JOURNAL OF PUBLIC GOVERNANCE

3 (69) / 2024

KRAKOW UNIVERSITY OF ECONOMICS

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The journal is co-financed in the years 2022–2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of agreement no. RCN/SP/0387/2021/1 concluded on December 15, 2022 and being in force until December 14, 2024.

ICI World of Journals/ICI Journals Master List, ProQuest

ISSN 2956-6061
e-ISSN 2956-6398

Information for the Authors: formerly 'Zarządzanie Publiczne/Public Governance' [ISSN 1898-3529; e-ISSN 2658-1116]

http://publicgovernance.pl

Cover Design – *Agata Łankowska*

Publisher
Malopolska School of Public Administration
Krakow University of Economics
ul. Rakowicka 27, 31-510 Kraków
phone: + (48) 122 937 560
www.msap.pl

Publishing Partner
Scholar Scientific Publishing Company
ul. Obożna 1, 00-340 Warsaw
phone: + (48) 22 692 41 18, 22 826 59 21, 22 828 93 91; Sales Department: ext. 108
e-mail: info@scholar.com.pl; www.scholar.com.pl

Typesetting: WN Scholar (*Jerzy Łazarski*)
Printed in Poland

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doi: 10.15678/PG.2024.69.3.00

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Andrzej Jaki

Introduction

The 21st-century economy is marked by the impact of many economic, social, and political crises. In these conditions, the issue of sustainable development is once again becoming extremely relevant. The beginning of comprehensive research on sustainable development was the report of the United Nations Commission on Environment and Development entitled *Our Common Future*. This report was prepared in 1987 by a team led by Gro Harlem Brundtland, former Prime Minister of Norway. In this report, sustainable development was defined as the pursuit to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. The continuation and development of research relating to the concept of sustainable development (SD) has contributed to the emergence of the following complementary perspectives on understanding this concept:

- SD is striving to harmonise social, economic, and environmental goals.
- SD is the integration of economic, ecological, and social development – the sustainability triad.
- SD is the integrative use of economic, environmental, and social resources, taking into account the harmonisation of economic rights with the laws of nature.
- SD is considered to be integrating political, economic, and social activities, maintaining ecological balance as well as the continuity of key natural processes to secure the basic needs of present and future communities.

In this issue of the *Journal of Public Governance*, the matter of sustainable development is presented from various perspectives adopted as a starting point for formulating research assumptions by the authors of individual articles.

Ana Krstić Srejović, *Predrag Mimović*, and *Milena Jakšić* set the primary objective of their article to evaluate the performance of sustainable development in the education sector through a relative comparison of thirty-five European countries over the 2013–2021 period. The results of the conducted research showed that the performance of the quality of education – measured in terms of the DEA concept of efficiency – during the period of 2013–2021 was at a relatively low but stable level, overall. It was shown that, above all, the observed countries that are not members of the EU achieved a significantly lower level of education quality during the observed period, including the United Kingdom.

The subsequent two articles highlight the social and ecological aspects of sustainable development. *Paweł Olejnik* focused on examining the impact of a socially-responsible approach to business on the effectiveness of the capital investment process on the market. The objective of his study was to research the influence of Corporate Social Responsibility (CSR) on the investment

Andrzej Jaki – Kraków University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland; e-mail: jakia@uek.krakow.pl; ORCID: 0000-0002-4799-4343.

risk level among companies whose shares are listed on the Warsaw Stock Exchange. In this study, an analysis and assessment of literature and empirical research was used, with a scope spanning the period from 2009 to 2017. In empirical research for investments in shares of the CSR companies (companies included in the RESPECT Index), risk measures were estimated, and their levels were compared with the levels of risk measures for investment in the general WIG Index. The results of the analysis showed that the companies from the RESPECT Index were characterised by higher total risk and lower systematic risk. The next author, *Janusz Rosiek*, focused on presenting the ecological perspective of sustainable development. The primary objective of his article is to justify the role of green finance in balancing the socioeconomic development of the European Union, with a particular focus on environmental aspects. Sustainable financing, as defined by the author, includes investment decisions that incorporate environmental, social, and governance (ESG) factors. Sustainable financing may also be relevant to achieving the EU's climate and environmental policy goals, and to putting the EU economy back on the road to recovery.

The article by *Kateryna Bagatska* and *Nataliia Bilous* addresses the specific and extremely relevant issue of stimulating entrepreneurial activities in the conditions of the economic, social, and political crisis caused by the war in Ukraine, which began in February 2022. The main objective of this article was to present different government methods and tools for stimulating entrepreneurial activity in Ukraine during the period of the full-scale war. The conducted research suggests that scholars from developed countries primarily emphasise the indirect influence of state support through creating a favourable environment for fostering SME growth and performance. To the contrary, scholars from developing countries with transitional economies focus mostly on direct government support, which is a relevant case in Ukraine. These direct methods of support (grants, affordable loans, deregulation) have proved to be efficient since their implementation.

The last article, one prepared by *Marzena Piszczek*, presents the issue of sustainable development from the perspective of public finance, as the need for the coincidence of economic and social goals is included among the key tasks of public authorities. The aim of the article is to characterise the factors destabilising the financial system of Polish local governments from 2018 to 2023, using the example of the city of Kraków. The conducted analysis revealed that tax policy in particular had a significant impact on the condition of Polish local governments, causing significant revenue losses. The case of the city of Kraków proves this. All of the factors, as mentioned above, had an impact on local budgets and resulted in an increase in current budget expenses as well as limited the investment opportunities of local government units.

doi: 10.15678/PG.2024.69.3.02

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Ana Krstić Srejović, Predrag Mimović, Milena Jakšić

The Non-Parameter Evaluation of the Quality of Education in European Countries Based on Panel Data

Abstract

Objective: The aim of this paper is to evaluate the performance of sustainable development in the education sector through a relative comparison of thirty-five European countries in the period of 2013–2021. Sustainable Development Goal number 4, namely the quality of education, was taken as a benchmark for evaluation.

Research Design & Methods: The performance of the countries was evaluated using the combined Slack Based Measure DEA Window model, which has a higher discriminating power than the standard DEA model and a dynamic dimension of observation. Finally, the robustness and sensitivity of the results was tested using bootstrapping methods.

Findings: The results showed that the performance of the quality of education, measured in terms of the DEA concept of efficiency, in the period 2013–2021, was at a relatively low but stable level overall. It was shown that, above all, the observed countries that are not members of the EU achieved a far worse level of the quality of education in the observed period, including the United Kingdom.

Contribution / Value Added: The obtained results are important in terms of benchmarking public policies related to sustainable development, especially in terms of contributing to discussions regarding the evaluation of countries' performance, especially in the field of education, as one of the key goals of sustainable development. Also, the results refer to the sources of the inefficiency of educational policies, primarily in countries that are not members of the European Union, but also in some of the member countries.

Keywords: sustainability development goals, quality of education, performance, efficiency, data envelopment analysis

Article classification: research article

JEL classification: C61, H52, I25

Ana Krstić Srejović – University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, Kragujevac, Serbia; e-mail: anakrstic@kg.ac.rs; ORCID: 0000-0001-5649-3199. **Predrag Mimović** (corresponding author) – University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, Kragujevac, Serbia; e-mail: mimovicp@kg.ac.rs; ORCID: 0000-0003-0323-8033. **Milena Jakšić** – University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, Kragujevac, Serbia; e-mail: milenaj@kg.ac.rs; ORCID: 0000-0003-0553-6085.

Introduction

The concept of sustainable development is not new, and it is defined as a concept based on ecological integrity and balance between economic, environmental, and social dimensions. Sustainability consists of three pillars: social, economic, and environmental (UN, 2012a; Stevens & Kanie, 2016; Boyer et al., 2016; Purvis et al., 2019; Olawmi & Chan, 2018). That is, sustainable development is development that meets the current needs of society without compromising the ability of future generations to meet their own needs (Brundtland Report, 1987). According to this model, sustainable development should equally try to reach ecological, economic, and social goals (Wichaisri & Sopadang, 2017, Diaz-Sarachaga et al., 2018). Sustainable development goals are mutually integrated, expressing the awareness that action in one area will affect results in others, and that development must find a balance between social, economic, and environmental sustainability. In this sense, when talking about the efficiency of sustainable development and its performance, in the scientific and professional literature it is viewed as multidimensional, through the prism of its goals, i.e. indicators.

Considering the accelerated depletion of many natural resources and the drastic degradation of the quality of the environment, it was necessary to redefine the model of economic growth and harmonise it with sustainable development (Jorgenson & Dietz, 2015). In 2015, the United Nations General Assembly adopted the Sustainable Development Agenda with 17 Sustainable Development Goals (SDG) and 169 related sub-goals, which can be grouped into three categories: basic needs (SDG 2, 6, 7, 14, and 15), objectives (SDG 1, 3–5, 8, 10, and 16), and governance (SDG 9, 11–13 and 17). Although this classification has been widely used in SDG studies, the combinations of different SDGs are relatively conceptual and based on expert knowledge. These goals reflect different dimensions of sustainable development, with different levels of achievement, which results in different national performances of sustainable development.

Sustainable development is a core principle of the Treaty on European Union and a priority objective for the EU's internal and external policies. The Sustainable Development Goals represent the core of European policy and are firmly rooted in the European Treaties as well as included in key projects, sectoral policies, and initiatives of the European Commission (2022). Hence the constant monitoring of the progress of EU members towards the proclaimed goals, for the purpose of which a set of appropriate indicators has been developed. Indicator trends are evaluated based on their average annual growth rate over the past five years. For twenty-two indicators with quantitative EU targets, progress towards those targets is assessed. These goals mainly exist in the areas of climate change, biodiversity, the European Pillar of Social Rights, energy consumption, and education. All other indicators are evaluated according to the direction and speed of change. The report of the Eurostat, the statistical office of the European Union, based on simple monitoring of statistical trends of selected indicators, shows that the EU has made progress towards most goals over the last five years, in line with the Commission's priorities in key policy areas such as the European Green Deal, the 8th Environment Action Programme, and the European Pillar of Social Rights Action Plan. The data shows that the EU has progressed strongly towards many socioeconomic goals, while more progress is expected in the environmental domain as the Member States implement the ambitious targets of the European Green Deal. The report shows that, over the last five years, the EU has made significant progress towards three SDGs (SDG 1, SDG 5, and SDG 8) and moderate progress towards most others. The smallest progress was achieved towards SDG 13, SDG 15, and SDG 17.

The quality of education as one of the goals of sustainable development, promoted in the UN agenda as SDG 4, is defined as the requirement to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (*Sustainable Development Goals*). This goal represents one of the vital components of sustainable development (Agbedahin, 2019; Leicht et al., 2018), its key driver, but also its condition *sine qua non*, because the ability to understand the importance of establishing a stable balance between the need for progress embodied in socioeconomic development and the controlled consumption of limited natural but also social, material, and spiritual resources depends on the level of individual awareness and the level of social responsibility. The main purpose of the SDG 4, is to encourage the principles and practices of sustainable development to create societies with exceptional opportunities in all fields of education (Franco et al., 2020). According to the UN, the world is falling far behind achieving quality education. It is estimated that by 2030, as many as 84 million children and young people will be out of the education system, 300 million students will fall behind in primary education, while only one out of six states will achieve the universal secondary school completion target (UN, 2012a, 2012b). Achieving the goals set within SDG 4 is of great importance for the achievement of other sustainable development goals. In addition to the fact that they provide literacy and access to basic education, higher education institutions are also considered very influential in achieving sustainable development, with the social responsibility to create an environment that fosters sustainable development among their students and communities (Ferguson &Roofe, 2020). Also, trade activities are directly related to education. The lack of educational opportunities in a certain region, i.e. the lack of professional and personal skills of people living in that region, significantly affects the creation of a business environment and new business areas in the region, as well as the degradation of the level of entrepreneurial and investment activities. That is why investing in the education of the population is of fundamental importance for faster economic development (Hanushek & Woessmann, 2008; Johnes et al., 2017; Cervello-Roio et al., 2020).

In this context, **the aim** of this paper, on the one hand, is to evaluate the achieved SDG 4 performance through a relative comparison of the observed countries, so that the indicators of the SDG 4 goal, as defined by the European Commission, will be considered as output variables of the Data Envelopment Analysis model, while their mutual influences are also taken into account. On the other hand, the relative comparison was made over a period of nine years, which is slightly longer than the EU standard (5 years), but in addition to the temporal dimension, it is also comparative. In this paper, Slack Based Measure Data Envelopment Analysis was used to calculate the results, which – compared to the standard DEA model – has a higher discriminating power and, therefore, provides a better and more harmonised efficiency calculation. The dynamic dimension of the model is provided by the coordinated application of DEA Window analysis.

In accordance with the determined research subject and objective, the following **research questions** are raised in the paper:

RQ1: Which countries achieved the best practice, i.e. the highest level of achievement of SDG 4 – the quality of education – in the observed period?

RQ2: What is the trend of relative technical efficiency of education policy, i.e. of the achieved level of education, from the point of view of the observed indicators of the observed countries in the period 2013–2021?

RQ3: What is the performance of the EU Member States in relation to the observed SDG 4 in the period 2013–2021?

The paper contains five parts. The first part presents an introduction to the research subject with a brief review of reference aspects of the problem. The second part provides a brief overview of the literature that refers to the topic of education as one of the goals of sustainable development. The methodology used is described in the third part of the paper. The fourth part structures the appropriate SBM DEA window models for evaluating and benchmarking the efficiency of the observed countries. The obtained results of the model, the robustness of the chosen methodology, and the validity of the obtained results are presented and discussed in the fifth part of the paper. The research framework of the paper is shown in Figure 1.

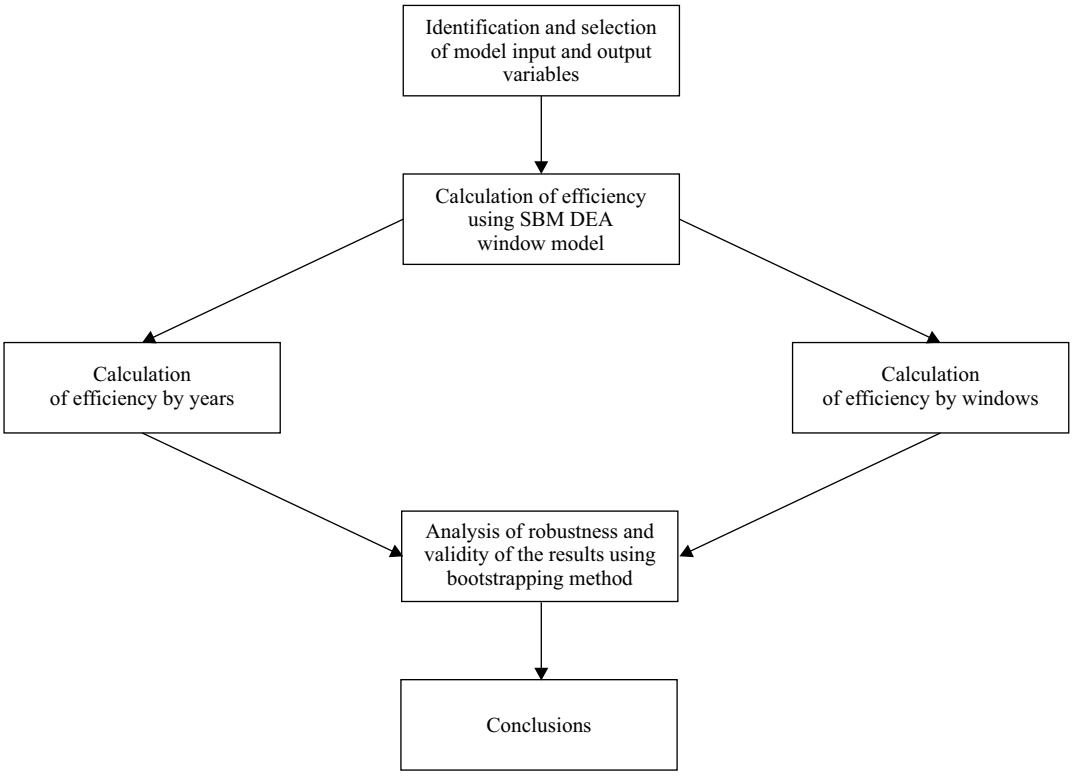

Figure 1. The research framework

Source: Authors' own work.

Theoretical background

There is no single definition of the quality of education, nor is there a universal consensus on what the appropriate strategy for ensuring and managing the quality of education is (Becket & Brookes, 2006), which has led to different interpretations and concepts associated with the quality of education (Shah, 2012). Quality in education is a multidimensional concept with different components (Sallis, 2002). The UNESCO (2021b) provided a quality framework for stakeholders that comprises five dimensions of quality education, namely (1) student characteristics; (2) the economic, social, cultural, and national context; (3) input-enabling intent; (4) the containment of different pedagogical dimensions; and (5) outcome.

Problems related to the quality of education are discussed both at the level of a specific educational institution, at the national level, and at the international level. These problems include measuring the quality of education, improving the quality of education, establishing quality standards, etc., and are multidimensional in nature (Ahmad, 2015). The literature devoted to the problem of the quality of education mainly focuses on certain levels of the educational hierarchy – primary, secondary, or higher education – or on different aspects of observation (Elsheaer, 2012; Brooks, 2021). Ko (2017) provides an overview of studies that identify the most significant factors affecting the quality of education in secondary schools, which concern both the educational infrastructure and the social context. Scheerens and colleagues (2011) use input-process-output-context for the selection and categorisation of quality indicators at all levels of the educational hierarchy, defining different perspectives of the quality of education: productivity, effectiveness, efficiency, fairness, responsiveness, and a more eclectic use of quality indicators the input, process, outcome, and context of education. Rodriguez and colleagues (2022) propose a multidimensional indicator for measuring the quality of education in public secondary schools. The results of the conducted study show the relevance of extrinsic factors, mainly the social context. Camilleri and Camilleri (2020) look at the quality of education in the broader context of sustainable development. The results show that quality education can have implications for job creation, competitiveness, and greater social cohesion, and that striving for continuous improvements in education quality and social inclusion could improve the cycle of productivity, economic growth, and prosperity results. The connection between the quality of education and sustainable development is also investigated by Grobler (2022), who proposes two interpretations of quality education – first, as a highly desirable goal, i.e. SDG 4 in the 2030 Agenda; and, second, as formal education (structured education system) of high quality and as a means to promote sustainability. Krstić Srejović and colleagues (2024) apply a multi-criteria approach to monitoring progress in terms of sustainable development indicators and identifying measures for improvement. They analyse the equality of educational opportunities, after which, using the ELECTRE III method, they rank European countries and, using benchmarking, give recommendations for national policies in order to improve them. Also, Saini and colleagues (2022) consider a case study to understand the relationship between the observed SDG 4 indicators. For this purpose, exploratory data analysis and the mining of numerical association rules in combination with genetic algorithm approaches were applied. The results reveal the presence of a significant degree of connection between these parameters, indicating the fact that understanding the impact of one (or more) indicator(s) on other related indicators is crucial for achieving the goals (or factors) of SDG 4.

Bearing in mind everything that has been said so far, in order to understand the broader picture of the state and progress of states in achieving the target level of education quality, it is necessary to apply a methodology of at least the same level of complexity as the quality of education itself as a goal of sustainable development.

Research methodology

Slack Based Measuring (SBM) DEA

Data envelopment analysis (*DEA*) is a method used for the comparative evaluation of the efficiency of decision-making units (DMUs), which are the relative performance variables of a production system. The calculation of the relative efficiency of the DMU is done by the ratio

of the weighted sum of the outputs and the weighted sum of the inputs required for their generation. The efficiency value in the *DEA* method always ranges between 0 and 1. The DMU will be efficient if it is above the reference limit, which contains a value of 1 as efficiency.

The Charnes, Cooper, and Rhodes DEA model, also known as the CCR (or CRS) ratio model (Charnes and colleagues, 1978), measures the efficiency of the *j-th* DMU as the maximum value of the quotient of the weighted sum of outputs and the weighted sum of inputs, where the weights are weighting coefficients of input and output variables, whose optimal values should be determined so as to satisfy the system of limiting conditions and ensure the extreme value of the objective function. With the Charnes–Cooper transformation, the output-oriented CCR model proposed by Charnes and colleagues (1978) can be formulated as below using linear programming:

$$\begin{aligned} &\max \theta_k = \Sigma_{r=1}^{s} u_r y_{rk} \\ &\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \le 0 (j = 1,\ldots,n) \\ &\sum_{i=1}^{m} v_i x_{ik} = 1 \\ &u_r \ge \varepsilon, r = 1,\ldots,s \\ &v_i \ge \varepsilon, i = 1,\ldots,m \end{aligned} \tag{1}$$

where θ_k is relative efficiency of the *k*-th DMU, *n* is number of DMUs to be compared, *m* is number of input variables, *s* is number of output variables, u_r is weight coefficient for output *r*, v_i is weight coefficient for input *i*, and ε is small positive value. In the literature, it is most often suggested that $\varepsilon = 10^{-6}$. The optimal objective value θ_k is called the ratio efficiency of the DMU. Potentially, if they exist, the optimal solution reveals the existence of excesses in inputs and shortfalls in outputs called "slacks". A DMU with the full ratio efficiency, $\theta_k = 1$, and with no slacks in any optimal solution is called CCR-efficient.

Assume that there are n decision units, denoted as DMUs. Let DMUj ($j = 1,2,\ldots,n$) consume m_1 variable input $x_{i_1 j}$ ($i = 1,2,\ldots,m_1$) and m_2 fixed input $x_{i_2 j}$ ($i = 1,2,\ldots,m_2$), to produce k_1 variable output $y_{r_1 j}$ ($r_1 = 1,2,\ldots,k_1$) and k_2 fixed output $y_{r_2 j}$ ($r_2 = 1,2,\ldots,k_2$). Then, according to Tone (2001), one can evaluate the performance of the observed DMU0 through the following Slack Based Measure (SBM) DEA model (1):

$$\begin{aligned} &\theta_0 = \frac{1 - \frac{1}{m}\Sigma_{i=1}^{m} \frac{s_i^-}{x_{i0}}}{1 + \frac{1}{s}\Sigma_{r=1}^{s} \frac{s_r^+}{y_{r0}}} \\ &x_{i0} = \sum_{j=1}^{n} \lambda_j \times x_{ij} + s_i^{(-)} \\ &y_{r0} = \sum_{j=1}^{n} \lambda_j \times y_{rj} - s_r^{(+)} \\ &s^- \ge 0, s^+ \ge 0 \end{aligned} \tag{2}$$

The optimal solution of model (1) is denoted as $(\theta, \lambda_j^*, s_i^{*(-)}, s_r^{*(+)})$. In model (2) the performance of DMU_0 can be improved by $x_{i0}^{'} = x_{i0} - s_i^{*(-)}$ – and = $y_{r0}^{'} = y_{r0} - s_r^{*(+)}$, wherein θ^* the efficiency of the j_{th} decision-making unit, λ_j^* contribution of the reference efficient decision-making unit in achieving the goal of the analysed decision-making unit, and $(x_{i0}^{'}, \forall i)$ i $(y_{r0}^{'}, \forall r)$ (optimally improved input and output variables, respectively.

The DEA Window analysis

In order to determine the performance and monitor the performance trends of the decision-making units over a specific time period, it is possible to use an extended DEA. In the literature, this analysis is known as the Window DEA method and represents a variant of a traditional DEA approach that can be described as a moving-moving technique and establishes efficiency measures by observing the DMU at different time periods as a separate unit (Wang and colleagues, 2013). At the beginning of the analysis, the length and number of windows in which the time periods overlap. Each unit is treated as a different DMU in a different time period, while the performance of the observed DMU is compared with its performances over other periods of time and with the performance of all other units encompassed by a single window (Yang & Chang, 2009). In the general case, the observed set consists of $n \times k$ entities and one entity in the period t. A window that starts at the moment l, $1 \leq l \leq k$ and has a length w, $w = k - p+1$, and consists of $n \times w \times p$ observations, where p is length of window and $p < k$ (Cooper and colleagues, 2007).

The corresponding SBM-DEA window model for is:

$$\min \quad \frac{1 - - \sum \quad \overline{\quad}}{+ - \sum \quad \overline{\quad}} \tag{3}$$

$$x_{i0}^{k} = \sum_{j=1}^{n} \lambda_j^k \times x_{ij}^k + s_i^{(-,k)}$$

$$y_{r0}^{k} = \sum_{j=1}^{n} \lambda_j^k \times x_{rj}^k - s_r^{(+,k)}$$

$$s_i^{(-,k)}, s_r^{(+,k)} \geq 0$$

By means of Charnes – Cooper transformations, it can be transformed into a suitable linear programming model, through which the efficiency is calculated for each window (Muhammad and colleagues, 2018).

Bootstrapping analysis

Bootstrapping analysis can be defined as a method by which a large number of new samples, of the same size as the original sample, are created based on available data from a sample, by random selection with return from the set of available data. The main goal of this method is to estimate population parameters. Based on its obtained values, confidence intervals are calculated for the parameter one is evaluating, and it can be used to test statistical hypotheses (Toma and colleagues, 2017). The number of bootstrap iterations can be from 1,000 to 5,000, although it is considered that the number of 2,000 is optimal for ensuring the proper range of the confidence interval for bootstrap efficiency estimation (Kang et al., 2024). Also, bias is often assessed in this analysis as well as a bias-corrected estimator (Simar& Wilson, 1998, 2000; Staat, 2006; Ropero and colleagues, 2018). Recently, however, a number of efficiency bootstrapping applications have emerged (Odeck, 2009; Song and colleagues, 2013; Toma and colleagues, 2017; Savović & Mimović, 2021; Savović and colleagues, 2021; Krstić Srejović and colleagues, 2022; Kang and colleagues, 2024).

Calculating efficiency using the DEA method can lead to biased estimates due to the lack of sample. Using a Bootstrap method to get the sampling distribution can simulate the distribution of the original sample estimator and correct biased estimates of the efficiency value (Song and colleagues, 2013). The bias value is calculated as the difference between the bootstrap value and the calculated parameter value, i.e.:

$$Bias_k = \theta_k^* - \theta_k \tag{4}$$

…where θ_k^* is the bootstrap value of the parameter, in this case the average efficiency both by window and by year in the period 2013–2021, for each observed DMU, i.e. state, while θ_k is the measured average efficiency, respectively. Then, the model efficiency corrected for bias estimation is equal to the difference (Song and colleagues, 2013):

$$\theta_k^{'} = 2 \times \theta_k - \theta_k^* (5) \tag{5}$$

…where $\theta_k^{'}$ is bias corrected efficiency, and

$$(\theta_{k,lowerbound}^{'}, \theta_{k,upperbound}^{'}) = (\theta_k^{'*(\alpha)}, \theta_k^{'*(1-\alpha)})$$

confidence interval for $\theta_k^{'}$.

The structuring of the model

The Data Envelopment Analysis has often been used, in different variants, in the measurement and analysis of sustainable development performance (Zhang and colleagues, 2008; Tian and colleagues, 2019; Li and colleagues, 2019; Wang and colleagues, 2018; Long, 2021; Zurano-Cervello and colleagues, 2019; Toma and colleagues, 2017; Grochová & Litzman, 2021; Jakšić and colleagues, 2024). Starting from the subject and goal of the research, and the principles underlying the application of the DEA method, as well as the fact that the focus is on maximising output, the components of the appropriate CCR-output-oriented model are defined as follows:

1. A group consisting of thirty-five countries for which there is available data is observed, mostly EU members.
2. The available data was collected from the Eurostat database for the period 2013–2021. As the focus is on the outputs in order to measure the achieved level of education quality, the input of each individual country is reduced to one (Lee and colleagues, 2022), while the outputs are indicators of the goal of SDG 4 – the quality of education in the EU (Table 1).
3. The corresponding SBM-DEA-Window model with one input and three outputs is formed.

The selected output variables SDGs 4–10, according to their characteristics, belong to the category of so-called undesired variables, for which it is characteristic that it is better if they have a lower value (Tone, 2021). This is in contrast to efficiency measurement in the DEA sense, for which the general rule is that an increase in the value of output variables has a positive effect on efficiency. To ensure this, a multiplicative inversion of the SDGs 4–10 output value was used: $f(0) = \frac{1}{0}$ (Krstić Srejović and colleagues, 2022). Thus, the following model (3) is formed:

$$\min \theta_0^k = \frac{1}{\frac{1}{1+\frac{1}{s_k}} \sum_{rk=1}^{s^k} \frac{s_r^{(+,k)}}{y_{r0}^k}} \tag{6}$$

$$y_{r0}^k = \sum_{j=1}^{n} \lambda_j^k \times y_{rj}^k - s_r^{(+,k)},\ s_r^{(+,k)} \geq 0$$

4. The selected window length is 4, in accordance with the recommendations of Cooper and colleagues (2007), who proposed that a window length of three or four time periods tends to yield the best balance of the informativeness and stability of the efficiency measure.

Based on the performed DEA window analysis with 6 windows[1] (p) each $w = 4$ in width, thirty-five observed decision units (n) and time period of 9 years (T), the total number of observations is $n \times w \times p = 840$ (Cooper and colleagues, 2007).

Table 1. Output variables for DEA

	Variable	Operationalisation	Source of data
Output variables	Early leavers from education and training by sex (D) (SDGs 4–10)	The indicator measures the share of the population aged 18 to 24 with at most lower secondary education who were not involved in any education or training during the four weeks preceding the survey.	https://ec.europa.eu/eurostat
	Tertiary educational attainment by sex (S) (SDGs 4–20)	The indicator measures the share of the population aged 25–34 who have successfully completed tertiary studies (e.g. university, higher technical institution, etc.)	https://ec.europa.eu/eurostat
	Participation in early childhood education by sex (S) (SDGs 4–31)	The indicator measures the share of the children between the age of three and the starting age of compulsory primary education who participated in early childhood education and care (ECEC), which can be classified as ISCED level 0 according to the International Standard Classification for Education (ISCED, 2011).	https://ec.europa.eu/eurostat
	Adult participation in learning in the past four weeks by sex (SDGs 4–60)	The indicator measures the share of people aged 25 to 64 who stated that they received formal or non-formal education and training in the four weeks preceding the survey (numerator). The denominator consists of the total population of the same age group, excluding those who did not answer the question 'participation in education and training'.	https://ec.europa.eu/eurostat

Source: Authors' own work.

Table 2. The descriptive statistics of model variables

Variable	SDG4-10	*SDG4 –20*	*SDG4-31*	SDG4-60
Max	0.0261	21.5	29.7	0.9
Min	0.4545	62.3	100	34.7
Average	0.1293	40.7	83.5	11.5
S.D.	0.0656	8.867	17.186	8.458

Source: Authors' own work.

Results and discussion

The results of the SBM DEA Window model

The obtained results indicate a relatively low efficiency of the sustainable development policy of the observed countries in relation to SDG 4 – the quality of education. Observed by years (Table 3), a stable trend of relatively low efficiency is present in most countries. It is noticeable

[1] $p = T - w + 1$ (Cooper et al., 2007).

that the COVID-19 pandemic did not have a significant impact on efficiency (2020–2021), which indicates the fact that European countries generally consistently implemented the goals of the sustainable development policy in this domain. The best practice (100%), with the maximum realisation of output in the period 2013–2021, in each observed year, was achieved only by France, while Switzerland had an average of 98.1%, Ireland – an average of 96.1%, Sweden – 93.7%, Lithuania – 92.4%, Luxembourg – 91.7%, and Denmark – 90.4%, these being the only countries whose efficiency is over 90% of the reference. The lowest efficiency was achieved, above all, by the Balkan countries that are not members of the EU, with the exception of Montenegro, whose average efficiency in the observed period was 84.4%, but, which is perhaps not surprising, with regard to the EU members whose geographical location is also the Balkans, Romania had an average of only 15.8% of the reference efficiency and Bulgaria – an average of 19.7%. Perhaps the biggest surprise is the United Kingdom's result of 56.6% and Germany, whose average efficiency was only 47.6% of best practice. The average efficiency of all the observed countries in the period 2013–2021 was 60.4% of the best practice; at the EU level, it was 61.9%, and at the level of non-EU countries, the average efficiency was 55.2% of the best practice. All eleven EU member states have an average efficiency above the EU average efficiency. In fact, it can be said that individually, in the observed period, a relatively or very low efficiency of sustainable development policy was achieved (with most countries below 60% or 50%), but that at the EU level, the trend of average efficiency is significantly above the average efficiency of countries that are not members of the EU (Figure 2), which only shows that, despite all the problems in that period, the EU remained firmly committed to the persistent implementation of the outlined policy of sustainable development in the field of education – somewhere with more and somewhere with less success. When the changes in efficiency are observed by certain time periods – windows (Figure 3) – it can be concluded that the results are somewhat better, but that the states mostly kept their ranks (Table 4). France is also the only country that was efficient in all windows and whose average efficiency is 100%, followed by Switzerland with 99.3%, Lithuania with 95.7%, Ireland with 95%, Croatia with 94.9%, Cyprus with 93.6%, and Montenegro with 93.1% as well as Sweden with 90.9%. These are also the only countries whose average efficiency per window in the observed period was over 90% of the best practice. The lowest efficiency in the observed period by windows was achieved by Romania with 13.3%, Bulgaria with 20%, North Macedonia with 22.7%, Turkey with 24.3%, and Slovakia with 29.8% (Figure 3). The average efficiency at the level of EU member states, according to the windows in the observed period, was 61.5%; for non-EU members, it was 55.5%; and for all countries – 60.2% of best practice (Figure 4), which only confirms the thesis of the relatively consistent and relatively efficient implementation of the set goals of sustainable development in the field of quality education, primarily at the EU level.

The analysis of the obtained results unequivocally confirms the thesis that membership in the European Union is a comparative advantage of member states in relation to non-member states when it comes to the effectiveness of national sustainable development policies. Specifically, when it comes to the goal formulated as SDG 4 – the quality of education – this advantage is especially emphasised in times of prosperity and stability. The very illustrative Figure 2 shows a clear noticeable difference in the measure of efficiency in the periods immediately after the world financial crisis (2013–2014) and immediately before the crisis caused by the epidemic of COVID-19 (2016–2019). With the already mentioned exceptions (Bulgaria, Slovakia, etc.), on the other hand, the greater resistance of non-member states to the crises itself is striking, so that in 2015 and 2020, the average efficiency of both states is almost equal. However, as

Table 3. Average efficiency by years in the period 2013–2021

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Belgium	0.568	0.620	0.526	0.559	0.631	0.602	0.565	0.593	0.726
Bulgaria	0.202	0.207	0.194	0.203	0.210	0.219	0.181	0.172	0.188
the Czech Republic	0.619	0.589	0.536	0.531	0.551	0.514	0.485	0.414	0.405
Denmark	1.000	1.000	1.000	0.906	0.813	1.000	0.736	0.715	0.965
Germany	0.508	0.495	0.481	0.475	0.466	0.454	0.450	0.463	0.491
Estonia	0.648	0.577	0.534	0.598	0.591	0.600	0.610	0.649	0.609
Ireland	1.000	1.000	0.830	0.823	1.000	1.000	1.000	1.000	1.000
Greece	0.300	0.293	0.295	0.338	0.366	0.357	0.375	0.403	0.438
Spain	0.454	0.450	0.444	0.434	0.436	0.451	0.447	0.471	1.000
France	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Croatia	0.392	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.389
Italy	0.395	0.431	0.404	0.420	0.402	0.397	0.401	0.401	1.000
Cyprus	0.868	1.000	1.000	1.000	1.000	1.000	1.000	0.481	0.621
Latvia	0.491	0.438	0.421	0.469	0.482	0.451	0.466	0.487	0.560
Lithuania	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.635	0.685
Luxembourg	1.000	1.000	0.810	0.905	0.777	0.851	0.911	1.000	1.000
Hungary	0.292	0.291	0.440	0.393	0.380	0.369	0.363	0.357	0.421
Malta	0.573	0.425	0.418	0.415	0.469	0.476	0.487	0.496	0.555
the Netherlands	0.774	0.761	0.758	0.739	0.753	0.731	0.726	0.756	0.870
Austria	0.643	0.709	0.684	0.685	0.673	0.656	0.633	0.593	0.763
Poland	0.397	0.378	0.332	0.340	0.358	0.449	0.392	0.360	0.409
Portugal	0.450	0.455	0.482	0.464	0.470	0.483	0.503	0.548	0.766
Romania	0.193	0.151	0.132	0.121	0.113	0.095	0.126	0.115	0.379
Slovenia	1.000	0.802	0.704	0.674	0.728	0.708	0.647	0.613	0.562
Slovakia	0.297	0.289	0.284	0.265	0.286	0.321	0.297	0.279	0.477
Finland	0.785	0.766	0.748	0.776	0.747	0.742	0.781	0.749	0.885
Sweden	1.000	1.000	0.905	0.865	0.832	0.832	1.000	1.000	1.000
Iceland	0.581	0.601	0.608	0.551	0.573	0.476	0.523	0.542	0.837
Norway	0.674	0.703	0.671	0.599	0.588	0.576	0.581	0.557	0.529
Switzerland	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.832
the United Kingdom	0.622	0.598	0.578	0.537	0.529	0.525	0.520	0.525	0.661
Montenegro	0.290	0.309	1.000	1.000	1.000	1.000	1.000	1.000	1.000
North Macedonia	0.270	0.242	0.215	0.238	0.204	0.213	0.236	0.240	0.236
Serbia	0.324	0.345	0.364	0.374	0.347	0.326	0.332	0.336	0.412
Türkiye	0.224	0.232	0.237	0.240	0.240	0.250	0.250	0.258	0.246
Average	0.595	0.604	0.601	0.598	0.601	0.604	0.601	0.577	0.655

Source: Authors' own work.

shown in Figure 4, viewed from the so-called windows, the difference in average efficiency is significantly more pronounced, especially in periods of crisis, without tangent points. Additional analysis of the impact of explanatory variables can include and emphasise the broader context of the problem – pointing to key sources of inefficiency in national strategies for the development of education in order to raise its quality – as a strategic resource of a nation.

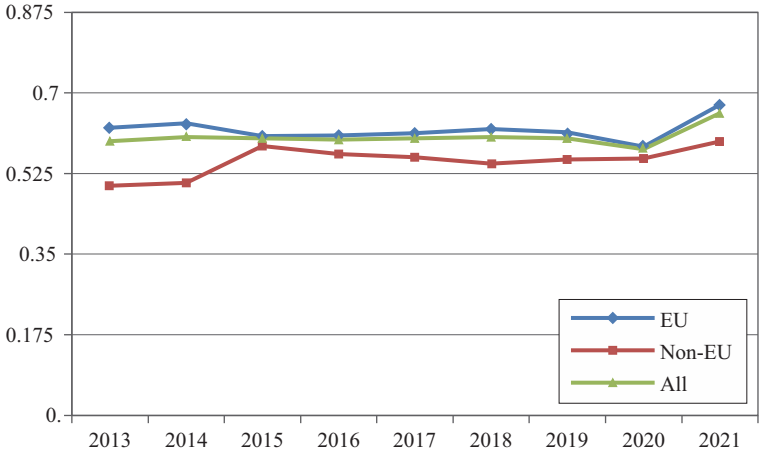

Figure 2. Average efficiency by years – EU countries vs. non-EU countries

Source: Authors' own work.

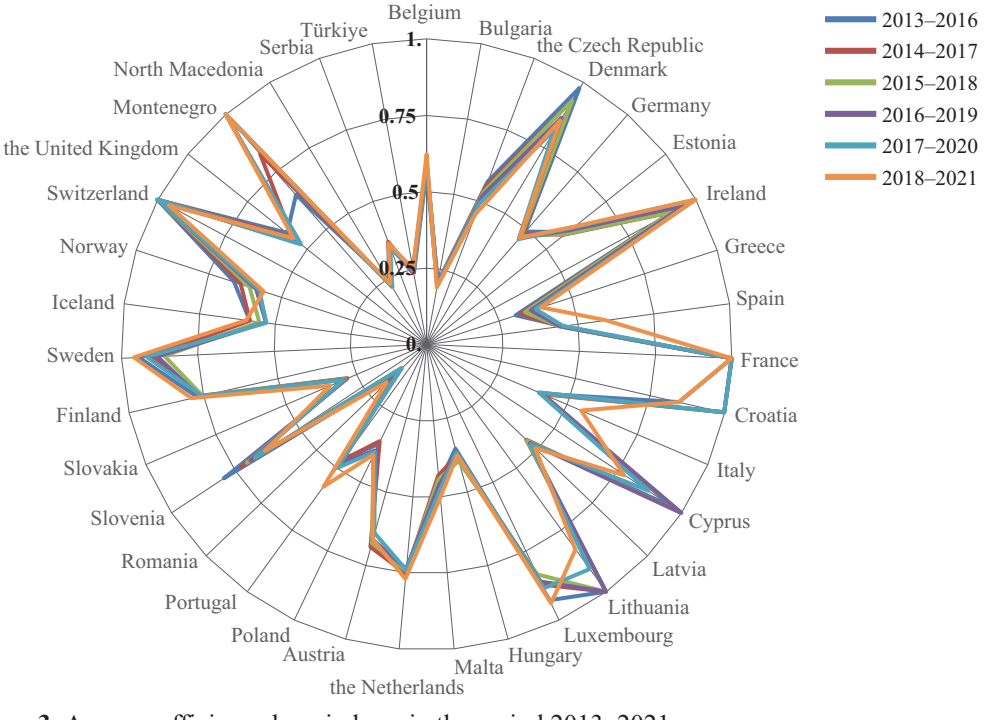

Figure 3. Average efficiency by windows in the period 2013–2021

Source: Authors' own work.

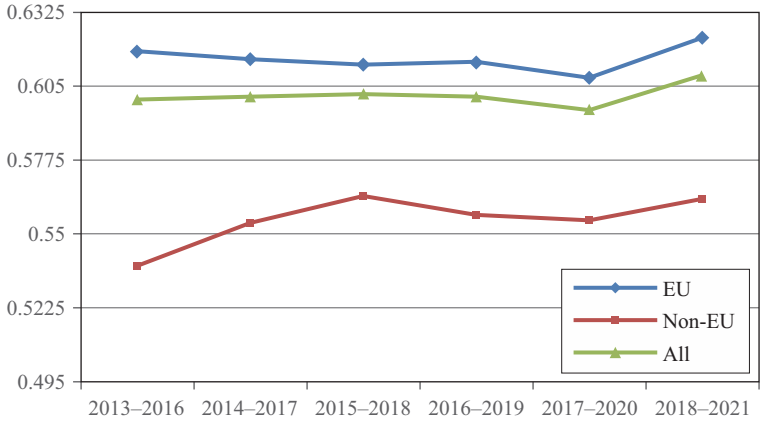

Figure 4. Average efficiency by windows – EU countries vs. non-EU countries

Source: Authors' own work.

The analysis of the robustness and validity of the results

For n = 2000 pseudo samples, corrected average efficiencies per model are calculated, with a confidence level of 0.05. The results of the bootstrapping analysis show that there were no significant deviations of the bootstrapped values from the original values and that they range within the allowed confidence intervals. A similar conclusion can be made regarding the average efficiencies per window. This is supported by the fact that almost all countries maintained their rank and that there were no significant deviations in the rank, except in the case of Croatia, whose rank according to the measured average efficiency per window was 10, and according to the bootstrapped value it was ranked in the fifth place (Table 4). Rank one according to the bootstrapped average efficiency of 100% by years and windows was achieved by France and Switzerland, rank three was retained by Ireland (by years), etc. Generally speaking, in most cases, the measured efficiency is underestimated (and in a small number of cases – overestimated), but this deviation is insignificant, which indicates the validity and accuracy of DEA results and the absence of bias in the assessment.

Table 4. Measured efficiencies, bias-corrected efficiencies, and ranking of observed countries in the period 2013–2021

	θ_k *by years*	Rank	θ_k^*	Rank	θ_k *by windows*	Rank	θ_k^*	Rank
Belgium	0.599	17	0.591	18	0.590	17	0.558	18
Bulgaria	0.197	34	0.196	34	0.200	34	0.198	34
the Czech Republic	0.516	20	0.525	22	0.520	20	0.501	21
Denmark	0.904	7	0.938	5	0.895	9	0.909	7
Germany	0.476	24	0.476	25	0.470	22	0.469	25
Estonia	0.602	16	0.607	17	0.596	16	0.606	16
Ireland	0.961	3	0.999	3	0.950	4	0.949	4
Greece	0.352	29	0.341	30	0.349	29	0.349	29

Table 4 – contineud

	θ_k *by years*	Rank	$\theta_k^{'}$	Rank	θ_k *by windows*	Rank	$\theta_k^{'}$	Rank
Spain	0.510	22	0.567	20	0.469	23	0.493	22
France	1.000	1	1.000	1	1.000	1	1.000	1
Croatia	0.864	9	0.864	10	0.949	5	0.949	3
Italy	0.472	26	0.475	26	0.431	26	0.407	26
Cyprus	0.886	8	0.900	9	0.936	6	0.957	3
Latvia	0.474	25	0.484	24	0.466	24	0.471	24
Lithuania	0.924	5	0.930	6	0.957	3	0.943	6
Luxembourg	0.917	6	0.906	8	0.888	10	0.880	10
Hungary	0.367	28	0.368	28	0.374	28	0.378	27
Malta	0.479	23	0.486	23	0.463	25	0.479	23
the Netherlands	0.763	12	0.764	11	0.751	12	0.753	12
Austria	0.671	14	0.669	14	0.668	14	0.655	14
Poland	0.379	27	0.383	27	0.381	27	0.377	28
Portugal	0.514	21	0.541	21	0.494	21	0.511	20
Romania	0.158	35	0.190	35	0.133	35	0.128	35
Slovenia	0.715	13	0.742	13	0.706	13	0.697	13
Slovakia	0.310	31	0.314	31	0.298	31	0.298	31
Finland	0.776	11	0.754	12	0.765	11	0.768	11
Sweden	0.937	4	0.960	4	0.909	8	0.907	8
Iceland	0.588	18	0.625	16	0.563	18	0.568	17
Norway	0.609	15	0.639	15	0.606	15	0.624	15
Switzerland	0.981	2	1.000	1	0.993	2	1.000	1
the United Kingdom	0.566	19	0.578	19	0.550	19	0.551	19
Montenegro	0.844	10	0.921	7	0.913	7	0.895	9
North Macedonia	0.233	33	0.233	33	0.227	33	0.226	33
Serbia	0.351	30	0.347	29	0.349	29	0.349	30
Türkiye	0.242	32	0.234	32	0.243	32	0.244	32

Source: Authors' own work.

Conclusions

The obtained results, based on the integrated application of Slack Based Measure DEA and DEA Window analysis of the efficiency of thirty-five European countries in the period 2013–2021, show a relatively stable trend and a relatively low efficiency of the implementation of the sustainable development policy in terms of achieving the goals proclaimed by the European Commission, specifically the quality of education. The effectiveness of the achievement is targeted by the requirement to minimise the reciprocal value of the weighted sum of the outputs, whereby the outputs are identified as indicators of SDG 4 – the quality of education – and measured using the non-parametric DEA method. Generally speaking, the efficiency in realising the goals of the education policy by year in EU member states in the observed period was at a significantly

higher level than the efficiency of non-EU states, while the average efficiency was also at a slightly higher level (61.9%: 55.2%). However, this is not in line with the optimistic conclusions based on the simple monitoring of statistical trends in Eurostat reports. The worst educational performances, in addition to the traditionally and expectedly poorly performing Balkan countries that are not EU members, were achieved by Romania, whose average efficiency was only 15.8%, and Bulgaria – with 19.7% of the reference efficiency. A bigger surprise is the weak result of Germany (47.6%) and the United Kingdom (56.6%), as well as the excellent performance of Montenegro (84.4%). The best performances were achieved by EU members – France, Ireland, Sweden, as well as by Switzerland as a non-member. At the same time, only seven countries, six of which are members of the EU, achieved an average efficiency of over 90% by year, while by periods (windows) an average efficiency of over 90% was achieved by eight countries, two of which, Switzerland and Montenegro, are no members of the EU. As many as ten EU members in the observed period were not even at 50% of the reference average efficiency. The dynamic analysis of efficiency, which included the time component, showed that there were no significant changes in the average efficiency and that there were no significant deviations in the relative achieved performances, so there were no deviations in the rank order either. A more detailed look at the results by year shows significant deviations between the achieved and target values of the observed indicators, where the most pronounced deviations observed by country were in the SDGs 4–10 indicators and especially in SDGs 4–60, and slightly smaller in the remaining two indicators, but for deeper indications and conclusions, a more detailed analysis should be carried out in order to understand the causes of these deviations, on the basis of which measures can be taken to improve the quality of education, both at the basic level and at all stages of life, including the development and improvement of digital skills. In the end, the analysis of the robustness of the obtained average efficiency values, using the bootstrap method, shows that the measured efficiency values, except the case of Montenegro, are relatively slightly underestimated and overestimated, and that this did not affect the achieved rankings of the countries, which indicates the validity and accuracy of the obtained results.

The obtained results are important in terms of benchmarking public policies related to sustainable development in the field of education, especially in terms of contributing to discussions regarding the evaluation of countries' performance, especially countries that are not members of the European Union. The analysis also helps to identify countries with the best educational policies and practices, as a benchmarking and model of how to build an effective education system, taking into account the importance and broader social implications of education and its impact on other sustainable development goals.

The inclusion in the analysis of several factors, which is both a limitation and a potential of the conducted research, would certainly contribute to a more credible assessment of the current situation, which is a fundamental assumption for identifying the key sources of the inefficiency of the educational system and, implicitly, the limiting factors of the quality of education. Also, additional analysis of the impact of explanatory variables can include and emphasise the broader context of the problem, pointing to key sources of inefficiency in national strategies for the development of education in order to raise its quality, as a strategic resource of a nation. In this sense, considering the application of DEA methodology and efficiency interval values (0–1), *Tobit* (censored) linear regression can provide a deeper insight into the key determinants of the effectiveness of national education policies.

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Funding
This research received no external funding.

Research Ethics Committee
Not applicable.

Conflicts of Interest
The authors declare no conflict of interest.

Data Availability Statement
All data will be available and shared upon request.

doi: 10.15678/PG.2024.69.3.03

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Paweł Olejnik

Investing in Shares of CSR Companies as an Instrument of Investment Risk Management

Abstract

Objective: Corporate Social Responsibility (CSR) is a concept of running a company that is more and more implemented among companies around the world. Not only companies are more and more interested in CSR, but also the financial community. The objective of this study is to research the influence of CSR on the investment risk level among companies whose shares are listed on the Warsaw Stock Exchange.

Research Design & Methods: In this study, an analysis and assessment of literature was used as well as empirical research whose scope covers the period of 2009–2017. In empirical research for investments in shares of companies included in the RESPECT Index there were estimated risk measures and their levels were compared with levels of those risk measures for investment in WIG.

Findings: Companies from the RESPECT Index were characterised by higher total risk and lower systematic risk. Moreover, the results of skewness and kurtosis were mixed.

Implications / Recommendations: The practical implication of this study is showing companies whose shares are listed on the Warsaw Stock Exchange and which implemented CSR. Moreover, mixed results of this study demonstrate that investing in shares of CSR companies is a complex issue, because the results depend on the kind of risk that is analysed. This is important knowledge in investment risk management. Information about companies that implemented CSR and about the risk level of those companies is important to investors who want to invest in CSR companies as well as to the managers of companies, because the influence of CSR on the investment risk level is indicated.

Contribution / Value Added: Investing in CSR companies is a complex issue and its results depend on risk measure. The added value of this study is to compare risk levels for investment in shares of companies included in the RESPECT Index with risk levels for investment in WIG. Moreover, this study contributes to a better understanding of the consequences of implementing CSR in a company as well as better understanding of a company's attractiveness for investors.

Keywords: Corporate Social Responsibility; investment risk management; risk measure

Article classification: research article

JEL classification: G32, M14

Paweł Olejnik – Kraków University of Economics, College of Management and Quality Sciences, Institute of Computer Science, Accounting and Controlling, Department of Economics and Organisation of Enterprises; 27 Rakowicka St., 31-510 Kraków, Poland; email: olejnikp@uek.krakow.pl; ORCID: 0009-0004-4709-1912.

Introduction

Corporate Social Responsibility (CSR) is a concept of running a company, which is more and more implemented among companies around the world. Not only companies are more and more interested in CSR, but also the financial community. According to K. Bouslah and colleagues (2018), there is growing importance of CSR within the financial community; the authors mentioned several indicators that support this claim. The first of them is the emergence and growth of specialised investment companies which monitor the behaviour of companies in social domains and provide social ratings for these companies. The second indicator is the emergence of mutual funds and indices which select companies on the basis of CSR criteria. Third of all, one can observe an increased interest among investors in CSR issues. Finally, many companies in order to discuss CSR issues produce a specific report, or in their annual report there is a specific section to discuss these issues (Bouslah et al., 2018, p. 643).

The objective of this study is to research the influence of CSR on the investment risk level among companies whose shares are listed on the Warsaw Stock Exchange. In order to reach this objective, two research questions are proposed. The first question is – which companies among those whose shares are listed on the Warsaw Stock Exchange implemented CSR? The second one – is there a statistically significant difference in the risk level of investing in shares of CSR companies and investing in WIG? This study is based on the analysis and assessment of literature and empirical research whose scope covers the period of 2009–2017.

Literature review

The primary responsibility of the risk management function is to understand the portfolio of risks that is currently being taken and the risks that are planned to be taken in the future. Moreover, there has to be taken a decision whether the risks are acceptable or not and, if they are not, what action should be taken (Hull, 2015, p. 1). "In a market economy, a security's risk is measured in terms of the volatility of its price (or of its rate of return). The greater the volatility, the greater the risk, and vice versa" (Vernimmen et al., 2009, p. 391). When money is invested, there is a trade-off between risk and return, which means that higher expected returns can usually be achieved by an investor only by taking higher risks (Hull, 2015, p. 2, 19). Therefore, risk is very important in the process of investing on capital market.

Investment risk is broken down into the volatility of security itself and the volatility of the market as a whole (Vernimmen et al., 2009, p. 420). The value of security can change due to fluctuations in the entire market or due to factors which are specific to the company and which do not affect the market as a whole. Due to these two sources of fluctuation, there are two types of risk. The first type is called market, systematic, or undiversifiable risk, and this type of risk is due to trends in the entire economy and affects all securities. The second type of risk is called specific, intrinsic, or idiosyncratic risk, which is due to factors affecting just the one company; this type of risk is independent of market-wide phenomena (Vernimmen et al., 2009, p. 395). According to X. Luo and C. B. Bhattacharya (2009), a company's total risk or volatility has two parts. The first one, called systematic, is the company's sensitivity to the changes in market returns or sensitivity to news of broad market changes which are common to all stocks. The second part, called idiosyncratic, reflects the risk associated with company-specific strategies (Luo & Bhattacharya, 2009, pp. 199–200).

Diversification is defined as "reducing risk by dividing a portfolio between many different assets" (Hull, 2015, p. 674). Therefore, when investors buy a portfolio of assets, they can reduce overall risk of this portfolio and that is the reason why investors do not buy single assets but they prefer to hold well-diversified portfolios (Vernimmen et al., 2009, pp. 394–395). The risk of a portfolio is lower than the average risk of the shares making up that portfolio (Vernimmen et al., 2009, p. 414), because investment risk consists of systematic risk and idiosyncratic risk; the first one (systematic risk) "cannot be diversified away" (Hull, 2015, p. 685), and the second one (idiosyncratic risk) "can be eliminated by diversification" (Vernimmen et al., 2009, p. 395).

Corporate Social Responsibility is a complex concept. According to A. B. Carroll, "the social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time" (Carroll, 1979, p. 500). Total CSR is constituted by four kinds of social responsibilities (Carroll, 1991, p. 40): economic, legal, ethical, and philanthropic. CSR means that companies "voluntarily take actions that benefit not only their shareholders, but also broader groups of stakeholders as well as society at large" (Jiraporn et al., 2014, p. 507).

In CSR literature, there are two opposite views regarding the relationship between risk and social performance. The first one, the risk mitigation view, suggests that there is a negative relationship between social performance and company risk, because a higher level of social performance may decrease the likelihood of negative events at the company level. Moreover, a higher level of social performance allows the company to be better prepared for difficult periods. The second view, the over-investment view, suggests a positive relationship between social performance and company risk due to managerial entrenchment (Bouslah et al., 2018, p. 644).

X. Luo and C. B. Bhattacharya researched companies from different countries in terms of the impact of corporate social performance (CSP) on systematic and idiosyncratic risk. The research scope covered the period of 2002–2003. The results show that CSP has impact in lowering systematic and idiosyncratic risk (Luo & Bhattacharya, 2009, pp. 198–213).

P. Jiraporn and colleagues (2014) researched US companies in terms of influence of CSR on S&P credit rating. The research scope covered the period of 1995–2007 and the results show that companies with higher level of CSR have better credit rating (Jiraporn et al., 2014, pp. 505–531).

Y. Kim and colleagues (2014) researched US companies in terms of influence of CSR on risk. The research scope covered the period of 1995–2009 and the results show that CSR has an influence on lowering risk (Kim et al., 2014, pp. 1–13).

I. Oikonomou and colleagues (2012) researched US companies in terms of the influence of CSR on risk. The research scope covered the period of 1992–2009 and the results show that CSR is negatively but weakly related to systematic company risk and that corporate social irresponsibility is positively and strongly related to financial risk (Oikonomou et al., 2012, pp. 483–515).

K. Bouslah and colleagues (2018) researched US companies in terms of the impact of financial crises (2008–2009) on the relationship between a company's risk and social performance. The research scope covered the period of 1991–2012. The results show that the relation between social performance and risk is time-varying and depends on market conditions. Social performance reduces volatility during the financial crisis (Bouslah et al., 2018, pp. 643–669).

W. Breuer and colleagues (2018) researched companies from thirty-nine countries in terms of the influence of CSR on the cost of equity. The research scope covered the period of 2002–2015. The results show that the influence of CSR on the cost of capital depends on the level of investor protection. CSR can substantially decrease companies' cost of equity in countries where investor

protection is strong. In countries with low investor protection, however, this relationship may be reversed (Breuer et al., 2018, pp. 34–55).

L. Djoutsa Wamba and colleagues (2020) researched European-listed companies in terms of the relationship between a company's environmental performance and its systematic risk. The research scope covered the period of 2007–2015. The results show that the synthetic global index of environmental performance negatively affects the systematic risk of company (Djoutsa Wamba et al., 2020, pp. 1677–1694).

Zu Rehman and colleagues (2020) researched European and Asian companies in terms of the influence of CSR initiatives by company on company performance and company risk as well as the mediating role of company reputation in CSR / performance and CSR / risk relationship. The research scope covered the period of 2014–2018. The results show that CSR has a significant positive influence on company reputation and company performance, whereas the impact on company risk is negative (Rehman et al., 2020, pp. 2991–3005).

E. Meira and colleagues (2023) researched ESG best practices indexes across four different regions in terms of added value and statistical differentiation among ESG strategies in the stock market. The research scope covered the period of 2011–2021. Classic and modern portfolio metrics as well as nonparametric tests were used. The results are mixed (Meira et al., 2023, pp. 1816–1834).

G. Cardillo and colleagues (2023) researched European companies in order to compare more sustainable companies with other companies in terms of risk-return trade-off and stock market liquidity. The research scope covered the year 2020. The results show that more sustainable companies have a better stock market performance than other companies (Cardillo et al., 2023, pp. 602–623).

A. J. Useche and colleagues (2024) researched companies from Chile, Colombia, and Peru in terms of the performance of investment portfolios built under the ESG criteria. The research scope covered the period of 2011–2019. The results show the value of responsible investment criteria (Useche et al., 2024, pp. 1323–1339).

There are many studies that research the influence of CSR on the investment risk level, but the results are mixed.

Research methodology

Due to the mixed results of previous studies researching the influence of CSR on the investment risk level, the objective of this study is to research this influence among companies whose shares are listed on the Warsaw Stock Exchange.

The first research question is – which companies among those whose shares are listed on the Warsaw Stock Exchange implemented CSR? The research scope covers companies whose shares are listed on the Warsaw Stock Exchange and which were included in the RESPECT Index (the index of Corporate Social Responsibility companies). The research scope covered the period of 2009–2017 and was divided into one-year periods. There were two reasons why the 2009–2017 period was chosen. The first reason was connected with the beginning of the period – the beginning of research scope was in 2009, because the RESPECT Index was launched in 2009. The second reason was connected with the end of the period – the end of research scope was in 2017, because after that year there were significant changes in the way the index of Corporate Social Responsibility companies was constructed.

Companies which implemented CSR were included in the RESPECT Index. The number of companies included was mixed. Some companies were in the RESPECT Index during the whole period and some companies were included for only one year. Table 1 presents companies included in the research scope.

Table 1. Companies included in the research scope

Sector	Company	Sector	Company
Auto parts	Inter Cars S.A.	Insurance	Powszechny Zakład Ubezpieczeń S.A.
Banks	Bank BPH S.A.	Metals products	RAWLPLUG S.A.
	Bank Handlowy w Warszawie S.A. (City Handlowy)	Mining	Jastrzębska Spółka Węglowa S.A.
	Bank Millennium S.A.		KGHM Polska Miedź S.A.
	Bank Ochrony Środowiska S.A.		Lubelski Węgiel Bogdanka S.A.
	Bank Pekao S.A.	Oil & Gas	Grupa LOTOS S.A.
	Bank Zachodni WBK S.A. (Santander Polska S.A.)		Polskie Górnictwo Naftowe i Gazownictwo S.A.
	BRE Bank S.A. (mBank S.A.)		Polski Koncern Naftowy ORLEN S.A.
	ING Bank Śląski S.A.	Paper & packaging	Mondi Świecie S.A.
Capital Market	DM IDM S.A.	Pharmaceuticals Wholesales	Pelion S.A.
	GPW S.A.	Power	Energa S.A.
Chemicals	Ciech S.A.		PGE Polska Grupa Energetyczna S.A.
	PCC Rokita S.A.		Tauron Polska Energia S.A.
	Zakłady Azotowe w Tarnowie – Mościcach S.A. (Grupa Azoty S.A.)		Zespół Elektrociepłowni Wrocławskich KOGENERACJA S.A.
Civil and water engineering	Trakcja PRKiI S.A.	Publishing	Agora S.A.
Consumer Durables	Fabryki Mebli „FORTE" S.A.	Telecom	Netia S.A.
Construction materials	Zakłady Magnezytowe „ROPCZYCE" S.A.		Telekomunikacja Polska S.A. (Orange Polska S.A.)
Drinks	Grupa Żywiec S.A.	Wood	Barlinek S.A.
Electro machinery	Apator S.A.		
General construction	Budimex S.A.		
Industry construction	Elektrobudowa S.A.		
	PBG S.A.		
	RAFAKO S.A.		

Source: Own work.

Table 1 demonstrates that the RESPECT Index included companies from various sectors, but the biggest number of companies is from the banking sector. The second place is taken by the power sector. Moreover, some companies changed their names; new names are provided in brackets. Because the number of companies included in the RESPECT Index was mixed and there were nine one-year periods, the total number of observations is 197.

The second research question is as follows: Is there a statistically significant difference in the risk level of investing in shares of CSR companies and investing in WIG? According to the literature presented in this study, there are three kinds of risk (Luo & Bhattacharya, 2009, pp. 199–200; Vernimmen et al., 2009, pp. 395, 420): investment risk (total risk), systematic risk, and idiosyncratic risk. Moreover, systematic and idiosyncratic risk are two parts of the total risk (investment risk). Because idiosyncratic risk can be eliminated by diversification (Vernimmen et al., 2009, p. 395), in this study this kind of risk was not calculated. Therefore, total risk and systematic risk were the two calculated types. Total risk is measured by estimating the standard deviation of return and systematic risk is measured by estimating the beta (β) coefficient (Luo & Bhattacharya, 2009, p. 200; Vernimmen et al., 2009, pp. 402–403).

In this study, daily percentage log-returns were calculated. Moreover, the standard deviation of daily percentage log-return, the skewness of daily percentage log-return, the kurtosis of daily percentage log-return, and the β coefficient were all calculated, too. Levels of these risk measures for investments in shares of companies included in the RESPECT Index were compared with levels of these risk measures for investment in WIG.

In order to estimate total risk, the standard deviation of daily percentage log-return was calculated. A higher level of standard deviation means a higher level of total risk. Moreover, skewness and kurtosis were calculated; these are – with the standard deviation – the basic characteristics of time series.

The skewness of daily percentage log-return is a measure in which its sign is important – positive or negative – and its absolute value. Positive skewness means that there are more positive returns. Negative skewness means that there are more negative returns. The absolute value informs about the strength of skewness. A higher absolute value means stronger skewness. Therefore, the analysis of skewness had two stages. The first stage was the analysis of the sign of skewness for returns of shares; whether it was the same as the sign for WIG. The second stage was research of the absolute value of skewness for returns of shares; whether it was lower or higher than for WIG.

The kurtosis of daily log-return presents the shape of the distribution of the return in compare with normal distribution. Therefore, the level of kurtosis for returns of shares was analysed; whether it was higher or lower than the level of kurtosis for WIG. The standard deviation, skewness, and kurtosis were estimated in the MS Excel programme.

The next risk measure is β coefficient, which is the measure of systematic risk. During the estimations of β coefficients, GARCH models were used. Therefore, at first, the ARCH effect test was carried out, and after that the estimations of GARCH models (0,1), (1,1), (1,2), (2,1), (2,2) were conducted, and conditional normal distribution, conditional Student's t-distribution, and conditional distribution GED were used. It means that in order to estimate the β coefficient, 15 GARCH models were estimated. The GARCH model was chosen based on information criteria AIC and BIC. Lower levels of these criteria means that the model is better, but in situation when these criteria indicated that different GARCH models were the best, a GARCH model was chosen which was indicated by BIC. The estimations of the β coefficients were made in GRETL, and

daily percentage log-return of shares and WIG were used. The estimations were made based on data from Thomson Reuters Eikon.

For every one of these risk measures and for every year there were calculated proportions of companies for which levels of risk measures for investments in shares were higher than for WIG (except for an analysis of the sign of skewness, in which the proportion of companies for which the sign of skewness was opposite than for WIG was calculated). Next, the sum of the 2009–2017 period for every risk measure was calculated. In order to answer the research question, a proportion significance test for the sum of the 2009–2017 period was carried out. The zero hypothesis of this test assumes that proportion in population is 0.5, it means, $p = 0.5$ (the share of companies with the level of risk measure higher than for WIG was 50% and for the sign of skewness, the share of companies for which it was opposite than for WIG was 50%). An alternative hypothesis of this test assumes that proportion in population is different from 0.5, i.e. $p \neq 0.5$. The significance level $\alpha = 0.05$. It needs to be explained that p means proportion and is different than the p-value, which is the observed significance level. Estimations of this test were made in GRETL.

The discussion of the results

Table 2 presents an analysis of risk measures for investment in shares of companies from the RESPECT Index for the period 2009–2017.

Table 2. The analysis of risk measures for investment in shares of companies from the RESPECT Index for the period 2009–2017

Specification	Total number of observations	Level of risk measure higher than for WIG / a sign of skewness opposite than for WIG		Test statistic z	p-value (two-sided critical area)
		Number of observations	Share (%)		
Standard deviation	197	196	99.49	13.89	0.00
Sign of skewness	197	91	46.19	–1.07	0.29
Absolute value of skewness	197	68	34.52	–4.35	0.00
Kurtosis	197	91	46.19	–1.07	0.29
β coefficient	197	67	34.01	–4.49	0.00

Source: Own work.

At the beginning of the analysis of risk measures for investment in shares of companies from the RESPECT Index for the period 2009–2017, it needs to be explained that in the sign of skewness there is a share of companies for which it was opposite than for WIG. Moreover, in β coefficient, its levels for shares of companies from the RESPECT Index were compared with the levels for WIG (for WIG $\beta = 1$); it was the analysis where the β coefficient for shares is higher than 1, and these shares are called aggressive and are characterised by higher than average level of systematic risk.

Based on proportion significance tests, it has to be stated that at the significance level $\alpha = 0.05$ in standard deviation, the absolute value of skewness and β coefficient zero hypothesis showed that proportion in population is 0.5, i.e. $p = 0.5$ has to be rejected, and an alternative

hypothesis stated that proportion in population is different from 0.5, i.e. $p \neq 0.5$ has to be accepted. The results shows that in these risk measures the share of companies was significantly different than 50%, but depending on the risk measure, investments in shares of companies from the RESPECT Index were characterised by higher or lower risk level than investment in WIG. Meanwhile, in the sign of skewness and kurtosis, there are no grounds to reject the zero hypothesis. The results shows that in cannot be stated that the risk level of investing in shares of companies from the RESPECT Index was different than the risk level of investing in WIG, because the share of companies was not significantly different from 50%.

The results shows that in case of standard deviation, which is the measure of total risk, the share of observations with the level of this risk measure for company was higher than for WIG – nearly 100% – which means that in almost every case, shares of companies were characterised by higher total risk than WIG. On the other hand, in the case of the β coefficient, which is the measure of systematic risk, the situation was opposite, because the share of observations with the level of this risk measure for company was higher than for WIG (higher than 1) – much lower than 50%. It means that in nearly 34% cases, shares of companies were characterised by higher systematic risk than WIG.

In the case of skewness, its sign was first researched comparing it with the sign of skewness for WIG. The share of observations in which the sign was opposite than for WIG was nearly 50%, which means that if in the WIG case, the sign of skewness was negative, there were more negative returns. If the signs of skewness were positive, there were more positive returns (the right tail of the distribution was longer than the left tail). This opposite behaviour of returns means higher risk. Secondly, the researched absolute value of skewness, that is the strength of skewness (higher skewness means higher risk). The share of observations in which the absolute value of skewness was higher than for WIG was lower than 50%. It means that in about 34.5% cases, the absolute value of skewness was higher than for WIG, i.e. the shares of those companies were characterised by higher risk.

In case of kurtosis, share of observations, in which its level was higher than for WIG was nearly 50%. It means, that in about 46% cases concentration of returns from investment in shares of companies around means returns was higher than concentration of returns from investment in WIG. Distributions of daily percentage log-returns from investments in shares of those companies were more peaked than for WIG and that means higher probability of occur extreme events, that is very high or very low returns compared with probability for WIG, that is higher risk.

Conclusions

The objective of this study was to research the influence of CSR on the investment risk level among companies whose shares are listed on the Warsaw Stock Exchange. In order to reach this objective, two research questions were posed. The first question was – which companies among these whose shares are listed on the Warsaw Stock Exchange implemented CSR? In order to answer this question, an analysis was conducted concerning which companies were included in the RESPECT Index. The second research question was – is there a statistically significant difference in the risk level of investing in shares of CSR companies and investing in WIG? In order to answer this question, for every risk measure a proportion significant test was carried out. The results were mixed. Companies from the RESPECT Index were characterised by higher

total risk and lower systematic risk. Moreover, the results of skewness and kurtosis were mixed as well. To sum it up, the objective of this study was reached.

The practical implication of this study is in indicating companies whose shares are listed on the Warsaw Stock Exchange and which implemented CSR. Moreover, mixed results of this study showed that investing in shares of CSR companies is a complex issue, because the results depend on the kind of risk that is analysed. This is important knowledge in investment risk management. Information about companies that implemented CSR and about risk levels of those companies is important to investors who want to invest in CSR companies as well as for managers of companies, because they show the influence of CSR on investment risk level.

The contribution and value of this study is that discipline is significant, because it extends knowledge about investment risk management and using shares of CSR companies as an instrument of that risk management. Moreover, this study contributes to a better understanding of the consequences of implementing CSR in a company and of company's attractiveness for investors. That attractiveness can have an influence on accessibility to equity, the cost of equity, the structure of capital, and, finally, the possibilities of the development of a company.

There are limitations to this research. The first of them is that the research scope covered a short period; therefore, the results were not obvious. Moreover, during the assessment of the implementation CSR, information was used from reports produced by companies, and these reports do not always allow an objective assessment of the level of CSR in a company.

Due to the mixed results of this study, there has to be the continuation of research into the influence of CSR on the investment risk level among companies whose shares are listed on the Warsaw Stock Exchange. In further research, different risk measures could be used, e.g. downside risk measures. Moreover, an analysis of the portfolio of the shares of companies which implemented CSR could be performed.

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Funding

This research received no external funding.

Research Ethics Committee

Not applicable.

Conflicts of Interest

The author declares no conflict of interest.

Data Availability Statement

All data will be available and shared upon request.

doi: 10.15678/PG.2024.69.3.05

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Janusz Rosiek

Financing Green Transformation in the EU's Economy: Selected Aspects of the Implementation of EU Programmes

Abstract

Objective: The aim of this paper is to present ways in which the EU and its member states finance sustainability and what the impact of this different sources of financing is on sustaining the EU's socioeconomic development. The main purpose of the article is to justify the role of green finance in the process of balancing the socioeconomic development of the European Union, with particular attention to environmental aspects.

Research Design & Methods: The study is based on the literature review of green finance, with a particular focus on the functioning of the green economy in the EU countries.

Findings: Sustainable financing is defined as investment decisions that include environmental, social, and governance (ESG) factors. Contemporary economic crises may be a stimulus for rebuilding more sustainable economy. Sustainable financing may be also relevant for achieving the EU's climate and environmental policy goals and for putting the EU's economy back on the road to recovery.

Implications / Recommendations: This article can serve as a basis for financial decision-makers in balancing the socioeconomic development of EU countries, as well as for more extended analyses taking into account new aspects of green finance.

Contribution / Value Added: The added value of this study lies primarily in the skillful connecting of four main aspects of green finance activity in EU: (1) presenting chosen – most important, in the author's opinion – theoretical aspects of green finance, taking into considerations especially the EU; (2) describing examples of some green finance initiatives implemented by the EU in the form of particular programmes; (3) presenting the most important part of the EU's green financing legislation; (4) showing basic interconnections between green finance and sustainability, and *vice versa*.

Keywords: green finance; green economics, environmental data; sustainable development; EU legislation and strategies; EU taxonomy; EU countries

Article classification: theoretical/review paper

JEL classification: Q50

Janusz Rosiek – Kraków University of Economics; ul. Rakowicka 27, Kraków; e-mail: rosiekj@uek.krakow.pl; ORCID: 0000-0001-6290-4724.

Introduction

Growing global awareness of the negative impact of deteriorating natural environment on the functioning of socioeconomic systems, the quality of life, and the profitability of various business ventures increases activity to halt the incremental progress of unfavourable phenomena (such as climate change, biodiversity loss, ecosystem degradation or biodiversity, the degradation of ecosystems, or the pollution of waters, soils, and the atmosphere). Failure to take protective measures can only bring about further losses, caused both by catastrophic weather phenomena as well as slow changes in the environment associated with global warming. This situation can only result in further losses caused both by catastrophic weather events and unusual oceans activity or increasing desertification.

Halting, or preferably reversing, these undesirable trends, however, is neither easy nor cost-free. Growing hopes are linked to green finance in its broadest sense, i.e. structured financial activities that have been created to ensure better environmental performance. It includes loans, debt mechanisms, and other investment measures that are used to develop green projects or minimise the impact of standard solutions on the natural environment, including climate.

The European Green Deal is a package of policy initiatives that aims to put the European Union on the path of environmental transformation and, ultimately, to achieve climate neutrality by 2050. It also focuses on supporting the transformation of the European Union into a just and prosperous society with a modern and competitive economy. Climate change and environmental degradation both pose a threat to Europe and the rest of the world. To address these challenges, the *European Green Deal Action Plan* was created. It concentrates on assistance in transforming the EU into a modern, resource-efficient, and competitive economy:

– that achieves zero net greenhouse gas emissions in 2050;
– that decouples economic growth from resource use;
– in which no individual or region is left behind.

Transitioning to a climate-neutral economy requires global solutions. It is, therefore, time to align these various initiatives across jurisdictions in order to:

– scale up sustainable finance to plug the current investment gap;
– ensure compatible markets for sustainable financial assets across borders and avoid fragmentation;
– achieve economies of scale by exploring synergies;
– maximise the impact of EU investment to support our industry and help us deliver on our core priorities.

The main benefit for investors from green activity is a greater choice of projects and green finance products to satisfy the fast-growing demand. In turn, the main benefit for businesses includes new sources of funding through global capital markets and the financial sector worldwide.

Research methodology

The research was based on theoretical approaches to the concept of green finance and EU policy documents and strategies as well as comparative analyses of studies taken from different sources (theoretical papers, EU documents, and legal acts). Literature on financial aspects of balancing socioeconomic development in EU countries has been selected to present a broader context of the analysis.

The considerations carried out in the study were based on a comparative analysis of the available literature on the subject, considering the theories justifying the importance of green finance for the EU economy, as well as the need for its widespread implementation. The tools of green finance were described, with a particular attention to a relatively new instrument in the form of so-called green bonds. The literature was selected based on its relationship between the theory of green finance and its suitability for sustainable development of EU countries. The considerations were supplemented with relevant charts illustrating the functioning of the green finance mechanism in the European Union. The main purpose of this article is to justify the role of green finance in the process of balancing the socioeconomic development of the European Union, with particular attention to environmental aspects.

The specific objectives of the study were: (1) to review the contemporary literature on green finance, with emphasis on its theoretical aspects, against the background of the existing (macro) economic theories, and on the practical functioning of this concept in the European Union; (2) to present the mechanism of the functioning of the green financing system in the European Union and to justify the necessity of its widespread implementation; (3) to show the close links between sustainable socioeconomic development and green finance as an essential means of its financing by the European Union; (4) to present the functioning of a relatively new green financing mechanism in the form of so-called green bonds; (5) to formulate conclusions on the legitimacy and effectiveness of the use of green finance to finance the socioeconomic development of EU countries, with a particular emphasis on its environmental aspects.

Compact literature review and theory development

The development of green finance theory

The essence and importance of green finance

Green finance has emerged as a strategy that includes not only instruments to reduce greenhouse gas emissions and adapt to climate change, but also financial products and services that address a wider range of environmental issues (Koondhar et al., 2021), such as industrial pollution control, waste management, sanitation and hygiene, and environmental protection (Falcone & Sica, 2019).

Green considerations in financing decisions have evolved over the past few years from a risk mitigation approach to a driver of innovation and new opportunities that benefit businesses and society in the long term (Global Sustainable Investment Review, 2018; see also: Green Finance Platform, 2021).

Green finance can be defined in various ways, which causes some problems with the interpretation of this concept. A team led by Höhne (2012) defined green finance as a concept that refers to financial investments affecting sustainable development projects and sustainable development initiatives, environmental products, and policies that encourage the development of a more sustainable economy. Today, the definition is more narrow, i.e. it refers only to environmental initiatives and omits the other orders of sustainability. Green finance is now usually understood as any financial activity (product or service) that has been developed to produce a better environmental effect (WEF, 2020). The aim of green finance is, therefore, to increase the level of financial flows (from banks, microcredit, insurance, and investment) from the public, private, and not-for-profit (non-profit) sectors towards the priorities of sustainable development (UNEP, 2022).

It is emphasised all the time that green finance is part of a broader concept of sustainable finance (UNEP, 2016). The definition of sustainable development implies that the main aim of this concept is not just growth, but broader development, which is difficult to measure in economic terms. Green finance is a part of sustainable finance that covers only environmental problems, while sustainable finance takes a broader view, adding social, economic, and governance (institutional) problems.

At the same time, it is important to note that green finance is a broader concept than climate finance (Höhne et al., 2012). The latter is included in the concept of green finance, which considers measures not only in the climate area, but also other environmental problems. Given that green finance is limited to environmental issues only, it should still not be considered solely as a concept for reducing environmental risks. It is increasingly being treated as a factor that increases innovation and introduces a new quality in the economic development of societies (Sharma et al., 2022).

According to Prandecki (2023), the creation of a system of green finance should take into account five aspects: (1) the strengthening of market practices, which should be widely applied; (2) the use of public funds, which should be widely applied but cost-constrained; (3) the steering of finance through policy, primarily as the use of funds for sustainable development purposes; (4) the transformation of culture (this solution is the least noticed, involving policy guidance); (5) the improvement of governance (the least practised one).

The impact of green finance on sustainable development

Many studies have explored the role of green finance and its relationship with sustainable development (see, e.g., Wang et al., 2022). Wang and Zhi (2016) indicate that green finance is beneficial for effective environmental risk management and the reasonable balancing of environmental and economic resources. Moreover, Ng (2018) indicates that green finance is an economic activity that promotes environmental improvement, better resource use, and response to climate change.

Unlike conventional finance, green finance emphasises environmental protection, green industry, and sustainable development (Falcone & Sica, 2019; Kang et al., 2019). Zhou and Cui (2019) show that green finance has a positive impact on environmental improvement and enhances corporate social responsibility. Tolliver and colleagues (2019) show that better financing for environmental planning as well as financial instruments specifically designed for climate-friendly projects can help to achieve environmental, social, and governance (ESG) goals. An and colleagues (2021) show that green loans can offer financial support for national sustainable development if they comply with environmental regulations.

Zhang and Wang (2021) demonstrate that the vigorous development of green financing can reduce carbon consumption and significantly promote sustainable energy development. Sachs and colleagues (2019) argue that there is heterogeneity in the benefits between different types of green financing participants. Sinha and colleagues (2021) further show that the green financing mechanism may progressively have an adverse impact on environmental and social responsibility (Wang et al., 2022).

The impact of sustainability on green finance

Some studies have also looked at the impact of sustainability on green finance (Wang et al., 2022). Xiao and colleagues (2019) showed that under various green government regulatory policies,

green corporate behaviour and supervisory intensity enhance the role of green finance. Sinha and colleagues (2021) found that environmental and social responsibility play a significant role in promoting and sustaining the green bond market. Russo and colleagues (2021) demonstrated that sustainability incorporates ESG factors to drive the development of green finance. Prajapati and colleagues (2021) showed that ESG increases demand for green bonds by boosting investor confidence. Dan and Tiron-Tudor (2021) stated that investor decisions take ESG more into account and that ESG has an obvious impact on green bond issuance. Madaleno and colleagues (2022) argued that demand for clean energy increases investment in green finance. Xu and colleagues (2022) emphasised that environmental regulation has a positive impact on green finance through short- or long-term external financing.

A new financial model of green finance

Financial instruments such as green bonds, socially-responsible investment funds, and sustainable infrastructure finance continue to attract the interest of potential investors, policymakers, and researchers, as well as already established financial institutions such as green banks and green funds (Sharma et al., 2021). The literature on sustainable finance can be broadly divided into three main strands: (1) investments in sustainable assets; (2) the limitations of such investments; and (3) a comparative analysis of sustainable investments and their conventional counterparts.

The first strand concerns investments in sustainable assets (Sharma et al., 2021). Developing this strand, Naeem and colleagues (2021) highlight that green bonds can serve as a hedging instrument, especially in the context of crises (such as a pandemic), while Jawad and colleagues (2020) argue that the European and global clean energy equity indices are highly efficient compared to the US clean energy equity markets.

The second stream emphasises the limitations of sustainable investments, highlighting some of the obstacles and shortcomings in their implementation. Zheng and colleagues (2021) underline that the development of green finance is hampered by transaction costs and operational inadequacies in Bangladesh.

The third strand emphasises comparative analysis, with one body of literature finding no differences in financial returns from sustainable investments (Sharma et al., 2022).

The 'green' essence of green finance is reflected in the distribution of untapped social capital to various industries, such as renewable energy, green buildings, climate crises, corporate governance, and environmental protection (Yuan & Gallagher, 2018; Urban & Wójcik, 2019).

The European Union – a review of legislation and strategies

The European Green Deal

The European Green Deal is a fundamental document outlining the objectives, tasks and priorities for implementing the green economy in the economic systems of EU countries. It also defines issues related to the financing of the investment process aimed at ensuring an adequate level of well-being for the citizens of these countries, primarily in environmental and social terms. However, this strategy does not seem to take sufficient account of economic issues. According to the critics of the Green Deal concept, this is expressed above all in the European Union imposing overly strict regulations for environmental solutions, e.g. regulations for the insulation of buildings,

the marketing of electric cars, and, in particular, very strict standards for EU agriculture. Figure 1 presents the essentials of the investment process leading to EU citizens living on a healthy planet.

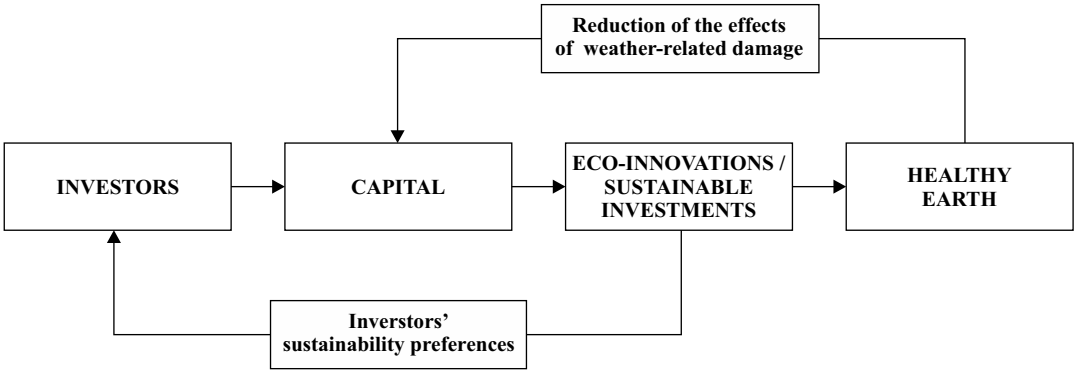

Figure 1. The components of the EU policy leading to the living in a healthy environment

Source: Own elaboration based on: COM, 2019b.

The European Green Deal is a key package of policy initiatives that aims to put the European Union on the path to environmental transformation and ultimately to achieve climate neutrality by 2050. It also aims to support the transformation of the European Union into a just and prosperous society with a modern and competitive economy. Climate change and environmental degradation both pose a threat to Europe and the rest of the world. To address these challenges, the *European Green Deal Action Plan* was created. It aims to help transform the EU into a modern, resource-efficient and competitive economy:

– that achieves zero net greenhouse gas emissions in 2050;
– that decouples economic growth from resource use;
– in which no individual or region is left behind.

Figure 2 presents key pillars of the green deal concept.

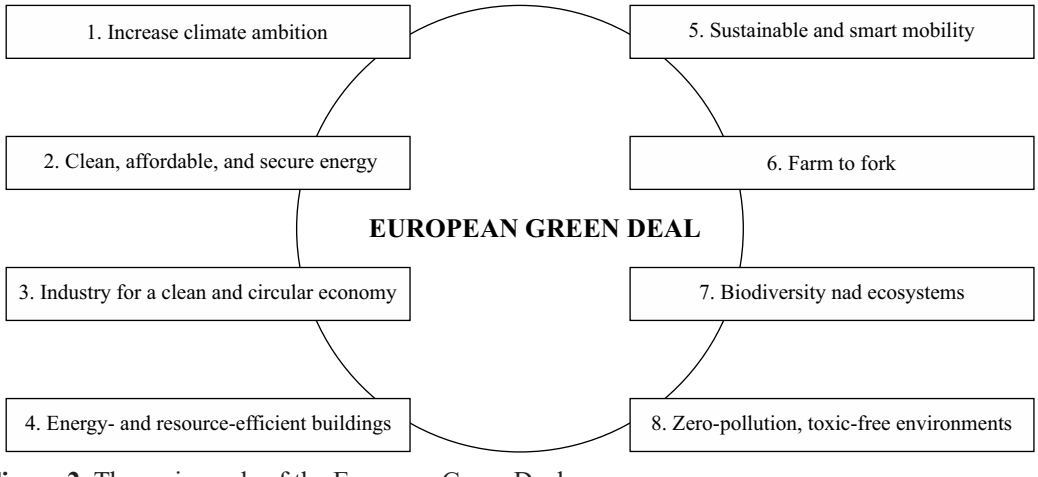

Figure 2. The main goals of the European Green Deal

Source: COM, 2019b.

The achievement of the objectives outlined in Figure 2 should lead to environmental, social, and economic benefits to the EU society.

Green/sustainable finance vs. the sustainability of EU countries

In particular, the following three key features of green finance should be noted:

– major private and public investments are needed to transform the EU economy in order to deliver climate, environmental, and social sustainability goals, including the Paris Agreement and the *UN Sustainable Development Goals (SDGs)*. Sustainable finance is an important component of *the European Green Deal*;
– sustainable finance makes sustainability considerations part of financial decision-making. This means more climate-neutral, energy- and resource-efficient, and circular projects. Sustainable finance is needed to implement the Commission's strategy towards achieving the UN SDGs;
– integrating sustainability considerations will mitigate the impact of natural disasters as well as environmental and social sustainability issues that can affect the economy and financial markets.

Figure 3 shows the EU's interaction between green finance and climate protection, taking into considerations primary climate goals by 2030.

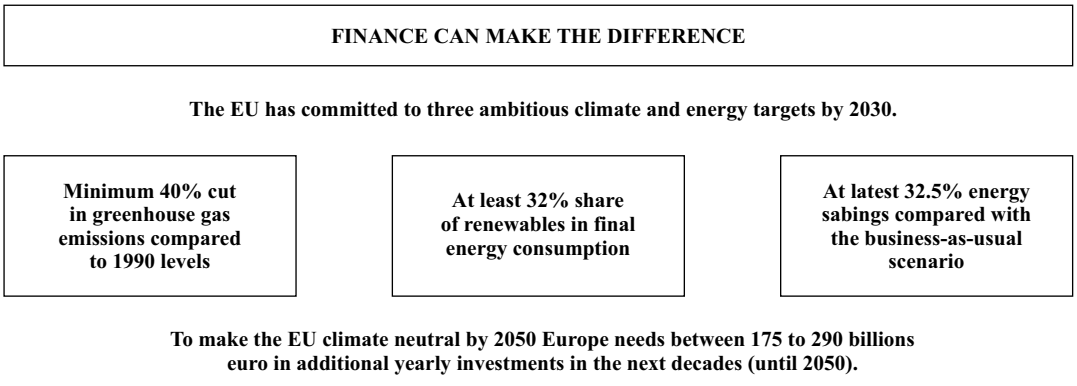

Figure 3. The EU's primary climate goals by 2030

Source: COM, 2019b.

It is clear from the chart above that the green finance activity is subject to a great deal of institutional regulation and is multifaceted in nature.

The EU green financing legislation

The EU introduced three key pieces of legislation that will incentivise and channel private sector investment into green and sustainable development. This follows from the 10-point Action Plan for Sustainable Finance from March 2018.

1. A unified EU green classification system – 'taxonomy' – to determine if an economic activity is environmentally-sustainable based on harmonised EU criteria. The European Parliament and the Council reached a political agreement in December 2019. The Taxonomy Regulation provides for a general framework that will allow the progressive development of an EU-wide classification

system for environmentally-sustainable economic activities. This aims to provide guidance for policymakers, industry, and investors on how best to support and invest in economic activities that contribute to achieving a climate-neutral economy. To qualify as green, an investment would need to contribute to at least one of the following six objectives: (1) climate change mitigation; (2) climate change adaptation; (3) the sustainable use of water and marine resources; (4) circular economy; (5) pollution prevention; (6) a healthy ecosystem.

A precise classification system is needed to exactly define the criteria that have to be fulfilled by sustainable or green investment products. Such a taxonomy should support investor decisions, avoid greenwashing, and help to channel capital flows into sustainable investments. The EU Taxonomy Regulation (EU, 2020) on the Establishment of a Framework to Facilitate Sustainable Investments) came into force on 12 July 2020, but many details are established through Delegated Acts. Figure 4 illustrates the cornerstones of the EU Taxonomy Regulation.

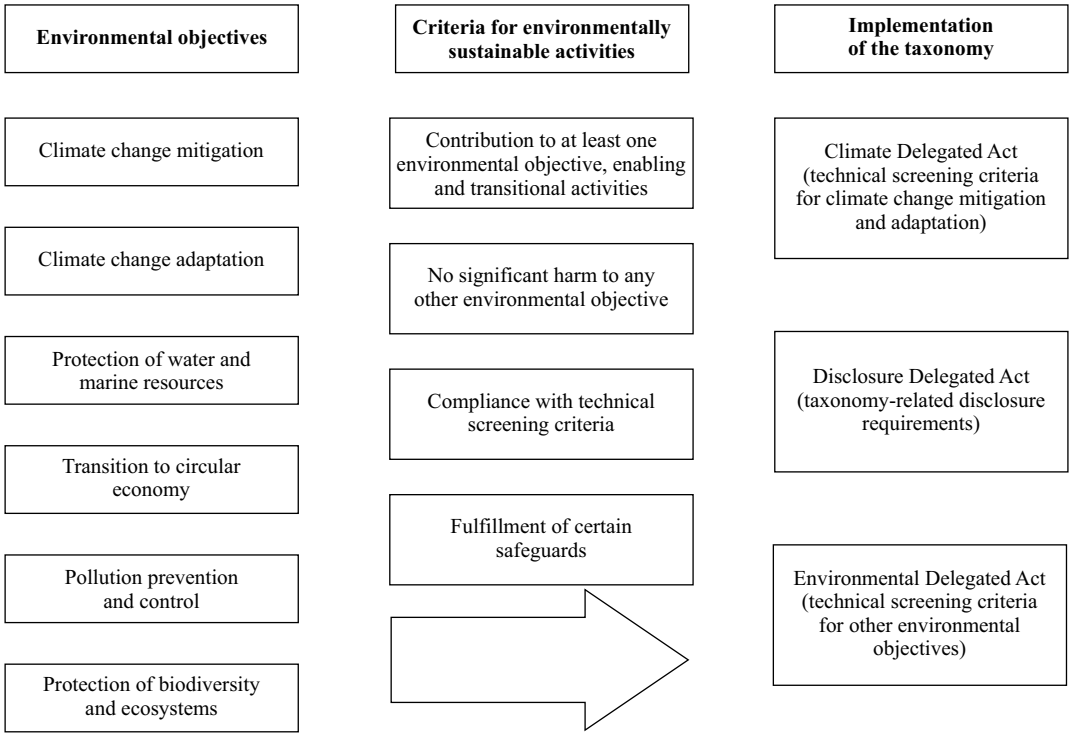

Figure 4. The pillars of the EU Taxonomy Regulation

Source: Own elaboration based on: Brühl, 2021.

2. Sustainability-related disclosures – enhanced disclosures by the manufacturers and distributors of financial products to end-investors. Financial market participants will have to disclose to their clients the impact of sustainability on financial returns and the impact of their investment decision on sustainability. These obligations come from March 2021.

3. Climate benchmarks and benchmarks' Economic, Social and Corporate Governance (ESG) disclosures – two new categories of climate benchmarks to orient the choice of investors who wish

to adopt a climate-conscious investment strategy. All mainstream benchmarks have to disclose their alignment with the Paris Agreement. Delegated acts, based on the work of the Technical Expert Group on Sustainable finance, are forthcoming beginning of 2020.

The Sustainable Finance Action Plan (SFAP) and the Sustainable Europe Investment Plan (SEIP)

The Sustainable Finance Action Plan (SFAP), announced by the European Commission, includes the following ten moves that can be divided into three categories (COM, 2018):
Category 1: Reorienting capital flows towards a more sustainable economy:
Action 1: Establishing an EU classification system for sustainable activities
Action 2: Creating standards and labels for green financial products
Action 3: Fostering investment in sustainable project
Action 4: Incorporating sustainability when providing financial advice
Action 5: Developing sustainability benchmarks

Category 2: Mainstreaming sustainability into risk management:
Action 6: Better integrating sustainability in ratings and market research
Action 7: Clarifying institutional investors' and asset managers' duties
Action 8: Incorporating sustainability in prudential requirements

Category 3: Fostering transparency and long-termism:
Action 9: Strengthening sustainability disclosure and accounting rule-making
Action 10: Fostering sustainable corporate governance and attenuating short-termism in capital markets

A description of the detailed steps can be found on the European Commission's website[1].

The Sustainable Europe Investment Plan (SEIP) is a key document for implementation of the EU green finance strategy. It recognises the massive investment needs of the European Green Deal. Unveiled by the European Commission in January 2020, the SEIP is designed to mobilise 1 trillion EUR of sustainability investments from public and private sources by 2030 and support cohesion territories in realising the green transition. It bundles together several EU spending programmes and instruments dedicated to environmental priorities, but with no overarching governance framework.

To assume the role of the SEIP's main implementation partner and further support the European Green Deal, the EIB Group announced in 2019 it would become the EU's climate bank and double its climate action and sustainability lending by 2025 as well as aligning its financing operations with the goals of the 2015 Paris Accords.

The Bank expects this transition to mobilise 1 trillion EUR on top of SEIP. The Commission and the EIB Group, however, underline that the SEIP falls short of closing Europe's green investment gap. In early 2021, the European Commission and the EIB Group estimated that the SEIP met less than half of the Green Deal's additional investment needs of 350 billion EUR a year.

[1] See: https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth_en [accessed: 19.09.2023].

Table 1 shows an outstanding investment gap between real and planned financing of green activities of around 182 billion EUR per year.

The EU's green finance policy should also consider possible ways of raising funds from new sources to fill the existing and emerging gap.

Table 1. The main sources of funding the EU's green finance policy

Source of funding	Funding per year (EUR, billions)	The remaining gap
EU budget (2021–2027)	46.0	
RRF	30.0	
Other EU instruments	17.5	
InvestEU (mobilised)	28.0	
EIB Group	35.0	
National co-financing	11.5	
Total contribution to close the 350 bn euro investment gap	**168.0**	**182.0**

***** RRF – Recovery and Resilience Facility

Source: Kedward & Ryan-Collins, 2022; Claeys & Tagliapietra, 2020, and data from the European Investment Bank (EIB) Group. It should be noted that the table does not include national promotional bank investments.

InvestEU

InvestEU is the cornerstone of the Sustainable Europe Investment Plan (SEIP) as well as the key investment pillar of the European green transition. Consolidating several EU financing programmes and instruments, InvestEU aims to mobilise more than 372 billion EUR of public and private investments through a 26.2 billion EUR guarantee from the EU budget, which is operationalised by the EIB Group and other public financial institutions. With the overarching goal of supporting "economic recovery, green growth, employment, and well-being", InvestEU supports investments in four policy areas:

a) sustainable infrastructure;
b) research, innovation, and digitalisation;
c) SMEs;
d) social investment and skills.

Its financial architecture is complemented by the InvestEU Advisory Hub, a technical expertise facility that helps private and public project promoters prepare their projects and access public financial support.

Leverage under InvestEU

Leverage under InvestEU is realised in two steps. Leverage refers to the total sum of public and private co-investments crowded in with the EU guarantee or the difference between investment targets and EU budget support:

– first, notwithstanding the meaningful differences between the EIB Group and other financial institutions, the EIB Group raises funds on international capital markets backstopped by the EU guarantee support;

– in the second step, the Bank deploys these funds via direct instruments, co-investing with private and public actors in individual projects. An example would be the EIB Group extending a loan to an infrastructure project promoter, performing due diligence on their project preparation and financial structure. Alternatively, it relies on indirect instruments that share financial risks with public and private financial intermediaries, such as loan portfolio guarantees, on-lending, or securitisations. The more the Bank relies on indirect instruments, the more leverage it can realise, as these blend the EIB Group's resources with the capacities of public and private banks as well as private investments.

Figure 5 illustrates the specific financial dimension of the leverage process implemented under the InvestEU programme.

* NGEU – Next GenerationEU
** EIB – European Investment Bank

Figure 5. Leveraging through InvestEU in 2015–2020

Source: Own elaboration based on: Findeisen & Mack, 2023.

This process is based on the provision of financial guarantees by the EU from its budget and the Next GenerationEU programme, which form the basis of the investment process implemented under the InvestEU programme. This process is implemented by the European Investment Bank (EIB) and other so-called Implementing Partners and leads to the achievement of the quota target for green investments implemented in this way.

Green bonds as an example of a modern financing instrument for green finance activities

As noted by Kultys-Grabowska (2023), Europe's green bond market is the largest in the world. Data shows that in 2020, as much as 60% of all senior and unsecured green bonds in the world came from the EU (ECB, 2022). This ownership can certainly be considered influenced by the preference for sustainable development in Europe. It is estimated that in order to achieve the goals of the European Green Deal, 260 billion EUR in additional investments must be made annually. Sources of funding for these investments include green bonds (COM, 2019a).

As stated by Kultys-Grabowska, in order to reduce the risk of pseudo green marketing and limit the disruption to the existing green bond markets, an attempt has been made to define a European green bond standard. The purpose of defining this standard is to strengthen the process of creating a capital markets union in the EU and to develop the market for this instrument in general (COM, 2019a). The main requirement for green bonds to be issued is to match projects with the EU taxonomy, so 100% of the funds from green bond issuance will be allocated to projects in line with this taxonomy (EU, 2022).

As further observed by Kultys-Grabowska (2023), the main objectives of the EU taxonomy include (EU, 2020): (1) the mitigation of climate change; (2) adaptation to climate change; (3) the sustainable use and protection of water and marine resources; (4) transition to a closed-loop

economy; (5) pollution prevention and control; (6) the protection and restoration of biodiversity. Relative to the alignment of green bond issuance with the EU taxonomy, there is a relief provided for state issuers; they would not have to align individual projects with the taxonomy under public subsidy and tax credit programmes, and would only have to assess the compliance of such a programme with the EU taxonomy. In addition to aligning assets and projects with the EU taxonomy, all issuers complying with the European Green Bond Standard should (EU, 2022): (1) provide a commitment to comply with the standard; (2) publish an annual report on the use of proceeds with an aggregate environmental impact; (3) submit the documents to an external audit conducted by auditors approved for inspection by the ESMA (*European Securities and Markets Authority*). There is relief for state-owned issuers to use state auditors, who would be exempt from the ESMA registration system.

Discussion

The in-depth literature research carried out by the author has made it possible to define the essence of the concept of green finance and the significance of its implementation for the economy of the European Union. This is of particular importance in the aspect of economic crises of diverse origin (economic, social, environmental, or even health), which have appeared relatively frequently in recent years. The theoretical considerations have been set in the context of the views of schools operating within mainstream economics and linked to them accordingly. Furthermore, the activity carried out in the field of green finance has been linked to concepts of balancing socioeconomic development.

The legal acts and strategies adopted by the European Union allowing for the effective/efficient implementation of financing instruments for the development of the green economy are also presented. In particular, the so-called taxonomy and its fundamental objectives were taken into account. The mechanisms of their functioning, as well as the financial scale of the support flowing from them, are also presented. Attention is given to the functioning of a relatively new green financing tool in the form of green bonds.

The analyses carried out by different researchers can provide a basis for understanding the interaction between climate protection and green finance in the EU, as well as serving to deepen knowledge in the field of finance by entrepreneurs, representatives of local authorities and local governments, and the beneficiaries of funds supporting sustainable socioeconomic development. The obtained results can also deliver knowledge to those interested in the presented issues (e.g. researchers of the issue under consideration). Outcomes may also contribute to the development of green finance within the framework of the EU's financial policy and highlight the shortcomings of its implementation into the EU economy to date.

In addition, the specificities of the EU's solutions are presented and the main aspects of the theoretical and practical functioning of the green finance concept discussed in the literature are selected and highlighted, primarily in the form of:

(1) the impact of green finance on balancing socioeconomic development, especially of the EU countries;
(2) the tools used by green finance and the mechanisms of its operation;
(3) the positioning and relevance of green finance theory in theories of economic growth and climate policy;
(4) the EU's approaches to the green finance taxonomy and the linkages between its elements;

(5) the strategies and legislation developed by the EU to implement green finance solutions in the EU economy;
(6) the elements of the investment process leading to EU citizens living on a healthy planet;
(7) the most important aspects of green finance system creation.

The conducted analysis was based on a skilful combination of the theoretical framework of the considerations presented in the texts (covering selected economic development theories as well as EU strategies and legal acts) with the practical aspects of their implementation, which included a brief description of the realisation of EU programmes to implement the concept of green finance (the Sustainable Finance Action Plan (SFAP), the Sustainable Europe Investment Plan (SEIP) and InvestEU programme).

Conclusion

a) A general summary/overview of the results and findings

The following final conclusions can be drawn from this study:

1. The concept of sustainable/green finance is an essential tool to support the implementation of the concept of balancing the socioeconomic development of the EU countries.
2. Growing hopes are linked to green finance in its broadest sense, i.e. structured financial activities that have been created to ensure better environmental performance.
3. Green finance activity includes loans, debt mechanisms, and other investment measures that are used to develop green projects or minimise the impact of standard solutions on the environment natural environment, including climate.
4. The interaction between climate protection and green finance in the EU is set out in several strategic documents, not only European, but also worldwide, most notably in: the UN Agenda 2030 (17 Sustainable Development Goals), the Paris Agreement 2015, the European Green Deal and its Investment Plan, Fit-for-55, the EU climate law, and in the rules of the EU's climate investments.
5. The cornerstones of the EU Taxonomy Regulation include: (1) environmental objectives; (2) criteria for environmentally-sustainable activities; and (3) the implementation of the Taxonomy (Delegated Acts).
6. The main pillars of the EU green finance policy include: (1) a unified EU green classification system – 'Taxonomy'; (2) sustainability-related disclosures; (3) climate benchmarks and benchmarks' ESG (Environmental, Social, and Corporate Governance) disclosures.
7. The scale and scope of financing for sustainability through green finance is influenced by the effects of economic crises of various origins.
8. There are protests in many European countries hindering the implementation of the Sustainable Development Goals (SDGs) in the EU economies and their financing through green finance. Of course, they can disrupt the implementation of the Green Deal financing schemes.

b) Practical implications and recommendations for practice (managers, business/industry, or policymakers)

This paper can be a valuable source of information on the financial aspects of sustainable socioeconomic development – considering ecological aspects – for managers, business/industry, or policymakers. In addition, the study can serve as a source of knowledge for the above-

mentioned groups of beneficiaries on the financial instruments used by the EU to support balancing socioeconomic development of the member states with consideration of their environmental needs.

c) A description of research limitations

The study is limited to a general analysis of the tools used at the EU level. It does not assess their efficiency/effectiveness. Also, a detailed explanation of the mechanism of operation of the tools described, as well as conditions of a political nature, is not included. Relatively little consideration has been given to crisis conditions in sustaining development. Social protests, controversies over the overly drastic nature of environmental policy, as well as the omission or insufficient consideration of economic, social, and institutional aspects (including legal issues) are the main problems which make the implementation of green finance concept to the EU economy very difficult.

d) Suggestions for future research directions

In future studies of the issues presented in this paper, it would be appropriate to pay more attention primarily to the following issues:

(1) relations and interdependencies with the EU agricultural policy;
(2) much broader consideration of controversies and public protests;
(3) the clarification of the mechanism of the operation of selected policy tools for balancing development, especially of an innovative nature;
(4) the determination of the efficiency/effectiveness of the EU funding/funding of this policy;
(5) a desirable nature of the policy of balancing development, the desired amount of funds allocated for this purpose, their optimal allocation and its criteria, as well as participation in the budget and the EU Financial Perspective;
(6) the impact of crises on funding opportunities (budget constraints);
(7) support at national and regional levels;
(8) the concepts of new innovative programmes to support the implementation of green economy concept by EU countries;
(9) the peculiarities of the financing tools for sustainable development considering environmental aspects, compared to standard financing tools for socioeconomic development.

A thorough analysis of the above issues, carried out also considering econometric and statistical methods, should provide more detailed conclusions on the effectiveness/efficiency of the impact of green finance on balancing socioeconomic development of the EU member states, taking into account ecological aspects.

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Funding
This research received no external funding.
Research Ethics Committee
Not applicable.
Conflicts of Interest
The author declares no conflict of interest.

Data Availability Statement
All data will be available and shared upon request.

doi: 10.15678/PG.2024.69.3.01

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Kateryna Bagatska, Nataliia Bilous

The Stimulation of Entrepreneurial Activity During Wartime: The Experience of Ukraine

Abstract

Objective: The article aims to present different governmental methods and tools for the stimulation of entrepreneurial activity in Ukraine during the full-scale war period. The purpose is to emphasise the necessity of SMEs' governmental support due to the sharp economic decline.

Research Design & Methods: The article uses secondary data analysis, desktop research, case-study method, as well as methods of analysis and synthesis.

Findings: The research suggests that scholars from developed countries underline mainly indirect influence of the state support through creating a favourable environment for fostering SMEs' growth and performance. On the contrary, scholars from developing countries with transitional economies focus mostly on the direct governmental support, which is the relevant case of Ukraine. These direct methods of support (grants, affordable loans, deregulation) have proved to be efficient since their implementing.

Implications / Recommendations: This paper may be crucial for researchers of entrepreneurship development in transitional economies in crisis periods. Also, it may be useful for policymakers, whose task is to foster economic growth through SMEs.

Contribution / Value Added: This paper benchmarks different approaches of developed and developing countries to the governmental support of SMEs. The article showcases the experience of Ukraine.

Keywords: entrepreneurship, governmental support, SMEs, governmental grants, loans, business

Article classification: research article

JEL classification: *H7, O52, E650*

Kateryna Bagatska – State University of Trade and Economics; Kioto, 19, Kyiv; e-mail: k.bagatska@knute.edu.ua; ORCID: 0000-0003-2184-2971. **Nataliia Bilous** – State University of Trade and Economics; Kioto, 19, Kyiv; e-mail: n.bilous@knute.edu.ua; ORCID: 0000-0002-2119-8701.

Introduction

Entrepreneurship is traditionally considered one of the key drivers of economic development and growth. Due to entrepreneurship, an increase in the standard of living of the population is achieved, hence the so-called middle class is formed, which in many countries is the driving force for progressive changes in society. Successful development of entrepreneurship is determined not only by the ability of the entrepreneur themselves to conduct this activity and take on costs and risks, but also by the ability of the state and local authorities to create favourable conditions.

As Friedman (2011) noted, entrepreneurship is a very vital ingredient for job creation as well as economic development, since the success of income generation for the major group of both rural and urban inhabitants without recognised paid job highly depends on entrepreneurship. The relationship between entrepreneurship and economic development has received a great deal of attention at the municipal, state, and federal levels. One of the latest studies of the influence of the development of SMEs, access to venture capital, ease of doing business, etc. on the indicators of the country's economic development is carried out in the paper of Nazarov and colleagues (2022). It demonstrates a positive impact, which once again proves numerous theses of scientists from all over the world.

Entrepreneurship is also about a sufficient level of economic freedom, which forms a passionate creative class capable of fostering changes in society. Another integral feature of entrepreneurship is the creation and implementation of innovations that have economic value, provide a change in the technological structure, and contribute to fostering economic growth.

Minniti (2008) emphasised the increasing attention of governments to entrepreneurship and a variety implementation tools and policies.

Ukraine belongs to the countries with a transitive economy and is listed in the group C (countries with insufficiently favourable conditions for the development of entrepreneurship) according to the GEM index (2023). Suffering full-scale invasion, which started in 2022 and significantly reduced the indicators of economic development (GDP in 2022 fell to 29%), the government launched business support programmes, so it is worth turning to the experience of countries that use similar measures and actively implement them.

Literature review

The issue of state support for entrepreneurship has been a subject of significant interest in recent years, particularly in developing countries. However, the COVID-19 pandemic and the accelerated innovative leap into the information society have also drawn the attention of scholars from developed countries, especially concerning the support of technological innovations. In this article, literature review addresses entrepreneurship as a whole.

The work of Ratinho and colleagues (2020) conducts a critical review of scientific research on entrepreneurship support for the period 2003–2015, analysing 122 academic articles. An important conclusion from this study is that, in addition to critical remarks regarding theoretical justification, methodology, and the quality of sample data, the authors summarised the most significant measures of state support for entrepreneurship highlighted in the reviewed articles, which are termed "policy discourse." The researchers asserted that a detailed analysis of academic articles did not allow for a definite conclusion about which specific methods of state support for entrepreneurship are effective. The authors emphasised that, given the increasing state investment in entrepreneurship

support worldwide, this conclusion is quite alarming. We believe that the effectiveness of state support methods will vary across different countries and types of economies, so the absence of a single consensus on effective methods can be considered logical.

European studies from the first decade of the 2000s focused on state policy regarding entrepreneurship as a whole and debated the merits of direct versus indirect support methods. For instance, the work of Minniti (2008), which summarises theoretical and empirical research on entrepreneurship from the early 2000s, concludes that the primary objective of state policy for fostering entrepreneurship in low-income countries is to create a favourable institutional environment that encourages active economic agents to start their own businesses. Direct state intervention in business development, on the other hand, often indicates distortions in the economy. Consequently, the government should strive to create favourable conditions for the division of labour, the commercialisation of inventions, and exchange, as excessive public involvement without the cooperation of the private sector can hinder entrepreneurs by causing potential market distortions.

Researchers Perren and Jennings (2005) examine the issue of state support for entrepreneurship in the media context. Based on the analysis of central and local government business support websites, they conclude that governments often exaggerate their role and significance in the development of entrepreneurship and frequently attempt to portray entrepreneurs as lacking capability and being controllable. The researchers express indignation at such an informational policy and call on governmental bodies to show greater respect for entrepreneurs.

The latest paper (Luz et al., 2024), conducted in 21 European countries for the period 2003–2018, highlights the relationship between economic, social, and governmental conditions and entrepreneurial performance. It considers opportunity entrepreneurship (OPP), necessity entrepreneurship (NEC), and total entrepreneurial activity (TEA). The results demonstrate positive and significant correlation between government indicators and GDP per capita, and government expenditure and NEC. Economic and governmental conditions have a negative impact on TEA, in contrast to a positive and negative impact on NEC. The researchers do not focus on methods of state support for entrepreneurship, but evaluate it as a whole.

In the study of the impact of entrepreneurial mentality on the sustainability of SMEs, conducted by scientists from Korea Tae-Ho-You and Yen-YooYou (2020), the authors revealed that the Republic of Korea's governmental support policy has an impact on sustainability.

An empirical study conducted by Kaya (2019) on the impact of federal and state governmental support on the performance of small businesses in the USA found that neither federal nor local support has a significant impact on entrepreneurship in general. However, this support is crucial for the performance of small businesses and the optimism of their owners regarding future expectations. Additionally, states that develop local-level support measures for small businesses tend to attract more entrepreneurs.

Summarising studies from developed countries, it is noted that researchers commonly emphasise indirect support measures, specifically the creation of favourable conditions, an appropriate environment, and an ecosystem that promotes the development and high performance of entrepreneurship (SMEs).

In contrast, researchers from developing countries underline the key role of the state in the development of entrepreneurship and focus more on direct business support measures.

Malaysian scholar Onielowo (2024) emphasises the crucial role of the government in fostering entrepreneurship. The study highlights, though in our view insufficiently substantiates quantitatively,

the positive relationship between entrepreneurship development and economic growth, with the government being one of the three key factors in stimulating entrepreneurship through support programmes, implementation, and financing. The author identifies proactive support measures, such as direct financial support and tax incentives, and passive methods, such as creating a conducive environment for entrepreneurship development. The author notes that governmental entrepreneurship support programmes are most prevalent in developing countries. Other researchers from Malaysia, e.g. Aziz and colleagues (2021), focus on the role of the state in supporting young entrepreneurs to address the issue of high youth unemployment. They conclude that the governmental factor provides a significant mediating role, and both talent demand and positive significance towards talent shortage.

A scholar from Bangladesh, where SMEs constitute 99% of private industrial businesses, Sadekin (2023), studies the impact of four factors on the performance of entrepreneurs under the patronage of the special government corporation BSCIC: competitive edge with large-scale industry, financial technical support, marketing initiatives, and government initiatives. The study identifies a negative impact of government initiatives. The researcher also emphasises the crucial role of micro-entrepreneurship as an effective means of poverty alleviation, given that most of the population in the country is poor and unskilled. State support is described primarily in indirect measures aimed at creating an enabling the environment, such as the development of banking services, business lending systems, access to raw materials, and transportation. The author refers to the experiences of Sri Lanka and Pakistan, where special financial institutions have been established to support business development. The negative result of government policy on small business performance, as noted by the author, may be explained more by the insufficiency of this impact rather than a negative effect.

Researchers from India, Acharya and Dixit (2019), focus their study on the evolution of entrepreneurship in the knowledge economy, the role of business incubators and accelerators in the development of innovative technological entrepreneurship, as well as the role of the state in nurturing a generation of innovative entrepreneurs through business incubators. The state's role is manifested in launching governmental support programmes for start-ups aimed at creating a suitable ecosystem. Among the support measures, regulatory simplification and grant support are also mentioned. The researchers identify a positive correlation between grant support for start-ups and their revenues. Other Indian scholars (Dhanapal et al., 2024) emphasise the importance of students' awareness of governmental entrepreneurship support programmes, which, in their opinion, will better encourage students to establish their own start-ups.

Researchers on governmental support for entrepreneurship development in Africa (Ajayi-Nifise et al., 2024) underline the crucial role of the government in stimulating SMEs. This includes tax incentives, access to financing through special government programmes, initiatives promoting innovation and research, regulatory acts, and the creation of an entrepreneurship support ecosystem. The scholars highlight the diversity of tools in different African countries, but note two common problems in entrepreneurship development across the continent: limited access to capital and infrastructural constraints, which they consider unique. The researchers propose adopting best practices from the United States for governmental business support, such as tax incentives in the form of reduced taxation on specific expenditures (e.g. capital purchases, research), and financial incentives for reinvestment in businesses. Another suggested practice is fostering an entrepreneurial culture by creating a safe, organic environment that encourages business development, promoting innovation funds willing to support businesses in their early

stages, and creating government programmes that attract large private capital to financially support small businesses.

In a study by Leonard (2024), the findings reveal a contextual and methodological gap concerning government subsidies and entrepreneurial activities. The results emphasise the significance of government subsidies in stimulating entrepreneurial activities by addressing critical barriers such as access to finance, technology, and market opportunities. Subsidy programmes have been pivotal in fostering innovation, supporting startup ventures, and driving economic growth across diverse sectors and regions. However, the effectiveness of subsidies is contingent upon factors such as the design of the subsidy programme, the institutional context, and the characteristics of the entrepreneurial ecosystem. While some subsidy programmes have demonstrated positive outcomes by increasing the number of new ventures and promoting innovation, others have faced challenges such as bureaucratic inefficiencies, a misallocation of resources, and unintended consequences. Moving forward, policymakers need to strike a balance between providing targeted support for entrepreneurship and avoiding potential pitfalls such as market distortions and dependency on governmental assistance. By adopting evidence-based approaches, promoting stakeholder engagement, and fostering a culture of entrepreneurship and innovation, governments can harness the transformative power of subsidies to create an enabling environment for sustainable entrepreneurship and inclusive economic growth (Leonard, 2024, p. 36).

A study from Nigeria (Salami et al., 2023) is devoted to the influence of the state policy of entrepreneurship regulation in general on the entrepreneurship development through its growth. However, the authors do not distinguish individual components of this policy, so it is not clear from the research which instruments of state policy exert a significant influence on the development of entrepreneurship in the country.

Instead, Kenyan researchers Musamali and Moyi (2020) focus on the gender effect of governmental entrepreneurship support programmes, namely the available credit, and show that governmental credit does not necessarily increase the rate of entrepreneurship. The results indicate that access to governmental credit does not significantly affect the rate of opportunity entrepreneurship using three different algorithms. The failure of governmental credit to impact opportunity entrepreneurship may be attributed to the low penetration of such credit. Such impact is not surprising. Access to such a credit requires applicant legalisation. Since most small entrepreneurs in the country are not officially registered and do not have bank accounts, thus being part of the shadow economy, they cannot access such loans. In these conditions, we consider that the government should start with creating incentives to bring the economy out of the shadows.

A researcher of the role of governmental involvement in the development of entrepreneurship in Nepal, Rahman (2024), notes that the government of the state is supporting start-ups by giving assistance in the way of start-up capital, incubations, resources to broaden awareness, inspiration, and more meeting space for the newest innovation. This will definitely contribute to the economic development. The scientist has empirically investigated the impact of 25 methods of state support on the development of SMEs in one of the regions of Nepal and has come to the conclusion about the significance of each instrument.

Ukrainian researchers in recent years have been focusing on the conceptual issues of state support for entrepreneurship. Thus, the work of H systematises the forms and methods of state support for SMEs during COVID-19. The authors substantiate the growing attention of the state to SMEs support during the pandemic and systematise the forms and types of such support in the EU countries. Thus, across European countries, the most widely used macroeconomic instruments

in response to the coronavirus crisis were income and profit tax deferrals, loan guarantees and direct lending to SMEs, and wage subsidies. Structural policies have been used modestly, with a focus on digitalisation, although over time the number of countries setting up such policies has increased. The use of grants, debt moratorium, and specific measures for the self-employed is mixed and highly different. Studying the development of SMEs in hospitality sphere, scholars (Hushtan & Korsak, 2024) emphasise the importance of close cooperation of SMEs with state and local authorities in terms of support, development promotion, investment prospects, and the implementation of European legislation in the activities of such enterprises.

Thus, governmental support of entrepreneurship is a controversial issue, but in crises periods, especially under the martial law, we believe in the necessity of such a support.

Research methodology

During the research process, various methods were used in order to analyse and assess the stimulation of entrepreneurial activity during wartime in Ukraine. They include the comprehensive analysis of continuous and recent publications, methods of analysis and synthesis, and desk research method, which envisages analysing and summarising secondary data on the example of Ukraine. Governmental grant programme efficiency is assessed by the ratio method. The authors interpret grant efficiency through the relationship between the amount of taxes returned and the amount of grans awarded. The application of all the methods indicated here enables the understanding and comprehension of the studied problem.

Results and discussion

The percentage of SMEs in Ukraine has always been significantly lower than average in the EU. However, the situation changed when COVID-19 started, and later during the wartime SMEs became the main job providers despite their decreasing quantity. Thus, according to statistical data as for 2019, small and medium-sized enterprises in Ukraine contributed 55% of the gross domestic product to the country's economy, while the share of small enterprises is only 16% of GDP; the same index in the EU is twice as high (Omelianenko & Korotkova, 2020). Later on, in 2021, SMEs became the basis of Ukraine's economy, generating 60% of GDP, creating 7 million jobs, and providing 40% of tax revenues. The following tendency preserved even in 2022, when, according to the results, 6.1 million people or 82% of all the employed worked in the sector of small and medium-sized enterprises, though the number of SMEs decreased to 11.7 million and became 11.4% lower compared to 2021 (Fedorchuk, 2023).

The full-scale invasion in 2022 caused not only terrifying damages but also economic losses. In 2022, 31.7% of enterprises completely stopped their work. The total loss of SMEs' revenue in 2022 compared to 2021 was 31.2% and, consequently, the national economy of Ukraine lost 29.2% of its real GDP (Figure 1).

Therefore, to sum it up, one can assume that without the governmental support, Ukrainian SMEs would collapse. All the methods of SMEs' governmental support are regulated by the Law of Ukraine and are classified as follows:

- simplified accounting and taxation system;
- financial support: grants and loans;
- deregulation: the simplification of permit procedures and document flow;

- the involvement of SMEs in public procurement;
- the stimulation of the innovations development;
- informational and consulting support.

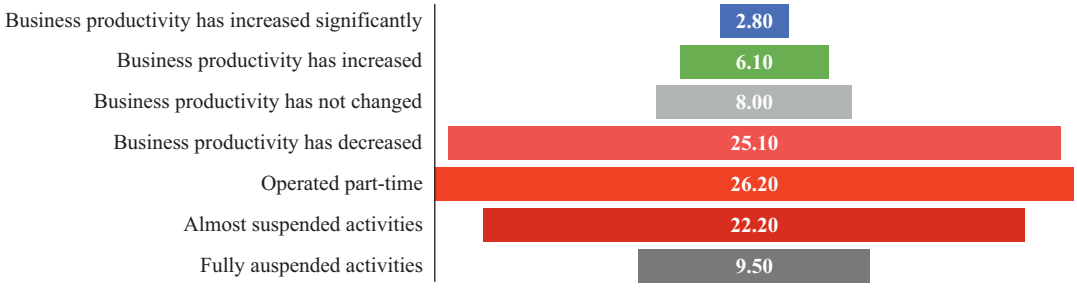

Figure 1. Business results in 2022 compared to 2021 [in %]

Source: Dligach, 2023.

The presented research deals in details with deregulation, financial support, information, and consulting support. Business deregulation is an important direction of state policy aimed at reducing state regulation of entrepreneurship. About 20,000 legal acts relating to the regulation of business activities are currently in force in Ukraine (Figure 2). However, according to research (Goriunov et al., 2023), the cost of regulation in Ukraine corresponds to the European average.

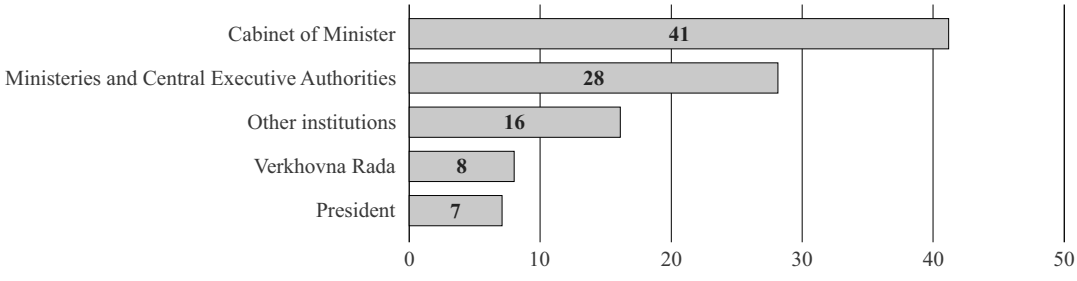

Figure 2. The structure of legal acts by publishers [in %]

Source: Goriunov et al., 2023.

Deregulation directions implemented in two waves:

– **the 1st wave – 2014–2019** (during this period, the executive authorities reviewed 3,215 legal acts within the framework of business deregulation and more than 700 of them were cancelled; the digitalisation of regulatory services has intensified); digitalisation in 2019, which implemented online registration of an individual entrepreneur private business, became a milestone for business deregulation and support;
– **the 2nd wave – 2021 till now**. In total, more than 1,000 instruments were considered, of which it was decided to cancel 235, to change 537, and to leave 238. Further processing of these decisions continues; as of now, 54 regulatory instruments have been cancelled.

All these steps were aimed at the procedures of simplification, cancellation, and a review of legal acts.

The next method which needs a closer look and further clarification is the financial support, namely the governmental one. It is presented by the programme of Affordable loans 5%–7%–9%. The programme of affordable loans was initiated as a response to the COVID-19 pandemic, but it proved its efficiency under the wartime, too. During five years, it was significantly changed: large businesses were added and excluded, the goals and areas of lending were expanded.

According to the programme, the Government covers the interest rate difference for the participating banks (at the end of 2023, the average interest rate in Ukraine not under the Programme 5%–7%–9% exceeds 20% per annum; such interest rates are considered to be rather low in Ukraine). To receive a loan, an entrepreneur must have at least three years of experience, must have no tax debt, and must draw up a business plan.

Thus, as of December 2023, about 40% of the net *hryvnia* loan portfolio of Ukrainian banks consisted of loans at preferential rates and 90% of new business loans during the full-scale war were issued precisely within the Programme.

The list of the types of affordable loans became wider during martial law period, especially in the support of agriculture and related industries, as well as business refinance (Table 1).

Table 1. Affordable loans 5%–7%–9% – classification

2020–2021	2022–2023
Anti-war	Anti-war
Anti-crisis	Anti-crisis, energy, processing (agriculture), trade companies
Investment	Business support, investment, investment 2023
Sowing campaign support (agriculture)	Sowing campaign support (agriculture), sowing campaign 2023 support (agriculture)
Private entrepreneurs support	Private entrepreneurs support
Refinance	Circulation 2023, loan prolongation (circulation), refinance

Source: Kornyluk & Kornyluk, 2024

The popularity of the Programme proves the positive results; for instance, Ukraine had 5.3% GDP growth in 2023. However, the specific impact of this Programme on GDP growth requires further assessment.

Another initiative that proved to be popular among SMEs and successful in Ukraine is the governmental grants programme.

There are 6 types of governmental grants:

1. **Own business** – 6,250 EUR covering acquisitions of equipment, raw materials, and partly managerial expenses. It is available for any type of business, which is required to hire two employees for three years. A business plan is needed to get the grant.
2. **Processing enterprise** – 200,000 EUR covering the acquisition and commissioning of capital assets, including production equipment. It must provide twenty-five jobs for three years. A business-plan is needed.
3. **Orchard** – it is available for entrepreneurs who have owned a land plot from one to twenty-five hectares for at least seven years and have developed a tree planting; they also must create

new jobs depending on the land plot size for a minimum of five years. A special project draft is needed.

4. **Greenhouse** – 175,000 EUR for a modular greenhouse construction project. Entrepreneurs who have owned a land plot for seven years, create minimum fourteen jobs per one hectare of greenhouse area for three year, and have a business plan can apply for the grant.
5. **For veterans** – 25,000 EUR is available when four employees are hired for three years and a business plan is developed.
6. **Miltech** – a grant covering innovative military solutions.

Considering the condition of providing jobs during a three-year period, the grant amount returns back to the budget in the form of salary taxes, therefore maintaining the budget balance. The process of governmental grants funding and control falls under the following four stages:

1. The **application** process is fully digitalised in Ukraine and is realised via a special business-support platform.
2. The **grant decision** is substantiated by certain criteria, e.g. the absence of tax debts or the entrepreneur's age, education, etc. Regional employment centres check business plans, conduct interviews with entrepreneurs, and make decisions on the funding.
3. **Funding** – entrepreneurs do not get money directly, as the grant amount is accumulated on the Oschadbank Account (the state-owned bank); the bank makes payment for the equipment, raw materials, and other materials.
4. **Control** – the State Tax Administration controls the entrepreneur paying taxes – both their own and their employees' income taxes.

The target use of money is fully guaranteed by having no direct access of the entrepreneur to grant resources. A great popularity of this programme is proved with the latest data showing that the total amount of grants given is 117.5 million EUR. The Own Business programme is the most popular, with 77 million EUR granted, and the Orchards and the Greenhouses programmes are the least popular due to a high number of employees required, though the jobs are predominantly seasonal ones. Currently, the government attention is paid to processing the enterprises in order to refuse the model of the raw material economy; the amount of these grants was 80 million EUR (Ministry of Economy, 2024).

Moreover, each region of Ukraine has a great number of new businesses registered. Even being close to the armed conflict frontline, the entrepreneurs are not afraid of setting up and doing business, demonstrating their trust in governmental support and their belief in Ukraine.

A special attention of research should be paid to the powerful governmental information and consulting support of SMEs, in particular the digitalised *Diia Biznes* ('Access to business') platform. This platform not only aggregates all relevant information regarding the creation and development of one's own business, but also acts as an intermediary in obtaining government grants and conducts active communication policies regarding business development.

The non-government support is represented by external donors, consulting companies as well as think tanks, business schools, and universities. In spite of business development being closely related to the war situation, the results of governmental support programmes still have a positive impact on business climate, which is proved by the following graph (Figure 3).

Figure 3, which demonstrates the growth of entrepreneurial business activity, is an indirect evidence of the grant programme success. To assess the efficiency of SMEs' financial support directly, we will calculate the level of funds return to the state and local budgets of Ukraine in the form of taxes and fees from the grant recipients who have a minimal tax burden and are on

a simplified taxation system. These taxes and fees are: personal income tax (18%), unified social tax (22%), military tax (1.5%), and single entrepreneurial tax (differs across the groups of SMEs).

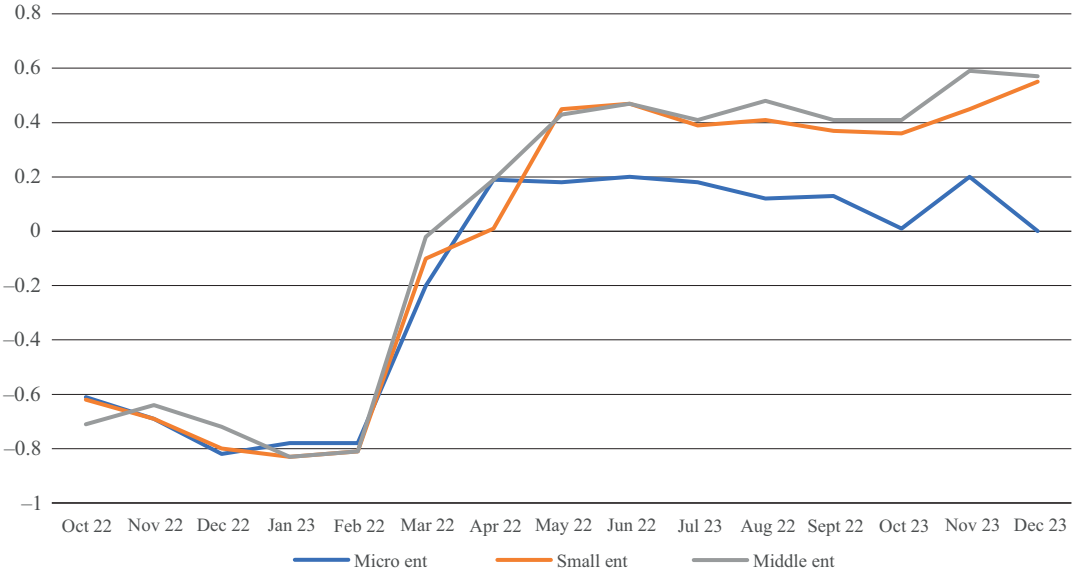

Figure 3. The Index of Business Activity Recovery

Source: Fedorchuk, 2023.

To generalise the calculations, the following assumptions have been made: 1) since small entrepreneurs in Ukraine are divided into three groups according to the type of their activity, and there is statistical information on the percentage distribution of entrepreneurs by groups (13.5% – the 1st group, 37.2% – the 2nd group, and 49.3% – the 3rd group), the percentage ratio among grant recipients is assumed to correspond to the percentage distribution throughout Ukraine; 2) the personal income taxes are calculated on the minimum wage basis; 3) the 3rd group of SMEs has progressive taxation, and the level of the single tax for this group is calculated based on the level of income – 30% of the maximum allowed. It corresponds to the average IT specialist income in Ukraine, which are mainly registered as SMEs of the 3rd group. Table 2 demonstrates the Government Grant Programme Efficiency.

Despite being based on the assumption of a minimal tax burden and the absence of the tax base increase, the table proves high efficiency of the grant programme for the state. Moreover, the programme has a positive impact on the local budgets revenues, since grants are received from the state budget, and taxes are mainly returned to the local budgets, contributing to the financial capacity of local self-governments.

At present, the primary steps towards forming an effective entrepreneurship support ecosystem in Ukraine can be considered accomplished. These steps include the establishment of support centres for SMEs, which are implemented in both physical and virtual formats in Ukraine. There is ongoing robust financial support for entrepreneurship through grants and credits. In recent years, administrative barriers to business creation and regulation have significantly decreased. Innovation support programmes are evolving, along with continuous educational programmes and courses

for current and prospective entrepreneurs. Communication campaigns to support businesses are consistently conducted. However, a challenging issue remains the tax burden on entrepreneurs. Discussions on the periodic cancellation of the simplified system for SMEs in general are raised in governmental structures. A notable success of the entrepreneurship support ecosystem was the creation of the *Diia Biznes* platform.

Table 2. The assessment of the Government Grant Programme Efficiency

Indicator	Year		
	June–December 2022	**2023**	**January–June 2024**
The number of grants awarded	3,034	9,462	5,859
The number of working places created	5,725	17,863	11,122
The amount of grants awarded [million UAH]	711.24	2,284.75	1,524.51
Taxes which should be paid per month:			
Personal income + military + unified social taxes (total 41,5% rate) [million UAH]	15.44	49.67	35.46
Single enterpreneurial tax, total million UAH:	15.75	83.35	54.90
1st group (fixed amount, 13,5% of all SMEs)	0.10	0.34	0.24
2nd group (fixed amount, 37,2% of all SMEs)	1.47	4.72	3.29
3rd group (5% from revenue, 49,3% of all SMEs)	14.18	78.29	51.37
Total taxes [million UAH]	31.19	133.02	90.36
Return for the 1 month, %	4.4	5.8	5.9
Return for the end of programme (3 years), %	158	210	213

Source: Own elaboration.

In order to stimulate and develop the entrepreneurial ecosystem in Ukraine, increase the number of entrepreneurs, and advance their contribution to the country's GDP, the state should bring together and coordinate joint efforts of entrepreneurs, governmental structures and programmes, educational institutions, consulting companies and platforms, financial institutions and organisations, as well as international grant-giving organisations.

Despite significant successes in the development of the entrepreneurial ecosystem, it is worth suggesting some directions for its improvement, particularly concerning the financial aspect. Thus, suggestions for improving the financial aspect of the entrepreneurship support ecosystem are outlined in Figure 4.

The activation of business grant support requires beginners to acquire skills in crafting business plans and grant applications in order to secure funding. Educational institutions, employment centres, local *Diia Biznes* offices, and local authorities can provide consultative assistance on this matter.

Simplifying financial and managerial accounting, as well as reporting, and the implementation of FinTech tools will significantly broaden the pool of future entrepreneurs. Therefore, centralising information on modern technological solutions will be a powerful step in the development of the ecosystem.

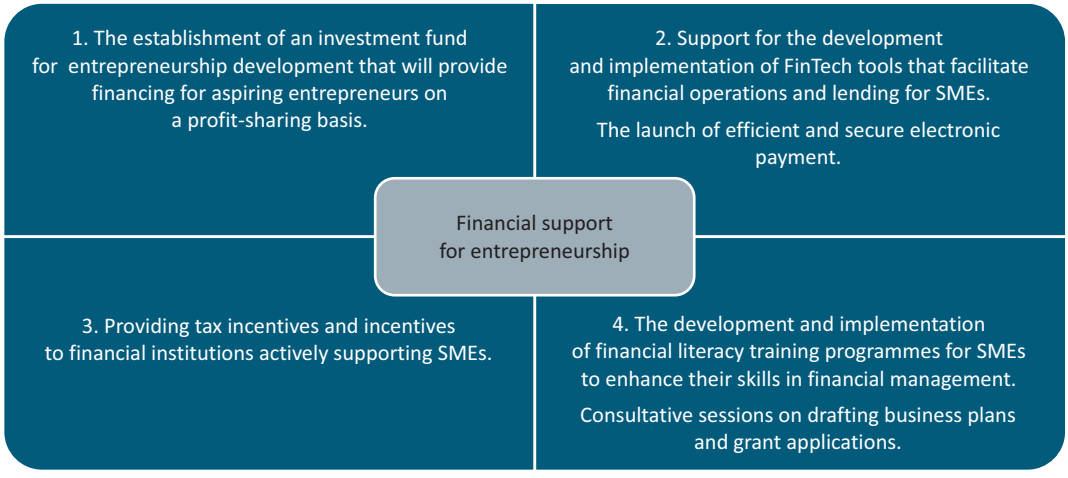

Figure 4. Measures for the development of the financial component of the entrepreneurship support ecosystem

Source: Own elaboration.

Conclusions

A study of international experience, with a focus on developing countries, and a comparison with the measures currently undertaken by the Ukrainian government to support small businesses provides grounds to assert that the business support measures in Ukraine during the war are systematic and aimed not only at direct support, which is often criticised by researchers from developed countries, but also at creating a favourable environment for business development. At the same time, the increasing military needs for the defence of the country compel the government to initiate unpopular discussions, such as the abolition of the simplified taxation and reporting system for SMEs, which we believe will lead to the growth of the shadow economy and an increase in distrust in the government among the population.

Secondary data on the impact of business support measures, presented in this article, demonstrates a positive effect of these measures; however, this effect is short-term and is currently expressed only in the increase in the number of registered businesses and in the revival of business lending due to accessible loans. The Grant Programme efficiency is assessed on the planned data which does not cover all the risks arising during the programme implementation. A comprehensive assessment of the results of state support for SMEs during the war in Ukraine should be conducted in 2–3 years, when it will be possible to observe financial effects in the form of increased tax revenues from businesses, the impact of SMEs on GDP, and other indicators.

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Funding
This research received no external funding.

Research Ethics Committee
Not applicable.

Conflicts of Interest
The authors declare no conflict of interest.

Data Availability Statement
All data will be available and shared upon request.

doi: 10.15678/PG.2024.69.3.04

Journal of Public Governance
No. 3(69)/2024
ISSN 2956-6061
e-ISSN 2956-6398

Marzena Piszczek

Factors Destabilising the System of Polish Local Government Finances Based on the Example of the City of Kraków in 2018–2023

Abstract

Objective: The goal of the paper is to characterise the factors destabilising the financial system of Polish local governments in the years 2018–2023 based on the example of the city of Kraków.

Research Design & Methods: To achieve the goal, the research used the analysis of law as well as the analysis of the major financial categories such as total incomes, debt, and operational surplus. These factors which had the major impact on destabilising the financial situation of Polish local governments were divided into those dependent on decision-makers (such as the size of subsidies provided for tasks or the tax policy pursued by the Polish government in recent years) and independent ones (including the effects of the COVID-19 pandemic and the war on Poland's eastern border, or an increase of energy and services prices).

Findings: Tax policy in particular had a significant impact on the condition of Polish local governments, causing significant revenue losses. The case of the city of Kraków proves this. All of the above-mentioned factors impacted local budgets and resulted in an increase in current budget expenses as well as limited investment opportunities of local government units.

Implications / Recommendations: In order to strengthen the financial position of local government, some systemic reforms dedicated to the tax policy and compensatory subsidy must be applied.

Contribution / Value Added: Some particular recommendations were proposed. Among them is the legitimacy of continuing works on changes to the self-government financing system. This should result in making the revenue base of territorial self-government units independent of decisions of central authorities as well as in strengthening the area of local taxes. The recommendation also relates to the compensation system and the objectivisation of the principles of allocating targeted subsidies.

Keywords: local government taxation, local government deficit, intergovernmental grants

Article classification: research article

JEL classification: H71, H72, H77

Marzena Piszczek, Department of Public Finance, Collegium of Economics, Finance and Law, the Institute of Finance, Kraków University of Economics; 27 Rakowicka Street, 30-510 Kraków, Poland; e-mail: piszmar@uek.krakow.pl; ORCID: 0000-0002-7571-7300.

Introduction

The reform of local self-government in Poland is regarded as one of the fundamental achievements of the Polish post-1989 transformation. Introduced together with many other reforms – such as the reform of education, health, or social security – it brought the most important expected and effective results, among which worth mentioning is the autonomy of self-governing bodies or the paradigm of their financial independence. Poland built a self-government system based, *inter alia*, on the European Chart of Local Government (Europejska Karta…, 1994), which was based on the delegation of tasks to the self-government level, the transfer of property to self-governments, or the constitutional principle of adequacy of funds. The assumptions were also about guaranteeing local governments funds as their own revenues. These in Poland include mainly: local taxes, fees, shares in central taxes PIT and CIT, and revenues from property. However, there has been some controversy surrounding self-governments, as self-governments in Poland are not only responsible for the delivery of public services, as defined in a number of laws, *de facto* setting their minimum standard, but are also responsible for local and regional development. The development of a local government depends on its ability to finance investments either with its own funds or with credit or loans. Indeed, a local government in Poland cannot incur liabilities for any other purpose. The last years of local government in Poland were characterised by special conditions. These include objective causes such as the COVID-19 pandemic or the war beyond Poland's eastern border, increases in the prices of goods and services, but also the Polish government's tax policy. All of the above, especially tax policy, have left a strong impact on local government finances. The analysis of factors destabilising local finances confirmed that the greatest negative impact on the finances of Polish territorial self-government units was exerted by decisions introducing changes to PIT, which resulted in a significant loss of revenue for local governments. Cities with poviat rights were the most affected group[1]. The analysis of the destabilising factors was conducted in relation to the most important group of Polish local governments, i.e. municipalities and cities with poviat rights, which also include Polish metropolises. It is the big cities that have felt the effects of legislative changes the most. The financial situation of large cities was presented on the example of the city of Kraków, the second largest city in Poland, characterised by a stable financial situation for many years. The analysis included studies of changes in basic legal acts and their impact on the functioning of territorial self-government units. The comparative analysis method was used to assess changes in the financial situation of territorial self-government units (TSU). Income figures – particularly total income, PIT shares, property tax revenues, the level of indebtedness of selected units of groups of units, their operating surplus, and total expenditures for the years 2019–2023 – were used as the basis for the analyses. The main source of data is the aggregate figures available at www.mf.gov.pl, which consist of summary statements on the implementation of TSU budgets, as well as publications of regional chambers of auditors or TSUs themselves.

The main hypotheses that were examined are as follows:

Hypothesis 1: The changes introduced into the Polish tax system had an impact on local government finances.

Hypothesis 2: The introduced legislative changes did not contribute to the stabilisation of local government finances.

[1] The Polish self-government system groups self-governments according to the following types: communes, poviats, cities with poviat rights, and self-governing voivodeships.

Hypothesis 3: In order to be able to establish the local government financing, some economic instruments should be introduced to the law system.

Literature review

During the period under review, there were incidents that significantly affected the way local authorities operated. These factors had a destabilising effect on the organisation of work and their financial situation. These factors can be divided into two groups:

1. factors dependent on decision-makers, which can include the size of subsidies and grants provided to the local level, or decisions on tax policy changes. In both cases, the decision-maker was the central government;
2. factors independent of decision-makers, e.g. random factors such as the COVID-19 pandemic or the war across the eastern Polish border.

In both cases, it was ultimately up to the central government and local authorities to mitigate the effects of these events. For local government, the epidemic period brought about many new challenges: the need to organise public services under epidemic conditions, reduced revenue for budgets resulting, *inter alia*, from government-imposed restrictions on economic activity, or the additional expenditure needed to ensure sanitary safety in subordinate facilities. The survey conducted among representatives of local government units at the municipal level sheds some light on the effects of the epidemic on the implementation of the plans of local government units, the work of their officials, finances, and the quality of the provided services. Reports prepared by the Bank of National Economy (BGK) (Bank Gospodarstwa Krajowego, 2020), Council of European Municipalities and Regions (CEMR) (2020), NALAS (2020), Batory Fundation (Nelicki, 2020), Staniszewski's research (2020) or the European Committee of the Regions (2021) confirm the difficult situation of local authorities in relation to COVID-19 not only in terms of the impact on the economy, but, above all, in terms of the fall in local government revenues. This is also confirmed by the Fitch Agency ratings with regard to the decline in corporate income tax (CIT). Around 75% of all expenditure on public tasks passes through the budgets of municipalities, which, of course, shows the extent of their responsibilities, but also the size of their cash flow. The municipalities' expenditure is mainly focused on education, health, and social protection. Local governments are strongly dependent on transfers from the government, mainly from PIT shares and transferred subsidies. The autonomy of Polish local government revenues is lower than the EU average, indicating a greater dependence on central government transfers. Local governments have little autonomy in setting tax rates. The largest share of tax revenue is shared between the government and local government. Therefore, the tax reforms introduced for central taxes have far-reaching consequences for local governments. The tax reform introduced in 2019 included personal income tax allowances and exemptions, a higher minimum wage, increases for teachers, and new tax loss rules. It also had an impact on local and regional government budgets in 2020. For businesses, it meant some significant changes such as mandatory split payment, a revolution in declarations; additionally, a white list of VAT taxpayers was created and new exemptions in PIT were introduced. The proposed solutions (cf. Piszczek & Surówka, 2023a, 2023b) consisted, *inter alia*, in increasing the tax-free amount, reducing the tax rate in the first tax bracket by five percentage points, increasing the amount of the first tax bracket by approximately 40%, introducing reliefs for seniors and families, as well as the so-called relief for 'young' taxpayers under 26 years of age. All this meant that PIT revenues fell.

Indeed, taxpayers gained from the reform introduced by the Polish Order, but not entirely and not all of them. As of 2022, the health insurance premium ceased to be a tax-deductible allowance. Poles paying PIT started to be charged with a 9% contribution to the National Health Fund. It is based on gross remuneration after deducting the Social Security contribution. Until the end of 2021, the National Health Fund contribution had only burdened taxpayers with 1.25%. Moreover, the reform of the flat-rate tax on registered income introduced in 2021 resulted in an additional decrease in PIT income on a general basis. As emphasised by Piszczek and Surówka (2023a, 2023b), the income situation of those local government units in which business entities paying this tax are located worsened above all. Rural and rural-urban municipalities were affected to a lesser extent, as farmers are exempt from personal income tax. Therefore, the problem affects predominantly medium-sized and large cities (WEI, 2023).

It is noteworthy that the government has twice decided to transfer additional funds to local authorities to make up for the shortfalls that have arisen in their budgets, but the amounts have not compensated for the losses incurred in connection with the introduction of the Polish Order. In addition, it was decided to set up new instruments to support local governments, which include the Government Local Investment Fund or the Government Polish Order Fund: Strategic Investment Programe, the COVID-19 Counteracting Fund, funds passing through the National Fund to Protect Environment (NFOŚ), dedicated to local governments, or support from extra-budgetary funds. Access to these funds was set using not very clear criteria, which was emphasised by local governments, even accusing the government of discretion, unequal treatment, and unfair access. An extensive coverage of the effects of the COVID-19 pandemic, tax changes and their impact on the budgets of TSUs, or the effectiveness of the introduced instruments was provided, *inter alia*, by Malinowska-Misiąg (2022), Czudec (2021), Sześciło and colleagues (2021), Flis and Swianiewicz (2021a, 2021b), Kostyk-Siekierska (2021), Łubina (2021), Ofiarska (2021), Rudka and Kocemba (2021), Balcerek and Kosiarz (2020), Bazylak and colleagues (2020), Bober and colleagues (2020), Bojarowicz (2020), Izdebski (2020), Klimek (2020), Nelicki (2020), OECD and CoR (2020), Swianiewicz and Łukomska (2020), and others.

The finances of Polish local authorities were also affected by events beyond our eastern border. The huge inflow of war refugees, war-induced inflation, and disruptions to supply chains have had a major negative impact on local budgets. According to the Warsaw Enterprise Institute (2023), between 3.5 and 4 million immigrants arrived in Poland, 60%–75% of whom were Ukrainians. This meant concrete impacts on local budgets, e.g. in the form of transferred social benefits enjoyed by Ukrainian citizens with refugee status, which – according to data from November 2022 (Karpińska, 2022) – were as follows:

- 328,000 children benefiting from the 500+ programme;
- 12 thousand parents benefiting from Care Capital;
- 141 thousand benefiting from the 300+ benefit;
- 53 thousand benefiting from family benefits.
- In the area of education, the benefits covered:
- 191 thousand pupils in schools, representing 65% of all Ukrainian children residing in Poland;
- 43 thousand children receiving pre-school care (this number represents 50% of all pre-school children who had fled to Poland before the war).

The total cost of the above support related to children from Ukraine is approximately 200 million PLN per month.

Other financial support for Ukrainian refugees includes the following:

- more than 1 million people benefited from the 300 PLN school starter kid;
- approximately 1.7–2 billion people benefited from the 40 PLN for Poles receiving under their roof.

On the part of local governments and non-governmental organisations, the total estimated cost of assistance amounted to about 10 billion PLN. The Government also created an instrument called the Ukraine Assistance Fund, which can be used to finance many educational tasks, education, and childcare costs. The Law on Assistance to Citizens of Ukraine has also been amended (Dz. U. 2024, poz. 167). In addition to the financial instruments described above, a number of amendments to the already existing laws and the establishment of new legislation should be mentioned. Some of them include: The Law on Public Finance (2021), the Law on Revenues of Local Self-Government Units (2024), the Law on Special Solutions Related to the Prevention and Eradication of COVID-19, Other Infectious Diseases and Crisis Situations Caused by Them (2020), or the Law on Interest Subsidies on Bank Loans Granted to Businesses Affected by COVID-19 and on Simplified Proceedings for Approval of Arrangement in Connection with the Occurrence of COVID-19 (Bank Gospodarstwa Krajowego, 2020). These and many other provisions were intended to enable immediate action by the government and local authorities to minimise the effects of the pandemic or the war. The final factor is undoubtedly inflation as well as increases in energy prices, services, and wages. The effects of these increases are visible in all local budgets, as even the same volume of services carries a higher cost.

Research methodology

The main objective of the research was to answer the question of which factors had the greatest impact on the financial situation of local governments. The research was conducted during the period 2018–2023. Two groups of units were examined, i.e. municipalities and cities with poviat rights (MNPP). There are 2,477 municipalities in Poland, among which there are: 1,464 rural municipalities, 711 urban-rural municipalities, and 302 urban municipalities, including 66 municipalities that are also cities with poviat rights. According to the Polish Constitution, municipalities are the basic units of local government (Article 164 of the Polish Constitution) (Konstytucja…, 1997). Cities with poviat rights, on the other hand, are a very specific group of units, bringing together many residents and also providing many services. For example, MNPPs perform about 75% of all local government investments in Poland, while only the twelve largest Polish cities are home to more than 40% of the population. Therefore, MNPPs concentrate a major part of public and business services. They are also important centres of education and culture. The following main categories were examined to check the aforementioned hypotheses: sources of incomes coming from the shares in PIT and CIT, local property tax, as well as other sources of incomes such as subsidies and grants. To illustrate the financial condition, such categories like debt, investment expenditures, and operational surplus were examined, too. All data was taken from the official statistics prepared by the Regional Chambers of Audit and the Central Statistical Office. The reports that show the figures are – as per Polish law – publicly available at their websites and government websites, too. One of the websites used for research was www.mf.gov.pl.

The level of own revenue of municipalities and cities with poviat rights (MNPPs)

The income of Polish municipalities and MNPPs is mainly shaped by three income streams: income from participation in central taxes and income from local taxes – both categories included in own income – as well as income from subsidies and grants. In order to illustrate the changes that took place over the period 2018–2023, an analysis of the most important revenue categories for municipalities and MNPPs has been made, i.e. PIT share revenue and property tax revenue. Table 1 demonstrates how these income streams changed over the period under study. While it can be concluded that property tax revenue shows – for both municipalities and MNPPs – an essentially similar steady trend, this trend is downward for PIT shares. With regard to the ratio of property tax revenue to total revenue, for municipalities this ratio is at an average level of around 10.4%, while for MNPPs – it is at an average ratio of around 9.55%. As regards PIT revenue as a proportion of total revenue, it averages around 16.4% for municipalities in the period 2018 to 2022, falling to 12.70% in the final year, i.e. 2023. Nevertheless, an upward trend can be observed in the period 2020–2022 from 15% to 17%. As far as MNPPs are concerned, the trend is downward over the period under review. The share of PIT revenue in MNPPs' total revenue falls from 27% in 2018 to 18.8% later on. It is worth noting that PIT shares are treated as an indicator of the self-reliance and strength of the local government unit, so their decrease translates into the loss of an important source building the economic and income potential of the local government unit (see Table 1).

Table 1. The share of personal income tax and property tax in the total income of municipalities and cities with county rights in the years 2018–2022 in billion PLN

Specification / Categories	2018	2019	2020	2021	2022	2023
The share of PIT in the total income in % – municipalities	17.00	17.00	15.00	16.00	17.00	12.70
The share of property tax in the total income in % – municipalities	11.00	10.00	10.00	10.00	10.00	11.40
The share of PIT in the total income in % – cities with poviat rights	27.00	27.00	24.00	25.00	25.00	18.80
The share of property tax in the total income in % – cities with poviat rights	9.00	10.00	9.00	9.00	10.00	10.30

Source: Own calculations based on the Central Statistical Office's and the Regional Chamber's of Audit data.

The level of debt and operating surplus of municipalities and cites with poviat rights (MNPPs)

The loss of an important part of own revenue results twofold over time. Firstly, its consequence is a reduction of the operating surplus in the budget. The operating surplus (OS) is the difference between current revenue and current expenditure. According to Polish law (Public Finance Act, 2022), it is not possible to pass a budget if the balance between these categories is not maintained. Hence, any element that may cause a decrease in current revenue or an increase in current expenditure is subject to special analysis and care by each local government. Secondly, if the level of the OS is reduced, then the investment potential of the territorial self-government units is reduced, too, as the surplus of the territorial self-government units is transferred primarily

to finance investments. The result of the ultimately declining operating surplus is an increase in the debt that local governments incur to cover capital expenditure, which is associated with higher debt service costs in subsequent years. Therefore, the next categories that were analysed included the indebtedness of the surveyed territorial self-government units and the category of the operating surplus. The trends in these categories are presented in Table 2. As can be seen, for both groups of territorial self-government units, the debt level increased in the period under study. In the case of municipalities, the increase is 29%, while for MNPPs it is more than 55%, with a large increase in debt in both cases particularly evident in the last year, i.e. 2023. On the other hand, when it comes to the operating surplus, which is the key category that determines the financial health of territorial self-government units, it is, unfortunately, falling drastically. These decreases are particularly visible in the case of MNPPs, for which maintaining investment dynamics – as noted – is crucial to social and economic development (Table 2 and Table 3).

Table 2. The change in the level of debt and operating surplus of municipalities and cities with county rights in the years 2018–2022 in billion PLN (current prices)

Specification / Categories	2018	2019	2020	2021	2022	2023
The debt level of municipalities	30.00	32.40	34.20	34.20	34.10	38.80
The debt level of cities with county rights	33.60	37.10	43.00	45.00	45.60	52.20
The operating surplus of municipalities	10.80	11.40	11.10	16.00	13.40	7.42
The operating surplus of cities with county rights	13.20	12.90	12.00	10.60	5.20	0.67

Source: Own calculations based on the Central Statistical Office's and the Regional Chamber's of Audit data.

Table 3. Change in the dynamics of debt and operating surplus of municipalities and cities with county rights in the years 2018–2023 [%]

Specification / Categories	2019/ 2018	2020/ 2019	2021/ 2020	2022/ 2021	2023/ 2022
The dynamics of the debt level of municipalities	108.00	105.56	100.00	99.71	113.78
The dynamics of the debt level of cities with county rights	110.42	115.90	104.65	101.33	114.47
The dynamics of the operating surplus of municipalities	105.56	97.37	144.14	83.75	55.37
The dynamics of the operating surplus of cities with county rights	97.73	93.02	88.33	49.06	12.88

Source: Own calculations based on the Central Statistical Office's and the Regional Chamber's of Audit data.

The level of the main economic categories and prospects of financial stabilisation for the City of Kraków

The city of Kraków is one of the cities with poviat rights, it belongs to the Union of Polish Metropolises (twelve largest cities), it is the second most populous city in Poland, and it has the second largest budget in terms of income and expenditure after Warsaw. The city has always been financially strong, with numerous Polish and foreign companies located here. However,

the last few years of Kraków's existence have confirmed a trend that can also be observed in many Polish municipalities and especially in MNPPs. The previously described conditions – such as government policy in the area of tax changes, especially PIT, or rising costs of services due to increased energy prices, wages, and salaries, or new expenses due to the pandemic or the war behind the eastern border – constitute the cause of the difficult financial situation, which is proved by Tables 4–6.

Table 4 includes the most important categories characterising the city, such as: total revenue, PIT revenue, property tax revenue, total expenditure, investment expenditure, debt, the operating surplus, and the budget result. When comparing the most important categories, such as total income and total expenditure, it should be noted that in the period under review (apart from the year 2020), the growth rate of total income was in each case lower than the growth rate of total expenditure. As a result, the city closed each year with a budget deficit, which shows strong growth dynamics, especially in the last two years (approximately 319% in 2022 and approximately 199% in 2023, respectively). The city strives to maintain the level of capital expenditure, but with a declining operating surplus this comes at the expense of incurring liabilities, the dynamics of which averages around 120% in each year. The city ended the year 2023 with a negative operating surplus of minus 0.74 billion and an all-time highest deficit of minus 1.67 billion.

It is also worth mentioning that an important component of the city's income, i.e. income from PIT shares, was showing lower dynamics than the total income category throughout the period under review, and recent years have confirmed strong declines in this category. Undoubtedly, the factor that had a decisive impact on the deteriorating situation of the city, in particular on the drastic decrease in the operating surplus, in addition to the growing costs of services, was the real loss of revenue from PIT shares. With regard to the rising costs of services, it is worth noting that the city made a number of significant changes to plans during the period under scrutiny, increasing the amounts allocated to tasks (Table 6). Increases in expenditure are observed in all of the examined services. However, the highest rates are recorded for education – a 24% increase in execution to plan; health – by 27%; and social care expenditure – by 13%. For these and other provided services, in a situation of reduced revenues from own income, the city had to ensure funding and liquidity.

Table 4. Selected financial categories in the years 2018–2023 – the City of Kraków – in billion PLN (current prices**)**

Specification / Categories	2018	2019	2020	2021	2022	2023
Total income (TI)	5.31	5.91	6.20	7.19	7.22	7.33
PIT tax	1.61	1.79	1.77	2.02	2.02	1.71
Property tax	0.53	0.54	0.56	0.60	0.64	0.71
Total expenditures (TE)	5.57	6.21	6.67	7.45	8.05	8.98
Investment expenditures	0.79	0.90	0.84	1.22	1.34	1.46
Debt	2.55	3.07	3.48	4.19	4.69	6.05
The operating surplus	0.32	0.36	0.08	0.68	0.01	(0.74)
TI – TE (budget result)	(0.27)	(0.30)	(0.47)	(0.26)	(0.83)	(1.65)

Source: Own calculations based on the Central Statistical Office and the Regional Chamber's of Audit data.

Table 5. Change in the dynamics of selected financial categories in the years 2018–2023 in the City of Kraków [%]

Specification / Categories	2019/2018	2020/2019	2021/2020	2022/2021	2023/2022
The dynamics of total incomes (TI)	111.30	104.91	115.97	100.42	101.52
The dynamics of PIT tax	111.18	98.88	114.12	100.00	84.65
The dynamics of property tax	101.89	103.70	107.14	106.67	110.94
The dynamics of total expenditures (TE)	111.49	107.41	111.69	108.05	111.55
The dynamics of investment expenditures	113.92	93.33	145.24	109.84	108.96
The dynamics of debt	120.39	113.36	120.40	111.93	129.00
The dynamics of the operational surplus	112.50	22.22	850.00	1.47	–7,400.00
The dynamics of budget deficit (TI–TE)	111.11	156.67	55.32	319.23	198.80

Source: Own calculations based on the Central Statistical Office's and the Regional Chamber's of Audit data.

Table 6. The percentage changes in plans as of 30 September and 31 December as well as budget execution as of 31 December in relation to the plan as of 1 January – selected sections, year 2023 [%]

Budget classification chapter	Adjustment as of 30.09	Adjustment as of 31.12	Budget execution / plan as of 31.12 / 01.01
Transport and communication	103.95	111.92	106.73
Public administration	104.54	109.85	107.82
Education	111.89	125.04	124.00
Health care	129.95	137.71	127.16
Social assistance	109.74	114.00	113.58
Communal services and environmental protection	105.91	108.19	105.14
Culture and the protection of national heritage	112.49	108.29	107.83

Source: Own calculations based on the Central Statistical Office and the Regional Chamber of Audit data.

Concluding reflections on the financial situation of the City of Kraków, it is worth analysing some categories for the years 2021–2027, presented in Table 7. The years 2021–2023 include data from budget execution, while the period 2024–2027 is based on data from the City's multiannual financial forecast. This data confirms the high indebtedness of the city. The debt-to-total-income ratio in 2023 shows an alarmingly high level, namely 81.09%. This ratio decreases in subsequent years, but nevertheless remains high at around 70%. We also observe high debt service costs, with the highest ratios in 2024 – 37.75% and 2025 – 36.36% when compared to capital expenditure. These are high ratios. The operating surplus, which, according to the plan, should be in positive territory from 2024 onwards, looks unrealistic. The operating surplus of 0.17 billion had been planned for 2024. At this point, we do not have data to confirm this level for the first half of this year.

In summary, the financial situation of the City of Kraków, like that of many other Polish cities or municipalities, is very difficult. This has been influenced by a number of events beyond the city's control, including government policies, whose impact on the city's finances has been destabilising.

Table 7. Selected financial categories in billion PLN and selected indicators in % for the City of Kraków in 2021–2027 – execution and plan (current prices)

Specification / Categories	2021	2022	2023	2024	2025	2026	2027
Debt [bln PLN]	4.19	4.69	6.05	6.41	6.65	6.34	5.98
The operating surplus [bln PLN]	0.68	-0.01	–0.74	0.17	0.46	0.97	1.26
Debt service cost [bln PLN]	0.06	0.19	0.37	0.37	0.32	0.19	0.21
Debt / total income [%]	58.27	64.95	81.09	79.92	78.23	70.84	63.48
Debt service cost / investment expenditures [%]	4.91	14.28	20.11	37.75	36.36	25.33	26.25

Source: Own calculations based on the Central Statistical Office's and the Regional Chamber of Audit data. Years 2021–2023 – execution; years 2024–2027 – plan.

Discussion

The analysis of the financial situation of municipalities, cities with poviat rights, and the city of Kraków confirms several important trends that have emerged in recent years and to which extremely turbulent external conditions have contributed, such as the COVID-19 pandemic, the war in Ukraine, as well as the changes introduced in Poland by new legislation under the government's policy called the Polish Order. As a result of these factors, it can be observed that the financial situation of Kraków, as confirmed by a review of the most important economic categories, looks worse in comparison to other local governmental units. The reviewed indicators such as the dynamics of the debt or the dynamics of the operational surplus confirm very unstable financial situation of the City of Kraków. An important indicator, namely debt to total income [%], confirms that Kraków is a city in high debt. Also the costs of servicing the incurred debt are constantly increasing. In the case of Kraków, the indicator in the form of debt service cost / investment expenditures [%] changed between 2021 and 2024 by almost eight times (grew from ap. 4.9 to ap. 37.8). However, one of the most alarming trends is the decrease in the operating surplus, which in 2023 reached minus 0.74 bln PLN. This will translate into problems in the future with regard to financing local services and implementing development tasks.

The discussion so far, supported by an extensive empirical analysis, shows that the finances of territorial self-government units in Poland require restructuring in order to stabilise their financial situation. These changes should consist, *inter alia*, in the reconstruction of own revenues reduced due to the Polish Order, in particular through significant increase of PIT contributions for territorial self-government units; such a postulate has been raised by all self-government organisations: the Union of Polish Cities, the Union of Rural Municipalities of the Republic of Poland, and the Union of Polish Metropolises. Discussions on changing the model of financing Polish self-governments are currently underway at the Ministry of Finance of the Republic of Poland.

Another important area for action should be the area of local taxes. The issue of reforming property tax, agricultural tax, forestry tax, and vehicle tax, among others, has been raised for decades. Undoubtedly, an area that would improve the condition of local authorities is an increase in the educational part of the subsidy, since, as is generally known, despite the principle of the adequacy of funds to the tasks, educational tasks are underestimated, which results in many cities, such as Kraków, paying extra from their own funds for these tasks. Kraków is paying over 40%. Questions have also been raised concerning the reconstruction of the compensation system in force in Poland. These and other solutions would serve to stabilise local government

finances. It is worth emphasising that until the end of the current year 2024, despite the already visible difficult situation, self-governments can benefit from relaxed fiscal rules introduced by the previous government. However, without radical changes to the system of financing self-governments, amendments to the Act on self-government entities' revenues, changes to the rules of participation in central revenues, and the reconstruction of the rules of the equalisation system, it will not be possible to conduct stable financial management by self-governments.

Conclusions

The aim of this article was to present the most important factors destabilising the system of local government finance in Poland. Among others, the effects of the COVID-19 pandemic, the Russian-Ukrainian war, and their impact on the budgets of Polish local government units were characterised. Both factors caused interruptions and disruptions in supply chains, which affected the condition of companies and the level of revenues to the state budget as well as the budgets of local self-governments, and which triggered an increase in the prices of services, energy, and salaries. All of the above was discussed based on the example of Kraków, showing the disruptions in budget policymaking, planning, and, above all, causing an increase in running costs. Also discussed are the changes introduced by the Polish government as part of the Polish Order programme, which had a direct impact on the income levels of the surveyed groups of local government units, i.e. municipalities and cities with poviat rights. Also mentioned are the government's intervention activities consisting in channelling aid to local governments, e.g. under the Assistance Fund for Ukraine. These and other activities, including the compensation of revenue losses to local self-governments, were aimed at mitigating the risks that the factors destabilising territorial self-government unit finances had entailed.

The conducted analysis allows conclusions and recommendations to be made. Undoubtedly, one of the recommendations is the legitimacy of continuing works on changes to the self-government financing system. These actions and changes should result in making the revenue base of territorial self-government units independent of the decisions of central authorities and in strengthening the area of local taxes. This recommendation also relates to the compensation system and the objectivisation of the principles of allocating targeted subsidies. On the other hand, the recommendation addressed to self-governments is to plan future activities rationally, taking into account changes that recent events have brought to the territorial self-government units' budgets, both on the revenue side and on the expenditure side. Planning should be characterised by realism and a sense of responsibility for future generations in the event of incurring debt, especially as the costs of servicing external financing have risen sharply in recent years, as evidenced by the case of Kraków.

Certainly, future research on the level of the operating surplus should be continued and a closer examination of the structure of expenditures in terms of individual municipal services should be undertaken, especially those which weigh most heavily on the budget, such as transport or education. This will make it possible to answer the question of whether the changes in the rules of financing territorial self-government units which have been announced since January 2025 will contribute to the improvement and stabilisation of the financial standing of Polish territorial self-government units.

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Funding

This research received no external funding.

Research Ethics Committee

Not applicable.

Conflicts of Interest

The author declares no conflict of interest.

Data Availability Statement

All data will be available and shared upon request.

Journal of Public Governance

Aims and scope

Journal of Public Governance (formerly *Zarządzanie Publiczne / Public Governance*) is a quarterly published since 2007. It is intended for experts and researchers who specialise in public issues, including political decision-makers and students. It offers a forum for debates between academics and practitioners interested not only in the theoretical foundations of public governance but also in the opportunities for its practical application. The quarterly is international in scope, which is reflected in the nature of research issues (they involve matters of interest to academic circles worldwide), the contributing authors (a significant proportion of them comes from different countries), and the composition of its Programme Board as well as the make-up of the team of reviewers (it includes international research and academic centres).

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In our journal, we adopt a unique approach to specific issues inherent in the sphere of public governance. The originality of our approach consists in the selection of both research areas and research methodologies.

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