog humanizma, programu koji pridaje veći emocionalni značaj digitalnim medijima kroz umetnost, nauku i tehnologiju. Takav pristup ima mnogo prednosti za transformaciju koja predviđa održivu budućnost. U zaključku, članak naglašava vrednost obrazovanja budućih nastavnika kao kamena temeljca za oblikovanje i transformaciju društva. Ovo obrazovanje postaje katalizator za stvaranje kognitivne konvergencije sposobne da podigne svest o kreativnim ljudskim kapacitetima potrebnim za izgradnju održive budućnosti, zajedno sa snažnom strategijom obuke u digitalnim

humanističkim naukama za rešavanje različitih kriza, sadašnjih ili budućih.

Sumirajući navedene radove moguće je izvesti jedan zaključak koji može obuhvatiti sve analizirane sfere. Ostvarivanje ciljeva Agende 2030 predstavljalo bi značajnu prekretnicu u ljudskoj istoriji, sa milionima ljudi izvučenih iz siromaštva, napretkom u obrazovanju, zdravstvenoj zaštiti, rodnoj ravnopravnosti i održivosti životne sredine. Takođe, ojačala bi se važnost međunarodne saradnje u rešavanju složenih globalnih izazova, podstakla bi se kontinuirana saradnja između država, međunarodnih organizacija i kompanija.

Završetak Agende 2030 predstavljaće odraz kolektivnog napora ka stvaranju održivijeg, pravednijeg i prosperitetnijeg sveta.

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- *Uvod* opisuje istraživački problem, sumira relevantna prethodna istraživanja u logičkom i kritičkom maniru, vodi čitaoca ka glavnom istraživačkom pitanju članka; jasno formuliše predmet i cilj istraživanja, kao i postojeće nalaze i teorije koje prikazano istraživanje testira ili pokušava da nadogradi.

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Zakon o sprečavanju diskriminacije osoba sa invaliditetom 2006 (2016, February 19). http://www.pravno-informacioni-sistem.rs/SlGlas-nikPortal/eli/rep/sgrs/skupstina/zakon/2006/33/1/reg

Novinski članci iz štampanih izdanja:

Frost, L. (2006, Septembar 14). First passengers ride monster jet. *The Salt Lake Tribune*, str. A2.

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Podatke i/ili proračune korišćene za kreiranje grafikona i tabela, takođe, treba dostaviti kao posebne datoteke (bez obzira što nisu sastavni deo rukopisa). Npr. ukoliko su grafikoni napravljeni u MS Excel-u, pobrinuti se da dozvoljavaju pristup izvornim podacima na osnovu kojih su kreirani.

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