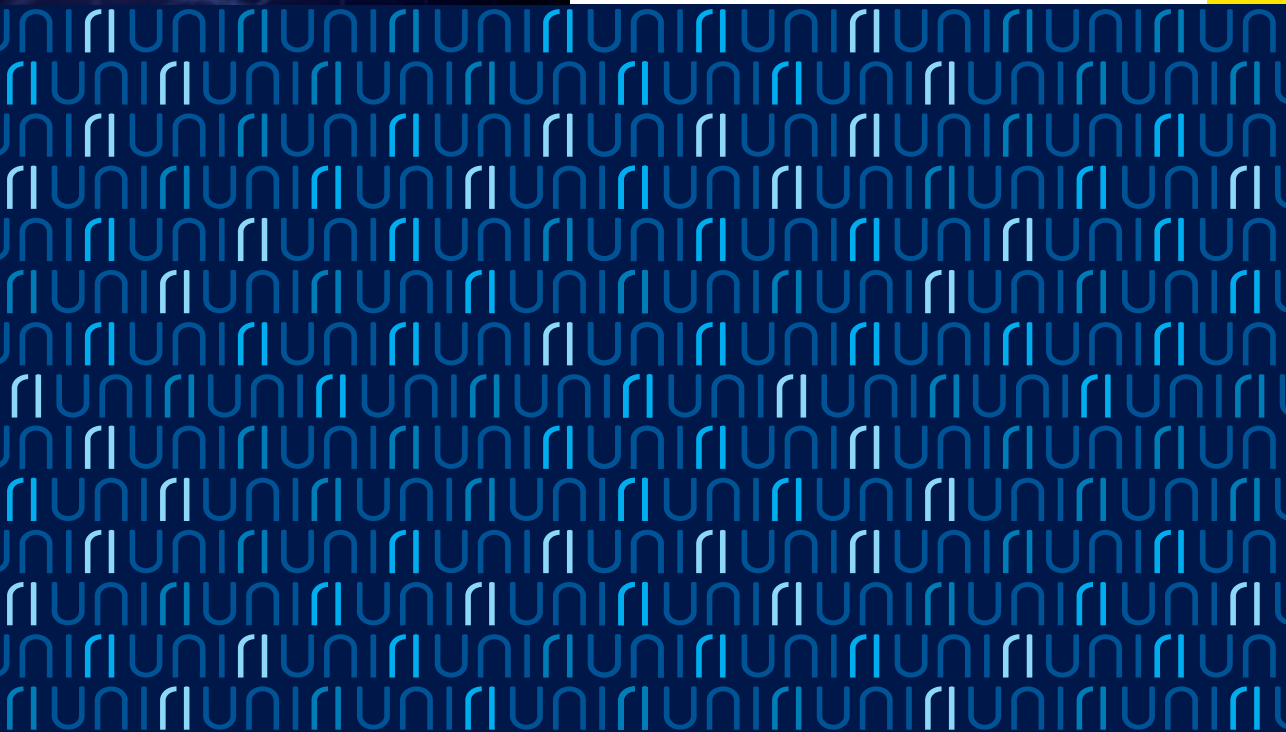




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PERSPECTIVES ON THE RESILIENCE OF ECONOMIC SYSTEMS



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PERSPECTIVES ON THE RESILIENCE OF ECONOMIC SYSTEMS

Research Monograph

FOREWORD

We are pleased to present the research monograph *Perspectives on the Resilience of Economic Systems* which sprang from the 6th scientific conference entitled *Economics of Digital Transformation* (EDT 2023). Throughout history economic systems have been put to the test but the confluence of 2022 events have sparked a renewed interest in assessing the resilience of our existing systems. In such turbulent times, it is imperative to question the sustainability of our systems and look for ways to strengthen resilience. From examining the resilience of entire economies to the adaptive capacity of individual firms, our discussions aim to shed light on the multi-layered nature of resilience in economic systems.

The EDT 2023 conference served as a platform for international and national researchers to present their research and findings. The three-day conference was attended by over 90 researchers from all over the world, who presented their findings in three sessions on topics such as fiscal decentralization and regional development, health and energy issues, and gender inequality. We were honored to welcome many esteemed keynote speakers from academia as well as Mr. Romain Duval from the International Monetary Fund, one of the world's most respected economists. We organized three panel discussions with distinguished guests on the interactions of fiscal and monetary policy, artificial intelligence and smart cities as well as the traditional Unger foundation panel. A special session for PhD students gave them the opportunity to present their work and advance their research under the guidance of experienced researchers. EDT 2023 hosted the 1st Croatian Health Economics Workshop (CHEW), which created a supportive environment for discussion, critique and improvement of the 13 presented scientific papers and provided a learning experience for all participants.

Finally, we would like to express our gratitude for the great contribution of our keynote speakers Romain Duval (Assistant Director in the European Department of the IMF), Wolfgang Karl Härdle (School of Business and Economics, Humboldt - Universität zu Berlin), Cathy Yi-Hsuan (Adam Smith Business School, University of Glasgow), Henry Horng-Shing Lu Chen (National Yang Ming Chiao Tung University, Taiwan), Gazi Salah Uddin (Linkoeping College), Kazi Sohag (Graduate School of Economics and Management, Ural Federal College) and Hoda Mansour (College of Business and Technology, College Business Administration, Jeddah). Additional thanks go to our panelists Roland Vincent Anglin (Cleveland State University) and Saša Drezgić (University of Rijeka) for the Unger Global Panel; Romain Duval (IMF), Ante Žigman (HANFA) and Davor Zoričić (Ministry of Finance) for the Interactions of Fiscal and Monetary Policy Panel; Henry Horng-Shing Lu Chen (National Yang Ming Chiao Tung University, Taiwan), Srđan Krčo (Metropolitan University – FEFA) and Jelena Stanković (University of Niš, Serbia) for the Artificial Intelligence and Smart City Panel. Special thanks to our invited speaker Boris Vujčić (Croatian National Bank), and our moderators Andrej Kričković (Higher School of Economics, Moscow) and Ana Babić (University of Rijeka). Moreoever, our gratitude goes to Alan F. Unger and the Unger Foundation for supporting our activities through the Unger Panel and

Unger Program which provided generous funding for the organization of the Conference. We are very grateful to our contributors, reviewers, program and organizing committee members, partner universities and sponsors, as well as our students, who received many compliments from our guests for their knowledge, conduct and hospitality.

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INTRODUCTION

The resilience of economic systems encompasses their ability to withstand and recover from disruptions and shocks, which is influenced by factors such as inter-organizational dependencies, information technology development, institutional stability and the drivers of economic progress. The research monograph *Perspectives on the Resilience of Economic Systems* addresses a range of different topics, divided into ten separate chapters, each contributing to the broad spectrum of resilience in today's dynamic world with its uncertain future.

The first part investigates the resilience of regional and local governments through the concept of fiscal decentralization, which could promote balanced public funding and enable equitable income redistribution. In addition, the authors investigate the impact of EU funds on regional economic growth and call for regional development policies that use EU funds to achieve economic growth. The subsequent set of contributions refers to modern technologies and digital transformation, the key elements that can drive economic and social change and serve as effective tools in improving the resilience of an economic system, as demonstrated by the Covid-19 pandemics. As the authors explain, in the context of digital labor platforms, ghost work has emerged as a new form of employment that is becoming increasingly important with the advances in digital technology and the exponential growth of available data. This requires a better understanding of the concept, its pros and cons in modern businesses and the provision of guidance to ensure labor market resilience. This also includes the economic aspect of blockchain technology in the protection of intellectual property (IP) rights, which has several important economic benefits of blockchain implementation in the IP protection process. These include time efficiency, lower administrative costs, better management of the overall IP protection process and the reduction of counterfeiting. Finally, the resilience of the national health system is a major societal concern and thus, the identification of the key determinants of health in the fourth industrial revolution is an important contribution to a stronger resilience of the health system. Therefore, higher institutional quality is essential as it prevents moral hazard, enables investment and the introduction of new health technologies, and provides more equitable access to health services. The resilience of societies or economic systems is determined by their efficiency in the use of their resources. Any gender inequality, regardless of whether it affects women or men, represents a social risk with numerous negative consequences, especially in terms of efficiency. Investment in intellectual capital also ensure the prolongation of increasing returns. Therefore, research on the importance of service quality in higher education, which emphasizes the crucial role of the human factor and education, contributes to solving the problem of system resilience.

We are confident that the scientific contributions will provide valuable insights and information to interested readers. We hope you enjoy reading our authors' contributions and hope to see you regularly at our annual conference.

CHAPTER 1

FISCAL DECENTRALIZATION OF LOCAL GOVERNMENT: A COMPARISON OF CROATIA AND EU COUNTRIES

Robert Matic¹, Helena Blažić Pečarić²

ABSTRACT

Fiscal decentralization is the transfer of responsibility over the provision of public services and funding sources from central government to lower levels of government. If done properly, it leads to a balance in all areas of public policy and the possibility of economic growth, serving as a tool to utilize resources, stabilize economic development and redistribute income. In addition, decentralization can improve the level of democracy in a society through greater accountability, transparency and citizen participation. The aim of the paper is to expand the scientific knowledge on fiscal decentralization, analyze the degree of fiscal decentralization in the Republic of Croatia and compare it with EU member states in order to provide the basis for more efficient economic and governmental decision-making that meets the needs of the local population. The results of the research are obtained using the most commonly used measures of fiscal decentralization, the share of expenditure and revenue of local units in total government expenditure and revenue. Compared to the other member states of the European Union, the results show that Croatia is on average more decentralized. It should also be noted that the observed data was calculated according to the ESA 2010 methodology and government deficit and debt.

Key words: *fiscal decentralization, local government, Croatia, EU*

JEL classification: *H20, H71, H77, P35, R50*

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1 Introduction

Decentralization is an extremely complex concept that encompasses administrative, political, and fiscal dimensions and their interaction. The relationships between the different levels of government are complex - hence there is no single definition of decentralization. In short, decentralization implies a legally defined and financially supported transfer of responsibility and authority (collection of revenues and financing expenditures) for the provision of public services from the central government to lower levels of government. Decentralization came about as a response to highly centralized administrative systems, inefficient public management, inadequate provision of public services and inadequate living conditions.

Fiscal decentralization has been the subject of research, especially since the beginning of the second half of the twentieth century. The actual conceptual framework of fiscal decentralization was laid out by Stigler (1957), Musgrave (1959), Oates (1972), and Brennan and Buchanan (1980). Oates' decentralization theorem refers to the fact that the unit of government closest to the citizens can best target and adjust its spending to local preferences and thus provide the public services that meet the needs of its residents. Local units should be assigned the power to dispose of the tax revenues they collect, i.e. they must have the ability to set the tax rates and the tax base for those revenues. This is the essence of fiscal decentralization (Ebel and Yilmaz, 2002a, p. 29). The leading reasons for implementing fiscal decentralization are the growing awareness among the population of their role in the decision-making process and the increasing need for high-quality management at lower levels of government. In order to achieve the highest possible degree of fiscal decentralization, local self-government units must secure the most generous sources of financing that will enable the provision of all public services in their area. This fosters greater competition among local self-government units to provide as many, better and higher quality, public sector services to their citizens as possible. Accordingly, the theory of fiscal federalism was developed to address the role of different levels of government and their mutual interaction (Oates, 1999).

In recent decades, many countries around the world have transferred fiscal and political powers to lower levels of government. According to data collected by Garman et al. (2001) on a sample of 75 developing countries, more than 80% of the analyzed countries were undergoing some form of government decentralization at the beginning of this millennium. The Regional Authority Index (RAI), created by Hooghe et al. (2010) for 42 democratic and semi-democratic countries, shows that 70% of countries have been decentralized since 1950 (Martinez-Vazquez, 2017). The former transition countries of Central and Eastern Europe (CEE) have also made significant progress in terms of both the relocation of state activities and the power to levy taxes (Makreshanska-Mladenovska and Petrevski, 2019). Decentralization is often promoted because it indirectly contributes to economic growth and is an important part of the development strategies of developed and underdeveloped countries (Sofilda et al., 2023).

In the Republic of Croatia, the issue of decentralization has always been topical, especially since 2002, when the process began. Lower levels of government were established to increase the growth and development of their territory through better education, health services and infrastructure. Decentralization leads to greater competition among local self-government units to provide as many, better and higher quality, public sector services to their citizens as possible. As decentralization has been proven to increase economic efficiency and since it can also lead to greater responsibility, transparency and democracy in society, we consider this issue to be extremely important. In this context, we determine our research subject: Based on a detailed analysis, the current degree of fiscal decentralization in Croatia will be defined through comparison with other EU member states in which there are similar trends and processes leading to fiscal consolidation and decentralization. As a detailed analysis of trends and an individual comparison of all EU countries with Croatia would be too extensive, we compare Croatia in relation to the average values of individual indicators in the old and new member states and all member states. Although this is not the first research dealing with fiscal decentralization in EU countries, its contribution is evident in the continuity and length of the analysis (2002-2022), and the various decentralization indicators calculated according to the new ESA 2010 methodology.

Alongside the process of fiscal decentralization in Croatia that began in 2001, the question of whether Croatia is a centralized or a decentralized country still arises daily. Although it is obvious today that Croatia is formally decentralized (territorially and administratively, as well as politically), the above-mentioned forms of decentralization do not necessarily have to be accompanied by fiscal decentralization. A basic research question is: Has the policy of fiscal decentralization in Croatia led to a decentralized fiscal system over time, or is the system today still highly centralized? The following research questions are also posed: How does Croatia stand in comparison with the new member states, which are considered the benchmark for Croatia, in terms of the degree of fiscal decentralization, and how does it stand in comparison with the average of EU member states? How does Croatia stand in terms of the degree of fiscal decentralization measured in terms of revenue and how does it stand in terms of expenditure? Does Croatia have a large number of employees at lower levels of government in comparison to other EU Member States, i.e. is there a high degree of decentralization of expenditure for employees? In line with the described research problem and the posed research questions, the main objective of the paper is to assess the intensity of fiscal decentralization.

2 Literature review

Falleti (2005) defines fiscal decentralization as a set of policies aimed at increasing the revenue or fiscal autonomy of local units, which may involve various institutional forms, such as increasing grants from the central government budget, introducing new local taxes, or transferring tax bases that were previously at national level. In other words, fiscal decentralization

addresses the issues of the level of government at which taxes are introduced and collected, the level of government that bears certain expenditures, and how vertical fiscal imbalances are corrected (Litvack, et al., 1998). In short, fiscal decentralization refers to the assignment of responsibilities (including sectoral functions) and own sources of revenue to lower levels of government - local units (Smoke, 2003). The aim is to assure that lower levels of government acquire certain degree of autonomy vis-à-vis central government structures (Mali & Malická, 2023).

The theoretical literature originally focused on the works of Tiebout (1956), Musgrave (1959), and Oates (1972), who argued that decentralization promotes allocative efficiency, efficiency in the delivery of public services, and greater transparency. It is often argued that fiscal decentralization increases economic efficiency because local governments are, due to their proximity and information advantage, in a better position than the central government to provide public services. In addition, decentralized expenditures can lead to greater “consumer efficiency” (Thiessen, 2003). As requirements differ in each local unit, resources can be saved by diversifying the services provided according to local preferences (Martínez Vázquez and McNab, 2003). Fiscal decentralization is likely to promote horizontal and vertical competition (Tiebout, 1956) at lower levels of government and force the government to focus on the efficient production of public goods and services (Thiessen, 2003). In addition, fiscal decentralization is seen as a way of strengthening democratic participation in the decision-making process, allowing for greater transparency and accountability (Ebel & Yilmaz, 2002b).

Decentralization increases economic efficiency because local units, due to more direct contact with residents, are able to meet public needs of local importance more appropriately, more quickly, more cheaply, and more efficiently, resulting in more efficient public administration. In addition, the possibility of “experimentation” with individual public policies and competition between local units in the provision of public services, as well as the mobility of households and businesses, promise more efficient service provision (Martínez - Vazquez & McNab, 2003). If implemented correctly, fiscal decentralization can lead to economic growth (Matić, 2023).

Decentralization relieves the state administration of tasks of local importance. Local initiative can lead to an innovative and more efficient approach to public service provision and more efficient use of public assets. Decentralization promotes unified development and reduces regional disparities by increasing the participation of different religious, ethnic, political, and other social groups in development decisions (Qian & Weingast, 1997). In addition, competition among local units can reduce regional inequalities with minimal or no central government intervention. If the equalization subsidy system is precisely defined and correctly planned, decentralization could be an important tool for addressing existing regional inequalities (Digdowiseiso, 2022). Higher decentralization offers less developed regions the opportunity to compete with more developed and richer regions by offering more attractive and advantageous investment conditions for companies and their citizens, which can, in turn, lead to higher economic growth (Matić, 2023; Holanda Figueiredo

Alves, et al., 2023).

The success of the implementation of the decentralization process depends largely on a number of socioeconomic and historical factors; thus the specifics of each economy must be taken into account. The effects of fiscal decentralization are particularly important for the EU as a supranational entity with complex policy-making structures that span all levels of government (Borrett, et al., 2021).

Globally, in recent decades, there has been an undeniable trend towards decentralization and greater diversity of multilevel governance, which has been termed as the “silent revolution” (Ivanyna and Shah, 2014). In modern states’ systems, local self-government is considered to perform two extremely important and often intertwined functions: a political function, which implies the role of a protector and representative of the interests of the local population, and an administrative function, which implies the provision of most public services, the most important of which are local municipal services (Lyngstad, 2010).

The proponents of decentralization (Iimi, 2005; Oates, 1995; Akai, Nishimura & Sakata, 2004; Nguyen & Su, 2022) emphasize increased efficiency in the allocation of limited resources and the provision of public services as the main motives for decentralization. The experience of individual transition countries shows that decentralization has also influenced democratic changes and increased citizen participation in the work of local government units and the decision-making regarding development issues. All of this has an effect on the increase in the accountability of local leaders and the reduction of corruption, and ultimately on the creation of a more favorable investment environment that has a positive impact on economic growth.

The opponents of decentralization state that the main reason for the negative impact of fiscal decentralization on economic growth is that local units lack capacity (primarily human, financial, and technical), that local bureaucracies are inefficient, and that, accordingly, investment in innovation and technology at the local level is weak (Arends, 2020). Tanzi (1996) believes that there is no credible evidence that the information held by officials in central government bodies is less accurate than that held by local governments. Prud’homme (1995) believes that local democracy is insufficiently developed and ineffective, especially in developing countries. He believes that the preferences of local people are complex and diverse, so that they cannot be interpreted by a single vote, and that local elections depend mostly on political loyalty and rarely reflect the preferences of local people.

3 Methodology

The system of fiscal decentralization in the Republic of Croatia must be analyzed in light of the above theoretical assumptions. Many authors evaluate the current system as highly centralized (Blažić, 2004; Jurlina Alibegović et al., 2013; Bajo & Primorac, 2014), and the question arises daily as to what changes should be made to the system in order to achieve the desired goals

of economic growth and development. The issue of decentralization is always topical, especially since 2002, when the process began.

The Republic of Croatia is compared in regards to the average values of certain decentralization indicators in the European Union member states. The observed data are calculated according to the ESA 2010 methodology³ and the Manual on Government Deficit and Debt. The data for local units were obtained from the individual (non-consolidated) financial statements of PR-RAS according to the ESA 2010 methodology. The ESA 2010 methodology contains data on local government processed for the Republic of Croatia on the basis of the financial statements of 576 units of local and county (regional) self-government, including all their budgetary and extra-budgetary users in the Register of budgetary and extra-budgetary users. In addition to this set, it also includes a set of units allocated to the local government subsector S.1313 according to the ESA 2010 methodology, which are not included in the register of budgetary and extra-budgetary users. (State Statistics Office, 2022)

Taking into account all the advantages and disadvantages of fiscal decentralization, countries indirectly determine the intensity of (de) centralization depending on their geographical, social, economic, and political characteristics. Because decentralization can manifest itself in many different ways, there is no single measure of the degree of decentralization. Table 1 shows the most commonly used indicators of fiscal decentralization.

³ Since January 2015, data for local and regional self-government units also refer to non-budgetary users of the county road administration. According to the GFS 2001 methodology, starting from January 2016, the methodology of reporting salaries and certain compensations of employees in primary and secondary schools, which are paid from the state budget based on legal provisions, was changed. Primary and secondary education institutions are beneficiaries of budget funds of local and regional self-government units. Therefore, for the sake of consistent application of the statistical scope of individual sub-sectors of the general government, the mentioned expenses are not reported in the state budget and the central government on GFS items 2111, 2121 and 22, but as current aid to local self-government units within GFS item 2631. At local level, revenues are reported from received aid and expenditures on GFS items 2111, 2121 and 22" (Ministry of Finance, 2017, p. 123). Until the end of 2015, salaries and individual allowances for employees in primary and secondary schools were reported under account group 31 Expenditures for employed in the financial report of the Ministry of Science and Education, and since 2016 they have been reported in the financial reports of primary and secondary schools and in the consolidated financial reports of their respective local or regional self-government units.

Table 1 Fiscal decentralization indicators

Numerator	Denominator	Main source
SCG/LG revenues	GG revenues	Oates (1985)
SCG/LG expenditures	GG expenditures	Oates (1985) and de Mello (2000)
SCG/LG autonomous taxes	SCG total revenues	Ebel and Yilmaz (2002b)
SCG/LG autonomous taxes	GG total tax revenues	Stegarescu (2005)
SCG/LG autonomous taxes	SCG total tax revenues	Stegarescu (2005)
SCG/LG autonomous taxes and non-tax revenues	GG tax revenues	Stegarescu (2005)
SCG/LG autonomous revenues	SCG total revenues	Meloche et al. (2004)
SCG/LG autonomous revenues	GG revenues	Meloche et al. (2004)
SCG/LG non-autonomous revenues	GG revenues	Meloche et al. (2004)
SCG/LG non-autonomous revenues	SCG total revenues	Ebel and Yilmaz (2002b)
SCG/LG taxes	SCG total revenues	de Mello (2000)
SCG/LG non-tax revenues	SCG total revenues	Ebel and Yilmaz (2002b)
SCG/LG transfers	SCG total revenues	de Mello (2000) and Ebel and Yilmaz (2002b)
SCG/LG total revenues	SCG total revenues	Dziobek, et al. (2010)

Notes: SCG- sub-central government, LG- local government, GG – general government

Source: Authors

The ratio of local government revenues to general government revenues and the ratio of local government expenditures to general government expenditures are the most commonly used indicators of fiscal decentralization (Baskaran, 2010). The fundamental drawback of these measures is the neglect of the degree of control (autonomy) of local units over the determination of tax rates and tax bases (Meloche et al., 2004), i.e., the decision-making power of local units over revenues and expenditures. (Ebel & Yilmaz, 2002b). Accordingly, Rodden (2004) points out that to gain full insight into the degree of expenditure decentralization, it is important to determine how expenditures are financed: through budget support (intergovernmental support), through revenues shared with the central government according to a set formula, or through own revenue sources that include autonomously determined own taxes, user fees, and borrowing. Ebel and Yilmaz (2002b) focus on the tax and non-tax autonomy, tax distribution, and fiscal dependence (dependence on grants from the state budget) of local units.

Two dimensions determine the degree of fiscal decentralization. The first dimension encompasses the scope and relative importance of the various functions and revenues assigned to lower levels of government, as well as the scope of government functions performed by the private sector. Another, even more important dimension concerns the power of lower levels of government in deciding on assigned functions and revenue sources (Bahl & Linn, 1992; Stegarescu, 2005).

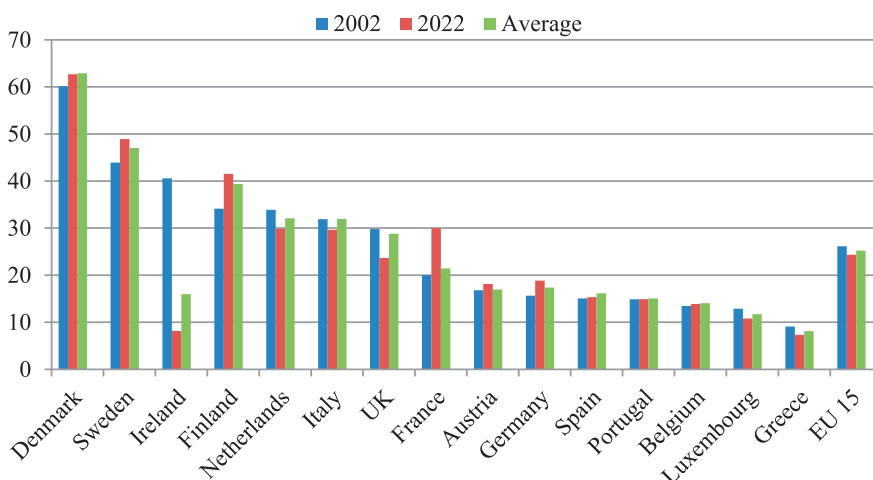
Although acknowledging the possibility of error in measuring the share of expenditures or revenues of lower levels of government (Bahl & Martinez-Vazquez, 2023), many authors still use the above measures. Enikolopov and Zhuravskaya (2007), Baskaran (2010), Oates (1985), de Mello (2000) and Baskaran et al. (2016) believe that the ratio of revenues to expenditures of local and general government (although it has many flaws) can serve as a very good relative indicator of fiscal decentralization and that a higher ratio means that the state is more decentralized. For an empirical study based on a larger sample of countries and over a longer period of time, the ratios of expenditure or revenue of lower levels of government to total government are still the most appropriate data to measure fiscal decentralization, and, as such, are also used in this paper. Fiscal decentralization is measured by the local level's share in the general government, excluding other lower levels of government, i.e., the federal level.

4 Results

4.1 Fiscal decentralization in the member states of the European union

As already pointed out, fiscal decentralization is measured by the shares of revenues and expenditures of local government in general government. Graph 1 shows the ratio of local government revenues to general government revenues for the EU-15 member states in the period from 2002 to 2022.

Graph 1 The ratio of local government and general government revenues in the EU-15 countries in 2002 and 2022, and the average over the period from 2002 to 2022 (in %)



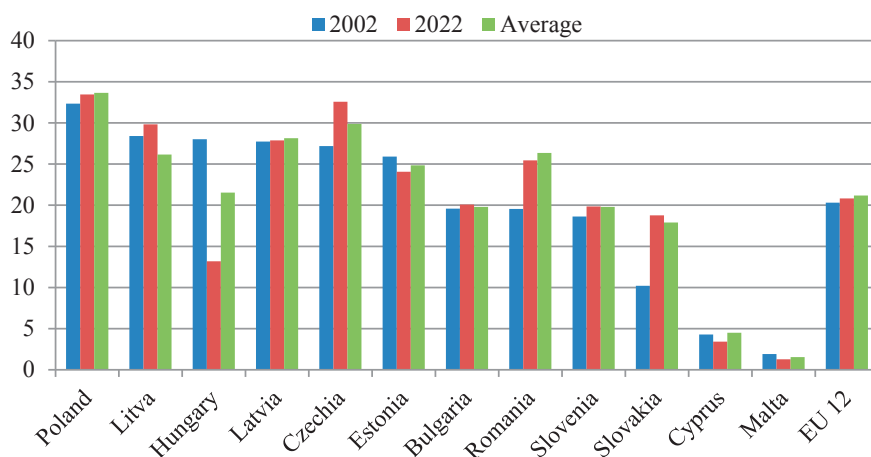
Note: Data refer to ESA 2010 coverage of general government and local government; the latest available year for the United Kingdom is 2018.

Source: Author's calculation based on Eurostat data 2023 *Annual Government Finance Statistics*

Revenue decentralization is measured by the share of local government

revenues in general government revenues. The degree of revenue decentralization in the EU-15 member states ranges from an average of 26.14% in 2002 to 24.36% in 2022, with Denmark having the highest degree of revenue decentralization (62.88% on average), and Greece the lowest (from 6.96% to the highest value of 10.60%, corresponding to an average of 8.12%). Although the reform of the local sector has drastically reduced the number of local units in order to strengthen them and create conditions for effective fiscal decentralization, Greece is still extremely fiscally centralized. It is interesting to note the trend of fiscal centralization in Ireland, which started in 2005, but also the greater centralization in most countries, which started after 2009, when the highest degree of decentralization was recorded on average, which can be attributed to the stabilizing role of the central government during the financial crisis. Graph 2 shows the ratio of local and general government revenues in the EU-12 countries in the period from 2002 to 2022.

Graph 2 The ratio of local and general government revenues of the EU-12 countries in 2002 and 2022 and the average in the period from 2002 to 2022 (in %)



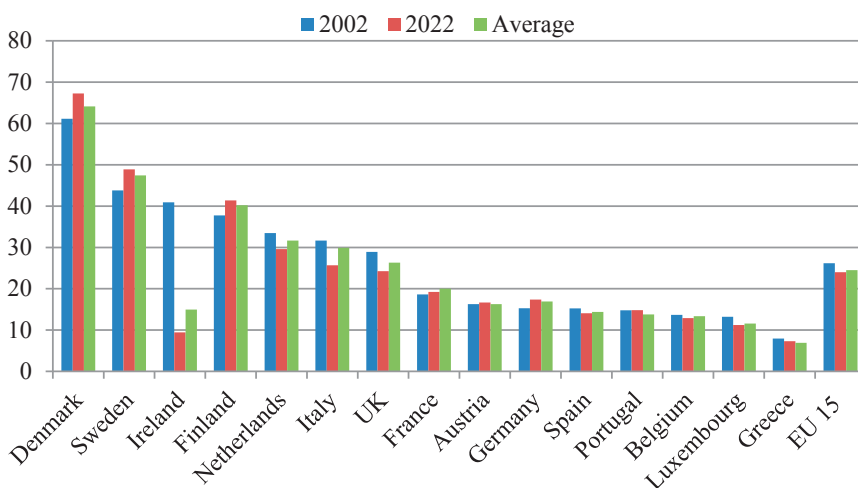
Note: Data refer to ESA 2010 coverage of general government and local government

Source: Author's calculation based on Eurostat data 2023 *Annual Government Finance Statistics*

The intensity of revenue decentralization is somewhat weaker in the EU-12 countries than in the EU-15 countries. The average degree of decentralization in the EU-12 countries ranges from the lowest value of 20.15% in 2016 to the highest value of 23.18% in 2010. The most centralized country is Malta, whose degree of decentralization ranges from the highest value of 1.91% to the lowest value of 1.27% over the period from 2002 to 2022, while Poland is the most fiscally decentralized, with an average decentralization coefficient of 33.65% over the period from 2002 to 2022.

Expenditure decentralization, measured by the share of local expenditures in general government expenditures for EU-15 countries, is mostly aligned with revenue decentralization. Graph 3 shows the ratio of local and general government expenditures for the EU-15 over the period 2002 to 2022.

Graph 3 The ratio of local government and general government expenditures in the EU-15 countries in 2002, 2022, and the average over the period from 2002 to 2022 (in %)



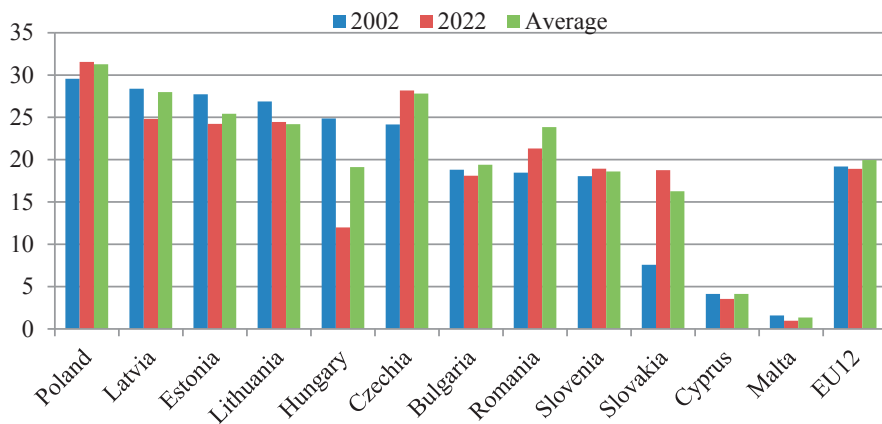
Note: Data refer to ESA 2010 coverage of general government and local government; the latest available year for the United Kingdom is 2018.

Source: Author's calculation based on Eurostat data 2023 *Annual Government Finance Statistics*

Denmark is the most decentralized country, with a decentralization coefficient of expenditures ranging from 61.12% in 2002 to 67.26% in 2022. The most centralized country in the EU-15 (also in terms of public expenditures) is Greece, with an average expenditure decentralization coefficient of 6.90%. In Ireland, after the gradual decentralization of expenditures at the beginning of the period observed, a turn toward centralization can be observed, reflected in a sharp decrease in the decentralization coefficient from 40.92% in 2002 to 9.45% in 2022.

Graph 4 shows the ratio between local government and general government expenditures of EU-12 countries over the period from 2002 to 2022.

Graph 4 The ratio of local and general government expenditures of the EU-12 countries in 2002 and 2022 and the average in the period from 2002 to 2022 (in %)



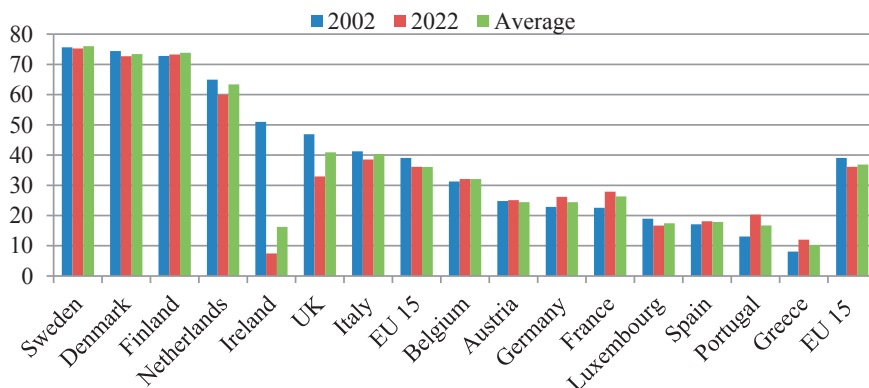
Note: Data refer to ESA 2010 coverage of general government and local government

Source: Author's calculation based on Eurostat data 2023 „Annual government finance statistics

The new members of the European Union have more centralized public revenues than the old members, their expenditures are also decentralized to a lesser extent. The average degree of expenditure decentralization ranges from 19.19% in 2002 to 18.91% in 2022. Poland has the highest degree of decentralization (34.35% in 2018). The most centralized EU-12 country is Malta, whose expenditure decentralization coefficient ranged from 1.60% in 2002 to 0.98% in 2022.

One of the indicators of decentralization is the decentralization of public administration. This segment of decentralization can be measured by the ratio of expenditures for local government employees and total expenditures for general government employees. The stated ratio for the EU-15 member states is shown in Graph 5.

Graph 5 Ratio of expenditures for local government employees and total expenditures for general government employees in the EU-15 countries in 2002 and 2022, and the average over the period from 2002 to 2022 (in %)

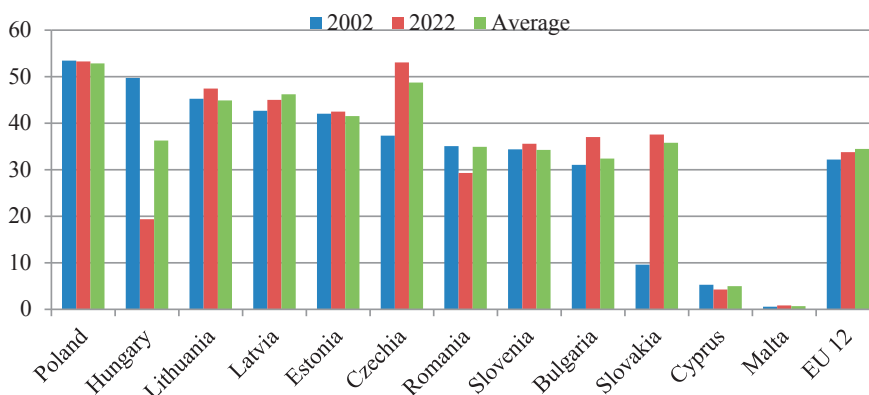


Note: Data refer to ESA 2010 coverage of general government and local government; the latest available year for the United Kingdom is 2018.

Source: Author's calculation based on Eurostat data 2023 *Annual Government Finance Statistics*

The ratio of expenditures for employees in the local and general government of the EU-15 countries ranged from 39.04% in 2002 to 36.11% in 2022. The most decentralized EU-15 countries by the corresponding indicator are the Nordic countries (Denmark, Finland and Sweden), and the most centralized is Greece. The coefficient of decentralization of employees in Ireland has drastically decreased from 51% in 2002 to 7.47% in 2022. Graph 6 shows the relevant ratio for the EU-12 member states.

Graph 6 Ratio of expenditures for local government employees and total expenditures for general government employees in the EU-12 countries in 2002 and 2022, and the average over the period from 2002 to 2022 (in %)



Note: Data refer to ESA 2010 coverage of general government and local government

Source: Author's calculation based on Eurostat data 2023 *Annual Government Finance Statistics*

Graph 6 shows that the new member states of the European Union have a somewhat lower decentralization coefficient for employees compared to that in the old member states. There was a clear trend towards decentralization up to the financial crisis, when austerity measures were taken and the coefficients decreased slightly. The most decentralized EU-12 country in the context of employees' decentralization is Poland, and Malta is probably the most centralized. Malta is also interesting because its coefficient of employees' decentralization is almost unchanged over the observed period, averaging to 0.68%. Hungary has a centralized public administration, as the coefficient of decentralization of employees was 49.75% in 2002 and 19.35% in 2022.

4.2 Fiscal Decentralization in the Republic of Croatia

The process of fiscal decentralization in the Republic of Croatia began in 2001, when part of the local units took over the responsibility for certain decentralized functions. The conditions for launching fiscal decentralization had been gradually created since 1994, through the processes of political and administrative decentralization, as fiscal decentralization directly depends on the development of the financing system of local units.

The formal conditions for decentralization were created by the adoption of the Act on Local Self-Government and Local Administration (Official Gazette, 117/1993), which determined the revenues of local units. However, it should be noted that the development of the infrastructure for the implementation of decentralization began earlier with the establishment of a legislative framework for administrative and political decentralization. Financing of local units was largely centralized during this period, that is, local units had limited autonomy in collecting revenues and determining the purpose of the collected funds. A legal framework was established determining the distribution of fiscal and administrative powers between the central government and local units (Bajo & Bronić, 2004).

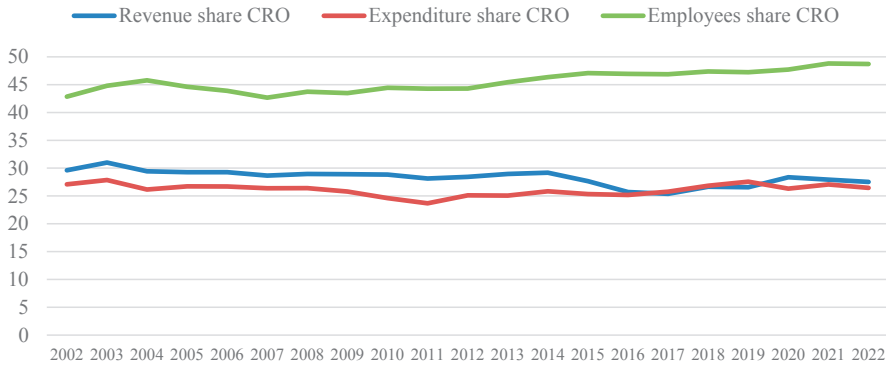
Fiscal decentralization in the Republic of Croatia began in 2001, when responsibilities for financing health care, education, fire departments, and social welfare were transferred to counties and larger cities. Not all local units took over the financing of the decentralized functions, just those with the largest fiscal capacity. Since 2001, there has been an additional possibility of financing local governments and cities through a personal income tax surtax, which can be introduced up to a certain ceiling.

Although the distribution coefficients of tax revenues had been changed frequently prior to 2007, since then, the financing system of local units has been based entirely on personal income tax. Corporate income tax has become entirely a central government revenue, while personal income tax is mostly left to local units. The central government has transferred part of the revenue from the equalization fund for decentralized functions to the lower levels of government in order to ensure the financing of decentralized functions. The inclusion of local units in the special financing system has been extended to include local units on the islands with an agreement to jointly

finance investment projects of interest to the respective island's development. Under the central government grant system, a grant to municipalities and cities in areas of special state concern and in hilly-mountainous areas has been introduced as a substitute for corporate income tax revenues left to the central government due to changes in the distribution of tax revenues.

The main innovations in the new Act on the Financing of Local and Regional Self-Government Units (Official Gazette 127/17) in comparison to the previous law concerned the following items: Personal income tax revenues became entirely the revenues of lower levels of government (including personal income tax revenues based on interest on savings), the central government took over most of the financing of decentralized functions, the criteria for granting aid that had been prescribed by the State Budget Execution Act were abolished, and a new model of fiscal equalization was introduced, financed from a share of the personal income tax. With the new Act on the State Administration System (Official Gazette 66/19), as of January 1, 2020, the tasks of state administration were transferred to the counties, which is an important step in the decentralization process. The units of local (regional) self-government were given the opportunity to respond directly to the needs of citizens and provide fast and efficient services. A small number of local units took responsibility for financing public services that were transferred from the central government to local units. Although the Republic of Croatia has been politically, administratively and territorially decentralized for many years, this does not mean that the relevant forms of decentralization have been accompanied by fiscal decentralization. In order to define a clear fiscal policy aimed at achieving a sustainable and stable financial system of local units, it is important to obtain information on the degree of fiscal decentralization, as mentioned above. There are no reference values for the degree of decentralization by which a country could be characterized as fiscally centralized or decentralized. However, if the degree of decentralization of individual countries is compared, it can be used as a relative indicator of the degree of fiscal decentralization. Graph 7 shows the degree of fiscal decentralization in Croatia in the period from 2002 to 2022 based on the indicators used in the previous part of the paper.

Graph 7 Degree of fiscal decentralization in the Republic of Croatia from 2002 to 2022 (%)

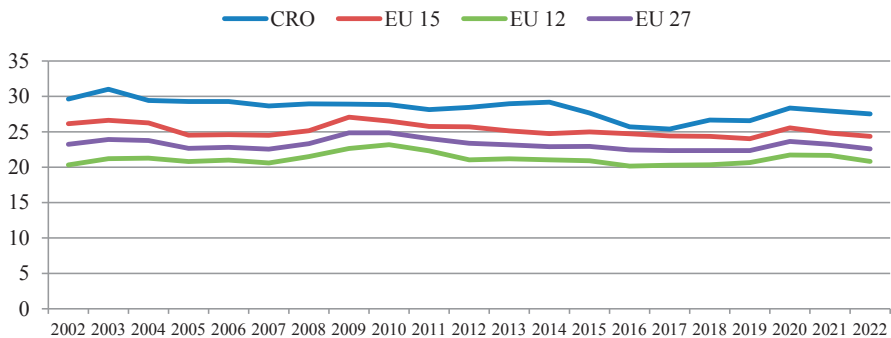


Note: Data refer to ESA 2010 coverage of general government and local government. Revenue share – the ratio of local and general government revenues, Expenditure share – the ratio of local and general government expenditures, Employees share – the ratio of local and general government employees

Source: Authors' calculation, based on Eurostat data 2023 *Annual Government Finance Statistics*

The Republic of Croatia has about 20 years of experience with the implementation of fiscal decentralization, and in the observed period there were no major deviations in the degree of fiscal decentralization. There is a coordinated movement of the revenues and expenditures degree, which in the period from 2002 to 2022 is on average between 23.67% and 27.87% for expenditures and between 25.38% and 31.01% for revenues. Moreover, the global financial crisis that began in 2008 did not cause major deviations in the decentralization indicators. The share of expenditures for employees in the local and general government is extremely high, averaging between 42.66% and 48.79% in the period from 2002 to 2022. Graph 8 compares the degree of revenue decentralization in the Republic of Croatia and the countries of the European Union in the period from 2002 to 2022.

Graph 8 Degree of revenue decentralization in the Republic of Croatia and EU countries from 2002 to 2022 (in %)

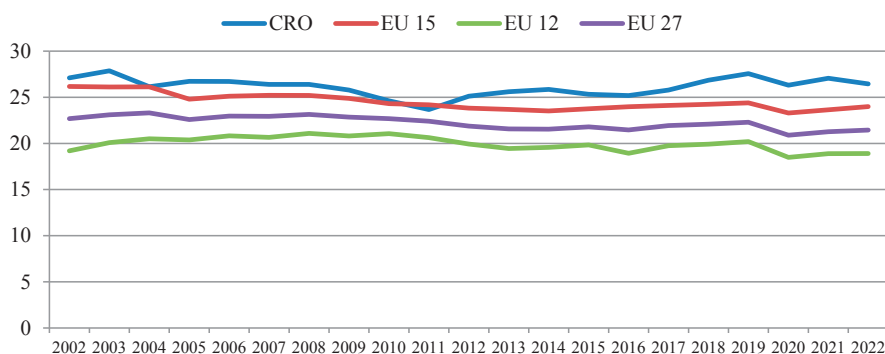


Source: Authors' calculation, based on Eurostat data 2023 *Annual Government Finance Statistics*

The degree of revenue decentralization (share of local sector revenues in general government revenues) in the Republic of Croatia is above the European Union countries' average and is so high that Croatia can be characterized as a fiscally decentralized country. This is also confirmed by the development of the value of the corresponding indicator in comparison with the European Union countries. The degree of revenue decentralization in the Republic of Croatia in the period from 2002 to 2022 ranged between a low of 25.38% in 2017 and a high of 31.01% in 2003. In the same period, the average degree of revenue decentralization in the EU member states ranged from 22.34% to 24.86%. The average difference in the degree of revenue decentralization between the countries of the European Union and the Republic of Croatia is mostly the same over the entire period. Looking at the new member states (EU 12), it is noticeable that Croatia has a much higher degree of revenue decentralization.

After comparing the level of revenue decentralization, Graph 9 compares the level of expenditure decentralization.

Graph 9 Degree of expenditure decentralization in the Republic of Croatia and EU countries from 2002 to 2022 (in %)

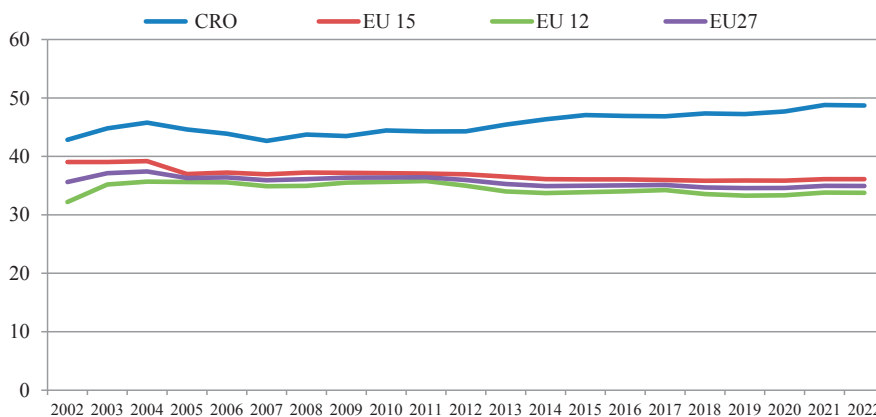


Source: Authors' calculation, based on Eurostat data 2023 *Annual Government Finance Statistics*

Expenditure decentralization mainly follows the trend in revenue decentralization. The degree of expenditure decentralization (the share of local sector expenditure in general government expenditure) in the Republic of Croatia ranged from 23.67% to 27.56%, while the average degree of expenditure decentralization in EU Member States is somewhat lower, ranging from 20.89% to 23.32%. Since 2002, the degree of expenditure decentralization in the Republic of Croatia has been moving in approximately the same proportions as in the European Union member states, which is why the average difference in the degree of expenditure decentralization between the European Union countries and the Republic of Croatia has been largely the same in the observed period. The same as with the indicator related to revenue decentralization, Croatia shows a significantly higher degree of expenditure decentralization in comparison to the average of new member states (EU 12). The average tendency of the degree of expenditure decentralization of European Union countries has been increasing which is

mainly due to the more intensive decentralization of expenditure at the level of the new EU member states. Graph 10 shows the degree of decentralization of expenditures for employees in the Republic of Croatia and the countries of the European Union from 2002 to 2022.

Graph 10 Degree of decentralization of expenditures for employees in the Republic of Croatia and the countries of the European Union from 2002 to 2022 (in %)



Source: Authors' calculation, based on Eurostat data 2023 *Annual Government Finance Statistics*

The degree of decentralization of expenditures for employees (the share of expenditures for employees of local units in expenditures for employees of the general government) also increases in the Republic of Croatia after 2002. The values of the degree of decentralization of expenditures for employees ranged from the lowest value of 42.66% in 2007 to the highest value of 48.79% in 2021. The average degree of decentralization of expenditures for employees in EU member states ranged from a low of 34.60% in 2019 to a high of 37.43% in 2004. The average degree of decentralization of expenditures for employees in the new EU-12 has approached the average of the EU-15, but is still at a slightly lower level (compared to the average of the EU-15). The values of the indicators for the Republic of Croatia are significantly higher than the EU average, which means that the government administration is quite decentralized compared to the EU average due to the transfer of part of the revenues and responsibility for the provision of public goods and services to the local units and their budget users.

After slight and inconsistent fluctuations in the values of the degrees of decentralization, which characterize the initial phase of the development of the system of financing local units, the degrees of decentralization in the observed period are higher than those in EU member states. If we compare the Republic of Croatia with the new member states (EU 12), the difference is even greater. Looking at expenditure on employees, which to a certain extent represents the number of employees at the lower levels of government, the Republic of Croatia has a much higher number of employees at the lower

levels of government than the member states of the European Union due to decentralization process of government administration. The impact of the creation of the legal framework for the implementation of fiscal decentralization became evident after 2001, when there was a significant increase in the decentralization of revenues, expenditures, taxes and also employees. Using the new methodology of ESA 2010, different results were obtained than in previous studies (Blažić, 2004; Jurlina Alibegović et al., 2013; Bajo & Primorac, 2014). This is logical considering that the calculation at local level includes budgetary and extra-budgetary users from the Register of budgetary and extra-budgetary users.

5 Discussion and conclusions

Since 2002, the Republic of Croatia has secured a significant part of financial resources through the system of tax revenue sharing and grant allocation, which has significantly improved the fiscal capacity of all local units. This also confirms the role of lower levels of government, which have been established to improve the quality of life of their citizens by deciding on the provision of local public services close to where they are delivered and close to the users, providing better educational, social and health services and infrastructure, thus positively influencing the quality of lives of their citizens. In the Republic of Croatia, the issue of decentralization has always been relevant, especially since the early 2000s, when the process began. The resistance to decentralization is almost as strong as its advocacy. The arguments begin and end with the weak capacity of most of the existing local units and the problem of (self-)financing decentralized functions. Decentralization can create a competitive atmosphere among local units as they strive to meet the needs of their residents in the best possible way, leading to a more innovative and flexible approach to service provision. Local decision makers have various tools at their disposal (their own budget, strategic development planning, independent action and networking, etc.) and can use these factors to improve their local environment. This also has a negative side in the form of a greater possibility for corruption and similar undesirable developments.

Few local units assumed responsibility for financing public services transferred from the central government to local units, although the conditions for implementing fiscal decentralization were formally established in 2001. Despite the fact that the Republic of Croatia has been politically, administratively and territorially decentralized for many years, it does not mean that the relevant forms of decentralization are accompanied by fiscal decentralization. In order to define a clear fiscal policy aimed at achieving a sustainable and stable financial system of local units, it is important to use information on the degree of fiscal decentralization. Comparing the indicators of fiscal decentralization (the ratio of revenues and expenditures of local and general government and the ratio of expenditures for local and general government employees) in the Republic of Croatia with the member states of the European Union, it may be concluded that the Republic of Croatia is decentralized in comparison with the other member states of the European Union. The degree of decentralization of expenditures, revenues and share of

employment in the Republic of Croatia is higher than the average of European Union countries. It shows a much higher degree of decentralization than the EU12 countries and a much higher number of employees, i.e. expenditure on employees at the lower administrative levels, than in the EU countries. The effects of the creation of the legal framework for the implementation of fiscal decentralization can be seen as early as after 2001, when there was a significant increase in the decentralization of revenues, expenditures, taxes and also employment. It should also be noted that the observed data were calculated in accordance with the ESA 2010 methodology and the Manual on Government Deficit and Debt.

Decentralization relieves the state administration of tasks of local importance. Administrative units at the lower levels of government have the opportunity to innovate and experiment with new development and financial policies and programs that, if successful, can be transferred to the national level. Local initiative can lead to an innovative and more efficient approach to the delivery of public services and a more efficient use of public property. If properly implemented and balanced across all areas of public policy, decentralization has been shown to contribute to economic growth. In addition to the economic benefits, decentralization could lead to greater accountability, transparency and citizen engagement, which would also improve the level of democracy in society.

It is necessary to carry out a complete functional and fiscal decentralization, accompanied by an efficient territorial organization, in order to create a sustainable and successful system of local and regional self-government, which will ultimately contribute to the social and economic development of the Republic of Croatia.

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CHAPTER 2

TAX COMPLIANCE AND TAX AVOIDANCE CONCEPTS: BIBLIOMETRIC LITERATURE REVIEW

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ABSTRACT

Although the topic of tax compliance is a relatively new field of research, it is of great importance for any country due to its great impact on public finances. The main objective of this chapter is to present a bibliometric literature review of the concept of tax compliance/non-compliance, focusing on the identification of key authors, key words and title words, and exploring the links between studies at regional and global levels. Methodologically, the research approach relies on the bibliometric review method using the R Studio software. Information was collected using the online database platform Elsevier Scopus. The findings showed a distinct pattern among authors, key terms, title words, and collaboration networks, particularly in regards to the publication of notable studies introducing the Slippery Slope model.

Key words: tax compliance, tax avoidance, bibliometric analysis

JEL classification: H20

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1 Introduction

Taxation is a dynamic fiscal policy instrument and a necessary component that plays an important role in all aspects of economic fields (Alhempfi et al., 2020, Miskam et al., 2013, Owens & Parry, 2009). Taxes contribute to the increase of public revenue and thus influence the possibilities for public spending and strengthening of the welfare state (Al-Maghrebi et al., 2022). Governments face the challenge of ensuring compliance with tax regulations, with a predominant focus on the collection of tax revenue and, consequently, on fostering the economic development of a country (Aulia, et al., 2022, Nigatu & Belete, 2022). The perception of the fairness of tax systems and high quality of public goods results in high tax compliance and positive perception of fiscal exchange (Alm et al., 1993, Cummings et al. 2005, Feld & Frey 2007, Hibbs & Piculescu, 2010). The government is tasked with delivering both the quantity and quality of public goods and services. The existence of uncollected tax revenues has repercussions, resulting in the manifestation of a tax gap, which serves as an indicator of non-compliance. One of the possible reasons for the tax gap might be tax evasion, which incurs economic costs, influences economic growth, and consequently influences the governments' ability to provide public goods (Alshira'h, 2019, Randlane, 2016). All of the above has led us to our research motivation, and this is, to investigate the determinants that influence it.

Since tax compliance seems to be a relatively new scientific phenomenon, the research approach focuses on a wider field of research, including the terminology, the synonyms and antonyms in this field. In general, tax avoidance refers to the act of taking advantage of legally available opportunities to minimize one's tax liability (Garner, 1999), or the intention to minimize tax liabilities within the legal range of the law (Kirchler & Wahl, 2010, Gassner, 1983, Sandmo, 2003). It refers to the attempt of reducing tax payments by legal means, for instance, by exploiting tax loopholes (Kirchler et al., Kirchler & Wahl, 2010). In contrast, tax evasion can be described as the international effort to bypass or violate tax laws with the aim of unlawfully reducing one's tax liability (Malkawi & Haloush, 2008, Prebble & Prebble, 2009, Rashid, 2020, Gottschalk, 2010). Consequently, tax evasion is illegal, while tax avoidance is a legal way of minimizing the tax burden (Malkawi & Haloush, 2008). In reality, however, there are many grey areas that do not permit an easy differentiation between tax avoidance and tax evasion (Kirchler et al., 2003, Slemrod & Yitzhaki, 2002). Tax avoidance is similar to evasion, in that it also aims to reduce or avoid tax payment. However, tax avoidance is not a criminal offence. Instead, tax avoiders achieve their goal by exploiting gaps or loopholes in the law, without directly violating specific legal provisions (Likhovski, 2007, Thuronyi, 1996). In practice, the differentiation between tax avoidance and tax evasion is often unclear or ambiguous. The reasons behind this ambiguity can be attributed to the excessive complexity and vagueness of tax laws, the limited expertise of taxpayers, and occasionally the practice of tax administrations to intentionally overlook a specific transaction or activity, even when the law is clear (Kirchler & Wahl, 2010, Slemrod et al., 2001).

Besides the fact that tax compliance is a relatively new phenomenon, it involves diverse scientific disciplines, causing problems in its definition. Exploring tax compliance behavior as a research area reveals its interconnectedness with various disciplines, including economics, psychology, sociology, politics, and law. Additionally, the scope has expanded to encompass medical fields, particularly neuroscience. Studies in neuroeconomics suggest that in scenarios where taxpayers face uncertainty regarding potential rewards and losses, the decision-making process is influenced by emotions (Bătrâncea & Nichita, 2012). The challenges arising from the interdisciplinary nature of tax compliance and tax avoidance are manifold. They range from terminological confusion and the multitude of determinants influencing compliance to the diversity of measurement tools, insufficient information, and overall complexity. These issues related to tax compliance and tax avoidance can be broadly categorized into two groups: the ambiguity surrounding the terms and the conceptual framework itself.

The definition of tax compliance varies among researchers. According to OECD (2014), tax compliance is characterized by the extent to which a taxpayer adheres (or fails to adhere) to the tax rules in their country. On the other hand, Kirchler & Maciejovsky (2001) describe tax compliance as the resourcefulness of taxpayer in minimizing their tax payments. Tax compliance is also defined as fulfilling reporting requirements, which means that taxpayers file all the required tax returns on time and accurately report tax liability in line with the regulations and court decisions applicable at the time the return is filed (Roth & Scholz, 2016, Dularif & Rustiarini, 2022, Paleka & Vitezić, 2023). In other words, it is the taxpayers' motivation to pay taxes either voluntary or enforced (Wahl et al., 2010, Palil & Mustapha, 2011, Nigatu & Belete, 2022). In general, compliance means behaving in conformity with the law, while non-compliance means breaking or evading the law (Bilgin, 2014). The tax compliance seems to exceed taxpayers' willingness and is turning into challenges of the tax system and its regulations, which could be non-transparent, difficult to understand, unjust and much too complicated (Alm & Kasper, 2023).

The foundation of tax compliance involves two theories: economic-based theory and non-economic-based theory. The economic-based theory is associated with weighing the costs and benefits involved in performing an action, in this case, tax compliance (Chen, 2006). The deterrence theory posits that taxpayers aim to maximize moral utility. In essence, taxpayers are motivated by economic factors, such as the pursuit of profit maximization. This theory suggests that the level of tax compliance is influenced by the cost associated with adhering to tax regulations.

Kirchler & Wahl (2010) emphasize a deficiency in having a clear definition of compliance and non-compliance, deeming the existing definitions of tax compliance and tax avoidance as incomplete. The absence of a comprehensive understanding of compliant and non-compliant behavior is influenced by the imprecise nature of terms and challenges associated with the discipline itself. Often, research tends to concentrate on only one or two elements, neglecting a holistic approach to the study of tax compliance and tax

avoidance. To address these challenges, the primary goal of the chapter is to establish precise definitions for key concepts associated with tax compliance and tax avoidance. Furthermore, the objective is to systematically map and organize the existing literature on the factors influencing tax compliance and tax avoidance. The objective should be achieved by focusing on the following two research questions:

1. How has the research filed on tax compliance/non-compliance developed over time (number of papers, most productive and most cited authors, authors' collaboration)?
2. What are the main determinants (factors) affecting tax compliance and tax avoidance that have appeared in the literature over time?

The main objective of this endeavor is to analyze the current body of literature concerning both compliance and non-compliance. This manuscript is organized into four sections; the first is the introduction, which includes a literature review in the tax compliance and tax avoidance field. The next section presents the research methodology, identifying the bibliometric analysis of the literature relating to the concepts of tax compliance and tax avoidance, while the third section presents the results. In the fourth section, the discussion and concluding remarks outline the inherent problems and limitations of the conducted analysis. Moreover, this section provides proposals and recommendations for future activities.

2 Methodology

The main idea of the chapter is to provide a bibliometric analysis of the literature relating to the concepts of tax compliance and tax avoidance. The methodological approach is based on the bibliometric tool R studio and the Biblioshiny interface, which provide the presentation of the contributions by the scientific community. The Biblioshiny interface is a useful tool as it enables immediate use since it works with collections from different databases. It is used by experts to produce bibliometric reports, by researchers from all fields to perform systematic analyses, and by bibliometric researchers for their own analyses.

The data collection process encompassed extracting scientific papers from the online database system Elsevier Scopus, accessible at <https://www.scopus.com>. This cited database was selected because it contains topics indexed by the Social Science Citation Index (SSCI), which is an advanced innovative research database with publication and citation data from the world's most influential social sciences' journals. It makes reporting highly meaningful by addressing the actual, anticipated, and often unarticulated information requirements of all stakeholders.

The analysis included all articles that were in the Scopus database. Based on numerous experiments, we found out the keywords and their synonyms that proved to be optimal for finding scientific articles with the desired content. These were *tax compliance* or *tax conformity* or *tax consent* and *tax avoidance* or *tax evasion* or *tax prevention* or *tax restraint*. The Scopus

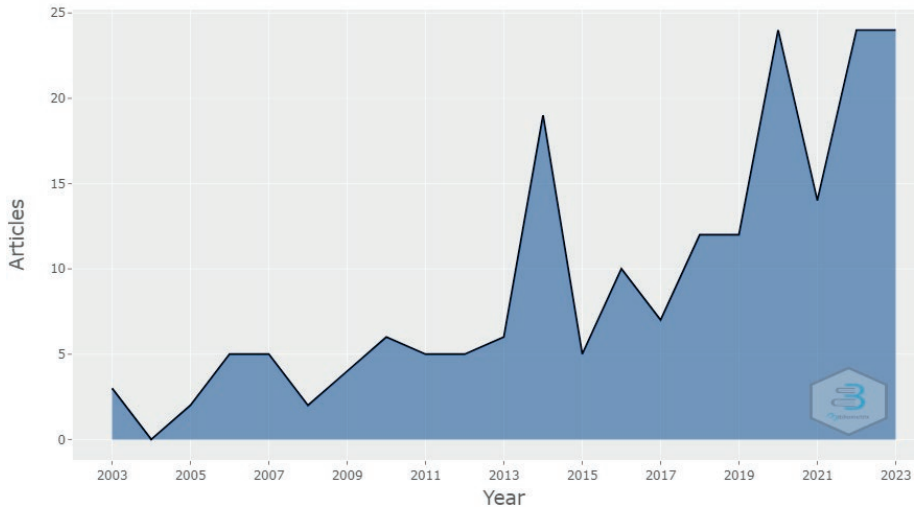
database obtained a total of 582 documents in the period from 1984 to 2023. The set of articles has been additionally limited according to the following criteria: a) the period - 2003 to 2023, b) the English language, c) the scientific papers and d) the field of social sciences. After this limitation, it retained 194 documents for further analysis. The obtained filtered data was exported in CSV (comma-separated values) format, and thus forming our own database for further processing. To work with the data, an open-source tool in the R programming language (The R foundation) was used, namely the R studio program, which is user-friendly and has expanded application options. Quantitative research on authors, keywords, citation networks, and historiography is conducted using the R Studio program, which incorporates the functionality of the Biblioshiny application (Aria & Cuccurullo, 2016). The software employed is freely available and can be run in various browsers, providing accessibility to the application from different computers, workplaces, and operating systems. The results in the application can also be visualized in a simple and transparent way, thus contributing to a better understanding of the subject matter.

3 Results

The results of the bibliometric literature review in the field of tax compliance and tax avoidance have revealed that the first relevant article was published in 1984. Between 2003 and 2023, a total of 194 scientific articles were written by 470 authors. Among these, 425 articles involved collaboration of multiple authors, while only 45 documents were authored by a single person. The average number of authors per document is 2.42, resulting in an average of 0.41 documents per author. Moreover, the average number of co-authors per document is 2.84. It is worth noting that the majority of the documents were published in the Journal of Economic Psychology, the Journal of Business Ethics, and the Public Finance Review.

To provide the answer to the first research question, which focuses on the development of the tax compliance and tax avoidance field over time, the bibliometric analysis was continued. The results revealed the number of papers, the most productive and cited authors, and the collaboration among the authors. The analysis for the period 2003 to 2023 revealed that the number of papers differs between years. As presented in Chart 1, the most productive year was 2022, although the number of papers significantly increased after 2014, and even more so after 2020.

Chart 1 The number of scientific articles in the period from 2003 to 2023



Source: Authors

The most productive period of publication is after 2022. Table 1 displays the most productive authors and the most cited articles.

Table 1 Most productive authors and top manuscripts per citation

Rank	Authors	Articles	Author	Top citations
1	KIRCHLER E	18	TORGLER B	1.190
2	ALM J	7	ALM J	1.067
3	TORGLER B	7	KIRCHLER E	802
4	KOGLER C	5	KOGLER C	265
5	FARRAR J	3	BATRANCEA L	223
6	FRECKNALL-HUGHES J	3	NICHITA A	223
7	HARTL B	3	BELIANIN A	221
8	HAUPTMAN L	3	MACIEJOVSKY B	189
9	KAPLANOGLOU G	3	KAPLANOGLOU G	136
10	MACIEJOVSKY B	3	DOYLE E	99

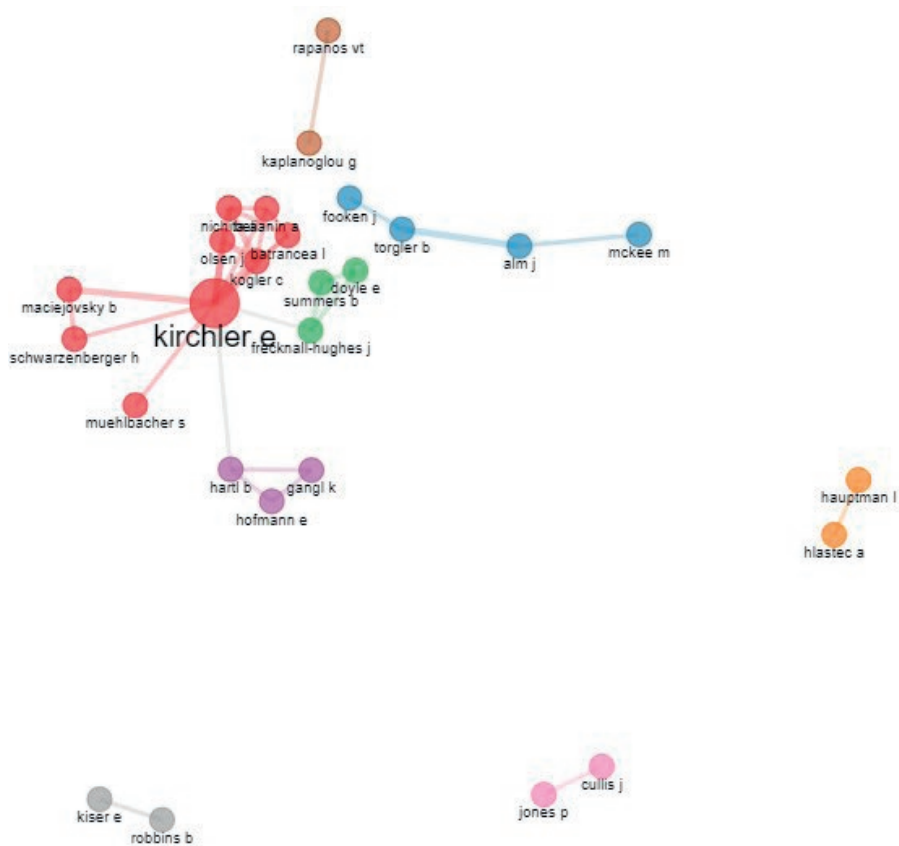
Source: Authors

Table 1 reveals that the compilation of the most cited articles does not entirely align with the outcomes of the list of the most productive authors. Only Kirchler et al. (2023, 2022, 2021, 2019, 2016, 2014, 2013, 2012, 2010, 2007, 2006, 2003), Alm et al. (2022, 2016, 2014, 2011, 2010, 2006), Torgler et al. (2023, 2019, 2011, 2010, 2006, 2005), Kogler et al. (2023, 2022, 2019, 2016, 2013), Maciejovsky et al. (2012, 2007, 2003), and Kaplanoglou et al. (2019, 2016, 2015) appear on both lists, while others either on one or the other list. Most papers expose trust in authorities and the power of authorities as defined in the Slippery slope model. However, there are some differences

among countries; trust and power are recognized as most important factors of tax compliance. Contrary to this, Alm and colleagues (2022, 2016, 2014, 2011, 2010, 2006) emphasize the importance of tax avoidance and tax evasion both as significant present challenges on a global scale. The results show that tax authorities around the world should choose the best practices for tax collection.

Figure 1 represents the collaboration network. When examining the collaboration network in more detail, we can find that the most networked cluster is formed around the following authors: Kirchler, Kogler, Maciejovsky, Bătrâncea, Belianin, Muehlbacher, Nichita, Olsen and Schwarzenberger. The other clusters consist of four, three or two authors.

Figure 1 Collaboration network



Source: Authors

Regarding our second research question about the main determinants (factors) affecting tax compliance/non-compliance that have appeared in the literature over time, we made a treemap, a word cloud and keyword co-occurrences. The treemap (Figure 2) shows the ten most frequently used words in the titles of the extracted papers. The results of the papers' titles

analysis show that 34% of the papers contain the word *tax system* and 12% include the word *compliance*, while other extracted words are less frequently used. The next four words used in the titles of the papers are *tax reform* (12%), *tax* (7%), *adult* (7%) and *human* (7%).

Figure 2 Treemap



Source: Authors

Word cloud visualizes the ten most frequent keywords in the publications (Figure 3). The vast majority of the 194 analyzed papers in the period from 2003 to 2023 contain *tax system*, *compliance*, *adult*, *human*, *tax reform*, and *tax* in the keywords section, although there are less frequently used words like *data set*, *article*, *China* and *attitude* (Figure 3).

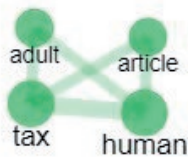
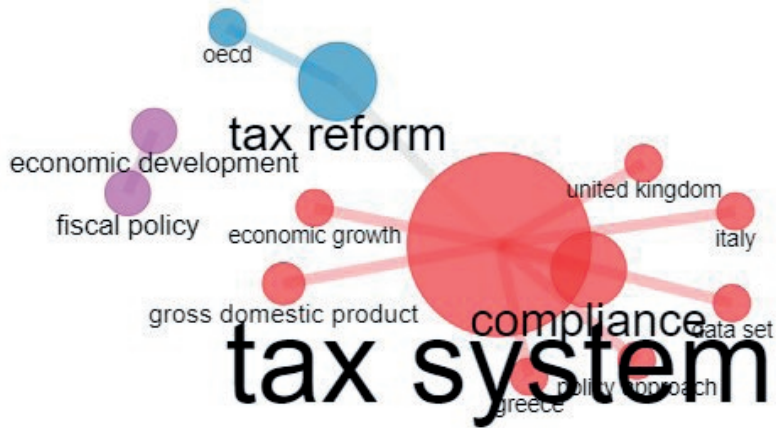
Figure 3 Word cloud



Source: Authors

The most frequently used co-occurred keywords are presented in Figure 4. In the matrix, four circles are formed. The first circle connects the terms: *tax system*, *compliance*, *data set*, *economic growth*, *Greece*, *gross domestic product*, *Italy*, *policy approach* and *United Kingdom*. The second circle connects the terms: *adult*, *human*, *tax* and *article*. The third circle connects the terms: *tax reform* and *OECD*, while the fourth circle connects the terms: *economic development* and *fiscal policy*. Significantly, the most used keyword is *tax system*.

Figure 4 Keyword Co-occurrences



Source: Authors, 2024

4 Discussion and conclusions

The bibliometric metadata analysis using R Studio and the Biblioshiny interface involving the databases of the main scientific journals, has provided various insights into the topic. By searching for relevant keywords and reducing subtopics, we extracted a collection of relevant metadata. The results of the analysis of the existing literature on the determinants affecting the concepts of tax compliance/non-compliance show that there is not a large amount of literature in this area. Consequently, our analysis was conducted on a sample of 194 papers that were published between 2003 and 2023. The results suggest that the field began to develop after 2004, although a significant increase in the number of published papers can be observed after 2014, and especially after 2022. It has also been found that although the number of authors in this scientific field is small, they are very productive. The research results presented in the Treemap, the word cloud and the keyword

co-occurrence show the most frequently used words in the titles of the publications are also the most frequently used keywords and most common in co-occurrences.

Regarding the main determinants of tax compliance or non-compliance identified in the literature review, it can be stated that the bibliometric analysis proved to be a partially useful tool and that further research efforts should focus on the accurate content analysis of the papers, which seems to be the main limitation of our work. Our further research should focus on the content analysis of the papers isolated in this bibliometric analysis by examining the factors that influence tax compliance.

However, conducting research in this field can be challenging due to several factors: its inter-disciplinary nature (the subject spans multiple disciplines, making it necessary to integrate insights from various fields), terminological confusion (the use of different terms and definitions can lead to confusion and hinder clear communication), numerous determinants (there are many factors influencing the research, which must be carefully considered), measurement instruments (selecting appropriate tools and methods for measurement is crucial but can be complex), information shortage (availability of relevant data may be limited, affecting the depth of analysis), overall complexity (the intricate nature of the topic demands thorough investigation). Navigating these challenges requires thoughtful approaches and collaboration across disciplines.

Another interesting research task would be to identify the most frequently cited countries and some other potential bibliometric outcomes.

Finally, research findings have shown that the research field of tax compliance/non-compliance has started to develop over the last two decades, with an intensification observed in the last decade. Indeed, it is plausible to assume that the increase in the number of documents is linked to a heightened awareness among academics, empiricists, and the broader public regarding the topic of tax compliance.

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CHAPTER 3

THE IMPACT OF EUROPEAN UNION FUNDS ON THE REGIONAL ECONOMIC GROWTH OF THE REPUBLIC OF CROATIA

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ABSTRACT

The European Union is one of the most developed areas on a global level, yet there are economic differences between countries, so economic convergence is fostered by European Union funds. The aim of this chapter is to analyse the influence of ESIF Funds on the regional economic growth of Croatia. The analysis was carried out for the 20 Croatian counties and the City of Zagreb in the period from 2014 to 2019. The results of the static panel analysis show that the contracted funds allocated by the European Union do not have a significant impact on regional economic growth in Croatia. Nevertheless, the expected plan of increased absorption in less developed counties is achieved. The above results point to the need to create a more concrete regional development policy in which European Union funds will be the means for achieving economic growth.

Key words: *European Union funds, economic growth, panel analysis*

JEL classification: *C23, O47, R11*

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1 Introduction

European Structural and Investment Funds (ESIF) represent an important instrument in stimulating the economic growth of European Union members as well as achieving economic convergence and cohesion. To promote this process, all EU members participate in the Cohesion Policy and have established joint funds to accelerate the development of less developed regions. Table 1 shows the European Structural and Investment Funds (ESIF) and their main priorities in addressing regional development issues.

Table 1 European Structural and Investment Funds (ESIF)

Fund	Purpose of the fund
European regional development fund (ERDF)	Promotes the balanced development of the entire EU, with a focus on regional projects.
European social fund (ESF)	Supports employment-related projects throughout Europe and invests in Europe's human capital – its workers, its young people and all those seeking a job.
Cohesion fund (CF)	Finances transport and environment projects in countries where the gross national income (GNI) per inhabitant is less than 90% of the EU average. In 2014-2020, these included Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.
European agricultural fund for rural development (EAFRD)	Focuses on resolving the particular challenges faced by EU's rural areas.
European Maritime, Fisheries and Aquaculture Fund (EMFAF)	Encourages fishermen to adopt sustainable fishing practices and the coastal communities to diversify their economies, improving the quality of life along European coasts.

Source: European Commission, 2015

There are a number of studies that indicate the positive effects of ESI Funds on economic growth such as Cappelen et al. (2003), Becker, S.O., Egger, P.H. & Von Ehrlich, M. (2010), Egri, Z. & Tónczos, T. (2018), Fidrmuc, J., Hulényi, M., & Zajkowska, O. (2019), Canova & Pappa (2021), but all of these papers concentrate on the regional economic growth of all member states. In 2013, Croatia joined the European Union as a new member state, which opened up its access to EU funds, and thus to new opportunities for economic development and the achievement of economic convergence of the Republic of Croatia's regions. The period of absorption of EU funds began with Croatia's accession to the EU, however, it is worth mentioning that the absorption of EU pre-accession funds indicated the lack of human capital and own resources necessary for a more significant absorption.

The funds available to member states are redistributed based on the strategies with set objectives and the funds are used to promote the achievement of these objectives. Looking at the financial framework of the Regional Development Strategy of the Republic of Croatia for the period until the end of 2020 (2017), almost half of the funds come from EU aid and

thus represent the main source of funding. Considering this importance, the relevance and intensity of the impact of EU funds, it is necessary to research the impact of EU grants.

The Republic of Croatia's accession to the EU opened up the possibility of using new instruments, among which the most important instruments are the ESI Funds available to EU member states. The aim of the study is to determine the relevance and intensity of the impact of EU funds on the regional economic growth of Croatia. A panel analysis is used to determine the influence of the contracted ESI Funds on GDP growth, which is an important independent variable. The hypothesis is that there is no strong impact of ESI Funds, due to the relatively low absorption of funds which makes the impact on growth delayed. The goal is to conduct a research that will create progress in researching the influence of ESI Funds on economic growth in Croatia. The chapter is organised as follows: after the introduction, section 2 provides literature review of papers examining economic growth and the influence of ESI Funds, section 3 provides key data on the use of EU funds in Croatia, section 4 presents the methodology used and relevant information on the model, section 5 shows the result of the empirical analysis and section 6 explains and discusses the results and finally section 7 concludes the paper.

2 Literature review

The influence of the EU on the member states is to a large extent carried out through legal changes and grants from EU funds. However, the most important instruments for the development of the member states are the Structural funds through which economic growth is encouraged. Previous empirical research conducted with the aim of investigating the impact of financial resources has shown positive effects in achieving cohesion and convergence. The works of Cappellen et al. (2003) and Becker et al. (2010) are only a part of a series of works that indicate the importance of observing the impact of ESI Funds on the economic growth in the EU. In addition to the aforementioned works, Canova and Pappa (2021) analyse the expected impacts based on past data and indicate the positive macroeconomic effects of European structural funds. However, the problem of this work is that it concentrates on the regional growth of specific member state's regions. Lolos (2009) presents a study of the impact of funds on economic growth in Greece. The aforementioned research indicates the positive impact in the achievement of economic growth. Furthermore, the authors Žáček, Hruža and Volčík (2019) conclude that ESI Funds have a positive effect on the regional economic growth of the Czech Republic. Their findings underline the importance of innovation and knowledge, along with labor and capital, as essential variables in the process of economic growth. By encouraging economic growth, the goal is to eliminate economic inequality, i.e. to achieve economic convergence in the EU. According to Borsi and Metiu (2015), the EU member states are not converging at the same pace, and per capita income convergence is not visible. Such results are explained by the insufficient structural reforms within the member states. Research related to the convergence of the European Union has shown that developed regions

are characterized by high technology, innovation, research and development, the quality of human capital, and specialization in sectors that require capital and knowledge (Petračkos, Kallioras & Anagnostou, 2011). According to the data, the region's growth rate does not depend on the amount of funding used, and the biggest problems can be observed in the regions of Greece, Italy, Portugal and Spain (Di Caro & Fratesi, 2022).

Before its accession to the EU, the regional economic development of Croatia was characterized by a process of divergence, due to which the peripheral areas lagged behind in development along with a significant process of depopulation (Pejnović, 2004). The use of EU funds depends significantly on the institutional capacities of the regions, so analyses of the impact of EU funds on the economic growth of Croatia are mostly carried out by researching the absorptive capacities of local and regional administrations and self-governments (Cace, C., et. al. 2009). According to the work of Maleković, Puljiz and Polić (2006), the preparation of international projects by the regions is characterized by a slow flow of information, lack of staff, insufficient education and insufficient funds from the regional budget required for co-financing. It is important to emphasize that the respective analysis was carried out before Croatia joined the EU. Ott, Bronić and Stanić (2016) analyse the aid used from EU funds in the period 2011-2014 and point to a lack of institutional capacity and the need for additional state influence. They point out that of the total funds used by the counties, 80% was allocated to 4 counties and 20% was used by other counties. Golob, Golob and Doretić (2018) observed a weak negative correlation between the county development index and the allocated funds through the 6.3.1. measure - fund for rural development. However, the same research with the development index for local governments indicated a weak positive correlation. Puljiz (2020) highlights the significant impact of EU funds on the revenues of local and county budgets in the period from 2014 to 2018. The increase in the budgets of local and regional self-governments was eight times higher compared to the initial period, with counties using the largest share of funds (43.7%).

The study of absorption capacities only shows the value of the contracted EU funds and is not the main indicator of the impact on economic growth. The main reason for this method of analysis is the short period in which Croatia is a member of the EU, and the entry into the new budget period of the EU opens up space for new research and deeper analyses. Vukašina (2021) examined the impact of ESI Funds on regional growth. Analysis of the period from 2013 to 2017 indicates that an increase in ESI Funds by 1% causes GDP to grow by 0.009%, which shows a small but positive impact on GDP.

3 EU funds and regional economic growth in Croatia

Croatia's entry into the EU in 2013 opened up the possibility of using ESI Funds from the Multiannual Financial Framework (MFF) 2014 – 2021. Table 2 shows the absorbed funds from the Multiannual Financial Framework – MFF for the period 2014 – 2021. The largest absorption of funds was from the

European Fund for Regional Development in the amount of more than 4.3 billion euros. The Cohesion Fund stands out with more than 2.5 billion euros of allocated funds, while around 2 billion euros were used from the European Agricultural Fund for Rural Development (EAFRD) for rural development. The funds used from the European Social Fund amounted to more than 1.5 billion euros, while the smallest amount of allocated funds, 250 million euros, were absorbed from the European Maritime and Fisheries Fund.

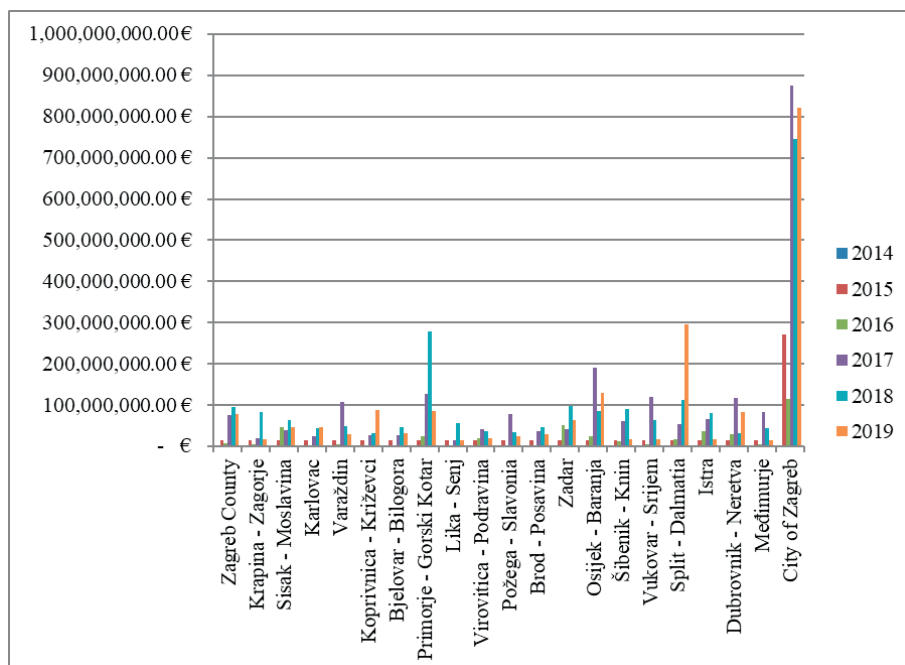
Table 2 Absorbed ESIF Funds in Croatia from 2014 to 2020

ESI Fund	Allocation (EUR)
European Regional Development Fund (ERDF)	4,321,499,588
Cohesion Fund	2,559,545,971
European Social Fund (ESF)	1,516,033,073
European Agricultural Fund for Rural Development (EAFRD)	2,026,222,500
European Maritime and Fisheries Fund (EMFF)	252,643,138
Total	10,675,944,270

Source: European Structural and Investment funds, 2022

Figure 1 shows the contracted grants from Structural funds in Croatia. According to the data presented, most of the funds were absorbed by the most developed counties, especially the City of Zagreb, where over 878 million of euros were contracted in 2017, and over 3 billion euros during the overall period. The second group of counties in terms of higher amounts of contracted funds includes the Osijek - Baranja, Primorje – Gorski Kotar and Split – Dalmatia counties, whose contracted funds do not exceed 530 million of euros per county. Among the counties with least contracted funds are Bjelovar – Bilogora, Brod – Posavina, Lika – Senj and Virovitica – Podravina, whose contracted funds are less than 1 billion per county. The Lika – Senj County contracted the smallest amount of funds, an amount not exceeding 100 million of euros.

Figure 1 Contracted grants from Structural funds in Croatia counties from 2014 to 2019



Source: Authors' calculations using data from European Structural and Investment funds, 2022

To allow for a better understanding of the different development levels among the counties, Table 3 shows the degree of development according to the Ministry of Regional Development and European Union Funds. The counties are divided into 4 development groups, with the City of Zagreb being the most developed and Virovitica – Podravina County the least developed.

Table 3 Development groups of counties from 2014 to 2016

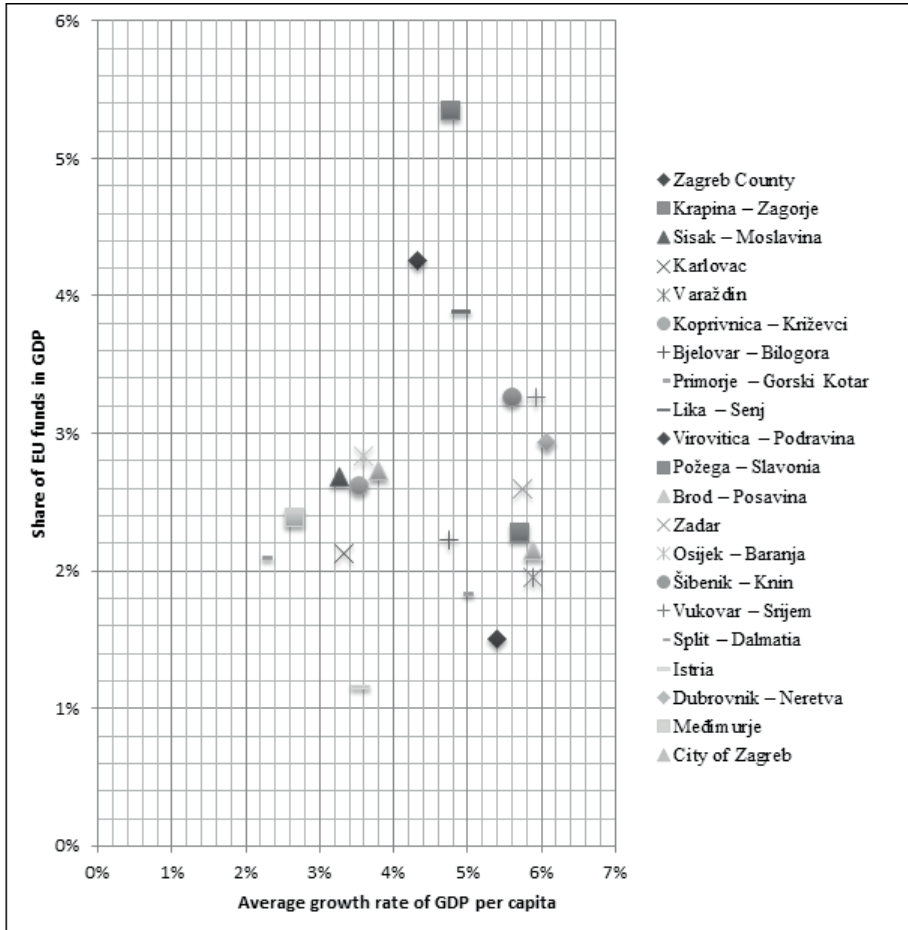
County	Development group	Index of development
City of Zagreb	4	117.758
Istria	4	108.970
Dubrovnik – Neretva	4	108.580
Zagreb County	4	105.980
Primorje – Gorski Kotar	4	105.278
Zadar	3	104.654
Split – Dalmatia	3	103.930
Varaždin	3	101.713
Međimurje	3	100.502

Krapina – Zagorje	2	98.976
Koprivnica – Križevci	2	98.493
Šibenik – Knin	2	97.041
Osijek – Baranja	2	96.009
Karlovac	2	95.191
Požega – Slavonia	2	93.947
Brod – Posavina	1	93.449
Bjelovar – Bilogora	1	92.576
Lika – Senj	1	92.387
Vukovar – Srijem	1	91.992
Sisak – Moslavina	1	91.701
Virovitica – Podravina	1	90.666

Source: Ministry of Regional Development and EU Funds

Figure 2 shows the ratio of the share of Structural funds in the counties' GDP and the average growth rate of GDP per capita. Dubrovnik – Neretva County has the highest average growth rate of 6.07% and is positioned in the group of high developed counties, while Požega – Slavonia County has the highest ratio of absorbed funds in GDP. Higher absorption is noticeable in less developed counties, such as Lika – Senj and Virovitica – Podravina counties.

Figure 2 Ratio of contracted grants from Structural funds and average growth rate by counties from 2014 to 2019



Source: Authors' calculations

4 Methodology

In order to analyze the impact of EU funds on regional economic growth, the methodology is based on the example of the neoclassical model of economic growth measurement set by Solow (1956) and Swan (1956). The model according to Vukašina (2021) was used:

$$\ln(y_{it}) = \alpha_i + \sum_{k=1}^K \varphi_{1,k} \ln(x_{i,t-1,k}) + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where i represents number of counties in Croatia, $i=1, \dots, 21$, while t represents the period from 2014 to 2019.

Table 4 shows the variables, the description of the variables and the data source. The basic variable is Gross Domestic Product, which represents the market value of all finished goods and services produced in a country, in this case a county. The independent variable of significance represents the contracted Structural funds as share in GDP. In addition, some national projects are divided by counties. Among other independent variables, it is important to highlight control variables such as HE, which represents the share of highly educated people in total population. This variable can be considered as an assessment of human capital, i.e. knowledge. The second variable is patents, which indicates the number of registered patents filed with the Croatia's State Intellectual Property Office, which is used to evaluate the development of innovation in a specific region. In addition to the variables mentioned above, the variable of employment is used, which is defined as the share of employees in the working-age population and represents the labor force, while gross investment represents capital. The sum of imports and exports in GDP represents openness. Fixed effects were used for the regions (α_i) and time fixed effects (γ_t). In addition, the standard error is shown (Breidenbach, Mitze & Schmidt, 2016). According to Mohl and Hagen (2010), a lagged impact of the absorbed funds is expected, especially in the case of Structural funds and investments in infrastructure. Therefore, two panel analyses are conducted based on this assumption.

The panel analysis of the impact of EU funds is based on a sample of 21 NUTS 3 regions in the Republic of Croatia in the period from 2014 to 2019. The source of the data was the Croatian Bureau of Statistics, while the exception is the data on the contracted means of Structural funds from the European Structural and Investment Funds website (www.strukturni.fondovi.hr), which were expanded with data from the website of the European Social Fund website (www.esf.hr). Data on the number of patents were collected from the website of the State Intellectual Property Office.

Table 4 Variables

Variable	Description	Source
GDPpc	Gross domestic product per capita	Croatian Bureau of Statistics
Eufund	Contracted Structural funds as a share in GDP	Structural and Investment funds
HE	Share of highly educated people in total population	Croatian Bureau of Statistics
Patents	Number of patents filed	State Intellectual Property Office
Employment	Share of employed people in the working-age population	Croatian Bureau of Statistics
GFCF	Gross investments	Croatian Bureau of Statistics
Openness	The sum of imports and exports as a share in GDP	Croatian Bureau of Statistics

5 Empirical data and analysis

Table 5 shows significant values of selected variables such as: number of observations, mean value, standard deviation, minimum and maximum. The descriptive statistics show that there are 126 observations for all variables (21 regions x 6 years). In the mentioned distribution, the mean value of the dependent variable, which is represented by the gross domestic product per capita, is HRK 72,631.78. The Brod – Posavina County has the lowest GDP per capita and amounts to HRK 42,264.43, while the highest is recorded in the City of Zagreb with HRK 176,012. The independent variable under observation is the share of contracted Structural funds in GDP. The smallest share was found in Primorje – Gorski Kotar County, while the largest in Požega – Slavonia County. In addition to the mentioned variables, it is important to emphasize the variables representing knowledge and technology, which are the most important factors influencing economic growth in the long term. The variable HE is defined as the share of highly educated people in total population. The City of Zagreb has the largest share of highly educated people with the highest percentage of 31.96%, while Virovitica – Podravina has the smallest share of 9.08%. The patents variable describes the number of registered patents. Here the Lika – Senj County stands out, as it has one registered patent in 2014, and there are no registered patents in other periods. The City of Zagreb has the largest number of registered patents, with 47 patents filed in 2019.

Table 5 Descriptive statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDPpc	126	72631.7764	25729.34893	42264.43107	176012
Eufund	126	0.0267285	0.02879177	3.1955E-05	0.170670193
HE	126	0.158705253	0.045939073	0.090820574	0.319558652
Patents	126	7.76984127	10.4408143	0	47
Employment	126	0.81671554	0.08743581	0.619230769	0.962500605
GFCF	126	2476382	5581362.725	176955	31404262
Openness	126	0.5288848	0.646858611	5.05242E-05	6.681360558

Source: Authors' calculations

Note: The analysis was made in Croatian kuna (HRK)

Due to the possible occurrence of multicollinearity, a correlation matrix was created (Table 6). The analysis of the correlation matrix revealed correlation problems with the variables \ln HE, whose coefficient is 0.87, and \ln GFCF, whose coefficient is 0.83. In addition to the variables mentioned variables, a correlation was found with the variables \ln Patents and \ln GFCF, which have a correlation of 0.77. In order to avoid errors in determining statistical significance, four models were created.

Table 6 Correlation matrix

	In GDPpc	In eufund	In HE	In patents	In employ.	In GFCF	In openness
In GDPpc	1						
In eufund	0.134675	1					
In HE	0.868217	0.256265	1				
In patents	0.518253	-0.17586	0.500119	1			
In employ.	0.706237	0.378999	0.601199	0.302202	1		
In GFCF	0.829189	0.04051	0.834239	0.766573	0.522592	1	
In openness	0.083361	-0.04162	0.018892	0.441848	0.208002	0.336262	1

Source: Authors' calculations

To determine a possible autocorrelation, we used the Durbin-Watson test (Table 7). The Durbin-Watson statistic is determined by a range of 0 to 4, with a range of 0 to 2 indicating a positive autocorrelation and a range of 2 to 4 indicating a negative autocorrelation. All tested models have a DW statistic value between 0.25075 and 0.435624, indicating the presence of autocorrelation.

Table 7 Test for autocorrelation

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
DW statistics	0.255752	0.359792	0.372509	0.372509	0.435624	0.250875

Source: Authors' calculations

After the test for autocorrelation, the Breusch-Pagan test is used to determine whether the variance of the errors from a regression depends on the values of the independent variables (Table 8). The Breusch-Pagan test indicates the presence of heteroscedasticity if the p-value is less than 0.05, i.e. H₀ is not accepted. If the p-value is greater than 0.05, there is no heteroscedasticity, i.e. H₀ is accepted. For all models tested, the p-value is greater than 0.05, which indicates the absence of heteroscedasticity.

Table 8 Heteroscedasticity test

	Model 1	Model 2	Model 3	Model 4
	p - value			
BP test	0.1497	0.956393	0.745973	0.057154

Source: Authors' calculations

After testing the autocorrelation and heteroscedasticity, it is necessary to determine which static model is suitable for the model test (Table 9). The results of the F-test have a p-value of less than 0.05 for all models, which indicates that the model with fixed effects is more suitable than the pooled model. In the LM test, the p-value of all tested models is less than 0.05, indicating that the random effects model is more appropriate than the pooled model. Finally, the Hausman test was performed, where the p-value is less than 0.005 and the model with fixed-effects is more appropriate than the random-effects model.

Table 9 Model testing

	Model 1		Model 2		Model 3	
	χ^2	p - value	χ^2	p - value	χ^2	p - value
F - test	153.7313	0.0000	143.0011	0.0000	127.4796	0.0000
LM test	174.6270	0.0000	151.5635	0.0000	158.8003	0.0000
Hausman test	15.62912	0.0036	20.020019	0.0012	19.363359	0.0036

	Model 4	
	χ^2	p - value
F - test	123.0092	0.0000
LM test	180.3926	0.0000
Hausman test	15.331912	0.0090

Source: Authors' calculations

After performing the previous tests, it is necessary to eliminate the observed problems. To eliminate the observed autocorrelation in the second model, lagged independent variables are used. In addition to eliminating autocorrelation, the lagged variables will show the lagged influence of the independent variables. The mentioned problem is significant for the variable *In_eufund*, since projects are often realized significantly later than the year of contracting.

According to the results of the panel analysis (Table 10), the independent variable of importance *In_eufund* has no significant influence on the dependent variable *In_GDPpc* in Model 1 and Model 2. In Model 3 and 4 there is significant and negative impact on *In_GDPpc*. The only variable that has a significant impact on the dependent variable is *In_HE*, according to the basic model, a 1% increase in the highly educated in total population causes GDP per capita to grow by 1.13%.

Table 10 Panel analysis 1

Variable	Model 1	Model 2	Model 3	Model 4
<i>In_eufund</i>	-0.004201 (0.002689)	-0.004218 (0.002708)	-0.004971* (0.002707)	-0.004979* (0.002690)
<i>In_HE</i>	1.129599*** (0.179881)	1.135050*** (0.188951)	1.144190*** (0.186798)	1.147336*** (0.17812)
<i>In_patents</i>	0.018269* (0.009708)	0.018535* (0.010119)	0.018568* (0.010001)	0.018723* (0.009597)
<i>In_employment</i>	-0.411066 (0.278050)	-0.411882 (0.279545)	-0.387911 (0.276568)	-0.388452 (0.275033)
<i>In_GFCF</i>		-0.002704 (0.027286)	0.001585 (0.027066)	
<i>In_openness</i>			-0.005883* (0.005252)	-0.005867* (0.003167)
Constant	13.12902***	13.17617***	13.12238***	13.14997***
Coefficient of determination (R²)	0.982857	0.982859	0.983427	0.983426
Number of observations	126	126	126	126

Notes: *** significance 1%, ** significance 5%, * significance 10%

Source: Authors' calculations

The model with lagged variables (Table 11) indicates an insignificant influence of the variable lag1 ln_eufund on the dependent variable. The only variable with a significant impact is lag1 ln_HE, according to which a 1% increase in highly educated people in total population causes an increase in GDP per capita by 0.97%.

Table 11 Panel analysis 2

Variable	Model 1	Model 2	Model 3	Model 4
lag1 ln_eufund	-0.002675 (0.003191)	-0.003191 (0.003195)	-0.003668 (0.003260)	-0.003232 (0.003262)
lag1 ln_HE	0.969142*** (1.185249)	1.077295*** (0.245090)	1.085278*** (0.245960)	0.982664*** (0.235206)
lag1 ln_patents	0.013520 (0.011194)	0.018575 (0.011686)	0.019065 (0.011735)	0.014283 (0.010473)
lag1 ln_employ	-0.060662 (0.351396)	-0.094510 (0.350048)	-0.079007 (0.351559)	-0.044689 (0.352483)
lag1 ln_GFCF		-0.041290 (0.029219)	-0.039738 (0.029367)	
lag1 ln_openn			0.002685 (0.003513)	-0.003013 (0.003523)
Constant	12.96543***	13.72541***	13.71354***	12.98417***
Coefficient of determination (R ²)	0.983006	0.983425	0.983548	0.983162
Number of observations	105	105	105	105

Notes: *** significance 1%, ** significance 5%, * significance 10%

Source: Authors' calculations

6 Results and discussion

The results of the first panel analysis does not indicate significant influence of Structural funds on Croatia's regional economic growth in the first and second models, but there is a 10% significance in the third and fourth model. In the second panel analysis, after lagging the dependent variables, there is no significant influence of Structural funds on the regional economic growth of Croatia. Additional analysis of Figure 2 with average growth rates of GDP per capita and contracted funds indicates increased absorption of ESI Funds in underdeveloped regions, while average growth rates do not indicate increased rates of economic growth in underdeveloped regions. These results can be explained by the low level of funds absorption in the observed period. A significant increase in funds absorption did not occur until 2018, and it is important to emphasize that these are contracted funds, so their impact on GDP is not expected until a later period. By comparing the results with the literature review, the institutional capacities for a more significant use of EU funds have not been sufficiently developed. Similar research investigating the impact of ESI Funds in the Czech Republic indicates a positive influence on economic growth. Differences arise from the longer period of observation and spillovers between regions. Furthermore, there is a need for structural reforms.

According to the analysis, the only significant influence on regional economic growth is the the number of highly educated population, indicating the significant impact of knowledge on economic growth. In addition, the share of employees in the working-age population in the base model has no significant influence. The variable patent, as a representation of the innovative capacity of the region, has no significant impact on regional economic growth.

The problems in constructing a panel are evident in the relatively short time period covered, which potentially affects the results of the analysis. Other problems arise from the limited amount of available data required for research. One of the examples is the variable used to determine the innovative capacity of regions, because according to Paul Romero's theory, investment in research and development is used as an indicator of innovation, while in this work it is replaced by the number of patents filed.

7 Conclusions

This research of the impact of ESI Funds on the economic growth of Croatia is a rare research type in the literature. Thus it contributes to the current literature by researching contracted funds in Croatian counties and the influence of ESI Funds on economic growth. The empirical research reveals that there is no significant impact of ESI Funds on regional economic growth in Croatia whereas the quantitative method of this research confirms the earlier literature results in regards to the inefficient process of contracting funds. However, a similar paper in another country – the Czech Republic, indicates that there is a positive impact. The differences in the results can be explained through the need for structural reforms in Croatia. The contribution of the work is manifested in the importance of studying the impact of EU financial instruments on the economic growth and development of Croatia. Empiric research is limited due to the short period of time and the problem of unavailable data. Further research can go in the direction of analysing the differences between Croatia and other new member states and/or to investigate the impact of ESI funds on individual activities or the development of individual counties.

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CHAPTER 4

ECONOMIC ASPECT OF BLOCKCHAIN TECHNOLOGY IN INTELLECTUAL PROPERTY RIGHTS PROTECTION

Petra Karanikić¹

ABSTRACT

Intellectual property rights (IPRs) are an important factor in fostering the economic growth and development of every country. The intellectual property rights protection process is a centralized, complex, and highly regulative process. Blockchain technology, as one of the disruptive technologies driving the Fourth Industrial Revolution, can have a positive impact on the improvement of the management and the cost-effectiveness of the IP protection process. The objective of this chapter is to explore and analyze the economic aspect of blockchain technology implementation in the IP protection process. The analysis of the available literature and current trends identified several important economic benefits of blockchain implementation in the IP protection process, namely cost and time effectiveness, lower administration costs, improved management of the overall IP protection process, and counterfeiting reduction.

Keywords: *intellectual property rights, blockchain technology, IP protection process*

JEL classification: *O1, O34, O40*

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1 Introduction

In a broader sense, intellectual property rights (IPRs) are those rights that were created as a result of individual intellectual and creative endeavors from the scientific, literary, and artistic domains (Karanikic, 2023). IPRs refer to the creations of human intellect resulting from their creative and innovative work. IPRs are monopolistic in nature and enable the IP holders to exclude others for commercial exploitation of their IP rights without their consent for a limited period. In return, the IP holders need to disclose their inventions to the public. Since one of the characteristics of all IPRs is limited time duration of protection, when the IP protection expires, the protected IP enters the public domain (i.e., becomes a public good), and can be used, modified, and improved by any interested third party. IPRs can be divided into two categories: copyright and related rights, and industrial property which includes patents, trademarks, industrial designs, and geographical indications.

Intellectual property rights are the main driver of innovation, while innovation is a basis for overall economic and societal progress. For this reason, every society needs to promote and incentivize innovation institutionally. The IPRs system is one of the oldest institutional incentivizing systems and the main goal of the IP legislation is to promote technological development (Riviere, 2018).

The intellectual property rights protection process is centralized and highly regulative. The IP protection process was digitalized by prominent national and international IP institutions (e.g., WIPO, EPO, etc.) which enabled the effective management of the IP protection process. Implementation of the blockchain technology in the IP protection process provided access to relevant market information, the finding of appropriate licenses, and enabling automated systems for marketing (Karanikic, 2021).

Blockchain technology is a revolutionary technology which has potential implications in various areas, including IP legislation and protection processes. In addition to this, there are positive economic effects of blockchain implementation in the IP protection process, which are visible in the cost-effectiveness and effective management of the protection process. An important aspect of blockchain implementation in the IP protection process can be observed in the reduced number of intermediaries. Effective management of the IP protection process can be supported by blockchain implementation in various activities within the process such as providing the proof of rights, keeping rights records, registering and clearing rights, controlling and tracking the rights distribution, etc. (Rambhia et. al., 2020).

The objective of this chapter is to explore and present an overview of the main findings on the economic aspect of blockchain technology implementation in the IP protection process through preliminary literature research and to provide an answer to the defined research question: What are the relevant economic benefits of blockchain implementation in the IP protection process? The chapter is structured as follows. After the introduction, the main features and functionalities of blockchain technology are presented in the second part of the paper. The research methodology and the current theoretical

overview of blockchain implementation in IP protection, with a focus on its economic aspect, are elaborated in the third part. The fourth part provides a discussion on the economic aspect of blockchain implementation in the IP protection process. In addition, the current initiatives by relevant IP institutions in the implementation of blockchain technology in IP protection are presented and elaborated, as well as the challenges of its implementation. The summary of relevant findings and proposed direction and elements for future comprehensive research on this specific topic are presented in the conclusion.

2 Features of blockchain technology

Blockchain technology is one of the most important technological innovations of the 21st century. The first introduction of blockchain technology to the public was in 2008 by the still-unknown identity of the author under the pseudonym “Satoshi Nakamoto”. It was a new method of value transfer execution between peers in a traceable and reliable way (Nakamoto, 2008). Blockchain deals with organizations, people, and technology. There are many benefits of blockchain technology implementation identified in the literature: an indivisible degree of security, the immutability of records, transparency of transactions, digital information authenticity and integrity, data ownership, and capability of trust substitution in intermediaries by trust in a predefined protocol consensus mechanism (Beck et al., 2017, Carvalho et al., 2017, Denter, 2021, Roth et al., 2022).

According to Hauck (2021), blockchain is considered a well-known and generally used distributed ledger technology that facilitates an expanding and chronologically ordered list of cryptographically signed, and irrevocable transactional records shared by all participants in a network. As an open ledger of information, blockchain can be used to record and track exchanged transactions verified on a peer-to-peer network (Clark, 2018). From an economic standpoint, a blockchain can be observed as an exchange network for value distribution between the actors presenting the functional units within the same network layer.

The notion of “blockchain” implies that every block in a chain contains information that is related to a different number of transactions. When each information is verified in Block 11, it will be added to the blockchain system without the possibility of being modified or changed in any manner. Even though Block 2 will contain different transactions, it will still be bounded with Block 1, since it will include a reference to Block 1. In short, every transaction will be stored on a block, which is a storage space, whenever a consensus is reached (Mougayar, 2016).

There are three different aspects of blockchain’s functions: the technical aspect, where blockchain is a background database that maintains a distributed ledger, the business aspect, which defines and elaborates blockchain as an exchange network for moving values between interested parties, and the legal aspect, where blockchain is perceived as a mechanism for validation of transactions for which the intermediary support and

assistance is not required (Mougayar, 2016).

Implementation of blockchain technology does not require a third-party involvement for value transfers, however, the parties involved in the transaction are ensured with security and transaction validity under proof of authenticity provided by the blockchain technology. Blockchain does not have a central server; there are many “nodes” in the system and their role is to constantly check and verify the transactions’ validity. In this way, blockchain technology eliminates the vulnerability of the traditional central database security (Gürkaynak et al., 2018).

The predefined transaction protocols can also be processed by the blockchain. Szabo (1997) developed the smart contracts concept in the form of software that stores various specific rules for contract negotiations, contract verification, and automated enforcement of the agreed contractual terms (Denter et al., 2023).

Blockchain technology can be observed from the perspective of transaction cost theory, developed for a particular economic guidance, for the needs of a particular economic organization regarding the choice and prediction of which governance forms of hierarchies, markets, or hybrids will be used since transaction costs are important decision-making factors (Williamson, 1975). Implementation of blockchain technology can cut costs related to verifying information (Catalini & Gans, 2020) and the way businesses cooperate (Kimani et al., 2020).

3 Implementation and economic aspect of blockchain in IPRs protection process

Understanding the blockchain’s main technical features is very important from the perspective of its implementation and economic implications in the IPRs protection process. For this reason, the preliminary literature research was conducted. The preliminary literature research was conducted by using the Web of Science (WOS) and Scopus databases. The inclusion criteria and focus were on the Topic and Title in WOS, and on the Article Title and Keywords in Scopus, involving all fields. The types of work considered included journals, conference papers, and book chapters. The following search strings were used: “blockchain AND intellectual property rights”, “blockchain AND intellectual property rights management”, “blockchain AND economics”, and “blockchain AND economics AND intellectual property rights protection.” The databases recognized only the papers containing the most frequent words and without connections between them. Only a few papers are considered relevant to the research topic and are thus included in this research. Other relevant literature addressing the research topic included in this chapter was sought for, selected, and analyzed by using the “snowball sampling” technique and grey literature to fill the research gaps.

The IP protection process through blockchain implementation is an innovative approach to IPRs protection, management, and enforcement (Karanikic, 2023). The protection of IPRs differs depending on the form of the respective

IP and is regulated by different national and international IP laws. It is a strict and well-regulated process. According to the civil law, copyright protection is granted automatically, whereas when it comes to other means of IPRs like patents, trademarks, and industrial designs, the protection is granted upon their successful registration process according to both the civil and common law. The registration process is complex and costly. However, the registration of the IP right enables IP holders to enforce their rights in the countries where the protection is granted. This aspect can be considered as a limitation in the context of the global economy and fast economic transactions.

The registration process for a particular IP right can be faster, easier, and cost-effective by blockchain implementation while alleviating the procedures and enforcement difficulties during IP protection. In addition, procedures and requirements for the protection of industrial property rights are different across various jurisdictions. However, these differences should not impact the blockchain technology implementation in the traditional IP protection process. Implementation of blockchain can enable the autonomous registration process of IPRs, but this will depend on the particular type of IP to be protected.

According to Gurkaynak et al. (2018), the blockchain can disrupt several steps in the overall IP protection process management: the IP registration through blockchain by using mobile applications to replace authorized IP institutions thus diminishing the registration costs for the applicants, the management of IP rights through the identification of copyright rightful owners, thus reducing the costs of licensing through smart contracts and the reduction of the need for third parties involvement in the process, and IP rights protection and enforcement against counterfeits.

The immutability, reliability, security, and efficiency as features of blockchain can be used throughout the overall IPRs life cycle: in the IPRs registration, licensing, contractual arrangements, and enforcement. When it comes to the creation of IP, a potential use of blockchain can be in establishing evidence of first inventorship (important for patents), creatorship (important for copyright), and the first use (important for trademarks) which will help in the identification of the rightful owners and minimize the number of IP litigations. Another implementation of blockchain can be in the synchronization of external and internal databases which could help patent examiners in their search of the patent literature through a consolidated platform which will significantly reduce the time and costs of the patent examiner. Tracking and detecting IP violations such as fake goods and parallel imports can become easier if the data is maintained on the blockchain. This will help in detecting counterfeit goods and in preventing their entry into the domestic market by the customs authorities (Singh and Tripathi, 2019).

Blockchain technology can be used as a register of IP using “hashes.” According to Ito and O’Dair (2019), a hash can be defined as an inimitable sequence of alphanumeric characteristics that represent a particular content file and can be perceived as a “digital fingerprint” that is encoded into the blockchain.” Hauck (2021) defines a hash as an output of the original information transformation considered as an input. Tapscott (2016) states that blockchain can help copyright creators capture the value of their copyright

work through the introduction of the authenticity and ownership aspects that are still missing nowadays. Hancock and Vaizey (2015) motivate companies to register their IP within a distributed ledger instead of the regular patent application. This approach has a positive cost-benefit impact through the reduced number of contract disputes in the UK, the reduced number of unnecessary interactions between relevant stakeholders, and improved and more effective management of the IP protection process.

Important blockchain characteristics for IP protection are low transaction costs, the reliance on mathematics as well as its transparency and immutability. As a result, there is a lasting and constant cost-effective effect for information recording and proof-of-existence (Riviere, 2018).

4 Discussion

Besides the evident theoretical evidence on the importance of blockchain implementation in the IPRs protection process, other relevant aspects should be considered and analyzed when it comes to the economic aspect of blockchain implementation.

The value of the IP market is large. The number of protected IPRs is constantly growing. According to the World Intellectual Property Organization (WIPO) statistical data for 2021, the number of global patent applications increased by 3.6% (3.4 million) while the number of trademark applications (18.1 million) increased by 5.5%, and industrial design applications (1.5 million) by 9.2% (WIPO, 2022a). The number of patent applications filed to the European Patent Office (EPO) in 2022 was 193,460 which is an increase of 2.5% compared to 2021 and presents a current record (EPO, 2023). It is evident that every improvement in the facilitation and management of IP protection is important from the economic standpoint, and it can be observed from several aspects such as cost and time efficiency, lower administration costs, improved IP protection effectiveness, and counterfeiting.

Blockchain implementation will have a significant impact on the IP ecosystem and, consequently, on overall IP protection. In 2018, a Blockchain Task Force was established by WIPO to prepare a new WIPO standard on Blockchain for IP (Task. No. 59) that will include all types of IPRs and the overall IP lifecycle (WIPO, 2022). The new standard on Blockchain in IP will enable and guide IP Offices and other relevant IP organizations in IP management, storage, processing, exchange, and dissemination by blockchain. Another impact of the new standard will be in the simplification and acceleration of blockchain implementation within the IP ecosystem in an interoperable way.

A WIPO Blockchain survey on blockchain implementation was conducted in July and August 2020. The study identified the contribution of blockchain in the establishment of a strong, cost-effective, and transparent IP protection processes in the digital transformation era. On one hand, decentralization is emphasized as one of the most important and distinctive factors of blockchain implementation. On the other hand, there is still a need for developing an appropriate governance of decentralized networks. The added value of the

blockchain implementation can be observed in payment automation, better administration, and management of IP, together with the anti-counterfeiting tools within a unified system. In addition, it can make the IP control and approval process of IP transactions faster by allowing for digital authentication that will eliminate paper use and lack/loss of documents and, as such, be more cost-effective.

A WIPO Blockchain White Paper (2022b) identified blockchain potential use cases relevant to the IPRs protection process. From the economic point of view, there are several important areas of blockchain implementation within the IP protection process: timestamping, IP registration, proof of existence, generation evidence, anti-counterfeiting, IP enforcement, and IP licensing. The transaction costs of IP protection can be minimized using the digital timestamp as proof of IP existence. Since IP rights can be registered nationally, regionally, and globally there is a need for the simplification of the IP registration process by using blockchain. This will improve the effectiveness of the IP registration process through better communication between applicants and respective IP offices. The proof-of-existence of a particular IP can be reached through the creation of secure, immutable, transparent, and confidential evidence at a given time. Implementation of blockchain as a platform will provide cost-effective evidence that enables clear and undisputed traceability to support any potential legal action related to the IP protection process. Implementing blockchain for sharing basic data on IPR ownership in a decentralized and secure manner is an important aspect in evidencing the generation of unregistered IP (e.g., copyright). In the case of copyright, blockchain offers a very good solution for sharing the basic data on its ownership in a decentralized and secure manner. It improves the common issues of rights not being paid to the rightful owner because of the not knowing of who they are, and the proof of ownership in a copyright infringement case. Blockchain can be used to fight against the counterfeiting of goods by tracking the routes and recording all the stakeholders involved in the final delivery of the products to the customer. The impact of counterfeited goods on the IP active industry is not only economic since it affects the final consumers by receiving poor quality goods at an excessive price. Implementation of blockchain technology can improve the information sharing between all actors involved and, in this way, improve operational efficiency, and reduce the administrative costs, efforts, time, and management of the needed paperwork and overall bureaucracy. A similar situation is with IP enforcement and the fight against counterfeiting where blockchain technology allows the creation of a decentralized platform where all actors in the IP protection process have access to the relevant information on IP-protected products. This can help in establishing more effective and efficient IP rightsholders and enforcement authorities to share confidential data securely and in this way help in the fight against counterfeiting. IP licensing management is a crucial aspect of a business's success. The biggest challenge today is the lack of protection in the digital environment. Implementation of blockchain can provide traceable and verifiable ownership and an accurate distribution of royalties, allowing the possibility to pay directly to the right holders, and in this way reducing or even eliminating the use of intermediaries.

Besides the findings based on the previously elaborated WIPO initiatives, there are some other opportunities for blockchain implementation in IP protection identified in the literature as follows: licensing, IPRs protection costs reduction, smart contracts, IP exploitation through franchising, and smoother management of the process.

IP licensing is an aspect of IP enforcement that can benefit from blockchain technology. Blockchain with its self-executing smart contracts is an economic instrument especially relevant for standardized transactions like IP licensing. Administration of the standard license agreements by using smart contracts could help in transaction automatization which will have a positive effect on time and cost reduction and efficiency increase. Moreover, blockchain can also be implemented in cases of franchises as a way of IP rights transfer and commercialization.

The overall costs incurred by the management of the IP protection process can be significantly lowered through blockchain implementation by reducing the need for intermediaries. The need for a central entity that will manage the transactions can potentially be eliminated depending on the chosen blockchain network. Implementation of blockchain technology can even unify many transactions on different platforms used by different authorities such as a verification platform, negotiations platform, etc. which will result in the automation and significant acceleration of the transaction process. The European Commission considers this aspect beneficial since it can drastically reduce transactions and complexity (Hugendubel, 2021).

From the operational standpoint, there are several challenges identified related to blockchain implementation in IP protection management: the problem of authenticity, provenance, and royalty stability (Karanikic, 2023). The authenticity challenge is observed in providing proof of existence and ownership for IP-protected work at a certain point in time. Despite the blockchain's ability to store information in an unchangeable way it still requires a permissioned network to validate the inserted information before it is published on the blockchain. For this reason, blockchain technology is not capable of validating and confirming the authenticity of the registered information (Ito & O'Dair, 2019). The provenance challenge of blockchain implementation is linked to the recording of the IP ownership transfer on the network. Even though it is expected that blockchain can facilitate the IP ownership transfer without the involvement of a trusted third party, blockchain cannot prevent the unauthorized replication of the IP-protected work outside the network (O'Dwyer, 2017). Until the resolution of the provenance aspect, the blockchain implementation related to the IP ownership aspect will be regulated by a transferable certificate issued by the respective third party (Asghar et al., 2023).

The royalty stability challenge of blockchain implementation lies in the fact that it is still not possible to use stable payment methods for decentralized royalty payments. Until this challenge is resolved, the royalty payment will be confronted with notable price fluctuations in return for the efficient payment without trusted third-party involvement (Asghar et al., 2023). Overcoming these challenges of blockchain implementation in IP protection will enable

the realization of the economic benefits of its implementation discussed and elaborated in this chapter.

5 Conclusion

Intellectual property rights present an important factor in fostering the competitiveness of every country. The IPR protection system is one of the oldest institutional incentivizing systems for innovation. For this reason, it is very important to have an effective IP protection process and the implementation of blockchain in IP protection will result in improved and cost-effective IP protection process management.

The introduction of a unified blockchain-based platform for IPR protection may improve the overall IP protection process management and help in overcoming the difficulties currently present in IPR registration, IPR confirmation, IP infringement monitoring, etc., and in eliminating the time-consuming and high-cost aspects of the IP protection process.

The implementation of blockchain in IP protection is well-recognized and has a large potential. The introduction of blockchain in the IP protection process could receive wide recognition as well as adequate legal status by relevant IP institutions including IP offices, WIPO, courts, and other government institutions in the future. This is especially important for these institutions as it will enable them to improve their operations, transactions, and procedures in a faster and cost-effective way, and with a higher level of security. Introduction and adoption of blockchain technology, by for example IP offices, will have a positive effect on the management of the IPRs protection procedures and will result in faster IP examination, more reliable IP records management, IP licensing and contractual agreements, enforcement of IP rights, and IP infringement dispute settlement.

An important aspect that should be considered for future research is linking blockchain technology with another promising disruptive technology, Artificial Intelligence (AI), in IP protection and analyzing the economic aspect of such collaboration. For example, by linking these two technologies there will be no human intervention needed in the IP registration process since the process would be completed by the system itself. Patent and trademark assessments could be performed by AI-based software since all relevant information could be provided via the blockchain. This will significantly improve the effectiveness of the IP protection process management and reduce IP protection process costs.

It is evident from the main theoretical findings in the existing literature that blockchain implementation in the IP protection process has many positive economic implications. Introduction of the blockchain technology in the traditional IPR protection system will significantly improve the traditional IPR protection system, a system that has not evolved in line with technological progress.

There is a lack of the existing theoretical state-of-the-art literature on the research topic. The research findings presented in this chapter fulfill the

identified research gap and contribute to the existing body of knowledge on the economic aspects of blockchain implementation in the IP protection process. It serves as a basis for the future comprehensive systematic literature overview on the research topic that will include the search of all available databases and sources of information not focusing only on WOS and Scopus databases and widening the search strings and keywords to collect and analyze larger number of available literature to get a more comprehensive overview of the research achievements.

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CHAPTER 5

GHOST WORK IN MODERN BUSINESS: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

Modern societies are confronted with enormous changes in the way of life and especially in the way labour force functions. In the context of the fourth industrial revolution, new technological phenomena such as artificial intelligence, the Internet of Things, the sharing economy or the platform economy have emerged and will certainly be of crucial importance in the future. Within the framework of the digital labour platform, ghost work has emerged as a new form of work that is becoming ever-more important with the development of digital technology and the huge amount of data available every day. One of the fundamental problems is that ghost workers operate in isolation on a digital device connected to the Internet, where they are assigned a number by a digital gig labour platform that matches them to a task. The objective of this chapter is to determine the role of ghost work in the market, its opportunities and challenges. This chapter gives an overview of the literature in this field. The research findings contribute to a better understanding of the concept of ghost work, which is primarily related to the problem of low wages of workers and dehumanized work combined with high psychological pressure and stress due to job insecurity. It also emphasizes the need to create legal regulations and establish guidelines to ensure better working conditions.

Key words: ghost work, digital labour platform, modern economy

JEL classification: J81, F61, F66

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1 Introduction

Modern forms of communication, information technologies, smart mobile devices, household appliances, robots, all these are devices driven by artificial intelligence and have become part of everyday life everywhere in the world. This change in the way people live and function brought the emergence of new terms, concepts, ways and forms of work. The question arises whether the aforementioned intelligent devices can act autonomously, i.e. whether they can perform tasks without human intervention and involvement. At the moment of a query, i.e. a request to execute a certain command, there are workers (so-called ghost workers) who process the questions and requests and adapt the information, answers and actions of the device.

Ghost Work is a relatively new term that emerged at the end of the 20th century, when the development of artificial intelligence and smart technologies that facilitate everyday life accelerated. Using digital applications to connect users' everyday devices and equipment, they make recommendations based on previous choices and preferences, and learn on that basis. The main assumption is that artificial intelligence is capable of generating new content, but can it do so without humans? What is the role of humans and their work in the development of artificial intelligence? Considering that we are talking about artificial intelligence and other modern technological forms and their implementation in devices and technologies, it is impossible not to ask how they know the answers to the questions posed to them by users? Who is behind these answers and how are the answers generated? The chapter attempts to answer the above questions and clarify in more detail who the ghost workers are, what ghost work means, how much this work is paid, under what conditions it is performed and what are the numerous ambiguities regarding this issue, i.e. the newly created form of work. By answering the questions of what ghost work is, what are its characteristics, advantages and disadvantages, it will be attempted to gain a more accurate insight into the term and the concept itself.

The main purpose of this chapter is to improve the understanding of the concept of ghost work and to show the main advantages and disadvantages of such work, but also provide potential solutions on how to improve the conditions of ghost work.

2 The main characteristics of ghost workers

With the modern business concept, the development of modern technologies, information technologies and tools, come the changes in the economic activity of business entities, as well as people's way of life. Daily life is characterized by technical-technological progress and improvements. Technology is there to facilitate daily activities and work, and by every day this technology is becoming more similar to human behaviour and way of thinking. However, the question arises how this is possible, how the computer knows what a human needs at a given moment. The answer to this question is - the ghost worker.

2.1 Conceptual definition of ghost workers

According to data, it is estimated that there were 4.2 billion virtual digital assistants worldwide in 2020, and that this number will double by 2024 (Statista, 2021). A virtual assistant (VA) in this sense refers to electronic devices that respond to commands, provide information to users, and help control other connected electronic devices. Currently, there are over 110 million VA users in the U.S., and this form of software is used in smartphones, smartwatches, smart speakers, or smart home devices. The most popular virtual assistants in the world are Alexa (Amazon), Cortana (Microsoft), Siri (Apple) and Bibby (Samsung). The “ghosts” in these devices are ghost workers.

In the labour market, the term ghost work is appearing more and more frequently. The term ghost work was first coined by anthropologist Mary L. Gray and computer scientist Siddharth Suri in the book “Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass” (Gray & Suri, 2019). The main motive for creating the term was to try to define the work itself and the working conditions where the value of the person providing the service is erased. Ghost workers are “the invisible workers who run the apps on our phones and the websites we look at” (Gray & Suri, 2019). In other words, ghost work involves tagging, moderating, editing, and sorting information or content. Most often, it is done remotely over the Internet, and it is all based on a contract between the employer and the employee. The workforce is invisible, and the job is adapted to people who want to work full-time from home and at times that suit them.

It is crucial to distinguish the concept of a ghost worker from that of a “worker in ghost” or “worker in shadow”⁴, which has a completely different meaning. A worker in ghost is a person who is on a company’s payroll but does not perform any real work. In some cases, the worker in ghost is a real person who has passed away or left the company in some other way, but whose information remains on the employee’s record. Another possible manifestation of a worker in ghost is that it is a completely fictitious person whose salary on the company’s payroll goes to a third party and constitutes financial fraud (TechTarget Contributor, 2019). In the early 2000s, studies were conducted on workers in ghost that showed that there are workers in ghost who exploit company resources (Mbuh et al., 2020).

2.2 Historical development of the ghost work

The concept of ghost work first appeared in the labour market when a young start-up company, Amazon.com, faced the problem of the sudden expansion of its digital business, i.e. e-commerce, in the early 2000s. The company had the idea of opening an online bookstore and first had to create a database of millions of books to distribute to users, i.e. customers. The large amount of data in the database was mostly incorrect and needed to be corrected. In

4 Ghost worker and worker in ghost are synonyms in English, but there is a clear difference between these two forms of workers. For ease of distinction, the term worker in ghost is used below.

order to create a loyal customer base, the company needed someone to filter all the data, tracking down duplicate titles, misspellings, outdated book jacket images and other data. Only when all the data was corrected and accurate, Amazon could offer this online bookstore service to a new generation of customers who were increasingly shopping online. In the early days of the online bookstore, this work was done by temporary and casual workers, but as other tech giants followed new trends and employed workers, Amazon decided to hire ghost workers to do the work. The main requirement for the job was English proficiency, and since they did not come to the office, they represented cheap labour that could be hired through staffing agencies. The workers hired by the agency now corrected the book titles, publication dates, and descriptions, combined the appropriate book covers and bindings with the appropriate editions, and created a database of keywords to be used for user searches. This database made it possible to generate a lot of relevant search feedback. However, the problems of the Amazon bookstore do not stop there. The volume of bookstores and business suddenly grew, and they became the largest online store, which resulted in the problem of product storage. In order not to store millions of commodities in their warehouses, the company decided to secure the sales assortment offered by them with the help of small and medium businesses, which stored the mentioned products in their premises and were ready to sell through the Amazon online store and their website. Soon, the problem (product descriptions) that was thought to be solved grew again. There was a need to ensure that all products offered matched the associated image on the website. This task required a large workforce willing to take on repetitive work tasks - checking that the product description matches the image, creating a description and keyword database for searching the store catalogue. The workforce was again provided by the staffing firm through the provision of contract workers. Due to the large volume of business, Amazon decided to create a website that would allow any accredited user account to edit product listings and customer reviews – Amazon Mechanical Turk or MTurk was born (Gray & Suri, 2019).

MTurk evolved into a dedicated labour market where workers performed various tasks and were remunerated for it. The platform had a prominent list of work tasks and the salary provided for performing the work. In the two years since it opened, more than 100,000 people registered on the platform and some work was done and paid through the platform. Once MTurk automated recruitment and payments, the company began to do business outside of Amazon teams, and logistics were created for paying workers who no longer necessarily had to be in the United States. MTurk now makes payments, which led to competition and a new labour market. The main difference from anything that existed in the labour market up to that point is that MTurk offered to do work through contracts, i.e. perform tasks that required very few skills or advanced computer knowledge. The only requirement for the work was that the worker had time, paid attention to detail, and had access to the Internet. Regardless of the type of work, the results were faster and cheaper than anything that had been done before, faster than it was done by white-collar office workers. Ghost work has officially appeared and its era began.

To find out who the ghost workers are, Huff and Tingley (2015) conducted a study of who MTurk workers are by comparing them to respondents to the Cooperative Congressional Election Survey (CCES⁵). According to a survey conducted, MTurk is most attractive to young Latin American women and young Asian men and women who live primarily in urban areas. The occupation of respondents employed in certain industries does not differ from CCES data, i.e. 12-16% of them have a professional occupation.

Ghost work has sparked a revolution in artificial intelligence as millions of people perform a variety of small tasks hidden behind consumer technology. Soon, all companies started using ghost work to perform macro tasks. Ghost work has spawned websites and mobile apps where workers hide behind Application Programming Interfaces (APIs⁶) used to recruit them.

2.3 Characteristics of ghost work

The vast majority of ghost work is very low-paid, and the employer uses this labour on a one-time, occasional basis. Workers are a low-tech service in high-tech production. Due to this, there is a reasonable fear that artificial intelligence will replace ghost work and that ghost work will become an obsolete technology. In addition to low incomes and job insecurity, this work is characterized by various forms of stress for workers and a high workload. In their work, workers are often exposed to inappropriate (violent or pornographic) content without their consent. Regardless of the region from which ghost workers come, their livelihood depends on this job, and most of them are long-term unemployed (Moreschi, Pereira & Cozman, 2020).

One of the few benefits of ghost work is flexible hours. Workers can choose when they do the work, and, in most cases, they do it in addition to another job or as an additional source of income. Although ghost work offers flexible hours and endless tasks, workers may be undervalued and underpaid by companies.

Compared to community work, which is characterized by a sense of community and cooperation at work, ghost work is based solely on the benefit of the company providing the work. This underestimated way of working differs from using subcontractors or outsourcing companies because it is based solely on the tasks to be done. Ghost work emphasizes the software or algorithm aspect of helping machines to automate further. By labelling content, ghost workers teach the machine how to learn.

2.4 Characteristics of ghost workers

Ghost workers perform their work and get paid through APIs in online work transactions. They test algorithms, edit pages, review and provide feedback,

5 The CCES is a national statistical sample survey conducted annually in the United States. The survey asks questions about general political attitudes, demographic factors, evaluation of voting opportunities, and political information.

6 API is interface for application programming with a set of certain rules and specifications that programmers use when developing support.

and ensure the accuracy and appropriateness of online content. Every search of Internet databases and every piece of feedback is filtered by ghost workers. Due to the extremely low income, ghost workers are forced to work much harder and be constantly on call to perform low-tech processes and per-content tasks, as well as high-tech tasks such as proofreading, designing, translating and other.

Ghost workers usually perform two types of work: microwork and macrowork (Royer, 2021). Microwork involves narrowly specialized activities that require extensive knowledge and work on long-term projects such as software development and design, writing, or translation. Macrowork, on the other hand, is performed through freelance platforms where workers perform simple, repetitive tasks that do not require extensive knowledge, training, and skills (product categorization, data processing and review, content moderation).

Ghost workers come from all age groups, economic environments, and cultural regions, and they all have one thing in common – a desire to make money. Some of the reasons why they choose this form of work are working hours adjusted to their wants and needs, additional income, the ability to work from anywhere, and the development of their personal skills (Royer, 2021).

Ghost workers are underpaid, as shown in a study by Hara et al. (2018), which found that only 4% of workers earned \$7.25 per hour, while the rest had hourly wages as low as \$2. This is precisely one of the reasons why these workers are increasingly joining together in various forums demanding more power in the labour market that only employers currently have (Klein, 2021). Worker evaluation is done by automated platforms and applications without any human involvement or access. It is very common for the worker to be “fired” without any explanation of what they did wrong or what should be improved, further increasing uncertainty (Valentine, 2021).

Ghost workers' shifts typically last nine hours, during which they process sounds, classify words and phrases, and evaluate responses from digital assistants and applications. The time for processing data and answering questions is relatively short, meaning that accurate estimates are made of how long it may take, and daily performance is determined for each worker. Data on worker performance is published publicly, increasing the set target number of tasks completed per day. The work itself is monotonous, but the volume and pace can be mentally exhausting because the worker must fully complete the work tasks each day, i.e. “give 100% of themselves”, which is impossible if the work tasks are continuously completed at the highest level (Gent, 2019). Currently, ghost workers have no health and social insurance, no paid annual leave, and cannot receive recommendations or references for the work they have done so far that they can transfer to the new platform they are working on, as digital resumes are not evaluated.

2.5 Reasons for entering the ghost labour market

Analysing the conditions of ghost work and the potential dangers that lurk for these workers, one must ask why anyone would choose to become a

ghost worker in the first place. The explanation includes, among other things, the need for money, or the lack thereof. Especially when unexpected costs and expenses arise. In such situations, people decide to do extra work, and working on the computer seems to be the ideal and fastest way to earn money in the absence of other opportunities. After the ghost workers satisfy the new needs, they stay in their jobs for reasons beyond money. One of the explanations for this is that they see this form of work as a way to free themselves, relieve pressure, and more easily overcome obstacles associated with every day, regular work. From a cultural perspective, the lower-paid job of a ghost worker with an uncertain career path is a very problematic choice. Workers who choose to work in this way have probably weighed the advantages and disadvantages of ghost work and concluded that it is a better option than regular work. On the other hand, some were forced into it because of permanent unemployment or the insecurity of a day job that did not offer permanent security or normal working conditions due to the amount of unpaid overtime. The main assumption of ghost work is that workers are immediately available and willing to work and can do the work that a computer cannot handle. Since there is no specific workplace, no working hours, and no professional supervision, ghost work functions as a self-organized activity by people who are online. Ghost workers have some semblance of control over their time, environment, and the work tasks they undertake.

Ghost work has become another source of income that meets the basic needs and diverges from traditional employment. An additional argument for entering the ghost labour market is the pronounced inflation, as wage growth does not adequately follow the increase in prices of goods and services. The fact that there is no state or city in the U.S. where a worker earning the state average wage can afford to rent a two-bedroom apartment while working normal hours does not help either (National Low Income Housing Coalition, 2022).

Individuals often choose to engage in ghost work as a means of escaping traditional employment structures, driven by the persistent presence of discrimination in various forms. According to research conducted in 31 countries between 2014 and 2019, one in five people has been subjected to discrimination on at least one human rights ground, and women being more often the victims (United Nations Human Rights Office of High Commissioner, 2020). Ghost work opens up opportunities for women to realize their right to a legitimate job, as approximately 2.4 billion women in 178 countries around the world do not have the same economic opportunities as men because legal barriers prevent their full economic participation (Bank, 2022). The expectation that women can have it all - formal employment, family life, and personal well-being – does not contribute. This has led to increased pressure on women to do it all, without additional support, because gender equality exists on paper but has not yet taken full root. It is said that women are expected to pursue a professional career during working hours and take care of the household after working hours (Hochschild & Machung, 2012). By working from the ghosts, especially in more conservative countries where society expects women to stay home and take care of the children,

ghost working is a way for these women to earn income and feel useful in contributing to society.

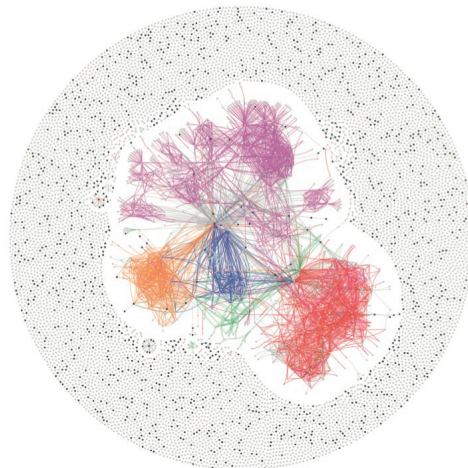
Moreover, ghost work is sometimes practised for personal growth, to gain experience, to learn new skills, or as a form of recreation. Ghost work can become an accessible training that improves skills in graphic design, transcription, typing, computer skills, and language translation.

Looking at the reasons why someone decides to work as a ghost worker, it is the possibility of additional earnings (younger, better-educated people who already have some sources of income), the possibility of additional training, or the possibility of being one's own boss and thus determining one's own working hours and volume of work.

2.6 Estimating the number of ghost workers in the world

Since there is no official report and since the data on the number of ghost workers is constantly changing, it is very difficult to find information on the actual number of ghost workers in the world. According to a research by Robinson et al. (2019), there are 250,810 MTurk workers worldwide who have completed at least one HIT⁷ through the TurkPrime platform. Since there is no transparency in the business (Saravanos et al., 2021), it is very difficult or even impossible to find out more accurate information about the workers themselves. It is estimated that half of the “turkers”, as they are called, work in the U.S., and at the same time, that their number is growing rapidly in Southeast Asia (Hernanz-Lizarraga, 2021). It should be emphasized that MTurk is only one of the several competitive platforms for performing ghost work. The figure below shows the network of ghost workers on the MTurk platform.

Figure 1 Ghost workers on the MTurk network



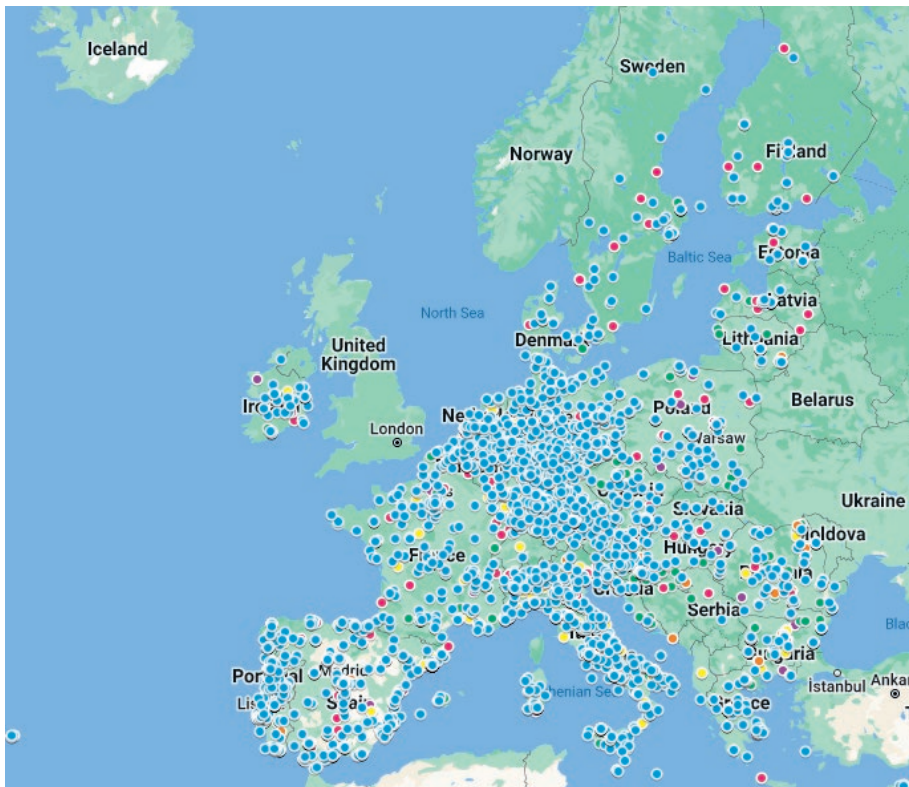
Source: Ghost Work, 2022

⁷ HIT or Human Intelligence Task is a task performed by a human, i.e. ghost worker.

The white shape of the circle represents workers from the U.S., and the dark circles represent other workers in various countries around the world. Light gray links represent one-to-one communications (phone calls, emails, text and instant messages, video calls). Colored lines indicate communication via online forums as follows: purple lines are Reddit's HITS, red lines are MTurk Grind, orange is TurkerNation, blue is Facebook, and green is the MTurk forum. The reason why most of the workers are from the U.S. is that Amazon only pays in cash to workers who are in the U.S., while workers from other countries are paid with Amazon gift cards.

Analyzing the locations of ghost work in Europe, it can be noticed that most of the work is done in Germany. Different platforms such as Amazon Mechanical Turk (MTurk), Appen, Clickworker, Microworkers, Picoworkers and Toloka (Ghost Work, 2021) are analyzed, with data provided by the workers of the aforementioned platforms themselves by mapping their location.

Figure 2 Workplaces of ghost workers in Europe



Source: Ghost Work, 2021

As for the remuneration, i.e. the salary of the ghost workers, the data are also very difficult to access. According to a survey of a relatively small sample of respondents, the most common average wage on the MTurk platform is \$2 per hour, with 4% of “turkers” earning more than \$7.25 per hour. Later, it was

found that workers in the U.S. earn an average of \$3.23 per hour, while in India they receive \$1.4 for the same work (Hara et al., 2019).

Table 1 Comparison of employee wages in the U.S. and India by sex

Country	Sex	Wage (USD)
U.S.	Women	2.79
	Men	3.68
India	Women	1.37
	Men	1.43

Source: Hara et al., 2019

The conducted research brings out the following characteristics of ghost workers (Ipeirotis, 2010):

- 54% of ghost workers are between 21 and 35 years old
- 70% of ghost workers are women
- Ghost workers have lower incomes on average (65% have incomes of less than \$60,000 per year)
- 55% of ghost workers have no children
- The racial composition is similar to Internet users, although there are slightly more Asians.

Considering that Amazon, i.e. the MTurk platform, has recently changed its payment policy towards ghost workers, it was logical that the number of workers will increase in other countries as well. And that is exactly what has happened. Although the majority of workers still come from the U.S., the number of workers in India and Brazil has increased. Workers in Brazil work in poor working conditions with low incomes, have high workloads, and suffer from various forms of stress and anxiety. The lack of regulations for this labour market does not contribute to this situation. The peculiarity of Brazilian ghost workers is that they are doubly exploited because they are paid less, the work is more demanding, and it is difficult to get their earned money (Moreschi, Pereira & Cozman, 2020).

Comparing ghost workers by gender, women are predominantly employed in the U.S., while men in India and Brazil. Looking at age, the majority of ghost workers in the U.S. were born between 1980 and 1989, in India, they are slightly younger (born between 1985 and 1989), while in Brazil they are on average 29 years old. Looking at the level of education, the majority of ghost workers hold an undergraduate degree and their household incomes are below the average income in their respective countries. There is a drastic difference in household size between India and the U.S.; while in India the average number of household members is four, in the U.S. most ghost workers live with two-member households.

The Pew Center estimates that there are 20 million ghost workers worldwide, but no accurate data are available. Research has shown that one in five

Americans have earned income from sales on the Internet, and nearly 24% of adults have earned money by working on an Internet platform (Smith, 2016). The same is evident from data published by the Labour Department, which states that 10.1% of American workers are working without an explicit or implicit long-term employment contract. The World Bank estimates also go in this direction, indicating that the on-demand labour market will continue to grow; they state that the market will be worth \$25 billion by 2020 (Gray & Suri, 2019). Such estimates and statistics point to the growth of this market, which is shrouded in a “grey curtain”, with no clearly defined name, no legal regulations, employee benefits, premiums, and guarantees.

3 Advantages and negative aspects of ghost work business

New phenomena and concepts, as well as ghost work of the modern economy, in order to come alive and survive, must bring and contain certain advantages that put them first, in order to become more and more accepted. Furthermore, since ghost work is exclusively work performed in the virtual world, consisting of a series of virtual tasks, with no human management, it is logical that there are no human aspects to the work either. The rest of this chapter presents some of the advantages and the negative aspects of the ghost work.

3.1 Reduction of the transaction costs of the business activity

Ghost workers are the basis of the new modern on-demand economy, which reduces transaction costs and increases company profits. Transaction costs are all costs associated with production management and the exchange of goods and services. The ghost economy appears in the market as software that eliminates costs such as finding workers, connecting them to each other, training them, communicating with them, and retaining them.

3.2 Flexible working hours and place of work

Traditional working hours mean going to work at a specific, fixed time, usually five days a week, all year round, and at the same workplace. The advantage that the majority of ghost workers emphasize, and which is largely one of the reasons why they choose this form of work, is the flexible working hours. The worker can choose when to do a particular job, because the only thing that matters to the client is that the job is done within the specified time, and when the worker does it is less important. Thus, individuals adapt their work to themselves and their lifestyles. Some work easier and better at night, while others work during the day. Similarly, some workers do not like the feeling of a cramped, sterile office space, and here again ghost work comes to the fore. A ghost worker can choose to work in his living room or in nature. The only condition is the access to the Internet. In addition to flexible working hours and an unlimited number of locations from which to perform the work, ghost work offers the possibility of an additional job and source of income.

3.3 Search for professional staff

When performing certain work, many companies encounter the problem of lacking professional staff to complete the project. Databases of ghost workers provide a wide range of workers and specialists with a wide range of specific knowledge and skills needed only at a particular time. In addition to skills that are only needed at a certain point in time, sometimes there are situations where the workload increases unexpectedly. Employees who are already working full time are busy with other tasks at the time of starting a new job and cannot take on additional tasks. In such situations, one of the possible solutions is ghost work. Another reason why ghost work is becoming more popular is that ghost workers often create better products and provide better solutions than individual agencies and contractors, and sometimes even full-time employees themselves.

3.4 Absence of discrimination in the workplace

Discrimination in the workplace is not a new and uncommon phenomenon, especially in historically marginalized communities, among women and people with disabilities. Ghost work offers these workers the opportunity to gain digital literacy, a sense of identity, family respect, and financial independence. Women who have chosen to temporarily leave the workforce to care for and raise children face barriers and closed doors when they decide to return to work. In addition to these obstacles, these women, whether they are from the U.S. or India, or have different socioeconomic backgrounds, education levels, and social roles, must fight for fair wages and recognition of their achievements in the workplace. This statement is supported by the fact that more than 42% of women have experienced discrimination in the workplace because of their gender (Parker & Funk, 2017). The same is true for people with disabilities, who very often face barriers due to their physical disability that are not associated with an intellectual disability or a reduction in knowledge and skills. Working from the ghosts removes all of the aforementioned obstacles. Working from the ghosts only evaluates their knowledge and skills, ignoring gender, gender role, religious or geographic origin. In particular, it is emphasized that women are protected during ghost work and possible sexist outbursts from employers or work colleagues are prevented, as the platforms through which ghost work is carried out provide minimal information about the worker, i.e. only the worker's knowledge and skills are observed and taken into account. Below are just some of the negative aspects of ghost work.

3.5 A virtual activity of ghost work

Ghost work takes place exclusively in the virtual world, i.e. via Internet access, usually on a computer. It is emphasized that the workers who perform this work are prepared for an uneven workflow. This indicates a situation where certain irregularities in the software occur from time to time, i.e. the software does not work as intended. Due to a series of commands present in the software, for some reason, the software decides to lock the employee's user account so that the employee cannot work and receive a salary. An

additional aggravating circumstance is that it is not possible to contact the user support to solve problems with the software. There is no feedback about the problem, what caused it and how it can be or was solved, only a message that the problem was fixed. Moreover, the software may make mistakes when calculating work compensation or assigning work tasks. In this case, given the virtual environment, there is no human factor that could fix the detected problem in the shortest possible time.

3.6 Other negative consequences of ghost work

One negative consequence of ghost work is that workers must bear most of the costs associated with the work. This refers to the cost of purchasing computer equipment, the cost of an Internet connection, the cost of additional learning and training to perform the work as well as possible, and other.

It should be emphasized that ghost work enables not only a two-way communication between workers and workers, but also between workers and employers, which is the basis for a quality business. Although ghost work combines algorithms, artificial intelligence, and platform interfaces that replace the role and function of the company, it has been proven that the platform cannot replace the role of the company as the coordinator of work. The reason for this is that ghost work also incurs transaction costs, which in this case are borne exclusively by the workers.

Moreover, in case of difficulties or problems, workers have no one to turn to, i.e. they are left to their own devices, as there is no human management in ghost work. Considering the fact that ghost workers perform their work exclusively of their own free will, they can come and go whenever they want, depending on the employer's attitude, and there are many workers willing to replace them.

Ghost workers often suffer from hypervigilance⁸ because they need to find a good assignment on a reputable platform that stands out from the crowd of projects. To achieve the above, they need to be in the right place at the right time all the time. When looking for it, workers spend many hours sorting and searching through job postings and offers. This state of affairs is a result of the lack of legal regulations that would require verification of job providers and protect workers from possible abuse. The deadlines for completing tasks are very often short and unrealistic, even though the task itself has no time limit. Thus, the basic "advantage" of ghost work - flexibility of working hours - is nullified. The most flexible working hours are for those workers for whom ghost work is not the main source of income and who do not need money to survive. In addition to limited work flexibility, due to short deadlines for completing tasks, workers must constantly search databases because job postings and job searches assume that the worker will see the task first and apply (Gray & Suri, 2019).

Rarely does a job provider answer questions about a particular task, and

⁸ Hypervigilance is a chronic state of heightened alertness and awareness accompanied of constantly assessing potential threats.

often a ghost worker loses his or her job for asking questions and wanting to know more. Workers are expected to be spontaneous and are given instructions on how to do the job, i.e. information in solving tasks and also in learning how to use certain tools. Apart from the fact that ghost workers have to fight for themselves, even the smallest mistake can lead to an account lockout that prevents them from working for a certain period of time. The lack of feedback on whether the job is being done well and whether the worker's skills are sufficient to complete the task pose a risk for the worker of losing their reputation in the employer community because, after all, their work is valued and assessed. For a poorly performed task or for abandoning a task, the employer will certainly give a negative evaluation and bad criticism, because he/she is not interested in the employee who performs the work, but only in the task finally completed.

One of the great risks of engaging in ghost work is not being paid for the work done. Even if workers have managed to find a task for themselves, learn how to use the platform, and complete the task despite insufficient clarification of what is expected of them, there is a risk that they will not be paid for their work. Payment problems are, in most cases, the result of errors in the design of the platform. The employer's basic assumption is that workers have access to broadband Internet, reliable power sources, and the latest computers on which to complete their tasks. Unfortunately, the reality is far from that. Workers are working with outdated computers, unstable Internet connections and power sources. The platforms on which the work is performed are sensitive to changes in the data in the worker's account, so it is not uncommon for the account to be suspended without warning or explanation if the worker changes some personal data, such as the address or the location to which payment is sent. In such situations, the workers, in turn, have no one to complain to and claim their rights. It is the company that decides whether the worker will be paid for the work done, and in the case of a payment suspension, workers have no right to an explanation other than a curt response that there has been a breach of contract. All this is further complicated by unclear legal regulations on ghost work.

The creators of the platforms, i.e. the programmers, try to create a perfectly functioning system for the largest possible number of users, both job providers and job seekers. The ghost labour market is extremely concentrated, which is confirmed by the fact that on MTurk 10% of task providers publish about 98% of tasks, which disturbs the balance of economic power and leads to a monopsony. Providers set a non-negotiable wage for a given task. Workers can only accept or reject a particular job for the amount offered. Because platforms make money from task providers, they give them greater market power and the ability to unilaterally decide who gets access and who does not. The platforms very often provide little guidance and direct communication and training channels. Since ghost workers' contracts only specify the terms of use, it is impossible to expect workers' rights and a clear employment status. Moreover, they have no one to turn to in order to prevent discrimination during employment when it comes to adjusting to different conditions, the possibility of career advancement, or taking legal action in case of unfair treatment, not to mention the lack of payment for the work done.

4 The influence of ghost work on digital business

In the modern digital age, which is also characterized by the age of artificial intelligence, human labour is still indispensable, running applications for cell phones, websites and systems. It is emphasized that while artificial intelligence is capable of making basic decisions, it cannot do so without humans. Although artificial intelligence can act independently, it still learns from humans and can very easily accept some behaviours that are not acceptable, such as racism, sexism, and others (Lifshitz, 2021). Therefore, the human factor is necessary in the work process. The new digital assembly line was created by the collective contribution of workers around the world who deliver parts of the project; it works in different sectors of the economy at all hours of the day and night. Ghost workers are an indispensable link, and a profound restructuring of the employment process itself is taking place.

As mentioned above, ghost work has not yet been legally formulated, and it is necessary to classify it. It is not yet possible to determine whether it is inherently good or bad. The fact is that this form of work is hidden from consumers. Companies collect projects, i.e. the tasks of numerous ghost workers who are paid per completed task. They complete their tasks through access to the Internet and computers, i.e. sophisticated databases, in collaboration with artificial intelligence.

The increasing presence of workers leads to downward pressure on wages and job insecurity. Platforms use cheap labour to organize data without concern for its origins or the conditions under which the work was done. Ghost work has allowed tech giants like Facebook and Alphabet to amass wealth based on the use of big data processed by low-paid ghost workers (Gaskell, 2019). The fact that certain tech and software companies employ fewer people on labour contracts and have lower benefits and tax advantages also contributes to this situation.

Ghost work has created a major new labour market in Africa. The continent itself experienced a digital entrepreneurship boom, investing in entrepreneurship programs, co-working hubs, and ICT infrastructure. Large sums of capital have flowed into the region: some \$55 billion through a connectivity initiative by the African Development Bank; the French Development Agency has committed \$76 million to start-up funds; the World Bank has launched its own Tech Accelerator XL Africa to help start-up entrepreneurs raise capital up to \$1.5 million. According to some estimates, total African funding for start-ups in 2019 amounts to \$1.3 billion, so there is an accelerated growth of African cities embracing the Silicon Valley brand; there is a “Silicon Swamp” in Lagos, a “Silicon Savannah” in Nairobi, and also “Silicon Swamp” in Cape Town (Royer, 2021). This progression of events promoted the idea of further entrepreneurial development in this new digital age, where technological infrastructure is readily available and barriers to entry for digital entrepreneurship are relatively low. According to this myth of digital universalism, anyone with an Internet connection can become a successful digital entrepreneur. Although the ICT industry expanded in Africa, it also experienced its collapse as quickly as it flourished. The African

example, in particular, highlighted the differences between the economic cores and the periphery. Western companies make their profits on the basis of lucrative and cheap labour, i.e. ghost workers.

All the same, there are more and more initiatives to change such an environment. One example is the University of Cambridge start-up Meaningful, which has joined companies such as iMerit, Samasource and CloudFactory. They believe there is an opportunity to offer better compensation, i.e. compensation closer to the country's standard of living. They point out that any company that uses ghost work has a significant social impact and should offer work in the right way. It is also very important that the data processed is of high quality and ethical, while ensuring the employment of young people.

Efforts are also being made to improve working conditions. International attention is focused on regulating exploitative labour on digital platforms. The Oxford Internet Institute has created the Fairwork Index, which ranks platforms based on factors such as pay equity, various forms of insurance, contract design, management, and representation. In January 2019, the International Labour Organization's Global Commission called on all stakeholders to develop "an international governance system for digital work platforms that requires platforms (and their clients) to comply with certain minimum rights and protections". The criterion would include ensuring that workers are informed of the identity of their clients and the purpose of their work, with requirements that platform operators flag tasks that can be psychologically stressful and harmful, such as content moderation work that exposes workers to graphic and violent imagery and is associated with cases of post-traumatic stress disorder (Royer, 2021).

5 Conclusion

Ghost work is an increasingly common phenomenon, although the concept itself is still relatively young. The growing number of platform workers as ghost workers has spurred academic research in this area. The social sciences are increasingly concerned with the analysis of this mode of working (Berinsky, Huber & Lenz, 2012).

Today, machine learning is performed under the supervision of a human who teaches the machine how to make correct and ethical decisions based on a set of data previously marked by humans, i.e. ghost workers. The closest way to explain the kind of work we are talking about here is the marking of data that must be done every time a website asks for confirmation that you are not a robot, i.e. reCAPTCHA, which identifies various objects such as a bicycle, a ship, or a traffic light.

The field of ghost work is becoming the subject of a growing number of studies that seek to identify the working conditions and experiences of these workers on platforms. The research findings point to the same problem related to the low wages of workers and dehumanized work associated with great psychological pressure and stress due to job insecurity, and highlight the need to create legal regulations for this type of work.

The inclusion of ghost work in the legal framework and the recognition of this form of employment, which differs from traditional work, could lead to the arrangement of this field and the equalization of wages and benefits for ghost workers. By classifying this form of work through regulations and laws, working conditions would become visible, and companies would recognize that it is not just temporary, cheap labour that leads to automation, but that it is a necessary human link in the entire chain.

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CHAPTER 6

DETERMINANTS OF HEALTH IN THE EU IN THE FOURTH INDUSTRIAL REVOLUTION

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ABSTRACT

Sustainable development that includes economic, social and ecological components, puts health in the focal point of all development agendas. With this research, I aim to identify cognitions about health that represents one of the key economic assets and explain the impact of different determinants on it. My objective is to identify the most important determinants of health in the EU in the period of the Fourth Industrial Revolution and to provide policy guidelines to improve health in the EU. The methodology used is panel GMM two step dynamic estimator for EU countries for the period 2012-2019. Research results show that higher pollution negatively affects health, while economic development, institutional quality, globalization and human capital positively affect health. Since health represents one of the most important public interests, policy makers should be focused on creating conditions that will improve the health of the overall population.

Key words: health, EU, the Fourth Industrial Revolution, panel GMM

JEL classification: I15, I18, I28

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1 Introduction

Sustainable development represents a key societal challenge of the 21st century. Mitlin (1992) emphasizes the scientific discussion regarding its definition. It encompasses not only the environmental component, but also the economic and social components. The social component is related to people and all aspects of their lives, such as health or working conditions. The UN (2023) places *good health* in sustainable development goals (SDGs). The focus on improving global health is also emphasized in SDGs related to poverty, hunger, clean water and sanitation, inequality, energy, economic growth, education and climate. It is highly important for all policy makers, since health drives productivity of human capital which in turn determines the productive power of all other resources, and represents a key driver of social and economic development. Sachs (2013) states that the world and the society entered the period of sustainable development that is human centric and focused on all aspects of well-being like health, environmental preservation and equality.

The OECD (2023) and Utah's Public Health Data Resource (2023) state that life expectancy is the most widely used indicator of health, since it is very comprehensive and encompasses a variety of aspects that affect health, and measures health status across all age groups.

The OECD (2023) and the World Bank (2023) define life expectancy as a number of years newborn children should live if mortality stays at the same level. The World Bank (2023) confirms that on global level life expectancy increased from 50.87 to 72.27 years from 1960 to 2020, while Roser et al. (2019) state that it increased from 28.5 to 71 years from 1770 to 2021.

The research problem is related to the fact that EU copes to meet the SDGs related to health outcomes and life expectancy increase and that it is lower than expected, what is confirmed by Gracia-de-Rentería et al. (2023) and OECD (2019). Health represents one of the major societal challenges and a topic of huge scientific interest. The Fourth Industrial Revolution is still an understudied topic, even though scientific interest is increasing. There is a lack of comprehensive studies related to this topic, its effects and determinants.

Based on the previous definitions and the focus of this research, the following research questions are defined:

1. How does pollution affect health?
2. How does economic development affect health?
3. How does institutional quality affect health?
4. How does globalization affect health?
5. How does human capital affect health?

The research hypotheses outlaid in this chapter are as follows:

1. Pollution negatively affects health.

2. Economic development positively affects health.
3. Institutional quality positively affects health.
4. Globalization positively affects health.
5. Human capital positively affects health.

The research goals of this chapter are to identify the most important determinants of health in in the period of the Fourth Industrial Revolution and to create policy guidelines to improve health in the EU. The research goals will be achieved by providing comprehensive scientific discussion about health and its determinants in the literature review and by testing the hypotheses through an econometric model. The obtained results will contribute to theory and represent the foundations for creating policy guidelines to improve health in the EU. The EU regards sustainable development as a crucial goal within its strategies and sees the Fourth Industrial Revolution as a key to reach development goals and to become the most dynamic global economy. Taking care of humanity and health is crucial for sustainable development, especially because improving health is one of the major societal challenges. Improved health is very important for economic growth, since reduced or endangered health negatively affects human capital which is the most important resource for each economy. The Fourth Industrial Revolution should be the key in the transition towards sustainable development and harmonization of economic growth with environmental protection and societal needs. The World Economic Forum (2016) states that this revolution is human centric and improves global health. It is expected to increase life expectancy. Castro E Melo and Faria Araújo (2020) and the World Economic Forum (2019) state that during the Fourth Industrial Revolution health significantly improved. Its technologies enable higher quality healthcare, more accurate diagnosis, better tracking of patient conditions, early reactions to potential problems, innovative curing methods and scientific progress.

The most important contribution of this research are increased cognitions about health and identification of its drivers in the EU, focusing on the period of the Fourth Industrial Revolution, because the determinants of the Fourth Industrial Revolution, such as human capital and globalization are included in the model. As said before, this is highly important since health represents one of the major societal challenges, especially after the recent Covid-19 pandemic. Another contribution of this research are increased cognitions about the Fourth Industrial Revolution that is an understudied topic. According to a variety of authors such as Sarfraz et al. (2021), Noble et al. (2022) and Ali et al. (2022) the world entered in the Fifth Industrial Revolution which was enhanced by the Covid-19 pandemic and rapid digitalization. It is very important to increase cognitions about the Fourth Industrial Revolution because the Fifth represents its continuation. These theoretical contributions resolve the gap by providing cognitions about the Fourth Industrial Revolution and contributes to scientific discussion about its impact on humanity. Another theoretical contribution is a contribution to scientific discussion about the role of globalization in improving health. The results of the model provide policy guidelines and thus represent an important applicative contribution of this

chapter.

Limitations of this research are: a relatively short period of time observed, the exclusion of UK due to Brexit, the usage of life expectancy as a health indicator and omitted variables. All limitations of the research will be in detail later explained in the Conclusion.

This research is structured as follows. The Introduction which provides insights into the research problem, its goals, questions, hypotheses, contributions and limitations. This is followed by a comprehensive Literature review. The third part represents and explains the chosen method, followed by the explanation of Empirical data and analysis. Part 5, explains and discusses the results of the model. The chapter ends with concluding remarks.

2 Literature review

In this segment by referring to previous research, I will explain the definition and importance of health, the factors and determinants that affect it and its correlation with indicators chosen for this research.

St. George University (2021) defines global health as the understanding of health on global and multidisciplinary level in order to reduce inequalities and improve the health of world population. Apart from pandemics, the most important risks that endanger it are rising inequality, pollution, political factors, severe diseases and nutrition. The WHO (2017) defines health as an overall physical, mental and social wellbeing. Health represents more than a situation when person is not ill or infirm. The most important factors that affect health are the social, economic and physical environment, connectivity, behaviour, personality, genetics and habits. The economic environment implies the living standard. The social environment encompasses knowledge, education and the healthcare system. Connectivity implies connections with people. The physical environment implies to public infrastructure that is a precondition of each development and access to basic needs: clean water, electricity, sanitation.

The OECD (2022) states that healthcare should be public and private investment priority. It is necessary to invest in people, equipment and quality of healthcare systems. Horton and Lo (2013) find that increasing investments in healthcare on the global level will reduce the overall death rate, prevent diseases and inequality. These are investments in social and economic development, humanity and national security. Zivin and Neidell (2013) examining China, Mexico and US municipalities and Becker (2007) examining the OECD countries using the FOC method state that health, as an important economic asset and human capital are the major drivers of productivity and economic development. Life expectancy is a major health indicator that increased rapidly after World War 2. Investments in human capital positively affect it. Davis et al. (2022) indicate that in USA, the unequal access to healthcare is a major cause of reduced health, life expectancy and increased death rate. It creates annual productivity loss of 42 billion USD. Suhrcke et al. (2006) state that improved health creates a variety of benefits

in the EU. It increases productivity, salaries, quality of human capital and growth rates.

Schneiderman et al. (2021) emphasize stress as one of the major global causes of reduced health and life expectancy. It has negative effects on both physical and mental health and consequently on productivity and economic growth. Guzel et al. (2021) state that the SDGs that prioritize health are important policy guidelines for social and economic development. They found on a panel of 16 poor countries that globalization, economic growth and democracy have a significant positive effect on life expectancy. Barlow and Vissandjee (1999), after a multivariate analysis on 77 countries, state that economic growth and the living standard, literacy and living conditions positively affect life expectancy, while higher temperatures, humidity level, and unhealthy nutrition expressed in consumption of food with low nutritional value reduce it. They confirm that life expectancy is a widely accepted indicator of health. Freeman et al. (2020) compared USA with Brazil and Ethiopia. Unequal access to and privatization of the healthcare system, lack of legislative related to it, lower social security standards and scarcity of politically active citizens reduced life expectancy in USA. In Ethiopia and Brazil investments in human capital and education, increasing equality, political, social and economic activity of citizens, improved living conditions, economic growth, social development and lower Gini coefficient increased life expectancy. Even though USA performs better than the compared two economies, not only in life expectancy, but also in overall development level, lowering life expectancy in USA signals that policy makers have to take necessary actions to improve health. Hasan et al. (2017) confirmed on a panel of 108 transition and emerging economies that the most important indicators of health are human capital, public investments in healthcare systems, economic growth and improved living conditions.

Bilas et al. (2014), based on a panel analysis, state that economic growth and quality of human capital are the most important drivers of increasing life expectancy in the EU. Life expectancy, as a crucial health indicator, is marked as a key development driver. Blázquez-Fernández et al. (2018), by using a dynamic panel, examined the drivers of life expectancy in EU economies. Despite negative effects on general health, higher Gini coefficient sometimes does not affect life expectancy. Economic growth and living standard positively affect life expectancy. Rodriguez Alvarez (2021), after a panel analysis, finds that inequality and environmental degradation negatively impact health in the EU28 and Turkey, while economic growth, investments in healthcare staff and transition to green energy have positive effects.

Ritchie and Roser (2021), using a comparative analysis, conclude that environmental pollution is one of the major global causes of death, which implies that it is also one of the main factors of reduced health and life expectancy. The World Bank (2023) states that global greenhouse gas emissions almost doubled since 1990, but in the EU, have been reduced almost 1.5 times. Smith et al. (2009), in their meta-analysis on 66 US towns, argue that pollution endangers health, causing variety of diseases, like cardiovascular, respiratory or certain types of cancer, and consequently

reduces life expectancy. Woodcock et al. (2009), using comparative risk assessment methods analyzing London and New Delhi, found that reduced emissions in the following decades should significantly improve life expectancy because this reduces the disease rate. This will be achieved by the transition to green innovations and healthier lifestyle. Health will be improved by replacing motor vehicles with walking or bike usage, what should increase physical activity, and thus not only reduce the emission rate, but also prevent diseases like cancer, depression, high blood pressure or respiratory diseases. Tan et al. (2022) argue that greenhouse gas emissions, as a major source of global warming, negatively affect health based on their panel analysis of 30 Chinese provinces. Mariani et al. (2010), using OLG model on 132 countries, emphasize the importance of environmental protection in increasing life expectancy and health. Countries with higher pollution significantly reduce life expectancy. But, also higher life expectancy positively affects environmental protection since people increase their efforts in that direction and act upon it. Pautrel (2009), using general equilibrium, confirms the significantly negative effect of environmental deterioration on health and life expectancy. In total, life expectancy on global level reduced for 7,900,000 years due to pollution. Environmental protection may constraint or reduce the growth rate in the short term, but after people change their behaviours the growth rates will increase. Rozenhalova et al. (2017) found that emission rates, especially of NO₂ or SO₂, cause higher pollution levels and have detrimental impact on health and life expectancy in the EU28. In accordance with the European Environment Agency (2016), Kolasa-Więcek and Suszanowicz (2019) using a neural network confirm that higher emission rates are one of key drivers of reduced life expectancy in 20 EU economies. Gracia-de-Rentería et al. (2023) in their analysis of the health production function found that increased emission rates and low quality food consumption have a significantly negative effect on health and life expectancy in EU economies, while living standard, public investments in health, integration in global trade flows, increased urban population and human capital creation increase life expectancy.

Roser (2013) and Roser et al. (2019) indicate that economic growth increased in the period of Industrial Revolutions, what is correlated with increasing life expectancy. It increased exponentially in the period of the second half of the 20th century. Barro (2013), using panel data, states that the correlation is vice versa, since improved health positively affects human capital and efficiency, while a higher welfare level is necessary for public and private investments in healthcare system and personal health. Shahbaz et al. (2019), based on the cointegration test on sub-Saharan countries found that GDP growth is one of the essential indicators of higher life expectancy in emerging economies, same as globalization and business activity. Wang et al. (2022) examined life expectancy on a panel of 134 national economies, including EU states, and found that economic development and welfare are important determinants of higher life expectancy. Mackenbach's regression analysis (2012) indicated that in Europe during the previous century economic growth and welfare positively affected life expectancy and health. Effects varied through decades. Additional factors that affected life expectancy were technological progress, innovation activity, nutritional habits, quality of healthcare system and

political conditions. Cervellati and Sunde (2005) found that in the EU, social variables and health are intercorrelated. Economic development generates welfare and enables higher investments in healthcare systems, personal health, innovations, R&D and human capital. Human capital enhances further development and better health outcomes, since more knowledge enables making better decisions.

Dingake (2017) theoretically explains that on a global level institutional quality is an essential driver for better health outcomes and life expectancy. Systems with higher rule of law level achieve better results in increasing the quality of healthcare systems, adopting new technologies enhancing prevention, more efficient treatment of different diseases or injuries and reduction of inequality in health services. Pinzon–Rondon et al. (2015) using a multivariate regression examined 96 economies that encompass 91% of the global population and found that institutional quality has a significant impact on improving health. It increases life expectancy, helps in curing and preventing diseases, and reduces the death rate. Positive effects on health are also confirmed for economic growth, living standard, investments in healthcare systems, income equality and liberalization. Gostin (2000) states that improving institutional quality has to become a key priority for global policy makers since it is a necessary factor in increasing the health of a population. Achim et al. (2020) found that in the EU and other 159 economies lower institutional quality reduces health and life expectancy and increases the death rate. Economic growth improves health, same as cultural heritage. Effects differ by development level. In developed economies poor institutional framework affects more mental health, while in transition and emerging countries, effects are more related to physical health. Socoliuc et al. (2022), based on a panel analysis, confirm this and state that poor institutional quality is especially harmful in terms of infant mortality in the EU28. Differences between developed EU economies like Scandinavian and Benelux countries, Germany, Austria, France and Ireland, and other members that belong to less developed part of the EU imply that to improve health, higher quality of public institutions that will enhance the rule of law and prevent immoral acts such as bribery is necessary. Economic growth and human capital improve health, while a lower labour participation rate reduces it.

Deaton (2004) emphasized huge scientific discussion about the effects of globalization on health and life expectancy. Scientists from certain fields like medicine claim that globalization negatively affects health, while social scientists disagree with it. However, this paper confirms that globalization, due to its various benefits like better technology and knowledge transfer, increased level of cooperation and trade, increases life expectancy and has a potential to accelerate its growth rate in poor and emerging economies. Bergh and Nilsson (2010) confirm on a panel of 92 emerging and transition economies that the globalization level with all its aspects like social, political and economic, is a major determinant of increased life expectancy, with special emphasize on the economic aspect. Economic growth and living standard positively affect it, but effects vary over time. Gale Johnson (2002), using a comparative analysis, states that despite claims about bad effects of globalization, it is a phenomenon that significantly improved the world

and society. The most important benefits are related to living conditions, like health and life expectancy, lower mortality rate, increased welfare, reduced business costs, knowledge and technology transfer, higher level of inclusion in trade flows. McCarthy (2011) states that the EU has to prepare to take advantages of globalization and integrate into global science and innovation flows in order to improve health of its population.

Oster et al. (2013), on a panel of 79 countries, and Castelló-Climent and Doménech (2008) indicate that knowledge and human capital are crucial drivers of increased life expectancy and improved health. People who are ready to invest in their knowledge, will be more focused on investing in their health. Kaplan et al. (2014) analyzing USA, Boháček et al. (2015) on the sample of SHARE countries and Van den Heuvel (2017) using cross sectional analysis of 31 European countries state that human capital and education are more important for health than investments in healthcare systems. Those are investments in social development that lead to higher health awareness, better decisions and health outcomes. Jagger et al. (2008), using meta regression, found that quality of human capital and inclusion into the education process from early to old age, investments in health care for older people and economic growth increase life expectancy, while lower labour participation rate, higher Gini index and poverty rate reduce it. Despite higher life expectancy that started to increase especially after World War 2, it is possible to expect that higher life expectancy in the EU might impact reduced life expectancy in certain period, what will be shown in the econometric model.

This section provides a comprehensive review of the literature on health in the EU and other countries or regions in the world. It also provides explanations related to the relationships among the different determinants and health and answer, in part, the research questions from the Introduction and is relevant for the researched topic. In the following section, related to econometric model, further answers to research questions will be provided since correlations among health and chosen independent variables will be tested.

3 Methodology/model/conception of analysis

Healthy human capital represents a development engine of each society and determines the productive power of all other resources. Sustainable development that is a societal agenda in the 21st century emphasizes health as a strategic global interest. The Fourth and Fifth Industrial Revolutions are emphasized as technological and social breakthroughs focused on people and humanity. The literature review served as a basis on which the different determinants of health like pollution, economic development, institutional quality, globalization and human capital are extracted. In the equation 1, I represent the econometric model.

$$Lifeexpe = f(envpoli,t; GDPgroi,t; insti,t; gloeci,t; HCi,t) \quad (1)$$

Consulting the relevant literature like Achim et al. (2020) and Hassan et

al. (2017) and references in this paragraph, I decided that the chosen methodology to construct the model in this research will be the GMM two step dynamic panel estimator due to its benefits and characteristics that will be explained in continuation. Piper (2014) emphasizes the advantages of this methodology. This method reaches higher precision in determining coefficients. Correlations between the dependent variable and independent variables are more accurate when a dynamic panel is used. Diagnostic tests like Sargan or Arellano Bond provide for more accurate results and their interpretation. Labra and Torecillas (2018) emphasize that this method is used widespread, especially in papers and studies in the field of economics. It enables pointing and determining the particular effects of each variable and multiple time periods, and it resolves endogeneity issue that might appear in the model which represents great benefits in comparison to other econometric methods. This method is highly adequate in accomplishing models which encompass multiple units in certain time periods These units can be national economies, enterprises, business sectors, regions etc. Baum (2013) states that one of the advantages of this method is the use of a lagged dependent variable and possibility of autoregression. Increasing usage and high suitability of the model is confirmed by Bond (2002) who states that a dynamic panel allows one to gain more necessary information and allows for possibilities to study the dynamic correlation among variables in previous periods. The advantage of this method is that it is much more appropriate to deal with the problem of different type of biases in research and possibility to research heterogeneity in dynamic relationships among variables. Gutierrez and El-Khattabi (2017) state that simplicity represents the advantage of GMM dynamic panel and that its usage enables elimination of the effects of omitted variables, and due to dealing with the problem of biases enables creation of suitable set of data and variables in the model.

There are several reasons to use this methodology. The model contains multiple units in certain time periods and requires studying dynamic correlation between variables. Since health is determined by a variety of variables, with this model I wanted to eliminate the effects of omitted variables. The results of the model represent the foundation for policy guidelines. Since public policies have to be evidence based, I think that a dynamic panel that successfully deals with the problem of biases and reaches higher accuracy level in establishing correlations between variables represents an adequate model for this research. Another very important reason is the use of diagnostic tests that provide more accurate results and their interpretation. The raw data I had at my disposition for this research are important in choosing the suitable methodology. In this research, variables were not stationary without differentiating it. It is also one of the reasons to use the panel GMM two step dynamic estimator. Another reason is because dependent variable value in one year depends on its value in the previous year.

There are 133 observations in the dynamic panel model for the chosen period 2012-2019 that encompasses the Fourth Industrial Revolution. The following equation shows the GMM dynamic panel model that comprises single- time shifted lagged dependent variable:

$$y_{it} = \beta y_{it-1} + u_i + v_{it}, |\beta| < 1 \quad (2)$$

In the model above y_{it} is the dependent variable in the period t . Lagged dependent variable in period t is y_{it-1} with lag for one period from t ; u_i is related to individual time-invariant effects. Value v_{it} in the chosen model, represents random error. Individual effects are taken as stochastic. Another and key noteworthy assumption related to the stability of the model are errors v_{it} , which are serially uncorrelated. Individual time-invariant effects are mainly linked to former effect of the dependent variable in the model, that is related to the problem of endogeneity and tends to deal with this problem.

Based on all previous explanations, the model in the equation below is created and examined:

$$dLifeexp_{i,t} = \beta_0 + \beta_1 envpol_{i,t} + \beta_2 GDPgro_{i,t} + \beta_3 insti_{i,t} + \beta_4 gloeci_{i,t} + \beta_5 HCi_{i,t} + u_{i,t} + v_{i,t} \quad (3)$$

4 Empirical data and analysis

This chapter aims to determine the role and impact of pollution, economic development, institutional quality, globalization and human capital on health in the EU for the period 2012 – 2019. The respective period is chosen since it focuses on indicators of health in the EU during the Fourth Industrial Revolution that lasted from 2011 – 2020. This period is taken, since it started in 2011, but its first effects were noted in 2012, while 2020 is marked as the start of the Fifth Industrial Revolution caused by the recent pandemic that resulted with disruption of overall society.

As a proxy for health, $d_Lifeexp$ or life expectancy at birth is taken from the World Bank database (2023). It is measured in expected years of life of newborn children in case when the death rate is constant. According to the relevant literature like OECD (2023), life expectancy is the most used indicator of health and, as explained in the Introduction, it measures health in all age groups. Moreover, the reason to include it is because according to the relevant literature such as Jagger et al. (2008), it is possible that increased life expectancy in one period might affect its reduction in the further period so I wanted to test it on the example of the EU.

Variable d_envpol is taken as a proxy for environmental pollution and represents total greenhouse gas emissions taken from the World Bank database (2023). Greenhouse gas emissions are frequently used in measuring pollution. Emissions are measured in kilotons of carbon dioxide and represent total emissions of greenhouse in the atmosphere where only short cycle biomass burning like agricultural waste is not incorporated in measurement. Relevant literature like Tan et al. (2022) emphasizes its detrimental impact on health and this is the main reason why its reduction is one of the key public interests and why hypothesis about its negative impact on health will be tested.

Economic development is measured in percentages on annual level and the variable d_GDPgro or annual GDP growth is taken as proxy from the

World Bank database (2023). Economic growth creates welfare and enables higher level of public, private and individual investments in health. A more particular reason for incorporating this variable in the model is because relevant literature such as Bilas et al. (2014) mentions the possibilities that even in developed economies which achieve economic growth, health might be endangered so in this econometric model, I wanted to test the correlation between health and economic development on the example of the EU.

Institutional quality is measured with variable *d_inst*. As a proxy is chosen the variable rule of law from the World Bank database (2023). It represents the opinion of the population about institutional quality and rule of law in a certain country. The calculations incorporate executions of contracts, property rights, quality of the judicial and police system, prevalence and punishment of criminal and violent activities. The lowest value is -2.5 points, while the highest value is 2.5 points. The rule of law, according to relevant literature like Dingake (2017), is very important in improving health since it enables the reduction of inequality and immorality in healthcare, more efficient technology and knowledge transfer and their implementation in the healthcare system.

The variable *d_gloec* is taken as a proxy for globalization, this is, the economic globalization index measured by the KOF Institute (2023). It is a part of the globalization index that includes political, economic and social globalization, and measures the integration level of a national economy in global economic, trade and financial flows. The minimal value is 0 and maximal 100. Integration in global flows in any area enables attracting foreign direct investments in healthcare system, technology and knowledge transfer across different healthcare systems, flow of the ideas and cooperation among medical, scientific and educational staff from a country and abroad what should improve health outcomes.

Variable *d_HC* or knowledge and technology output is taken as a proxy for human capital. It is taken from the World Intellectual Property Organization (2023). The minimal value is 0 and maximal 100. It measures investments of a national economy in human capital and the results of processes based on knowledge, competencies and skills. Improved knowledge and human capital imply higher awareness about the importance of health, avoiding risky behaviours and improving the health of the population. This indicator is adjusted to the period of the Fourth Industrial Revolution that is based on technology and knowledge and in accordance with definition of human capital provided by OECD (2023) and World Bank (2019) which state that it consists of skills and knowledge and other characteristics people possess that help them to be productive. Before presenting results of the model it was necessary to make stationarity tests. Results can be found in the table 1.

Table 1 Stationarity of the variables

Variable	P value
Lifeexp	0.6838
envpol	0.6838
GDPgro	0.6611
inst	0.8743
gloec	0.9123
HC	0.9446

Source: Author's calculations

To achieve stationarity, I used the first differences of chosen variables, since they are not stationary without differentiating. I used the KPSS test that is the most suitable for smaller samples and time periods like the Fourth Industrial Revolution and provides higher accuracy of results. It is very important to test stationarity of the variables, otherwise, the model can produce misleading results. The null hypothesis is that the series is stationary around the trend and there is no unit root. Since p-value is higher than critical 0.05, the null hypothesis is confirmed and variables are stationary.

5 Results and discussion

Table 2 provides results of the model set in equation 3.

Table 2 Results of the model:

	Coefficient	Std. Error	z	p-value
d_Lifeexp(-1)	-0.488657	0.0235666	-20.74	<0.0001
d_envpol~	-0.00000619812	0.00000160668	-3.858	0.0001
d_GDPgro	0.00972187	0.00143546	6.773	<0.0001
d_inst	0.292404	0.135013	2.166	0.0303
d_gloec	0.0538757	0.0121007	4.452	<0.0001
d_HC	0.00638335	0.00201840	3.163	0.0016
T3	0.277861	0.0436642	6.364	<0.0001
T4	0.0737664	0.0289747	2.546	0.0109
T5	0.286501	0.0192622	14.87	<0.0001
T6	0.137061	0.0244471	5.606	<0.0001
T7	0.216940	0.0196189	11.06	<0.0001

Number of observations	133
Cross sectional units	27
Time series length	Minimum 2, maximum 4
Number of instruments	24
Test for AR(1) errors: z	-3.33192 [0.0009]
Test for AR(2) errors: z	-0.359934 [0.7189]
Sargan over-identification test: Chi-square(13)	13.6429 [0.3995]
Wald (joint) test: Chi-square(6)	985.968 [0.0000]
Wald (time dummies): Chi-square(5)	407.34 [0.0000]

Sum squared resid	5.184850		S.E. of regression	0.206152
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Source: Author's calculations

There is a possibly unexpected result for the lagged dependent variable $d_Lifeexp (-1)$. It concludes that life expectancy in previous year reduces life expectancy in the next year for 0.488 years. Manton et al. (1991) state that despite optimistic predictions, increasing life expectancy has limits. It is possible that it will take a declining trend or a trend that is not always positive. Authors referred to a variety of scholars that set constraints and maximum levels of life expectancy. It is in accordance with Woolf and Schoomaker (2019) which found that USA noted a long period of an increasing trend and an accelerating growth rate of life expectancy. This period was first followed by lower growth rates, and later by lower life expectancy. The results show very small but significant impact of pollution on health. Namely 1 kilotone of increasing CO₂ will reduce life expectancy for 0.0000061 years. If GDP increases 1% annually, then life expectancy will increase for 0.0097 years. If the estimation of rule of law increases for one point, life expectancy will increase for 0.2924 years. If the score for economic globalization index increases 1 point, life expectancy will increase for 0.0538 years. If the score for knowledge and technology output increases for one point, life expectancy will increase for 0.00638 years.

Variables included in the model, same as time dummies are statistically significant on the level of 1%. Only variable d_inst that is taken as a proxy for institutional quality and expressed with the rule of law estimation and time dummy T4 are significant at the level of 5%. Results for all independent variables are in accordance with theory, except for the lagged dependent variable. The explanation why such situation might happen is given in the previous paragraph. Model diagnostics show there is no second order autocorrelation since the value of Arellano Bond test is 0.7189, which is higher than the critical value of 0.5. The result of the Sargan test is 0.3995 which is higher than the critical value. This means that the used instruments are valid and the model is accurate. The Wald test for variables and time dummies is significant which implies that the variables possess sufficient levels of explanatory power. All diagnostic tests, the same as the stationarity test confirm the validity and stability of the model as it provides accurate results.

The most important findings of this research are that higher greenhouse gas emissions negatively affect health, while higher GDP growth, economic globalization level, rule of law and human capital expressed in knowledge and technology output positively affect health. The results of this model are in accordance with the theory and previous research presented in Literature review. The results contribute to scientific discussion about the role of globalization in improving health since, as explained earlier, medical sciences claim that globalization has negative effects, while social sciences claim these effects are positive. Previous studies find that effects are, in the majority of cases, positive, but they can vary over time. In the future it is possible to focus on other variables that affect health and take a longer time period into consideration. More detail explanations about the findings, contributions and possibilities for further research are explained in the Conclusion.

6 Conclusion

In this research, I wanted to examine the determinants that affected health and lead to higher life expectancy in the period of the Fourth Industrial Revolution, focusing on EU countries. Through literature review, I provided a comprehensive scientific discussion about health and its determinants, focusing on defined research hypotheses and variables chosen for this research. The econometric model tested and confirmed the research hypotheses and allowed for the following conclusions: pollution negatively affected health, while economic development, increasing institutional quality, human capital and economic globalization positively affected health in 27 EU members in the period of the Fourth Industrial Revolution. The results of the econometric model represent the most important contribution to economic science since they increase the cognitions about health which is a key societal challenge and its correlation with different variables important in economics: GDP, globalization, institutional quality, pollution and human capital. All these variables are also important for the period of sustainable development, which is a key paradigm in the 21st century, and emphasize the various aspects of development which are not only economical. Another contribution is providing for new cognitions about the impact of globalization on health since, as mentioned in the literature review, there is a strong scientific discussion about it. Since this analysis is focused on the period of the Fourth Industrial Revolution and variables like human capital and globalization represent its drivers, new cognitions about this topic represent another theoretical contribution. Results of the model represent a foundation to create practical contributions explained in policy guidelines.

Improving health is a part in the sustainable development agenda and since EU sees sustainable development as one of the key public priorities, focus on health is necessary. In order to improve health, EU has to continue with its environmental policy and strive to achieve carbon neutrality by lowering emission rates. Economic development or GDP growth that will increase well-being has to be a key goal in all EU strategies and agendas, since it is necessary to increase wealth in order to improve health. To enhance economic development, I consider that for it is necessary for the EU to strengthen the

economic globalization level, institutional quality and human capital. This research confirms that these variables represent important determinants of improved health. Stronger integration into global economic, trade and financial flows should increase economic activity and dynamism and attract private investments in different areas related to health and by increasing wealth it should also increase public investments in healthcare systems. For EU policymakers, it is necessary to strengthen the rule of law level since it is one of the crucial indicators of institutional quality. Higher institutional quality is necessary since it will prevent immoral actions, enable investments and the adoption of new technologies in the healthcare system, and higher equality in access to healthcare services. Human capital, as the key potential that determines the productive power of all other resources should be in the center of any EU strategy. In creation of any strategy or agenda, EU policy makers should have in mind Benjamin Franklin expression that investments in knowledge pay best interests. To improve health in the EU, it is necessary to invest not only in healthcare staff, but in knowledge, skills and education, since an educated population will have higher awareness of the importance of health. The variable taken as a proxy for human capital is knowledge and technology output since this variable is adjusted to the age of the Fourth Industrial Revolution that is, as mentioned previously, human centered. The EU should create a macroeconomic and institutional environment that will enhance investments in improving domestic human capital, but also attract high quality foreign human capital. An educated human capital will create better knowledge and technology output and enable quality improvement of the healthcare system which will improve health.

Limitations of this study are mentioned in the Introduction. A relatively small time period is chosen because it relates to the period of the Fourth Industrial Revolution and it is determined by its duration. Not including UK in this research represents limitation, since the UK was an EU member during the observed period, but since policy implications relate to the period after Brexit, I decided to focus only on EU members after 31 January 2020. Another limitation of this research might be the use of life expectancy as the dependent variable, since there are more indicators of health. These indicators should be measured differently for various diseases which may cause problems in making cross country comparisons. But, as mentioned during this research, life expectancy represents one of the most used indicators of health as it also measures health status across all age groups. Limitation of the study are also the omitted variables that affect health. Some of them are mentioned in the literature review. This was the reason why I used a dynamic panel that deals with the problem of omitted variables. However, this study provides area for further research. Since there are multiple variables that affect health and life expectancy, further research might be directed towards the role of other factors like technology, FDI, green innovations or cultural environment. Since, the Fifth Industrial Revolution represents the continuation of the Fourth, examining health and its determinants in that period is also a possibility for further research. In the further research, it is possible to focus on other indicators that measure health since life expectancy is only one indicator, and/or a possibility to apply different approaches for different diseases.

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CHAPTER 7

SUSTAINABILITY EFFECTS OF STRENGTHENING GENDER EQUALITY PROCESSES – THE CASE OF WOMEN EMPOWERMENT IN ALBANIA

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ABSTRACT

The aim of this chapter is to identify the socio-economic spectrum of sustainability effects resulting from the realization of gender equality. Using qualitative statistical data to illustrate the sustainability aspects of the women's empowerment process in Albania, the research objective is based on the hypothesis that unequal opportunities for women prevent their full potential to contribute to social and economic values, which has a negative impact on overall sustainability. The analysis uses national statistical data based on gender-specific variables related to entrepreneurship, employment structure in industry, rural and urban poverty rates, and Gender Responsive Budgeting (GRB) expenditures which were analyzed to identify cross-institutional support for gender equality. The results of the study show that the role of women is insufficiently considered in some aspects of sustainable development in Albania. As a fundamental finding, the authors emphasize that any case of gender inequality (women or men) is a social risk with multiple negative impacts - especially in terms of sustainable development. Therefore, this chapter calls for a strong commitment of all national factors to empower women and to utilize the country's institutional and non-governmental potential to ensure a more sustainable value based process of women's empowerment.

Keywords: *gender equality, women empowerment, sustainability, social responsibility*

JEL classification: *J16, K38, D63, I24*

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1 Introduction

The process of women's empowerment is essential for sustainable development, since gender equality is a crucial social lever for balance in general sustainability issues. Gender equality is high on the agenda worldwide because of gender inequality, and no country has yet achieved gender equality. Today, attention to gender equality is more important than ever before for companies and organizations because if they fail to address gender inequalities, they risk creating both significant risks (including legal and reputational risks) and missed opportunities (Quinn, 2016). Beyond addressing reputational risks, a gender-responsive approach requires agencies to proactively advocate more equitable opportunities and to empower women.

Gender equality is the foundation for the prosperity and well-being of economies and societies. Yet women in all regions of the world continue to be discriminated against and do not enjoy equal rights and opportunities. Gender differences are obvious but systematically larger, i.e. more widespread and particularly pressing in developing countries than in developed countries (Ahmed et al., 2001; Dey & Dutta, 2014; Jayachandran, 2015, Nolte et al. 2021). In Albania in particular, sustainable development is hampered by gender-related problems, despite efforts by the government and the donor community to mitigate these problems (Pacukaj, Brajshori, Deda, 2021, Dini, 2021, Basha, Dervishi, Hoxha, 2023). Although the country is on the path of development in several aspects, sustainability becomes questionable in terms of gender equality (OECD, 2021).

Women play an important role in society and contribute to stability, growth, progress and social development. Unfortunately, when it comes to gender inequality related to women, their growth (sustainability) dimension has been neglected and the future efforts of women have been underestimated (Tinker, 2007). For example, women make up about 43% of the agricultural labour force worldwide - as much as 70% in some countries (Fatema ali Kareem, 2021). In Albania, the percentage of women in the agricultural labour force is 45.4%, compared to 36.2% of men. Research emphasized agriculture as relevant in reducing poverty (Dorosh, Thurlow & Davis, 2019) and as a basic model of growth, particularly for developing countries (Van den Broeck & Maertens, 2017). In addition, women play an important role in the exploitation, management, conservation, and use of natural resources, both as producers and consumers, even when they have minimal access to and control over these resources (UN Women, 2014-2022). Similarly, women work more and are paid less; 38% have no income of their own (Ortega, 2013). In Albania, women's labour force participation (61%) is lower than men's (77.6%), with gender gaps averaging 18 percentage points. As a developing country, Albania is one of the countries still struggling to achieve women's empowerment and gender equality. The Food and Agriculture Organization of the United Nations – FAO (2016) reports data that majorly underpin increasing poverty of women and a large employment gap in regards to men. According to the Gender Equality Index – GEI (2020) countries that already have a critical gender gap face higher risks regarding digitalization and future of work and business

development. The opportunity to affect society through productive activities is more prevalent among men than women. Occupational stereotypes limit the choices of women, who work primarily in sectors such as health and social services, education, manufacturing and agriculture where lower salaries traditionally prevail. Although companies have started to become aware of social responsibility, the concept remains vague, and gender consideration is sometimes even unknown to a large proportion of companies operating in the country. According to the Gender Equality Index for the Republic of Albania (INSTAT, 2020a) the gender pay gap (GPG) was calculated at 10.7% for 2018 and 10.1% for 2019, well below the EU-28 average of 14.1%. In the EU Gender Equality Index published in 2020, Albania scores 60.4 out of 100, seven points lower than the EU-28. Therefore, this chapter discusses women's empowerment and gender equality as a means to achieve sustainable development in Albania.

In this chapter, based on a case study approach, the authors note that women's low levels of empowerment, lack of access to resources and opportunities impede sustainable development. As for the structure of the chapter, it first attempts to conceptualize some basic terms; accordingly, the definitions of sustainable development, women's empowerment, gender equality and sustainable development are discussed based on the relevant literature, and these definitions are applied throughout the chapter the discussion. Then, the analysis of women's empowerment in Albania is highlighted followed by concluding discussions and suggestions.

2 Literature review

The literature review is based on explaining the social relationships between the concepts of sustainable development, gender equality, and women's empowerment. Sustainable development is understood as three interrelated and balanced dimensions: 1) *Economic*, 2) *Social*, and 3) *Environmental* (UN Women, 2014). These dimensions are equally important and interrelated; the absence of one will affect the others (Stevens, 2010). Research has shown that promoting gender equality and empowering women is associated with greater innovation, return on investment, higher productivity, cost savings, and market growth. (Grosser & Moon, 2008; Babcock, 2012). From corporations to SMEs, everyone benefits from promoting gender diversity and empowering women to succeed in the workplace, but just as there is no single solution to achieving gender equality, there is no single strategy to promote women's empowerment (UN Women, 2017, UN Women, 2020a). On the one hand, strategies need to be carefully underpinned by realistic gender data that provide detailed insights into women's issues. To ensure a truly transformative social change, the sustainability paradigm treats gender equality as a crucial issue in social sustainability i.e. as IMF (2014) states as "part of the growth and stability equation".

2.1 Socio-economic development and gender equality

Equality and development in general are closely linked, especially in developing countries where more equality positively affects socio-economic development (economic growth and social sustainability), and more development, initiates higher equality (Duflo, 2012). Grosser and Moon (2008) examined the potential and actual contribution of social sustainability to gender equality in the context of gender mainstreaming. They introduce gender mainstreaming as a combination of technical systems (monitoring, reporting, and evaluation) with political processes (women's participation in decision making) and explore how this is compatible with social accountability agendas. Testa (2012) provides a broader overview, noting that "increased representation of women on boards appears to strengthen corporate social responsibility, improve community integration, and provide a stronger focus on long-term sustainability issues." Although gender equality is recognized as a priority worldwide, many organizations strive for stronger position and communication on this issue through consistent and more formal approach. The goal is often not to achieve quantitative results in terms of an equal number of men or women as employees or entrepreneurs, but to ensure that both genders have equal opportunities, business access and to prevent gender based discrimination.

A number of scholars have shown that sustainable development is impossible without gender equality and the processes of women's empowerment. It is also affirmed that gender inequality is pervasive in all cultures around the world and that sustainable development cannot be achieved without serious steps to address it (Stevens, 2010, Leal Filho et al, 2023). UN Women (2014) emphasize that achieving gender equality is paramount to creating a just and sustainable world and strengthening the role of women in providing for their families and communities. Furthermore, Stevens (2010) highlights that "a growing body of research indicates that gender inequalities have high economic costs and lead to social inequality and environmental degradation around the world", meaning that sustainable development cannot be achieved without the equal inclusion of women in all areas of development initiatives. However, gender inequalities in the economic, social, and environmental spheres remain widespread and persistent (UN Women, 2014, UN Women 2020a). Any development initiative must ensure that both men and women contribute and benefit equally. Women should be empowered and have equal opportunity to contribute to and benefit from all dimensions of development to achieve sustainability.

The process of women's empowerment is based on social and economic elements. According to OECD (2008), economic development as a component of sustainable development is unthinkable without the inclusion of women. However, in many developing countries, women's labour is not properly utilized. Despite some improvements, women's economic opportunities and participation are still low. This is due to male-centered development projects and the exclusion of women from the formal employment sector (World Bank, 2014), and women still lack adequate access to training, extension and credit services, financial support, and modern technology (Food and Agriculture

Organization of the United Nations – FAO, 2016).

For an effective and sustainable economic growth of any country, equal participation of both genders is crucial. Early OECD reports (2008) and analysis of equality issue stated it is a widely acknowledged fact that achieving economic growth depends on the full utilization of women's skills and qualifications. Moreover, women make up 70% of the world's poor because of unequal economic opportunities (OECD, 2008). Also, according to OECD findings, valuing women's work has an impact on lifting them out of poverty so that they can contribute to national economic growth. What most hinders poverty reduction and economic growth in developing countries is actually the lack of appreciation of women's work (OECD, 2008). Therefore, women's economic empowerment is central to the realization of women's rights and gender equality. It includes, among other things, women's ability to equally participate on existing markets, to use production resources, ensure decent work and participation in decision-making at different levels (from households to global organizations). Empowering women in the economy and eliminating gender disparities in the workforce are key to sustainable development. Women's economic participation boosts productivity, increases economic diversification, and income equality, in addition to other positive development outcomes (IMF, 2018). The business sector benefits from strengthening women's socio-economic position due to higher employment and leadership possibilities of women. Ensuring gender equality is about inclusion of all human capabilities which consequently increase business effectiveness and provide business sustainability.

2.2 Entrepreneurship and gender equality

Since the early 2000s, entrepreneurship in general has received increasing—though not uncontroversial—attention as a means of pursuing market-based approaches to development and social impact (Blowfield & Dolan 2014; Bruton, Ahlstrom & Li, 2010). The experience of microfinance, which focused on providing financial tools to women, combined with enthusiasm for “conditional cash transfers” to women heads of households in the mid-2000s sparked interest from policy organizations such as the World Bank, the United Nations, and national governments (Johnstone-Louis, 2017). Research and reports from these organizations suggested that women could have a multiplier effect, as increases in women's incomes, for example, appear to have numerous positive secondary effects for children and communities (Elborgh-Woytek et al., 2013; World Bank Group, 2014). The World Bank supports gender equality as a “smart economy” and continues to recommend links between prosperity in society and women's empowerment (World Bank Group, 2014). In pursuit of gender equality, published reports emphasize women's empowerment, while some reports specifically portray women entrepreneurs as a source of untapped or underutilized financial returns (Koch, Macbeath, Lawson, and Matsui 2014; World Economic Forum, 2014). Women's participation in the formal labour force has increased in some sectors and regions, yet women and girls are still disproportionately unemployed, underemployed, or informally employed compared to men

worldwide (Elborgh-Woytek et al., 2013). Thus, not least because of their historical exclusion from formal markets and their simultaneous relative specialization in unpaid/care work, women appear to represent a means by which business and social goals can be pursued simultaneously, making women's entrepreneurship attractive (Johnstone-Louis, 2017).

Various studies on social responsibility and women's empowerment in developing countries have shown their positive benefits for organizations and society. Akter's (2020) study on social responsibility in small and medium enterprises (SMEs) in Bangladesh found that women's empowerment is an important part of business strategies in companies that want to remain competitive. McCarthy (2017) also showed that women's empowerment programs have important functions in different social responsibility policies. According to Hildebrand Sen and Bhattacharya (2011), social responsibility in developing countries in the form of "*business as usual*" will not bring the expected benefits at the corporate level or positive changes in terms of social or environmental development. These are the reasons why women's empowerment must be implemented structurally as part of a comprehensive socio-economic processes that will ensure sustainable impacts based on guaranteed gender equality. Among these processes gender responsive budgeting arises as an operational model of achieving holistic gender fairness in terms of public finances. Intention of gender budgeting is to enable sustainable value for a society based on gender equality.

Gender Responsive Budgeting (GRB) is one of the ways governments demonstrate their commitment to gender equality by making appropriate allocations in budgets to bridge the gender gap (Lubani et al., 2020). The gender gap results from unintended consequences of government policies that do not take into account the differences between women and men in their social and economic circumstances. "Introducing a gender perspective into government policies and budgets can raise awareness of these differences and the resulting impact of public policies on women and men" (Rubin & Bartle, 2023). According to Budlender (2002), GRB is "a form of policy analysis from a gender perspective" that is not just about the numbers in the budget, but about "the policies and programmes that underlie those numbers" and the potential outcomes after implementation. This suggests that all parts of budgeting and policymaking must take into account the needs and interests of all citizens, and if it is to have a lasting impact, GRB must become an integral part of government and public administration.

3 Conception of analysis and data sources

To analyze the state of gender equality in depth, a conceptual analysis is used in combination with empirical data. Published annual reports and policy documents from various organizations and government websites were used as the primary data source. These reports are generally made available online and accessible to the public during the given research. Conceptual and substantive analyses are the starting points for examining policy documents that policy makers as well as programs of WB, UN Women, the EU, and

other foreign organizations seek to implement in Albania. Their findings and reports need to be subjected to thorough content analysis. The examination of their validity, replicability and reliability will be both empirical and content analysis oriented, testing the hypotheses so that the results provide answers to questions about the gap mentioned above.

The remainder of this section describes each of the data sources used in this study and explains why they were applied in regards to the research objective. The objective was to conduct a combination of quantitative trend analysis, which is an empirical approach to accessing qualitative gender data across different social structures and observing the evolution of gender variables over time. Specifically, the dynamics of gender equality are captured through the values of a sequence of periodically spaced observations of homogeneous variables (i.e., percentage of women in entrepreneurship, percentage of women in the labour force) at equal time intervals. Data on general demographic indicators in Albania are also briefly presented. Sources used:

1. *Albania Country Gender Equality Brief* by UN Women (2020) provides a review of the current situation on gender equality and position of women in Albania with gender indicators that relate to Sustainable Development Goals (SDG).
2. *INSTAT (2020a, 2020b) Women and men in Albania* is a continuous publication that presents data on various social sectors by gender to present contemporary issues in achieving gender equality. The publication is being published by the Institute of Statistics (INSTAT) as an independent public legal entity tasked with producing official statistics in the Republic of Albania. This source includes gender-disaggregated data referring to cross-sectoral changes and national policies that deal with gender equality issues.
3. *Income and Living Conditions Survey in Albania (2019a, 2020c)* measures the living standard, poverty rate, and possible material/social limitations for Albanian households. It is based on the Eurostat methodology for comparable statistics and surveys on income distribution and social exclusion at the European level.
4. *General demographic data for Albania* – observing:
 - a) *Population*: on January 1, 2020, Albania had a population of 2,845,955 (1,425,342 women and 1,420,613 men), a decrease of 0.6% from January 1, 2019. The natural population (births/deaths) has decreased in recent years, and it is lower for males than females, with 3122 and 3512 units, respectively. In 2019, emigration increased by 13.3%. Net migration (immigration-emigration) is negative and amounted to minus 23,082 inhabitants in 2019 (INSTAT, 2020a, 2020b, 2020c, 2021).
 - b) *Rural versus urban*: According to population estimates for distribution by residential area, about one-third of the population (31%) lives in Albania's capital, Tirana. Since population figures are not broken down by rural and urban location, there are no precise data on the number, gender and age

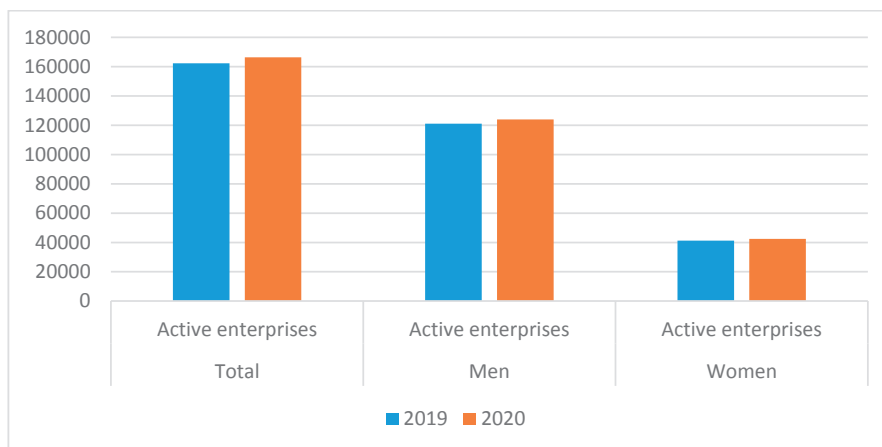
of residents by place of residence.

- c) *Age demographics*: Albania's population is characterized by ageing. The median age of the population increased from 36.7 years in 2019 to 37.2 years in 2020, and the youth dependency ratio (the ratio of the number of persons of working age from 0 to 14 years to the number of persons of working age from 15 to 64 years) decreased from 25.1% to 24.6%. During the same period, the old-age dependency ratio (the ratio of the number of persons aged 65 and over to the number of persons of working age 15 to 64) increased from 20.5% to 21.6%. The overall sex ratio is 109, with men predominating in the population up to the age of 35-39 (INSTAT, 2020a, 2020b, 2020c, 2021).
- d) *Structure of households*: The average number of members within one household is 3.3. The number of household members in urban areas is lower (3.1) than in rural areas (3.5). In the last 10 years, this number has fallen from 3.8 to 3.3. This negative trend is intense in rural areas where household members went from 4.1 to 3.5. However, the average Albanian household size is higher than the EU average of 2.3 members due to multi-generational cohabitation in all areas of the country. The survey indicates that men dominate Albanian households with 5.4 times higher than female-headed households (UN Women, 2020).

4 Research analysis

The Albanian business is dominantly based on small and micro companies that engage one to four workers. Such companies make 92% of all registered companies, where 62% of those operate in trade, tourism and catering. The share of women is 96%, and that of men is 4% (INSTAT, 2021). In 2019, 25.3% of active businesses were run or owned by women, and in 2020, 25.4% of active businesses were established and operated by women, while the vast majority of 73% of active businesses are operated by men. Characteristic limitation for businesswomen in this sample is that they are self-employed and engaged mainly with small businesses.

Figure 1 Active enterprises in Albania by gender 2019-2020

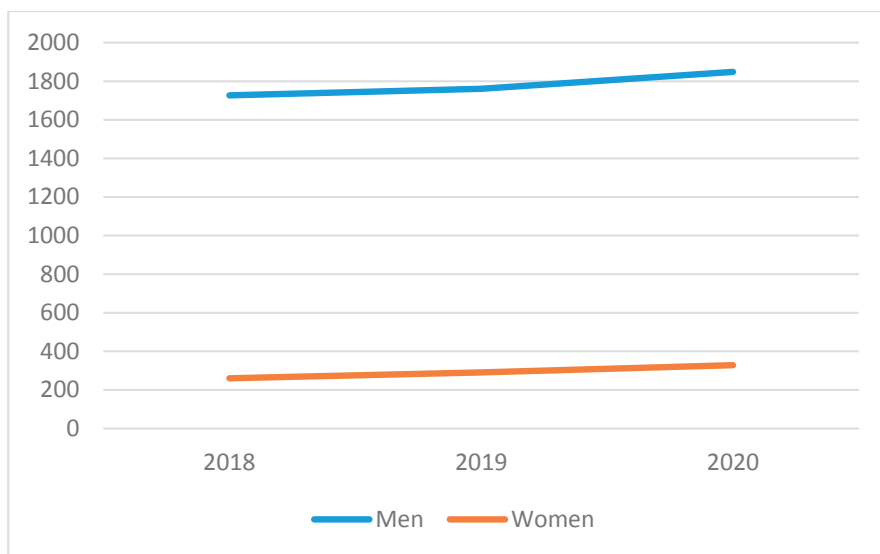


Source: INSTAT (2021) Women and men in Albania, Tirana: Republic of Albania Institute of Statistics – INSTAT.

The data indicates how women are limited to self-employment and small-scale companies/businesses in which access to financial sources and new investments is limited (96.2% of women-owned companies are in this category). In the long-term, women entrepreneurs may be more exposed to bankruptcy. The number of credit users from banks in 2019 was 312,046 among which, 56.5% were men and 43.5% women. In the entire 2017-2019 female credit users grew, which is a good indicator. Among 2,431,342 of depositors in 2019 57.1% were men and 42.9% were women – meaning a 3.7% decrease of female depositors.

In 2020, the number of women-owned businesses (businesses with 10-49 employees) increased to 328 (from 232 in 2019, Figure 2). The positive trend is evident in the increase of newly established companies owned by women. This is an indicator of women high capability in finding and ensuring suitable financial sources, and successful developing pathways of their businesses. This approach contributes to women even being better protected from actual financial and pandemic turmoil.

Figure 2 Ownership of active enterprises in Albania by gender



Source: INSTAT (2021) *Women and men in Albania*, Tirana: Republic of Albania Institute of Statistics – INSTAT.

Women's entrepreneurial opportunities in rural areas are far less favourable than in urban areas. In the agricultural sector, the main barriers for a majority of women include: simple/undeveloped farming, low revenues, or even unpaid work on informal small/family farms. Women's efforts are not being truly rewarded or even paid in terms of final production results. More than 80% of land rights are defined by men line (husband, father in law, brothers, fathers, grandfathers). Such "tradition" is discouraging women to demand ownership over economic resources and benefits that come out from owning even a particle of land (including farm registration, credit, and extension services).

Gender issue advocates equal pay/value for labour and enforcement of equality principle within educational, political, economic, and cultural aspects in every society. Violence against women and girls that additionally degrades women's social position, has a strong source within traditional patriarchal structures. Unfortunately, these structures are specific to the Albanian society. Predominantly male oriented social identities generate further patriarchal hierarchy, preserving the code of men honour (even shame for women) with a multi-generational pattern in which only men manage family affairs. Such a generally approved platform leads to negative social constructs as poverty, misleading opportunities of women employment, human rights, education, and gender-based migration.

Female employment figures indicate an increase over the 2015-2020 period from 39.2% of the total workforce in 2015 to 46.1% in 2020. However, their employment levels are lower than those of men, which were 53.3% and 59.2%, respectively, over the same period. The level of informality in

employment remains high for men compared to women. The share of informal employment in total non-agricultural employment in 2020 was 34.1% for men and 21.9% for women. Looking at the structure of employment by gender and sector of activity for the three main activities in Albania, it is obvious that women are highly present as labour force in agriculture (presented by data in Table 1 for the period from 2016 to 2020).

Table 1 Employment structure by gender within three most important national industries in Albania (%)

Data: Total on industry level	2016	2017	2018	2019	2020
1. Agriculture	40.2	38.2	37.4	36.4	36.1
2. Trade, Transportation, Accommodation and Food, and Business and Administrative Services	24.3	25.0	25.7	27.2	27.2
3. Public Administration, Community, Social and other Services and Activities	16.2	17.4	17.2	16.3	16.2
Data: Women					
1. Women in Agriculture	45.4	42.5	42.3	41.6	41.4
2. Women in Trade, Transportation, Accommodation and Food, and Business and Administrative Services	19.9	20.0	20.8	21.6	21.6
3. Women in Public Administration, Community, Social and other Services and Activities	20.0	22.4	21.4	20.7	21.2
Data: Men					
1. Men in Agriculture	36.2	34.9	33.5	32.3	31.8
2. Men in Trade, Transportation, Accommodation and Food, and Business and Administrative Services	27.8	28.8	29.6	31.7	31.7
3. Men in Public Administration, Community, Social and other Services and Activities	13.1	13.7	14.0	12.8	12.2

Source: INSTAT (2022) *Women and Men in Albania, 2021*, Tirana: Republic of Albania Institute of Statistics – INSTAT.

The UN Women report (2017) on women's contribution to gender responsive budgeting in Europe and Central Asia Region states that more than 50% of rural women are engaged in agriculture, but only 10% of farms are owned and managed by them. These are small/family managed farms with modest production and small market potential. On such farms, due to management based on family hierarchy, women regularly work without any kind of income. Women are generally involved in almost all agricultural activities, including growing and harvesting fruit and vegetable crops, growing and collecting medicinal and aromatic plants, and caring for animals. Detailed data on active enterprises in agriculture, forestry and fisheries by gender of owner/manager in (%) for the period between 2018 and 2020 are provided in Table 2. The management of the finances of these activities is in the hands of male family members, which is another aspect of women's decision-making power

in family and business-related matters.

Table 2 Active enterprises in top tree national industries of Albania by gender of owner/administrator (%)

Gender	2018		2019		2020	
	Men	Women	Men	Women	Men	Women
Agriculture, Forestry & Fishing	89.9	10.1	89.4	10.6	88.6	11.4

Source: INSTAT (2022) Women and Men in Albania, 2021, Tirana: Republic of Albania Institute of Statistics – INSTAT.

In Albanian communities, although women are highly involved in agricultural activities, men lead the activities that require decisions about money and access to information. In addition, women take care of most of the housework, children, and the elderly, resulting in time constraints that make engagement in other areas more difficult. By age 15 and older 42.3% women were employed in agriculture in 2018. In the same period (2018), paid female employees accounted for 47% of the employed aged 15 and over, while men account for 42.5%; self-employed women aged 15 and over account for 24.3%, while men account for 41.6%; and unpaid female family workers aged 15 and over account for 28.8%, while men account for 15.9%. This is further evidence of the low economic diversification in rural areas and the insufficient opportunities to start agricultural businesses, especially for women.

Another significant indicator showing gender gaps is the gender wage gap for agricultural professionals, which changes from 7% in 2019 to 9.7% in 2020. The Time Use Survey (INSTAT, 2011) shows that women in rural areas spend more unpaid hours on housework than men, as the number of hours spent on unpaid housework in 2017 was 34.9% for men and 42.5% for women, a difference of 7.6% (INSTAT, 2019a).

Significant gender inequalities/disparities are also evident in general wage levels, particularly in the agricultural sector. In 2020, the average gross monthly wage per worker across all sectors for men was ALL³ 55,317 compared to ALL 51,679 for women. In “Agriculture, forestry and fishing” the average gross monthly wage per worker ALL was 34,039 for men and ALL 31,941 for women. Despite the gender wage gap, these figures show, among other things, that workers in the agricultural sector are paid far less than the overall average gross monthly wage (about 38% less).

The risk of being poor due to unemployment, severe material deprivation, or social exclusion, by age group and gender, for the 2019-2020 period shows a larger decrease in the age groups

0 -17 years and 18-64 years, where the risk of being poor in 2020 decreased by 1.3 and 1.2 percentage points, respectively, compared to 2019. The age group of 65+ decreased by 0.1 percentage points compared to 2019. There has been some progress in eliminating poverty, but the highest risk of poverty

³ Lek is Albanian currency for which ALL code is used internationally.

remains in the 0 - 17 age group. As shown by Table 3, females (girls and women) experience a higher risk of entering poverty gap than their male counterparts.

Table 3 Poverty risk rate by age groups and gender in rural and urban areas of Albania 2019 2020 (%)

Age group	2019			2020		
	Male	Female	Total	Male	Female	Total
0-17 years old	27.9	31.7	29.7	26.7	30.1	28.4
18-64 years old	22.3	23.3	22.8	21.4	21.7	21.6
65 and over	12.9	14.8	13.9	13.0	14.5	13.8
Total	22.2	23.8	23.0	21.4	22.3	21.8

Source: INSTAT (2019a, 2020c) *Income and Living Conditions Survey*, Tirana: Republic of Albania Institute of Statistics – INSTAT.

The current analysis indicates presence of structural imbalance in terms of women’s economic and social participation. This imbalance is clearly due to gender inequality, i.e. the fact that gender roles are traditionally assigned to men and women. However, in a modern society and its economic activities, this imbalance can lead to further and long-term gender gaps that can have negative impacts:

- loss of opportunities for women to access socio economic activities,
- neglect of women’s contributions in developing full potential, especially in terms of national identity and processes that increase national wealth and economic prosperity
- decreasing value of GDP and loss of potential social values in activities where individuals are excluded due to their gender or other differences (in this case, women due to existing gender inequalities).

The main assumption is that when an individual is deprived or minimized of the opportunity to create value in a society because of some kind of inequality (religion, gender, etc.), this is not only discrimination against the individual, but also discrimination against national prosperity and wealth. This means that a discriminated person is excluded from the regular social, economic, political or cultural processes and therefore these processes are deprived of the contributions that could be ensured if discriminated persons were actually involved. Therefore, the national economy loses opportunities and values that can be created by individuals (women or men) who are excluded from the society due to any sort of discrimination.

In order to reduce and eliminate gender inequalities in a society, i.e. to achieve gender equality at broad social, economic, cultural and political levels (at the national level), the Gender Responsive Budgeting (GRB) model is used in practice. GRB can be used at different levels, from NGOs for specific projects to government-based initiatives for national implementation. GRB has proven to be a well-structured model for addressing gender inequality, especially when it comes to improving the social and economic status of women (Khalifa

& Scarparo, 2021, Elson & Sharp, 2010, Rubin & Bartle, 2023). GRB is based on financial access to implement and fund activities, programs, processes that will ensure women’s social and economic participation and achieve the long-term elimination of gender inequalities. As Sodani and Sharma (2008) point out, GRB “is not a separate budget for women, but an allocation of budgetary resources with gender intelligence...” Therefore, GRB is being introduced as a national model to achieve greater representation and structural presence of gender that is in an unfavourable socio-economic position within various levels of the public and private sectors.

Regarding Albania, its national GRB initiative is largely driven by its application process for EU membership and support from UN Women Agency, and is also heavily influenced by the existing model in Austria (Quinn, 2016). Gender budget elements represent 6.3% of the total 2019-2022 medium-term budget, compared to only one percent in 2015, when UN Women began supporting GRB in Albania (Table 4).

Table 4 Percentage of GRB in total Albanian national budget expenditures

Year	No. of budget programs (total):	No. of budget programs that include GRB:	No. of objectives:	No. of outputs (by type):	GRB related budget funds (in million USD):	% of GRB vs. total budget expenditures:
2015-2017	84	9	11	14	38.4	1%
2016-2018	84	20	27	23	63.4	1.73%
2017-2019	84	24	32	33	90	2.30%
2018-2020	84	28	41	41	120	2.40%
2019-2021	75	33	52	52	298	6.3%

Source: Ministry of Finance and Economy of Albania, available at: www.financa.gov.al. (20.02.2023)

Although current GRB expenditures in Albania show a growing trend, there is no system to transparently track the dissemination of GRB funds, missing thus the transparency of intended gender outcomes based on direct gender-responsive initiatives. The National Strategy for Gender Equality 2016-2020 presents information for planned budget expenses from the donors and government. The main objective is that 72.2% of GRB expenses in a four-year period has to be ensured from the state budget (central and local levels) while donors should be able to ensure the remaining 27.8%. Since 2008, public financial management in Albania has been continuously reformed, and one of the main objectives of this reform is full implementation of budgeting for gender responsive programs on a national level. The number of programs initiating gender equality on a national level in Albania increased from 9 in 2015 to 28 in 2020, and the share of funding for gender equality issues amounted to 6.3% of the total government budget for 2020.

5 Results and discussion

Empirical data show that women in Albania have greater difficulties in accessing productive resources (land, finance, information, services) compared to men. Access to these resources is highly dependent on the national and global environment, on the one hand, and on household dynamics, social and cultural norms, and the legal framework, on the other. This gender inequality results in missed opportunities for women contribution to sustainable development that impacts different forms of social value. Women do not have the power and influence to benefit from and control economic activities. They have limited opportunities to participate and be represented in rural institutions, organizations, and public life. In this context, changing social norms requires the education, awareness, and active engagement of men and boys in addition to women. Women can effectively make their voices heard and take on leadership roles (both at the individual and collective levels) only if they have the support of men. In this way, women and men can change discriminatory social norms through collaboration and cooperation.

The two dimensions relevant to women's economic participation are power and agency, where agency refers to the ability to make autonomous decisions and to translate those decisions into desired outcomes. The exercise of power and agency is dependent on social and cultural norms. Therefore, the context in which power and agency are developed is an important dimension. It also takes into account the individual and domestic dynamics that influence women's ability to exercise power and agency. In this chapter, we have provided an overview of the challenges facing women in Albania, based on the available analysis, which should be useful to policymakers. The government, as the top national policymaker, can use different strategic frameworks to address obstacles in promoting women's entrepreneurship and creating sustainable social engagement for women overall.

One of the most well-known frameworks for understanding the challenges women face in business and society is that of Brush, Bruin and Welter (2009). However, to interpret the main research findings in this chapter, we additionally extend the given model to include social and sustainability variables (Table 5). Our analysis shows that gender inequality has complex socioeconomic causes and needs to be addressed in terms of sustainable development. Sustainable development means treating any type of social inequality as a negative value of sustainability itself. This conceptual model is useful to understand the main challenges that women face when they decide to start a social initiative, such as a business or a social project. Following this classification, we focused on five of the most important research areas in Albania and summarized the factors that determine women's socioeconomic opportunities. These factors are presented through socio-economic dimensions in Table 5 (Society, Sustainability, Market, Finance, Motherhood - SSMFM).

Table 5 Socio-economic factors of sustainable women empowerment – SSMFM building dimensions

Dimensions: Socio/economic	Factors	Main findings
Society (S)	Social status Cultural norms Education Involvement/Activism Non-profit social organizations	Women engagement multiplies social value and GDP contributions; Women's education benefits society as a whole; In countries where gender inequality is high, NGO advocate gender equality projects with positive impact on reducing the gender gap;
Sustainability	Sustainable development Health Environment	Gender equality is one of the key SDG goals; Women have different access to public services depending on the level of development of the country; Women's environmental initiatives in case of gender disparities do not reach implementation stage;
Market	Full market participation Female entrepreneurship	Women meet more barriers than men; Women engage in business from necessity vs. free market opportunity;
Finance	Availability of financial funds	Women experience crediting barriers with investors preferring men entrepreneurs; Women demand lower loans than men; Perceived gender capabilities play a role in women's entrepreneurship
Motherhood	Unpaid work/familial responsibilities	Obligations related to starting a family coincide with efforts of starting a business Women manage multiple roles often being in an organizational gap between family and business High rate of business development initiates a possibility of conflict with family interests

Source: Authors adaptation based on 3M building blocks from Brush, C., De Bruin, A., Welter, F. (2009). "A gender-aware framework for women's entrepreneurship", *International Journal of Gender and Entrepreneurship*, Vol. 1, No. 1, pp 8–24. <https://doi.org/10.1108/17566260910942318>.

Our research assumption is that gender inequality, which prevents an individual from fully and freely participating in economic, social, political, or cultural activities because of his or her gender, has negative effects on social and economic value. The gender inequality we analyze assumes that women have less access and socioeconomic opportunities. The business ideas, social, political, or cultural initiatives that could be implemented in a society by women, but are not because of gender inequality—all of these initiatives represent lost social and economic value to a country. Therefore, in this chapter we added dimensions of social value and sustainable development to the models used to identify gender inequalities. The aim was to go beyond the issue of gender equality in business or political quotas for women, and analyze what gender inequality means for sustainable development. Our goal was to illustrate what kind of loss in social and financial value occurs when one gender is less represented in society. Based on the above concept, our research aims to address the future research agenda for gender equality. Our

research findings argue for an analysis of social value in the context of gender equality and sustainability. Sustainable value in the economy and society can only be created if negative inequalities are minimized and there is a tendency to reduce them.

6 Conclusion

In this chapter, the focus was on gender equality and women's empowerment in Albania. The study found that while Albanian women make up half of the country's total population, their potential is not fully realized due to gender inequalities. Previous research has confirmed that gender equality and one country's level of development are intertwined, i.e., mutually dependent, meaning that gender equality creates the conditions for greater economic development and contributes to economic growth and social sustainability - and vice versa. Mainstream approaches reflect gender inequalities or gender discrimination in the labour market and entrepreneurship. Appropriately harnessing the potential of women and men should rank high among the priorities of national economic strategies. If the national economy does not fully utilize the labour force of women, it means that the country is wasting resources. An important aspect of economic growth, social inclusion, and environmental sustainability is the pursuit of gender equality. Women's economic empowerment is central to the realization of women's rights and gender equality. It includes, among other things, women's ability to participate equally in existing markets, their access to and control over productive resources, access to decent work, agency, and meaningful participation in economic decision-making at all levels, from the household to international institutions. Women's and girls' participation in the formal labour force has increased in some sectors and regions, yet women and girls remain disproportionately unemployed, underemployed, or informally employed compared to men.

Attention is drawn to the model of Gender Responsive Budgeting as a public financing platform designed to ensure long-term and sustainable impacts on women's entrepreneurship, social activism, education, and political representation. All parts and elements of the budgeting and policy-making process must take into account the needs and interests of all citizens, women and men, and if this tool is to be used to eliminate inequalities and have a lasting impact, GRB should be engaged by government and public administration. Ensuring gender equality in all areas, both *de jure* and *de facto*, is crucial for sustainable development, and facilitating progress of gender equality is a key component of the EU accession agenda in Albania. Nevertheless, economic inclusion and women's empowerment require the ongoing commitment of public institutions in every society. The most important implications and suggestions for future research lie in the definition of gender-specific sustainability performance and its measurement and analysis beyond the monetary scale. In the future, additional analyses of the social value generated by gender equality should be conducted. Such research can include the question of positive social value associated with gender equality based on variables such as opportunity, diversity, openness

and transparent collaborations between all social entities as stakeholders (business, government, NGOs).

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CHAPTER 8

INVESTING IN THE QUALITY OF THE HIGHER EDUCATION SERVICE PAYS OFF – APPLICATION OF THE TAM MODEL ON THE HEI SECTOR

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ABSTRACT

The rapid changes characterizing our society are reflected in many areas, including education. To successfully respond to the challenges, higher education institutions (HEIs) need to make an additional effort to investigate what influences their students in their decision-making process. Previous research assumes that perceived service quality affects customer satisfaction and brings many benefits to HEIs. Considering the importance and recognition of the TAM model in the process of technology acceptance, the authors decided to test the TAM model in the context of education. Therefore, the purpose of this study is to apply the TAM model in the context of student reenrollment to HEI. For that purpose, the scales usually used in the TAM approach were adapted to the research context. The research was conducted at a public HEI in Croatia in the field of economics on a sample of 218 students. A positive correlation was found between perceived service quality and perceived usefulness of the study program, as well as perceived ease of study. Additionally, a positive correlation between the perceived usefulness of the study program and perceived ease of study with the intention to re-enroll HEI was confirmed.

Keywords: *perceived service quality, higher education institution, usefulness of study program, ease of studying, re-enrollment intention, TAM model*

JEL classification: *M30, M31, I23*

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1 Introduction

In today's dynamic and highly competitive environment, even organizations not originally market-oriented, such as educational institutions, are embracing a market-based mindset. They are increasingly adopting marketing-based strategies (Kusumawati et al., 2010; Fosu & Poku, 2014; Plewa et al., 2016) and viewing potential students as consumers of educational services (Browne et al., 1998; Ehrman, 2006). The main goal of these organizations is to enhance their reputation and to compete better in the educational landscape. Now more than ever societies face decreasing fertility rates that threaten economic growth and affect all aspects of society (Vos, 2009). The decline in the birth rate is reflected in all spheres of society and, consequently, in education. However, at the tertiary level of education, a particular specificity is maintained because, on the one hand, we have a lower number of newborn in general while, on the other side, we have an increase in the number of students at the tertiary level of education, as stated by the Eurostat (2023). Accordingly, the share of people aged 25-74 years with tertiary education has increased from 24.5 % in 2012 to 31.8 % in 2022. As competition grows fiercer due to an increasing number of participants (Nehme et al., 2014), higher education institutions (HEI) are striving to understand the impact of various variables on students during the re-enrollment process. Particularly bearing in mind that these organizations also strive to attract high-quality students.

By gaining a deeper understanding of students and the factors that influence them, HEIs can enroll students with higher levels of knowledge gained in the previous educational cycle. Consequently, this enables them to deliver higher-quality graduates to the job market. In pursuing their competitive advantage, educational institutions are placing greater emphasis on quality (Abdullah, 2006). HEIs became aware that long-term survival depends on the quality of their service and that service quality is the differentiating factor. The significance of service quality in higher education has become an increasingly important subject of numerous scientific studies, particularly since the 1980s. This growing interest can be attributed to scientific and technological progress, economic changes, and the mounting educational and social pressures on HEIs (Al-Dulaimi, 2017).

The importance of service quality is supported in different research (Hoxby, 1997; Long, 2014), which emphasize that student satisfaction depends on the quality of a HEI (Brady & Cronin, 2001; Alves & Raposo, 2007; Sultan & Wong, 2013; Mwiya et al., 2017). The analysis of student satisfaction and influencing factors, leads to focused attraction and better retention of higher-quality students, which represents the goal of HEIs (Al-Alak & Alnaser, 2012; Yeung et al., 2013; Celik & Akyol, 2015).

The TAM model (The Technology Acceptance Model), originally designed to gauge customer attitudes towards new technology adoption, can also be applied to measure the acceptance of new technologies in the context of education. Given the TAM model's significance and recognition in understanding technology acceptance, the authors saw an opportunity to

test it within the educational domain. This decision was influenced by the belief that HEIs should be at the forefront of introducing and utilizing new technologies in the educational process. As a result, the primary objective of this study is to investigate the applicability of the TAM model in understanding student re-enrollment behaviors. There are previous studies that analyzed the connection between the TAM model and the perceived level of quality when it comes to e-services (Hsu et al., 2012). Still, in this research, the focus is placed on higher education. A question arises regarding how perceived usefulness and ease of use are related to the perceived level of service quality and the intention to re-enroll in HEIs. This suggests a research gap concerning the perceived level of service quality and its connection with the variables of usefulness, “ease of use”, and satisfaction in choosing a HEI.

Namely, it has been proven that greater usefulness is positively associated with repeat purchases regarding online products, as well as a positive correlation between satisfaction with repeat purchases (Li, 2016). This was also confirmed when it comes to banking products (Pikkarainen et al., 2004) and the hotel industry (Helia et al., 2018). So, testing the TAM model in educational context, offers the possibility to better understand the process of choosing a HEI, and the degree of influence of perceived service quality on the choice to re-enroll in a HEI.

Moreover, it has been proven through previous studies that greater perceived ease of use (Davis & Viswanath, 1996; Pikkarainen et al., 2004; Yang, 2005; Li, 2016; Helia et al., 2018) also leads to the intention to repurchase or re-consume the product/service. Service quality is often evaluated as a significant variable that affects satisfaction (Brown & Mazzarol, 2008, Alves & Raposo, 2007), usefulness of models (Rittgen, 2010), or perceived ease of use as one of the determinants of service quality in e-service (Santos, 2003); therefore, this research empirically tests the relationship between them.

The chapter is organized in the following manner. After the Introduction, the Literature review is presented with a focus on perceived service quality in higher education and usefulness, ease of use, and intent of re-enrolment. Followed by Methodology and Empirical data and analysis. Results and discussion offer insight into how conducted research contributes to the research field. At the same time, Conclusion summarizes the study’s findings.

2 Literature review

This chapter aims to provide a theoretical introduction to perceived service quality in higher education. Additionally, it will delve into other essential constructs relevant to this research: usefulness, ease of use, and intent of re-enrolment. Understanding these constructs is crucial for comprehending the overall dynamics of technology acceptance in higher education.

2.1 Perceived service quality in higher education

Higher education service quality has been a prominent subject of research in recent decades, with numerous research analyzing the concept since the

early 1980s, as noted by Doherty (2008). However, despite the abundance of publications, the proper understanding of service quality still needs to be identified. The significance of higher education service quality is highlighted by some authors (Lazibat et al., 2013) who relate it to student satisfaction. Furthermore, according to others (Lewis et al., 1994), service quality in higher education aims to address the needs of students by identifying and fulfilling their expectations through the delivery of educational services.

In higher education, “quality assurance” encompasses a comprehensive set of policies, processes, activities, and mechanisms designed to recognize, maintain, and enhance the quality of education (Ivković, 2009). Standards and guidelines (ESG) for quality assurance in the European Higher Education Area (EHEA) support, among others, the following principles (Glanville, 2006):

1. the interest of students and employers and society in general for quality higher education,
2. the importance of the autonomy of higher education institutions, which bear the primary responsibility for quality and its assurance,
3. the need for external quality assurance must correspond to the purpose, i.e., the achievement of their goals,
4. the quality of academic programs must be developed and improved for the benefit of students and other users of higher education,
5. the need for successful and efficient organizational structures that will provide academic programs,
6. transparency and the use of external expertise are essential in quality assurance processes,
7. the necessity to encourage a quality culture within higher education institutions, etc.

In higher education, the role of students as users is more complex than in other services. Students are not only users of a service but also active participants in the process of providing a service on which the process results depend (Lazibat et al., 2013). So, they act as co-creators of their education.

Legčević (2009) states that service quality is the general opinion of the client about the service, which consists of a series of successful or unsuccessful experiences. Negative experiences help business entities to improve their service. Harvey and Green (1993) proposed five ways to define quality:

1. Quality as excellence - quality is considered exceptional and achieved by meeting and exceeding high standards.
2. Quality as perfection – quality is based on processes and specifications that must be met. Perfection represents the fulfillment of the concept of “zero defects.”
3. Quality as appropriateness – quality refers to fulfilling user requirements and expectations.

4. Quality as value for money – quality is equated with specification levels and directly linked to costs. The efficiency and effectiveness of processes and systems is monitored.

5. Quality as a transformation – the process should lead to a qualitative change. In higher education, transformation refers to improving and empowering internal and external users.

To gain a deeper understanding of how to assess service quality, it becomes essential to examine the various dimensions students use for its evaluation. According to Parasuraman, Zeithaml, and Berry (1985), consumers employ similar criteria to evaluate service quality, regardless of the type of service. Several scales can be employed to measure service quality, including the SERVQUAL scale (Parasuraman, Zeithaml & Berry, 1988), the modified SERVQUAL scale (known as SERVPERF), introduced by Cronin and Taylor (1992), or the HEdPERF scale, specifically tailored for higher education by Abdullah (2005).

In this research, focus in on the SERVQUAL scale, as it is considered the most commonly used scale for measuring expectations and the actual level of service received (Dužević, Časni, Lazibat, 2015).

Determinants of service quality (Parasuraman, Zeithaml & Berry, 1988) are as follows:

1. Tangible assets – which includes physical objects, equipment, and personnel appearance;
2. Reliability – the ability to perform the promised service reliably and accurately;
3. Responsiveness – willingness to help users and provide fast service;
4. Assurance - the knowledge and friendliness of the employees and their ability to inspire confidence;
5. Empathy – caring, individualized attention that the company provides to its clients.

In conclusion, the concept of higher education service quality has been the subject of extensive research and discussion over the past few decades. Quality assurance in higher education involves a multifaceted approach, encompassing policies, processes, activities, and mechanisms aimed at recognizing, maintaining, and enhancing the quality of education. Many different scales and techniques can be used in the process. However, understanding and addressing the determinants of service quality, such as tangible assets, reliability, responsiveness, assurance, and empathy, is essential for HEIs seeking to excel in providing a high-quality educational experience to their students.

2.2 Usefulness, ease of use, and intent of re-enrollment

The constructs of *usefulness* and *ease of use* originate from the “Technology Acceptance Model” (TAM) model proposed by Davis, Bagozzi, and Warshaw

(1989). Originally used to investigate factors influencing technology acceptance, the TAM model reveals the relationship between perceived ease of use and usefulness as a function of behavioral intention as well as the behavior itself (Davis & Viswanath, 1996). The model has been applied in understanding technology and its influence on various areas in a number of previous research. Some previous research explored the acceptance of the technology in the educational context (Fathema, Shannon & Ross, 2015; Rad et al., 2022), but its application in choosing a HEI has yet to be explored.

Although the TAM model has been developed throughout history, from the initial TAM model in 1986, through modified models: TAM 1 - 1989, TAM 2 – 2000, and TAM 3 - 2008 (Lai, 2017), the proposed conceptual model of the importance of quality in choosing a HEI, in this research, is based on the first final version of the TAM model (Davis & Venkatesh, 1996). The Davis model assumes the mediating role of perceived ease of use and perceived usefulness in the complex relationship between system characteristics and the probability of system use (system success indicators), where the variables perceived ease of use and perceived usefulness have a crucial influence on the outcome of the process itself (Marangunić & Granić, 2012; Scherer, Siddiq & Tondeur, 2018). In applying the constructs of usefulness and ease of use, emphasis is placed only on measuring the constructs and the process of their connection to re-enrollment and not on the technological component of the mentioned model. Research that explored the ease of studying (Keller, Hrastinski & Carlsson, 2007) put emphasis on how easy students perceive their studies to be, how frustrating the subjects are for them, what standards they believe professors set for their studies and how much overall effort they think they will have to put into everything. Furthermore, focus is put on students' perception of the accessibility of courses and lecturers, private life during studies and perceived additional benefits.

If perceived usefulness in the original TAM model implies the fact how much users believe that the use of technology will improve their work in the future (Davis, Bagozzi & Warshaw, 1989), then in the context of higher education and the HEI selection process, perceived usefulness implies how and to what extent students perceive that the completion of their studies at a certain HEI will contribute to the possibility to find a better employer and have a more satisfying job in the future.

Similar positive associations between perceived usefulness and user intention to purchase or repeat use have been observed in technology use contexts (Chen et al., 2010), as well as positive links between usefulness, ease of use, perceived service quality, and satisfaction in web portal user evaluations (Yang et al., 2005). However, additional research in the context of higher education is needed.

Furthermore, if the use of a certain technology is complicated for the user, it is expected that they will give up using it or will be reluctant to buy that technology again (Li, 2016). Suppose we place the above in the context of higher education. In that case, the complexity of studying affects the intention not to continue one's education at a HEI or choose any another education opportunity that the respective HEI offers. According to the above - mentioned,

in this research, the usefulness of the student's perception of studying (Keller, Hrastinski, and Carlsson, 2007) was contextualized in the HEA (Higher Education Area). It focusses on perceived benefits like developing skills and knowledge by attending programmes at a specific HEI. The importance of perceived usefulness of studying was previously observed in the research of the process of choosing study programs (Jadrić, Garbin Praničević & Garača, 2010). Kesić and Previšić (1998) also confirmed the previous analysis of Andrijić et al. (1990), pointing out that motives for choosing business programs are influenced by usefulness of studying, as well as the ease of studying. Also, the ease of enrolling or completing studies is one of the most critical factors influencing re-enrollment in higher education (Bračun, 2016), especially for students of HEIs with business programs (Halim et al., 2009). In accordance with the aforementioned previous research, this construct will be transformed into the Higher Education Area and used as an "ease of studying".

3 Conceptual model and methodology

In this chapter, a conceptual model and methodology are presented. First, hypotheses are developed, and afterward, the research framework and methods are presented.

3.1 Conceptual model

Considering the information presented above, the question emerges regarding the relationship between the perceived usefulness of the study program and the ease of their connection with the perceived level of service quality and intention to re-enroll in HEIs. In light of the above, hypotheses are set, and a conceptual model is developed for further research.

Rittgen (2010) demonstrated the relationship between the usefulness of the study program and the perceived level of service quality, revealing that higher perceived usefulness leads to greater user satisfaction. In the context of higher education, we aim to test this relationship, leading to the formulation of the following hypothesis:

H1: The level of service quality is positively related to the perceived usefulness of the study program.

Based on the existing research, primarily in the context of technology use, the analysis of the relationship between the perceived level of service quality and the perceived ease of studying indicates a positive correlation (Yang et al., 2005). Moreover, perceived ease of use has been identified as one of the most significant factors influencing the re-use of a technology (Santos, 2003). Consequently, the following hypothesis can be formulated from the above findings:

H2: The level of service quality is positively related to the perceived ease of studying.

The observation of the construct of the usefulness of the study program in

relation to the intention to reuse has consistently demonstrated a positive correlation in various studies (Davis, 1996; Pikkarainen et al., 2004; Yang et al., 2005; Li, 2016; Helia et al., 2018). In the context of higher education, this leads to the formulation of the following hypothesis:

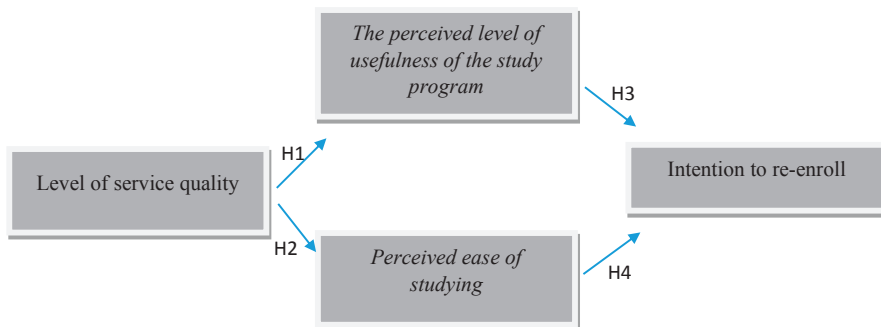
H3: The perceived level of usefulness of the study program at a HEI is positively related to the intention to re-enroll the higher education institution.

Furthermore, the relationship between the ease of studying and the intention to re-enroll presupposes the existence of a positive relationship that several authors have proved (Davis, 1996; Pikkarainen et al., 2004; Yang, 2005, Li, 2016; Helia et al., 2018), from which the hypothesis follows:

H4: Perceived ease of studying positively relates to the intention to re-enroll in a higher education institution.

Based on the previous, a conceptual model is presented in Figure 1.

Figure 1 Conceptual model



Source: Authors

3.2 Research methodology

The research was conducted in January 2019 on a sample of 250 respondents, of which 218 were considered. Namely, only the questionnaires that were completely answered were used in the analysis. The questionnaire was distributed at a public HEI in the field of business among students in the first year of the undergraduate study program. The questionnaire (Appendix 1) was divided into several thematic parts according to the constructs used (perceived level of service quality, usefulness of study program, ease of studying, intention to re-enroll).

The SERVQUAL scale measured the construct perceived service quality with 29 questions, created by Parasuraman, Zeithaml, and Berry (1988), adapted for research purposes according to Rodić Lukić and Lukić (2018). SERVQUAL is the most commonly used scale for measuring expectations and the received level of service quality (Dužević, Časni, Lazibat, 2015). The scale implies two groups of statements. The first group of words is related to the expectations that students have from a HEI related to service quality, and

the second group of statements refers to statements focused on evaluating the received level of service quality at a HEI.

The construct *The perceived level of usefulness of the study program* is taken from the authors Keller, Hrastinski, and Carlsson (2007) and implies the perception of the usefulness of study program in the future, the possibility of developing skills and knowledge necessary for the labor market, responding to personal needs and knowledge needed in further education.

The *Perceived ease of studying* construct is taken from the authors Keller, Hrastinski, and Carlsson (2007). It includes variables with which students measure their attitudes that define the ease of studying in terms of teachers' criteria, non-frustrating courses, the amount of free time for studies, defined requirements for passing the course, the availability of lecturers, etc.

The *Intention to re-enroll* construct, derived from the works of Brady, Cronin, and Brand (2002) and Fathem et al. (2015), encompasses the intention to engage with the content at the HEI, pursue further education within the same HEI and recommend the HEI to others.

Answers were offered through a Likert scale of possible solutions ranging from 1-7 (1 - Totally unimportant to 7- Totally important). The questionnaire was distributed online through the LimeSurvey platform. The analysis included reliability analysis through Cronbach Alpha analysis, Spearman's coefficient for correlation analysis, and perceived-expected gap analysis. The results were processed with the SPSS program ver 22.

Additionally, for the tangibility variable, a specific question (trick question number 4) was inserted and inverted to measure the tendency of students to provide automatic responses without carefully considering their answers. By deleting the trick question, Cronbach's Alpha for the tangibility variable improved to 0.82 instead of 0.74, which indicates higher internal reliability.

4 Empirical data and analysis

Before testing the set hypotheses, Cronbach's Alpha coefficient was calculated to assess the reliability of the applied scales. The Cronbach's Alpha coefficient measures the internal consistency of a set of statements and can range from 0 to 1. A higher Cronbach's Alpha coefficient indicates greater reliability of the scale. In this study, the overall Cronbach's Alpha was calculated to be 0.738, indicating a satisfactory level of reliability (Heale and Twycross, 2015).

All calculated values were within the expected limits, as presented in Table 1.

Table 1 Cronbach Alpha values

Dimensions/Constructs	Cronbach Alpha
Expectations - tangibility	0.82
Expectations - reliability	0.82
Expectations - responsiveness	0.92
Expectations - assurance	0.87
Expectations - empathy	0.79
Perceived - tangibility	0.88
Perceived - reliability	0.81
Perceived - responsiveness	0.94
Perceived - assurance	0.91
Perceived - empathy	0.85
Level of service quality= Expected level-Perceived level	0.88
The perceived level of usefulness of the study program	0.95
Perceived ease of studying	0.91
Intention to re-enroll	0.79

Source: Authors

Following the previous steps, the researchers proceeded to test the normal distribution of the data. Since, based on the obtained results, the distribution was not shown as normal, Spearman's coefficient was used to calculate the correlation. To test the first hypothesis, the connection between the service quality and usefulness of the study program was tested. Correlation values are presented in Table 2. From the table, the correlation of service quality with all five questions that measured the usefulness of the study program is present, with the highest correlation being shown on the question that reflects the students' attitude about how well the HEI they attend suits them and their needs.

Table 2 Correlation of Service Quality and usefulness of Study program

	QUALITY	Usefulness 1	Usefulness 2	Usefulness 3	Usefulness 4	Usefulness 5	USEFULNESS
QUALITY	1.00						
Usefulness 1	0.25**	1.00					
Usefulness 2	0.29**	0.84**	1.00				
Usefulness 3	0.24**	0.77**	0.86**	1.00			
Usefulness 4	0.23**	0.71**	0.76**	0.84**	1.00		
Usefulness 5	0.27**	0.75**	0.79**	0.84**	0.79**	1.00	
USEFULNESS	0.27**	0.88**	0.92**	0.94**	0.89**	0.90**	1.00

Note: Usefulness=Usefulness of study program; Quality=Service quality; **. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

In the following Table 3, the H2 hypothesis was tested, which measured the correlation between the perceived level of service quality and the ease of studying. The analysis showed a correlation in all eight questions that

measured the ease of studying. The highest correlation was established in the question measuring the availability of lecturers (ease of studying 7 in the table presented below). The term “availability of lecturers” refers to the extent to which lecturers are available to students to ask them about any problems they have in mastering the materials during and outside of class. The total correlation of ease of studying was 0.28 (Table 3).

Table 3 Correlation of perceived level of service quality and ease of studying

	QUALITY	Ease 1	Ease 2	Ease 3	Ease 4	Ease 5	Ease 6	Ease 7	Ease 8	EASE
QUALITY	1.00									
Ease 1	0.24**	1.00								
Ease 2	0.32**	0.71**	1.00							
Ease 3	0.22**	0.62**	0.67**	1.00						
Ease 4	0.22**	0.77**	0.69**	0.67**	1.00					
Ease 5	0.19**	0.75**	0.61**	0.66**	0.84**	1.00				
Ease 6	0.24**	0.66**	0.68**	0.59**	0.75**	0.73**	1.00			
Ease 7	0.27**	0.43**	0.48**	0.39**	0.33**	0.37**	0.49**	1.00		
Ease 8	0.18**	0.45**	0.52**	0.49**	0.48**	0.51**	0.58**	0.66**	1.00	
EASE	0.28**	0.86**	0.82**	0.78**	0.90**	0.88**	0.85**	0.54**	0.66**	1.00

Note: Quality=Service quality; Ease=Easiness of studying; **. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

Next, the correlation between the perceived level of usefulness of the study program to re-enroll was measured, which showed a positive correlation between the two constructs (Table 4).

Table 4 Correlation of perceived level of usefulness of study program and intention to re-enroll in the higher education institution

Constructs	Intention to re-enroll
The perceived level of usefulness of the study program	0.68**
Perceived ease of studying	0.38**

Source: Authors

When the relationship between the perceived ease of studying and the intention to re-enroll in HEI was measured, a positive correlation was noticed since the statistically significant correlation coefficient was 0.38 (Table 4).

Additional analysis was made in the Table 5, where the mean was calculated with the expected and perceived level of service quality. If the value is negative, then there is a negative gap in service quality; as such, it assumes a guideline to the HEI which segment of quality needs to be improved to increase students’ perception of the level of service received. By analyzing the responses, it was concluded that the students had the highest mean of expectations in the statements that measure the understanding of what the teaching staff offers. The highest mean of the perceived service quality level was registered with the students feeling safe at the campus and the HEI.

The highest negative gap is the one between the expected and perceived level of service quality related to the *Tangibility dimension* observed with

the statement “Good atmosphere”. Furthermore, the largest positive gap was observed in the statement “Attractiveness of the interior” - where the perceived level exceeded expectations. When we analyzed the *Reliability dimension*, the biggest gap was observed in the statement “Teaching staff shows understanding” and the smallest negative gap is noted with the statement “Staff providing services from the first meet”. In the *Responsiveness dimension*, the biggest gap was observed with the statement “Non-teaching staff is always ready to answer”. Within the *Assurance dimension*, the biggest gap is observed with the statement “Staff should create confidence”. The analysis of the *Empathy dimension* showed the biggest gap in the statement “Improvement of the service”. In total, the biggest negative gap was registered with the statement “Teaching staff shows understanding”.

As we can define from this analysis, according to the students’ perception, HEIs are not oriented towards improving the service quality and/or ensuring the good quality of service and program that meets students’ needs. “Attractiveness of the interior” is the only statement where perceived level has superiorly exceeded expectations with minimum mean with the statements “The attractiveness of the exterior”, “Knowledge of non-teaching staff” and equal mean value of the expected and perceived level with the statement “Individual attention by teaching staff”.

Table 5 Mean values of expected and perceived service quality levels

Mean value of the statements	Mean value of expected quality level	Mean value of perceived quality level	SERVQUAL GAP (P-E)
Tangibility			
Modern equipment	6.23	5.73	-0.5
Visual materials are attractive	5.45	5.27	-0.18
Employers are clean	6.07	5.79	-0.28
The attractiveness of the interior	4.02	5.71	1.69
The attractiveness of the exterior	5.35	5.69	0.34
HEI location	5.86	5.80	-0.06
Good atmosphere	6.24	5.49	-0.75
Good quality of service and program meets needs	6.14	5.51	-0.63
Additional activities	5.16	5.01	-0.15
Reliability			
Service provided by the agreed deadline	6.13	5.61	-0.52
Non-teaching staff shows understanding	5.95	5.33	-0.62
Teaching staff shows understanding	6.35	5.59	-0.76
Staff providing services from the 1st meet	5.93	5.59	-0.34
Responsiveness			
Non-teaching staff ready to help	5.87	5.50	-0.37
Teaching staff ready to help	6.22	5.84	-0.38
Non-teaching staff is always ready to answer	5.96	5.56	-0.4

The teaching staff is always ready to answer	6.18	5.81	-0.37
Fast reaction	5.84	5.66	-0.18
Knowledge of staff in provided deadlines	6.05	5.84	-0.21
Assurance			
Nice with the people	6.13	5.74	-0.39
Knowledge of non-teaching staff	5.47	5.50	0.03
Knowledge of teaching staff	5.99	5.76	-0.23
Students should feel safe	6.29	5.93	-0.36
Staff should create confidence	6.19	5.79	-0.4
Empathy			
Individual attention by non-teaching staff	5.01	4.96	-0.05
Individual attention by teaching staff	5.19	5.19	0
Good working hours	5.59	5.28	-0.31
Understanding of students	5.82	5.25	-0.57
Improvement of the service	6.19	5.50	-0.69

Source: Authors

5 Results and discussion

The research findings established a positive correlation between perceived service quality, ease of study program, and usefulness of study program. This implies that students studying business, when perceiving a higher level of quality, also experience higher levels of ease in their studies and find higher usefulness of selected programs in their education. Furthermore, their intention to re-enroll in the same HEI in the future is enhanced.

By utilizing a market orientation HEIs have a valuable tool to differentiate themselves in a competitive educational market. With students being seen as consumers, understanding the factors influencing their satisfaction becomes crucial. Positive behavioral intentions, such as the intention to enroll in further studies or recommend the institution to others, are frequent manifestations of student satisfaction, motivating their decisions to choose a HEI. Equating quality with student satisfaction (Lazibat, Sutić & Baković, 2013) highlights the significance of measuring the perceived level of quality to inform future strategies for educational services.

Quality in higher education is an ongoing and relevant topic, but it still needs to be more researched, making every new piece of knowledge valuable to educational service providers. In this study, the researchers analyzed the perceived level of quality at a specific HEI in the field of business and its correlation with the perceived usefulness of the study program and ease of studying. The literature review led to the identification of these two constructs as essential areas for further investigation, presenting promising opportunities for additional research.

Previous research (Bradley, 2007) has confirmed that students' expectations

often surpass the actual level of service quality received. To assist HEIs in enhancing student satisfaction, the researchers scrutinized the segments where this “gap” between expectations and reality is most pronounced. This gap can often be seen in the expectations and perceived quality of Student Offices - the places where students re-enroll and where they come to get answers in case of unclear procedures when studying.

According to the technological models, there is a positive association between two constructs - usefulness and ease - with re-enrollment intention (Songkram et al., 2023), which was also confirmed with this research, placed in the context of the Higher Education Area. Therefore, in this chapter, in addition to the connection of usefulness and ease of studying with the service quality, their relationship was also tested as a function of the intention to re-enroll in HEI. The research confirmed hypothesis H1, which states that the perceived level of service quality is positively related to the usefulness of the study program. The highest relationship was shown by the student's attitude about how the chosen HEI fully meets their needs. The weakest relationship was the question related to the student's assessment of how much the chosen HEI will help them create the skills needed for the labor market; when testing hypothesis H2, the relationship between the ease of studying and the perceived level of service quality was confirmed. A particular emphasis is placed on the availability of lecturers as an essential variable that makes it easier for students to study and is linked to the perception of the service quality at the HEI. The weakest relationship was shown by the variable related to the attitude of the subjects students take at the HEI and how manageable the subjects are for them. Hypothesis H3, which indicates the connection between the usefulness of the study program and the intention to re-enroll, was also confirmed, as well as hypothesis H4, which served as a basis for measuring the connection between the ease of studying and the intention to re-enroll in HEI.

6 Conclusions

According to the results of this research, the application of the TAM model in higher education can be used.

This research confirms the importance of service quality in higher education. However, the scientific contribution of the chapter is reflected in the application of the TAM model, otherwise used to analyze the process of technology acceptance in the context of higher education. The conclusions from this research can serve as implications for decision-making bodies in higher education management. Namely, it is evident that the human factor, the teacher factor, plays a vital role in students' perception of the usefulness of the study program. Critical knowledge is gained in the field of the highest expectations for students in the first year of studying, related to the teaching staff showing understanding. It is essential to notice that in this category, students get the most disappointed, and that's where the biggest gap is observed. According to the results, the development of empathy is something HEIs can work on with the teaching and non-teaching staff in the future.

Based on these findings, the recommendations for managers in higher education emphasize the importance of focusing on improving the level of service quality, particularly by placing special attention on the human factor and education. Managers should prioritize fostering empathy and enhancing accessibility within the educational environment. By doing so, they can create a more supportive and understanding atmosphere, making students and staff more aware of the significance of these qualities in providing an excellent educational experience.

The conducted research provided valuable insights into the attitudes of first-year students regarding the perceived level of service quality of study services at the selected HEI. Notably, there are no known studies examining the connection between the perceived level of service quality and the two primary constructs of the TAM model (ease of study program and usefulness of study program). As a result, the proposed conceptual model serves as the foundation for developing new studies exploring these relationships further. The proposed conceptual model represents the basis for the development of recent studies.

One limitation of the research is that it was conducted solely with first-year university students from field of business. Existing studies suggest that students' satisfaction and their perception of higher education may decline as they progress through their education (Tricker, 2005). The question is how their attitudes and memories about the "ease of studying" they considered during study evaluations will change over the years of study. Given that the study was conducted at the end of the first semester, it raises the question of whether students' evaluations of perceived quality are primarily based on their expectations or the reality they have experienced so far. It is crucial to consider whether students have spent enough time at the HEI for their assessment of quality to be realistic and whether their perception might change over time as they progress through their higher years of study.

To address this, a longitudinal study could be beneficial, tracking changes in student attitudes throughout their studies. Such a study would provide valuable insights into the evolution of perceived service quality and satisfaction throughout the academic journey.

Additionally, the research was limited to one HEI, and future studies should consider expanding the analysis to include other HEIs. Exploring different fields and areas of study, as well as various types of HEIs (public and private), can contribute to a more comprehensive understanding of the factors influencing perceived service quality and student satisfaction. Further research opportunities are also found in examining students' attitudes in other years of study. This would offer valuable insights into how the perceived level of service quality may change based on the stage of a student's academic journey. Moreover, investigating students' intentions to continue their studies at the same or a different HEI can provide essential information about their educational choices and preferences.

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Annex 1. Questions used in the research

The faculty should be modernly equipped, including computer labs that are available for students to use
Brochures, flyers, magazines, and other printed materials, as well as websites and other online resources, should be visually appealing and easy to use.
Faculty employees (teaching and non-teaching staff) should act in a clean and orderly manner
The interior of the faculty (premises, appearance of devices, furniture...) should not be visually attractive
The exterior of the faculty (appearance of the building, parking, green areas...) should be visually attractive
The faculty should have a convenient location and good accessibility
The faculty should have a good atmosphere conducive to learning
A well-designed program (by major) should meet the needs of students
The faculty should organize additional activities for students (recreational, fun...)
Employees at the faculty should provide the service within the agreed (promised) period
Non-teaching staff at the faculty (student services...) should show understanding of students' problems
Professors and teaching assistants should show understanding of students' problems
Faculty employees should provide service from the first meeting
Non-teaching staff (student services...) should always be ready to help students
Professors and teaching assistants should always be ready to help students
Non-teaching staff (student services...) should always be accessible and ready to answer students' questions

Professors and teaching assistants should always be accessible and ready to answer students' questions
Faculty employees should respond to student requests quickly and without waiting
Faculty employees should know the answers to students' questions regarding the time frames required for the service to be performed
Faculty employees should be friendly with students
Non-teaching staff should know necessary to answer students' questions
Teaching staff should have the knowledge needed to answer students' questions
Students should feel safe at the university (material and personal safety)
Faculty employees should instill confidence in students by their behavior
Faculty employees (student services...) should provide individual attention to each student
Professors and assistants should provide individual attention to each student
An ideal faculty should have convenient working hours that suit the majority of students
Faculty employees should have an understanding of the needs of their students
An ideal faculty should be focused on providing the best possible service to its students
Your faculty is a modern equipped institution, which has computer classrooms that are available for students to use
At your faculty, brochures, leaflets, magazines, and other printed materials, as well as the website and other online sources, are visually attractive and easy to use.
The employees of your faculty (teaching and non-teaching staff) act neatly and cleanly
The interior of your faculty (premises, appearance of devices, furniture...) is visually attractive
The exterior of your faculty (appearance of the building, parking, green areas...) is visually attractive
Your faculty is in a good location and is accessible
Your faculty has created an excellent atmosphere conducive to learning
The quality of service at your faculty, as well as the well-designed program (by major), fully meets the needs of students
Your faculty regularly organizes additional activities for students (recreational, fun...)
Employees at your faculty provide services within the agreed (promised) period
Non-teaching staff at your faculty (student services...) always show understanding of students' problems
Professors and assistants at your faculty show understanding of students' problems
The employees at your faculty provided the agreed services from the first meeting with you and then on
The non-teaching staff (student service...) at your faculty is always ready to help students
Professors and assistants at your faculty are always ready to help students
Non-teaching staff (student services...) at your faculty are approachable and always ready to answer students' questions
Professors and assistants at your faculty are approachable and always ready to answer students' questions
Employees at your faculty always respond to student requests quickly and without waiting
Employees at your faculty are friendly with students

Non-teaching staff at your faculty have the knowledge needed to answer students' questions
The teaching staff at your faculty knows that it is necessary to answer students' questions
As a student, I feel safe at the university (material and personal security)
Employees at your faculty instill confidence in students with their behavior
Employees at your faculty (student services...) provide individual attention to each student
Professors and assistants at your faculty provide individual attention to each student
Your faculty has convenient working hours that suit most students
Employees at your faculty understand the specific needs of their students
Your faculty is focused on providing the best possible service to its students
I think the faculty I am attending is beneficial for me
This college will help me develop the skills needed for the job market
I think that in the future, I will be in a situation to use the knowledge I have acquired here
I believe that this faculty meets my needs
The knowledge I gained at this faculty will be helpful in my further education
I think the faculty I attend is easy
The courses I take at this faculty are not frustrating
I believe that the lecturers at this faculty will not set high criteria
I don't think I will have to work too hard at this faculty
Courses at this faculty are simpler than courses at other faculties
By studying at this faculty, I have enough time for other activities
Lecturers and assistants are always readily available
By joining this faculty, I will receive additional benefits (such as certificates, etc.)
I intend to use more of the contents of this faculty in the future (the contents include lectures, etc.)
I intend to use other faculty possibilities more often as well
I intend to re-enroll in a higher level of education (another study program) at this faculty (graduate study) or some other education offered by the faculty (course, seminar, etc.)
I intend to recommend this faculty to close people

Note: All questions used 7-point Likert scale from (1 - Totally unimportant to 7- Totally important).

CHAPTER 9

HOW ARE DISASTERS REFLECTED IN SCIENTIFIC LITERATURE?

Barbara Purkart¹, Janez Stare²

ABSTRACT

The chapter describes the review of crisis and disaster literature published in Scopus, the Elsevier's citation, and abstract database, over the last 71 years with the Biblioshiny application. The review of crisis and disaster literature is part of the doctoral disposition Evaluation of institutional care for the elderly in the republic of Slovenia in crisis conditions related to the covid - 19 pandemics. In the literature review, the history and the pioneer work of first research centres of crises and disasters are presented, such as Disaster research centre at Ohio State University and Europe's main research centre at Leiden University where distinguished scholars like Uriel Rosenthal, Arjen Boin and Paul 't Hart are based. For statistical computing and graphics, we used the R programming language. The bibliographic analysis was performed in the application Biblioshiny in R studio programme Bibliometrix. The main findings of this review are that natural disasters are historically well presented in scientific literature, which cannot be claimed for the second group, manmade disasters. The covid - 19 pandemics is for the present time not very noticeable among all other crises in disasters, nevertheless it has encouraged a lot of cooperation among scientists worldwide. The question whether the covid - 19 pandemics can be classified as manmade or natural disaster remains unanswered.

Key words: *crisis, disasters, covid - 19, bibliometric analysis, biblioshiny,*

JEL classification: *H12, H84, C88, D83,*

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1 Introduction

The global pandemic of covid - 19 was a universally unforeseen and unexpected disaster. The chances for a worldwide health emergency or crisis were, at least in the EU, estimated as low, and found EU poorly prepared; the same could be said for the legal framework (Flear and De Ruijter, 2019). Can we claim, that covid - 19 pandemics was a black swan event, an event impossible to happen until it did?

The important literature on crisis and disasters was closely examined by different key and distinguished scholars (Wolbers, et al., 2021; Kuipers and Welsh, 2017). The area of studies is growing, but, at least in the past, it had tendencies to focus on more traditional, natural, disasters. We will briefly, just by examining key words, abstracts, and article titles, consult crisis and disaster literature and look for new trends in the past years. Our main research question is whether the global pandemics of covid - 19 is visible in the crisis and disasters scientific literature. In this chapter we will start with literature review of relevant crisis and disaster literature in the Scopus database, we will continue with the conception of our bibliometric analysis, that we prepared in Studio R and then we will move on to the presentation of interesting empirical data and analysis, and, at the end, we will present the most relevant results and suggest further discussion.

This work is part research work on doctoral disposition Evaluation of institutional care for the elderly in the republic of Slovenia in crisis conditions related to the covid – 19 pandemics (Purkart & Stare, 2022)

2 Literature review

The crisis and disaster scientific literature started to emerge after the second world war. Before that, humanity was involved in numerus crisis and disasters. Crisis and disasters are a repetitive phenomenon, and this fact is the first key characteristic of crisis and disasters literature. Therefore, it is not true, that crisis and disasters are appearing mostly in the present moment, they were a part of humanity throughout its long history (Kuipers and Welsh, 2017). The first listed article on crisis and disaster in Scopus search database dates back to 1953. It was published in the American Journal of Psychiatry (Drayer, 1952). The article calls for the application of experience gained in war psychiatry to civil use. Commoners that are involved in catastrophic circumstances in peaceful environments and are suffering immense emotional damage, which is comparable to trauma experienced in world war I and II, could be helped with methods learned in war psychiatry, suggests the author.

The fast industrial development after the world wars, and the financial perspective of crisis and disasters in focus, gave rise to the first research centres for crisis and disasters. In 1963, a pioneer Disaster Research Centre was established at Ohio State University, USA, by three sociologists working at the University (Quarantelli, 2009). The initial research work on crisis and disasters was performed in the field of social sciences. The main researchers

at the centre were Enrico Quarantelli, Russell Dynes, and Eugene Haas. In 1984, the independent centre, which was technically or financially never part of the University, moved to Delaware. In 1976, the Natural Hazard Centre was established in Colorado, also in the United States (Natural Hazards Center, undated). In Europe, the main research center was established at Leiden University in the Netherlands (Kuipers & Welsh, 2017) where researchers of crisis management, Uriel Rosenthal, Arjen Boin and 't Hart were based. The main researcher centre of another important research group, the so-called Berkeley group, was established in mid 1980s. The founding researchers were Todd La Porte, Karlene Roberts, Gene Rochlin and Karl Weick, who centered their work around High Reliability Organizations. High Reliability Organizations are organizations which have fewer or no accidents, even though they perform under great pressure (Roberts, 2018).

Strong connection with practice and a desire for applicability is the second key characteristic of crisis and disaster literature. Researchers are trying to influence policy making and contribute to the improvement of preparedness for all phases of crisis ('t Hart and Sundelius, 2013) and with the use of knowledge gained from past experiences, dealing with such cases, e.g., Ebola outbreak, major health emergency threats or critical infrastructure breakdowns, they call to improve organizational resilience (Lloyd-Smith, 2020; Darkow, 2019; Barasa, et al., 2018; Doerfel & Prezelj, 2017; Boin & McConnell, 2007).

An important role in crisis and disasters literature is held by National Agencies or Administrations e.g., FEMA (Lucie, 2016; Sylves & Cumming, 2004) in United States of America or Administration for Civil Protection and Disaster Relief in Slovenia (Doctrine of Protection, Rescue and Relief, 2002). Supranational organizations for help, like United Nations, support crisis and disaster research with important documents (UNISDR, 2015a; UNISDR, 2015b) that are often named after a recent major disaster, e.g., Sendai Framework, named after the Sendai earthquake and tsunami in 2011. Furthermore, the European Commission, especially, the Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO) and World Health Organization provide major documents and legal framework on disasters (EU, 2023; World Health Organization, 2019; EU, 2013)

3 Conception of analysis

We used Elsevier database for abstracts and citations, Scopus, as source of data for analysis of metadata, which we accessed through the Digital library portal of the University of Ljubljana. We firstly searched for most relevant keywords, then we exported a large base of metadata to home computer and prepared it for further use.

The bibliometric analysis method was used for consulting the history of crisis and disaster literature. We used open-source R programming language for statistical computing and graphics. The analysis was performed in the application Biblioshiny in R studio program Bibliometrix, which is used for comprehensive science mapping (Aria & Cuccurullo, 2017). Application

Biblioshiny specializes in visualization of data, and provides useful and interesting but sometimes hidden statistical data, as it is able to describe the selected base of data from various points of view.

4 Empirical data (documentation background) and analysis

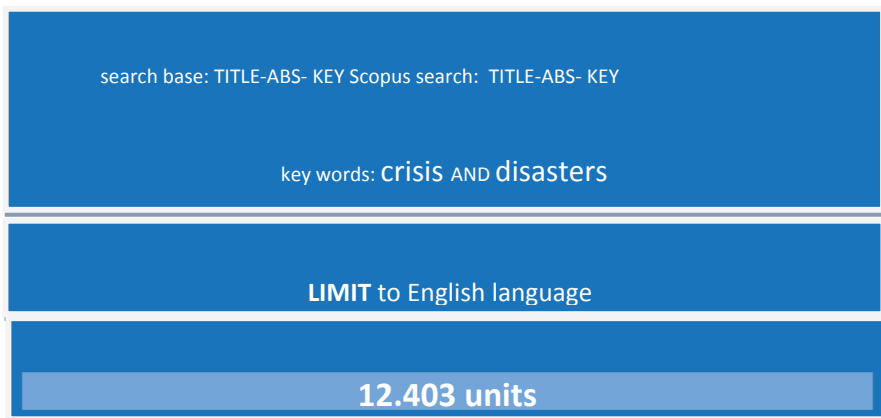
The metadata was gathered in the Scopus database. We used several keyword searching titles, abstracts, and keywords in the base to accumulate most relevant results. We selected all articles, published and articles still in press, available in the Scopus base up to May 2023.

We selected the key words *disaster AND crisis*, since they provided best results for our further work. We tested several different key words, but they were too narrow or misleading. The base was relatively large, it consisted of 13,061 units, and it covered 71 years of research work done on crisis and disasters.

We filtered the data and included selected citation information, bibliographical information, abstract and keywords, and additional references. At this point we were still preparing the base within the Scopus environment. We limited our selection to English language only, since we could not use other world language articles due to our language barrier. With language limitation, we reduced the base to 12,403 units of articles.

The filtered data was exported from the Scopus database in the comma-separated values format to our home computer, which was rather time consuming, because of the immense database, which was as formerly described prepared for further work.

Image 1 Graphical display of data gathering and filtration



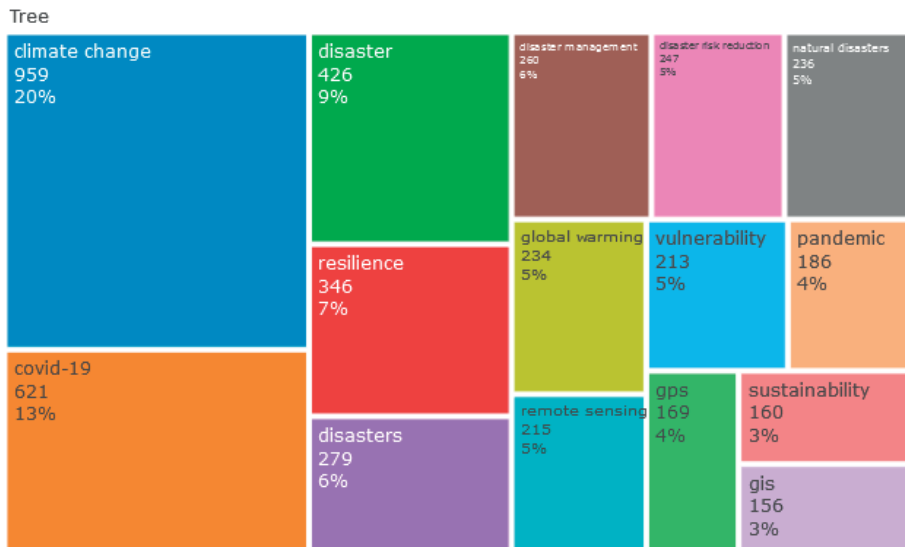
Source: Author

5 Results and discussion

We imported a relatively large base, consisting of 12,402 units in comma-separated values style in Biblioshiny application. The application runs in a browser, which makes it accessible from different computers, workplaces, and operating systems. The large base of metadata consisted of citation information, bibliographical information, abstract and keywords and additional references. It was considerably difficult to manoeuvre over the application, since a lot of given features could not consume such a large base of metadata. Many features could not be consulted because of that. The limited number of available features was capable of statistical computing of data and graphical visualization of results. We had to wait up to ten minutes to visualize or statistically process the data at single occasion.

Image 2 shows the most interesting findings.

Image 2 Graphical display of authors' keywords - tree map of 15 most often used words



Source: Author

If we look for the most often used words in authors' keywords for "crisis AND disasters", we can see that *covid - 19* in the visualization tree of authors' keywords holds second place, just behind *climate change*. This is very interesting and unexpected, because we get very different results if we use other Biblioshiny features. If we investigate the list of most frequent words in "crisis AND disaster" literature search, and list them descending from the most frequent downwards, we cannot find any documents related to covid - 19 among the list for a long time. The term *Covid - 19* is displayed just on the thirty-first position, followed by *coronavirus disease 2019* on the thirty-eighth position and *epidemic* on the thirty-ninth position.

Image 3 Graphical display of the most frequent word in crisis and disaster literature search

31	covid -19	497
32	adult	493
33	organization and management	476
34	earthquakes	443
35	flooding	441
36	greenhouse effect	415
37	world health organization	414
38	coronavirus disease 2019	387
39	epidemic	381

Source: Author

Image 4 Graphical display of first 20 titles of most cited documents

Paper	Total Citations
LOZANO R, 2012, LANCET	10093
VOS T, 2012, LANCET	5712
NAGHAVI M, 2015, LANCET	5523
EASTERLING DR, 2000, SCIENCE	3588
EVANS P, 2012, EMBEDDED AUTONOMY: STATES AND IND TRANSFORMATION	3268
SMIT B, 2006, GLOBAL ENVIRON CHANGE	3148
NAGHAVI M, 2017, LANCET	3101
TURNER BL, 2003, PROC NATL ACAD SCI U S A	2798
EMANUEL K, 2005, NATURE	2688
WANG W, 2003, PLANTA	2594
CUTTER SL, 2008, GLOBAL ENVIRON CHANGE	2319
COSTELLO A, 2009, LANCET	1703
SEKI M, 2002, PLANT J	1644
MCGRANAHAN G, 2007, ENVIRON URBAN	1643
LESK C, 2016, NATURE	1627
BRESHEARS DD, 2005, PROC NATL ACAD SCI U S A	1621
GARDNER TA, 2003, SCIENCE	1526
KASSEBAUM NJ, 2016, LANCET	1484
GOSWAMI BN, 2006, SCIENCE	1387
HALLEGATTE S, 2013, NAT CLIM CHANGE	1335

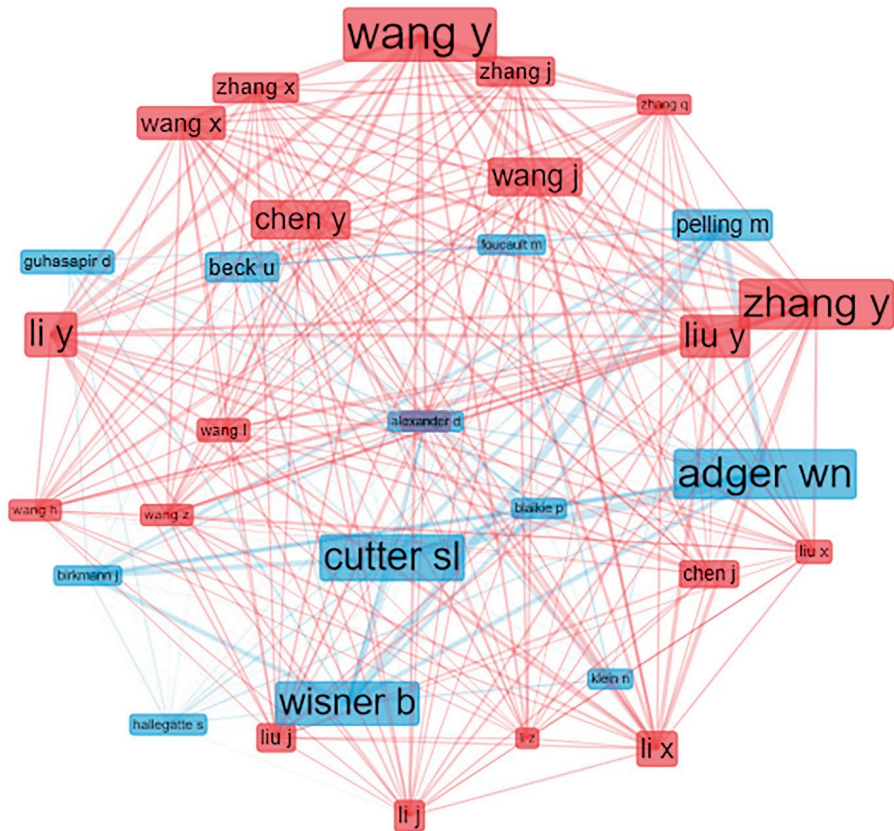
Source: Author

If we observe the graphical display of the first 20 titles of most cited documents, we can see that the years of publication ranked first 20 places of most cited documents, are 2017 and older. That is a time when the pandemics of covid -

19 was not a threat for crisis or disaster.

The graphical display of co-citation network in *Image 5* suggests that there is a considerable amount of cooperation among authors in crisis and disaster literature all over the world. That is very reassuring, since this kind of intellectual structure promises further development, research and improvement in crisis and disaster literature.

Image 5 Graphical display of the co-citation network



Source: Author

5 Conclusions

Crisis and disasters are divided in two groups. First are classical natural disasters, which were represented well through history in scientific literature. Until 2016, as much as one third of the articles published in the three main Journals on public policy: The International Journal of Mass Emergencies and Disasters (IJMED), The Journal of Contingencies and Crisis Management (JCCM), and Risk Hazards and Crisis in Public Policy (RHCPP, since 2010) addressed natural disasters (Kuipers and Welsh, 2017). Most of the articles

are single event case studies. The second large group of crisis and disasters are in a classical view supposed to be man-made disasters, and this group is sometimes further divided to technological disasters and socially focused disasters (Lindell, 2013).

To conclude, we can find at least two unanswered questions. The first one is, whether it is even possible to divide disasters into man-made and natural disasters, since humans have affected nature in such an enormous way in the last period. And the second question that remains is whether covid - 19 pandemics can be sorted into natural or also into man-made disasters since the consequences of the virus disease were and are so closely connected to society and its preparedness for crisis and disasters. Unfortunately, in consideration of the field of crisis and disasters, we presume, that there are some more black swans, surprising extreme events (Aven, 2013), waiting to present themselves to us.

We can acknowledge two important limitations of this research. The first one is the use of only one citation and abstract database, the Scopus. With this decision, some articles listed in other databases like Web of Science (WoS) were overlooked. The second important limitation was, that because of a large database, 12,403 units, a lot of given features of the application could not be tested, since the application could not consume such a large base of metadata. Recommendations for future research are the use of a smaller, more limited, and selected or filtered database, or a selection of other environment for statistical computing and graphics.

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CHAPTER 10

A CORRELATIONAL ANALYSIS OF PRE-ROLL VIDEO ADS ON YOUTUBE AND THE AMOUNT OF TIME USERS SPEND ON YOUTUBE

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ABSTRACT

The new version of the Internet platform Web 2.0 made sharing content and developing two-way communication faster and easier. Constant advancement and technological inventions lead to the development of the YouTube platform, which turned from an internet service into an influential media exploited by people for various contents and purposes. By using all sources and through media content we are able to achieve communication, transmit information, show everyday life routines and share experiences. YouTube helps in sharing all the above details. Even though the emergence of the new ways of communication and sharing of information, brought about both positive and negative opinions about it, the overall society is ultimately adapting to these changes and remains faithful to the medium that best provides the needed information. Since its beginning, YouTube has progressed tremendously in terms of its features and capabilities. The aim of the chapter is to point out the correlation between pre-roll video ads (which is a subcategory of video ads) and the time users spend on the platform, and to determine whether the YouTube platform is in risk, given that ads affect the decrease in the amount of time that users spend on the platform.

Key words: *pre-roll video ad, YouTube ad, social media advertising, YouTube, video ads*

JEL classification: *M3, M31, M37*

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1 Introduction

The Internet platform YouTube is one of the most visited websites and social networks on the Internet. YouTube is considered one of the first Internet platforms whose primary function is related to video content. On this platform, it is possible to upload your own videos, but also to watch other people's videos. Since the very beginning of the website's existence, its popularity has been constantly growing. The simple concept of posting and viewing video content has proven to be a successful concept on the Internet. As the popularity of the platform grew, different ways of advertising began to be implemented on the platform. One of the ways to advertise on the platform is through so-called pre-roll video ads. This is a type of paid ad in an audio-visual format that is automatically triggered when a user opens a certain video content. The pre-roll video ad is designed in such a way that the user must first view the ad in order for the selected video content to appear. As a free medium, YouTube has become a means of promoting anonymous film authors and musicians who have gained popularity through this means and have broken into traditional media such as radio and television advertisements that appear next to their works. The power of YouTube has also been recognized by politicians. Thus, the candidates for the 2008 US presidential elections used YouTube as a medium for the presidential campaign, most notably Barack Obama and Hillary Clinton. Potential voters can view videos of presidential candidates expressing their views and comment on them with their own work. Furthermore, the US media point out that YouTube played a significant role in the defeat of Republican Senator George Allen in 2006 due to a video in which the senator expressed racist views. The primary goal of this research is to find out the impact of pre-roll video ads on the time that users are willing to spend on the platform and how much negative impact there is on the time itself. It is trying to find out which groups of consumers will first give up watching video content and be the fastest to leave the platform. In addition, the goal is to discover the effectiveness of this type of advertising, i.e., how much users actually notice the content of the ad itself.

2 Advertising on social networks

The Internet has enabled a whole new approach to advertising. The advertiser is provided with numerous ways to monitor the success of the ad or campaign. There has always been a degree of uncertainty about advertising through the traditional media. Two characteristics that can be avoided in Internet advertising can be mentioned here. Firstly, when advertising through traditional media, the advertiser is never completely sure whether the target group of consumers will see the ad, and secondly, the advertiser must pay for each individual ad regardless of whether they make any potential profit (Vossen, and Hagemann, 2007). Online advertising, including that through social networks, provides solutions to these problems. Online advertising allows for the possibility of targeted marketing, which is one of the aspects of Web 2.0. With targeted marketing, it is possible to advertise to individuals who match the profile of the desired user or consumer. This is achieved by

tracking the search history of those keywords using so-called cookies that are saved in the user's browser after visiting a certain website or after searching for a certain term in a search engine. In addition, there is the option of paying per click, in which the advertiser does not pay for the advertising space itself to the platform where the ad is placed but pays for each click on the ad and usually pays a few cents per individual click (Vossen, and Hagemann, 2007). These techniques enable the ad to be noticed by consumers whose characteristics correspond to the set target group. There are also other ways of paying for advertising on the Internet, namely direct advertising through social networks. In this type of advertising, different subcategories can be used, including promotional posts, sponsored posts (most often through influencers), and so-called boosted posts that appear on the home page or the platform's newsfeed (Quesenberry, K. A.; 2019) It can be concluded that marketing and promotion on social networks have already left their mark in the modern sphere of communication. Two types of promotion emerged from the above-mentioned promotions on social networks. The first is social advertising, which focuses on the generation, targeting, and distribution of promotional materials to a specific target audience group, while the other type, native advertising, displays promotional content on the platform or application in the sense of indirect promotion, in the form of an article or something similar. (Quesenberry, K. A.; 2019) In this context, it is also necessary to monitor the reach of the promotion itself. This can be seen in the context of organic reach, which shows how many individual users saw an ad that was not paid for, and paid reach, which shows how many individual users saw a paid ad. The most effective advertising on social networks is the one that combines all the above factors.

2.1 Purpose of advertising on social networks

A large number of companies have already directed their marketing efforts towards this modern technology. It can be said that the use of social networks for marketing and promotional purposes is becoming a new component of the marketing mix and can be described as a hybrid element of the promotional mix (Mangold, Faulds, 2009). Research by Heiberger and Harper (2008), Imlawi et al. (2015) and Rueda et al. (2017) specifically suggests a positive correlation between Facebook usage and student engagement at the university level. Among which, OLED TVs are expected to generate 2.3 billion U.S. dollars and portable gaming consoles are expected to generate 1.5 billion U.S. dollars (statista, 2023). When looking at the basic elements of the promotional mix (advertising, public relations, direct marketing, personal selling, and sales promotion), it is possible to use all elements of advertising through social networks. Moreover, with the aspect of social networks, there is an additional component that can be very useful in advertising. In classic marketing, the company communicates with customers or consumers one-way, while with social networks there is a feedback option, which allows the company to immediately recognize the positive and negative aspects of the marketing campaign (Mangold and Faulds, 2009). In addition to the benefits that advertisers have, the portals or social networks themselves, which provide space on their pages for promotional purposes, can derive financial

benefits. Online advertising has become the most prominent and lucrative business model on the Internet (Vossen and Hagemann, 2007). Levy (2008) emphasizes that the twenty-first century was a turbulent time of technological change. Devices have become smaller and smaller, and the user base larger. By having the general public transmit, sharing, editing and create content, the viral video initiated major changes in modern media. (Levy, 2008: 4) The age of publication and sharing begins with videos that simultaneously inform and entertain a large audience. Also, persons who create accessible content often begin to influence a change of opinion on the topic presented. YouTube is defined as a community where people have fun, inform, educate and inspire others by sharing videos. (Schepp, Schepp, 2009). Modern times also mean a change in the way of advertising. A person who decides to get involved in the business of recording and publishing videos can have several different goals that they want to achieve. Someone does it solely for fun or as a hobby, while someone sees content creation as an opportunity for work. Kostić Stanković, Bijakšić and Ćorić (2020) claim that social networks represent the platform that has the most significant impact on consumer perception. Social media marketing networks is a subtype of digital marketing that aims to produce content that users will share so that the organisation achieves greater brand exposure and better performance. (Kostić Stanković, Bijakšić and Ćorić, 2020) Social networks and platforms become places that are recognized by prestigious organizations or companies. Those of famous people, who express themselves in front of the audience, benefit from mutual sponsorship and advertising. One of the consequences of this is that a large number of public figures on these social networks, known as influencers, make it possible to promote and sponsor brands, products, and the like. The more views an influencer has, the more attractive it becomes for companies that advertise online, so they can focus on advertising through a specific influencer that thematically covers a specific sector to which the company itself belongs. As an example, a company that is in the fashion industry can cooperate with a certain influencer who is known on his platform for posts about the fashion industry. This also facilitates the segmentation of the target audience, since such influencers are followed by people who are interested in such topics, and there is an additional effect of trust towards the influencer himself/herself on the part of the audience. That this global connection can also cause certain shortcomings or obstacles to successful communication with the target audience. One of the problems with advertising through social networks is the distrust in the published information. Modern internet technology enables any user to publish information. This can cause various negative consequences. At this moment, it is impossible to prevent the publication of false information on the Internet and on social networks. "The digital environment provides the possibility that anyone, regardless of age and expertise, can be the author of a large amount of information, which certainly leads to the question of credibility because electronic presentations can post content without prior review or review by the editorial team, which parallels the content of digital media with the myth of the Pandora's box" (Šmakić, 2017). For this reason, distrust in posts on social networks can become a problem for advertisers. In this context, it is important to mention how media literacy affects the trust of social network users. People with a higher level of

media literacy are more sceptical when using social networks. Such people will not open a specific ad unless they are convinced that it is not a case of false information. Unlike the people with a lower level of media literacy who filter announcements more and have a harder time deciding on whether to view a particular ad. Such an audience needs a positive image and trust in the company (Fletcher, 2018). New generations can rarely separate business from private life, so the situation is similar in their virtual lives, where more than 40% of the respondents use social networks both businesswise and privately. Since social networks are a new trend, most respondents have a relatively short tenure at social networks. Certainly, due to commercialization, every company that cares about positioning itself on social networks strives to encourage its employees to actively use it. Social networks beyond doubt increase direct communication with potential consumers who can get all the required information directly. It can be said that social networks represent a kind of utopia that aims to bring people together. This type of utopia requires the principle of interaction, where private and professional contacts are created. Social media represent a new form of entertainment (Antonides and van Raaij, 1998; Constantinides and Fountain, 2008; Erdogmus and Cicek, 2012; Kim, Jeong and Lee, 2010; Munar, Gyimothy, and Cai, 2013) and escape from everyday problems (Antonides and van Raaij, 1998; Erdogmus and Cicek, 2012). People need to have fun in order to enjoy life, recharge their “batteries,” or simply laze around. Many people have profiles on several different social platforms and media, and visit them regularly and with care. They spend time creating and publishing content. Add new information about their daily activities that members of their community can read and respond to their messages. They view photos and videos on Flickr and YouTube, listen to music (Kim, Jeong, and Lee, 2010), tweet, etc., which does not have to be conditioned by goal-oriented activities but by mere entertainment. Accordingly, even with the many elements to consider when launching an advertising campaign (e.g. duration, budget, buying personas, segmentation criteria, objectives and expected outcomes), Facebook offers one of the most cost-effective advertising platforms (Shewan, 2017). The real importance of digital business is not in the emergence of new technology; the importance is in the change of customer behaviour. Marketing campaigns prompt user reactions and ensure more precise campaign management.

2.2 Measuring the success of advertising on social networks

In order for social media advertising to be successful, it is necessary to measure the performance of the ads or the campaigns themselves. By measuring performance, an organization can find out how many social network users actually saw the ad itself, and in addition, how many of them opened, or even bought the advertised product or service. It is also possible to calculate the return of income, that is, whether the organization has recovered the money invested in the campaign. A large number of components are included in the calculation, and for this reason there are also various tools and software that enable easier measurement and calculation of success during advertising. According to some authors, performance measurement begins with planning itself. By defining quality strategies and

accurately defining goals, the organization can ensure that the campaign goes in the desired direction. The organization must also be aware of its position in the market, so that it can know in which direction it should move if it wants to achieve the defined goals. In addition, it is necessary to measure the viewing of the organization's page itself (which is linked via the ad), and this implies not monitoring only the number of views, but also the way in which users reach the page and what users do on it. These items can be measured using various tools that can be found on the Internet (Warren, 2009 cited in Heckadon, 2010). There are of course other metrics used to measure performance. If you want to exclusively measure the financial success of advertising, it can be measured using the "Customer Lifetime Value" model (Turner, 2010 cited in Heckadon, 2010), which calculates the total income received from an individual consumer throughout his entire life. Likewise, one of the strategies for measuring the success of advertising on social networks is to measure it in a way to identify users and to assign a certain value for them, looking at the direction of their interaction on social networks, and to record the user's interaction process on the organization's pages. In most cases, this is done using *cookies* that are saved on the user's device when entering the website and by which information about the user's movements is sent to the organization (Balwani, 2010, cited in Heckadon, 2010). As already stated, in order to facilitate the measuring of the success of advertising on social networks, various applications and software have been created to perform the measurement process and the calculation of results. They are incorporated on the final page being advertised on social networks and thus measure the activities that individual users carry out on the organization's pages. One of the most used applications in this sense is Google Analytics. Bashar et.al., (2016) have done an empirical research to understand the effectiveness of social networking sites as a marketing tool and an effort has been made to analyze the extent social networking sites helps consumers in buying decision making. Results of paper suggested that the medium is growing very fast and holds huge potential but is still in its nascent stage in India. The function of this application is to monitor the activities of users who stay on websites, and this includes monitoring the number of users who have accessed the website, monitoring how many times an individual user opens the page, the average time spent on the page, the most frequently accessed pages, and monitoring how and by what means the user accesses the organization's pages (Plaza, 2011).

3 YouTube is a video sharing platform

Since technology products continue to be a strong draw for consumers, advertisers and marketers have sought to entice consumers to engage with the products' advertising. One of the most popular platforms to foster user engagement is YouTube (Buffer,2023). YouTube is a big Website that consists of a certain number of smaller web pages. In this sense, the platform therefore consists of several smaller subcategories, each of which performs a special function. YouTube is right after Google, the most popular online location worldwide (Alexa, 2020). YouTube is a platform that has a diverse

user base with up to two billion users per month, which is almost one in four of the world's population. This makes it easy for brands to choose it as a channel to connect with new target groups. Approximately 77% of internet users aged between 15-35 years of age use YouTube, followed by 73% of users aged between 36-45 years, and 70% of users aged 46-55 years (Relevantadmin, 2023). These pages can be accessed by simply clicking on the designated website object. All pages consist of two blocks of content, one of which is fixed (does not change when another page on the platform is opened), and the other which changes when another page of the platform is opened. The fixed blocks on the platform are the head of the page where the platform logo is located, which is also a link to the platform's Home page, next to it there is a field to search for video content, and after that, on the right, four icons with different options (Create, YouTube applications, Notify you icon that opens the settings for managing the user account) and on the left side of the page a menu, which can be displayed in a smaller or expanded form and which contains the following icons with links; Home, Explore, Shorts, Subscriptions and Library. The remaining central part of the platform represents each individual page opened on the platform, and it is the part of the page that is not fixed. This section displays various customization options and offers videos that came from search results or as a result of opening a specific page on the platform. Recent literature evolves this terminology further, preferring "audience engagement," a term that more inclusively covers users, consumers, and customers within online environments. Audience or user engagement refers to user-initiated actions that contribute to the "co-creation of value" and knowledge within an online community (Brodie et al., 2013; Hussain et al., 2021; Mvondo et al., 2023). A typical YouTube channel provides video content and text as comments (Khan and Malik, 2022; Ladhari et al., 2020; Sokolova and Perez, 2021). On YouTube, there are both participation and consumption modes of user engagement (Khan, 2017).

While there is a considerable number of works that thematise social networks in general, there are few works dealing with social networks that serve to reproduce video content (Hussain et al., 2018). Platt et al. (2015) investigate whether communication via YouTube serves to exchange ideas globally, or does it simply reflect already existing cultural channels. Taneja et al. deal with a similar topic (2014), when they claim that websites cluster together with language and geography, at the same time emphasizing the greater role of cultural similarity than the possible censorship of the network of individual countries. In other words, they claim to monitor virtual online borders of already-existing cultural regions. Similarly, Mohan and Punathambekar (2019) emphasize that already existing linguistic and cultural regions are crucial for the expansion and localization of digital platforms. In other words, YouTube users are rooted in their own cultural regions mainly based on language and video production and consumption. They represent the cultural imagination of certain regions that may correspond to geopolitical boundaries but may also transcend them. On the other hand, Mellander et al. (2018) proved that geographical differences in music preference (which can be brought into relationship with YouTube content preference) maintain existing economic and political divisions in American society. Furthermore, Broderson et al.

(2012) studied the relationship between video popularity and locality, and Delbruel et al. (2015) geographic distribution of tags on YouTube. Hussain et al. (2018) focus on qualitative features. YouTube is trending in the US and the UK, where they find that videos with a larger number of comments have a more even number of likes and dislikes, while videos with a smaller number of comments, as a rule, are more polarized. Baek (2015) examines how cultural proximity and exoticism affect the reception of K-pop music using data on the most popular YouTube videos for 72 countries around the world. Park et al. (2017) also use lists of the most popular videos on YouTube. Their goal was to prove that, despite the global availability of cultural content, consumption of popular culture shaped by specific cultural values does not result in universal cultural convergence. Nieborg and Poell (2018) discuss the platformization of the cultural industry, arguing that the cultural industry and digital platforms are mutually reinforcing. Namely, platformization is not only an external process that affects the transformation of the cultural market itself. The cultural industry actively organizes its own production and distribution via digital platforms (YouTube).

(Ferhat Ferhatoglu, 2019) in study shows less accurate and less reliable videos are more favorable by open access video platform YouTube® users. Also, the open access nature of YouTube® complicates filter process of video quality and accuracy. Health professionals prepared only half of the videos, and this suggests that the remaining videos could be potentially misleading, so this free and unreliable data may misinform and mislead the patients which creates a problematic patient-physician relation. Despite all its disadvantages, educational value or potential of YouTube® cannot be ignored (Ferhat Ferhatoglu, 2019). A Vtuber can be a YouTuber who uses cartoon or motion capture technology to represent themselves (Zhou, 2020). Vtubers are currently being used to sell unpopular products and promote merchandise by using their images, sounds, and content during live broadcasts. One of the key advantages of using Vtubers is their ability to instantly respond to any inquiry, making them an attractive option for companies looking to promote their products (Zhao, 2022).

YouTube offers its users numerous possibilities. Users can post, watch, comment and share videos. They can also create personal profiles that show who they are subscribed to, recent activity, friends, comments and favourite videos (Smith, Fischer, 2012: 104). Owners of the YouTube platform do not have direct control over what viewers can see and when, but this does not mean that the content on the platform flows unmediated. Van Dijck explains how search engines and ranking algorithms play a significant YouTube Content Management Role: "YouTube's interface design and its underlying algorithms select and filter content, directing users to find and watch specific videos among millions of streams, at example via the button for "most popular" videos. The site controls the video traffic not by program schedules, but by an information management system that directs user navigation and selects content to promote" (2013). Video Power Index To asses both the view and the like ratio of the videos we chose BVideo power index[^] (VPI) which was first described by (Erdem MN et al. , 2018) the formula calculated video power index: $\text{like ratio} \times \text{view ratio}/100$.

Van Dijck (2013) emphasizes that reference systems, and search functionalities with ranking mechanisms like PageRank, get an apparent impression of the users as they are in control over the content they watch. YouTube states that searching for the desired video would be an extremely difficult task without a proper classification system since each minute more than 500 hours of content are streamed on that platform (YouTube, 2023). Precisely for this reason, YouTube uses its search results ranking system to help its users find the most relevant and useful results. To achieve optimal search results, the YouTube platform takes into account three key factors: relevance, engagement and quality. For example, the total viewing time of a particular video which is associated with a specific query is analysed to determine its relevance. Importance is also given to user's search and video viewing history to provide personalized results (YouTube, 2023).

3.1 Types of ads on the YouTube video sharing platform

Previous research on the YouTube social network included, on the one hand, the measurement of the technical aspects of video content creation and their impact on optimizing the IT system to make the content easier to share, while on the other hand, research focused on the influence of different behavioural constructs when creating video content on the behaviour of other users. Skippable in-stream ads are a type of video ad that can appear at the beginning, middle, or end of a user-selected video during the entire video. The characteristic of this type of video ad is that it can be skipped 5 seconds after its launch. This type of advertising requires a video that lasts longer than 15 seconds and can even last several minutes. The technical perspective that leads to the success of YouTube marketing is creating an emotional connection with content that makes viewers feel emotionally involved with a brand's story. This method yields better results than focusing on presenters or using humour to achieve sales success and can also create positive memories for consumers through creative thinking (Relevantadmin, 2023).

Non-skippable in-stream ads are used as ads that are displayed before, during, or after the video that the user has opened. Unlike the previous type, non-skippable in-stream ads, as the name suggests, are ads that cannot be skipped. For this reason, these videos must be under 15 seconds. Unlike the previous two types of ads, an in-feed video ad is a video ad that does not start automatically when opening a video but is a video that is suggested to the user on the feed, in other words, on the home page or in the list of searched videos in the first place, Bumper ads reappear before, during, or at the end of the opened video. This type cannot be skipped. Bumper ads can last up to 6 seconds, and their primary purpose is to create brand awareness. With these ads, advertisers send short and memorable messages that represent the brand in a specific image. This type is the shortest type of video ad that is shown to the user. The reason for this is that the user does not spend a lot of time watching the selected video, which can be beneficial for advertisers. YouTube, also known as Vtuber, is a recent innovation that has gained popularity worldwide since 2016. Vtubers can be either 2D or 3D and are characterized by having one person provide the voice and

another person control the character's movements (Mahujchariyawong and Nuangjamnong,2021). Outstream ads are exclusive to mobile devices. These are video ads that appear on websites and applications that are in the Google Partner system. These ads run as automatically muted videos. This type of ad is used to expand the advertiser's general reach by entering new territories. This provides the advertiser with the greatest possible reach in a modern environment dominated by mobile devices. Masthead ads are used exclusively in cases when one wants to achieve a wide reach and create a certain image in the public in a relatively short time. For these reasons, they are used most often for various events, such as fairs. Masthead ads are also only available by reservation through Google sales representatives. This type allows for advertising on different devices, such as computers, mobile devices, and TV devices.

4 Research methodology

This chapter focuses on and deals with the peculiarities of the user's social behaviour on the YouTube network as the most important network for sharing user video content and which enables users to create and upload video content that they then view and share with other users (Tuten, Salomon, 2013). The social network YouTube was founded in 2005 and is currently the second-largest social network in terms of the number of users, with over 2 billion users. About 61% of all Internet users use the YouTube social network on a weekly base (Statista 2020). From the initial service for sharing music video content by lesser-known musicians who by their own part wanted to make it available to a wider audience, YouTube has become a platform for sharing a wide types of content, from musical, educational, informative to sports, scientific, and other contents. Today, the YouTube social network has actually become the biggest current library culture as well as an archive for numerous old films, sports content, and explanatory videos.

Besides that, the appearance of YouTube led to the development of new types of influencers, the so-called YouTube influencers who do not have to necessarily be famous people who have a wide circle of followers for their posts (Hollensen, Kotler, Opresnik, 2019). Indeed, this has been recognized by numerous business organizations in the industry. Cosmetics, sports shoes and clothes, computer games, etc., organizations tried to connect their brands and products with famous YouTube influencers wanting them to become their brand ambassadors and promote their products (De Veirman et al., 2017). Various studies confirm that investments in this type of marketing will grow in the future at a rate of over 30% and reach a peak of approximately 10 billion USD by 2020 (Gallagher, 2018; Statista, 2018). Despite the stated importance, scientific research on the YouTube social network has been scarce. For the most part, previous research, in addition to the YouTube social network, also covered other social networks at the same time, such as Facebook, Instagram, Twitter, etc., and dealt with various aspects of the influence of the creation of the user's content on the online behaviour of other users or followers. Previous research on social networks found that the content they created had a positive impact on users themselves, on

brand perceptions and choice (Gruen, Osmonbekov, and Czaplewski, 2009) and other users as well. They believe more in these contents than in the content created by business organizations (Ling, Chung, Wweaver, 2012) or promotional messages (Welburne, Grant, 2016). Furthermore, social network research shows that influencer' content on social networks has influenced brand perceptions, the purchasing of products, and spreading positive online information about the purchase (Susarla, Oh, Tan, 2016, Uzunolu, Kip, 2014). Research shows that the content they create e.g., bloggers who have a lot of followers are more liked by other users in the relationship to content that is followed by a smaller number of users (De Veirman et al., 2017) and in conditions where the content looks less "professionally" made (Hautz et al., 2014) or is labelled as sponsored (Mueller et al. 2018). For this research, the authors created a survey questionnaire through the Google Forms platform. The survey questionnaire was used to collect all the necessary data related to this research. The research was carried out using a questionnaire that was created at the University North Department of Business Economics in Varaždin, which was previously evaluated on a smaller number of respondents. The first group of questions is related to the use of the YouTube social network. This part of the survey questionnaire serves to collect information about how long the respondents have been using the YouTube social network, the device they most often use to access the platform and how often they use it. The second group of questions contains 25 questions about respondents' attitudes towards YouTube advertising using the Likert scale (from 1 - completely disagree to 5 – completely agree). The questions related to the perception of informativeness, fun, irritation and the credibility of advertising on the YouTube social network and its impact on the purchase decision to buy promoted products. The last group of questions refers to the collection of demographic data (age, gender, level of education).

The questionnaire was published by the author on the Facebook page was filled out by 100 respondents, and was carried out on a random sample. The survey questionnaire is divided into three parts according to the type of question. The first part consists of four multiple-choice questions, and these questions were used as a basic indicator of how the respondents use the YouTube platform. The next part, at the same time, the largest part of the questionnaire, which includes all questions from questions numbered 5 to 22, consists of questions in which respondents choose the intensity of their personal preference (intensity from 1 to 5). The last part of the questionnaire consists of three questions, which were again asked as multiple-choice questions and concerned the socio-demographic characteristics of the respondents. The survey was conducted in the period from June 20, 2023, until August 22, 2023. The IBM SPSS program was used for the statistical analysis of the data, which will be used to confirm or refute the hypotheses.

4.1 Objectives and hypotheses of the work

As already stated, the goal of this research is to find the correlation between pre-roll video ads and the time users spend on the platform. An attempt is

made to find out whether time and ads are positively or negatively correlated and to what extent as well as to see on which groups of users do these variables have the greatest impact on. We also wanted to find out if there is a risk of a decrease in the total time spent by the user on the platform. The hypotheses are as follows:

Hypothesis H0: There is a connection between gender and the potential danger that users will spend less time on the platform if the number of ads on the platform increases.

Hypothesis H1: On average, users who frequently access the YouTube platform give up watching selected video content more often due to the appearance of pre-roll video ads than people who access the platform less often.

Hypothesis H2: Users who actively follow certain channels on the YouTube platform will sooner give up watching the selected video if pre-roll video ads appear, unlike users who do not actively follow certain channels.

Hypothesis H3: Younger users of the platform are more likely to give up watching selected video content due to the appearance of pre-roll video ads than older users.

4.2 Discussion of research results

In chapter 4.2. the results obtained from the survey questionnaire used for this research are presented and described. To make the results easier to understand, each question will be explained in text with the help of graphs. For a more comprehensible concept, socio-demographic issues will be described first. After the socio-demographic questions, the remaining questions related to the use of the YouTube platform will be described in chronological order. First, the first four questions of the survey questionnaire will be described, which, for the sake of simplification, will be called Questions about the Basic Use of the Platform. The questions that were asked using Li (questions to which respondents chose the intensity from 1 to 5) will be divided into two categories, for the reason that the answers to questions 5 to 12 were asked in a different way than the answers to questions 13 to 22, and for this reason they will be described as questions of intensity measure A and questions of intensity measure B.

The first question about socio-demographics was question number 23: Your gender. All 100 respondents answered this question. 48 respondents (48%) answered *male*, and 52 respondents answered *female* (52%). When it came to the age of the respondents, the distribution of answers was as follows: 40% of the respondents were aged 18–25 (40 respondents), 24% were between 26–35, 18% between 36–45 (18 respondents), 16% answered 46–55 (16 respondents), and 2% answered 56 or more (2 respondents). From these results, it can be seen that the majority of respondents are in the age group between 18 and 25 years. In terms of their educational level 5% of the respondents completed elementary school, 40% completed secondary school (40%), 41% completed undergraduate studies, 11% completed graduate

studies and 3 respondents (i.e. 3%) completed postgraduate studies or doctorate. From these results, it can be seen that most of the respondents completed either high school or undergraduate studies. The first question in this category is question number 1. *How often do you open the YouTube platform?* All 100 respondents answered this question. Almost never was chosen by 7 respondents (7%), once or twice a month by 5 respondents (5%), once a week by 14 respondents (14%), several times a week by 33 respondents (33%), and finally 41 respondents (41%) answered every day. From these results, it can be seen that the majority of respondents open the YouTube platform every day. The second question is question number 2. *When you are connected to YouTube, how much time (per day) do you spend on the site?* 37 respondents (37%) answered Less than 1 hour, 45 respondents (45%) answered 1 to 3 hours, and 18 respondents (18%) answered more than 3 hours. From these results, it can be seen that the respondents mostly spend either less than 1 hour per day on the platform or from 1 to 3 hours per day. The third question is question number 3. *Do you actively follow certain channels (content creators or influencers) on the YouTube platform?* 72 respondents (72%) answered yes, while 28 respondents (28%) answered no. From these results, it can be concluded that the majority of respondents actively follow certain channels on the platform.

Hypothesis H0 reads: There is a connection between gender and the potential danger that users will spend less time on the platform if the number of ads on the platform increases. In order to confirm this hypothesis, the following results of questions or items from the survey questionnaire will be used: 23. *Your gender is 20. Do you think that you will spend less time on the YouTube platform if more pre-roll ads are displayed on the page?*

Table 1 Pearson correlation of hypothesis H0

Correlations			
		Sex.	I believe that I will spend less time on the YouTube platform if the page shows more pre-roll ads
Sex	Pearson Correlation	1	-.089
	Sig. (2-tailed)		,378
	N	100	100
<i>I believe that I will spend less time on the YouTube platform if the page shows more pre-roll ads</i>	Pearson Correlation	-.089	1
	Sig. (2-tailed)	,378	
	N	100	100
** Correlation is significant at the 0.01 level (2-tailed).			

Source: Authors

Table 1 shows the Pearson correlation between the particles needed to confirm the hypothesis H0. It can be seen from the table that there is a negative correlation between the selected particles. The significance is 0.378.

With the help of these data, it can be concluded that when changing one variable, the other will not change.

Hypothesis H1 reads: Users who frequently access the YouTube platform are, on average, more likely to give up watching selected video content due to the appearance of pre-roll video ads than people who access the platform less often.

In order to confirm this hypothesis, the following results of questions or items from the survey questionnaire will be used: 1. *How often do you open the YouTube platform?* 11. *How often do you give up watching a selected video if an ad appears before the video?* 12. *How often do you turn off the YouTube platform completely if an ad appears before the selected video?* 13. *Do you have a habit of giving up watching a selected video on the YouTube platform because a pre-roll ad appears before the video?* 14. *Do you give up watching video content if an ad appears before the desired video, although you can skip it after 5 seconds?* 15. *Do you give up watching video content if an ad appears before the desired video that you cannot skip?* 16. *Do you give up watching video content if two ads appear one behind the other before the desired video?* 17. *Do you have the habit of turning off or exiting the YouTube platform completely because a pre-roll ad appears before the video?*

Table 2 Cronbach alpha of hypothesis H1

Reliability Statistics	
Cronbach's Alpha	N of Items
.967	8

Source: Authors

Table 2 shows the Cronbach alpha coefficient obtained from the mentioned particles needed to confirm the hypothesis. This coefficient measures the internal consistency of the particles, and the coefficient ranges between 0 and 1. The Cronbach alpha coefficient in this case is 0.967, which indicates a high degree of correlation between the variables, which is acceptable for confirming the hypothesis.

Table 3 Pearson correlation of hypothesis H1

		Frequency of use	Opting out due to ads	Shutdown of the platform due to ads	Opting out due to one ad	Skippable ad opt-out	Unskippable ad opt-out	Opting out due to two ads	Platform shutdown custom
<i>Frequency of use</i>	Pearson Correlation	1	,650**	,615*	,787**	,753**	,800**	,741**	,743**
	Sig. (2-tailed)		,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Opting out due to ads</i>	Pearson Correlation	,650**	1	,967**	,733**	,671**	,699**	,737**	,705**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Shutdown of the platform due to ads</i>	Pearson Correlation	,615**	,644**	1	,706**	,658**	,681**	,715**	,688**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Opting out due to one ad</i>	Pearson Correlation	,787**	,733**	,706**	1	,893**	,891**	,914**	,910**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Skippable ad opt-out</i>	Pearson Correlation	,753**	,671**	,658**	,893**	1	,853**	,845**	,894**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Unskippable ad opt-out</i>	Pearson Correlation	,800**	,699**	,681**	,891**	,853**	1	,917**	,881**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Opting out due to two ads</i>	Pearson Correlation	,741**	,737**	,715**	,914**	,845**	,917**	1	,885**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100
<i>Platform shutdown custom</i>	Pearson Correlation	,743**	,705**	,688**	,910**	,894**	,881**	,885**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000
	N	100	100	100	100	100	100	100	100

Source: Authors

Table 3 shows the Pearson correlation between the particles needed to confirm hypothesis H1. It can be seen from the table that there is a positive correlation between the selected particles. The correlation between the variables is strong, and the significance is 0.000. With the help of these data, it can be concluded that when one variable is changed, others will be changed at the same time.

Table 4 Descriptive statistics of hypothesis H2

	Channel monitoring	N	Mean	Std.Deviation	Std.Error Mean
<i>Opting out of ads</i>	Yes	72	3.79	.963	.114
	No	28	2.21	1.067	.202
<i>Shutdown of the platform due to ads</i>	Yes	72	3.74	.993	.117
	No	28	2.21	1.101	.208
<i>Opting out due to one ad</i>	Yes	72	4.24	.880	.104
	No	28	2.36	1.162	.220
<i>Skippable ad opt-out</i>	Yes	72	4.00	.949	.112
	No	28	2.25	1.041	.197
<i>Unskippable ad opt-out</i>	Yes	72	4.31	.816	.096
	No	28	2.50	1.139	.215
<i>Cancellation due to two ads</i>	Yes	72	4.41	.852	.100
	No	28	2.57	1.103	.208
<i>Platform shutdown custom</i>	Yes	72	4.11	.897	.106
	No	28	2.36	.951	.180

Source: Authors

Table 5 T-Test of hypothesis H2

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
<i>Opting out of ads</i>	7.134	98	.000	1.577	1.139	2.016
<i>Shutdown of the platform due to ads</i>	6.675	98	.000	1.522	1.069	1.974
<i>Opting out due to one ad</i>	6.735	98	.000	1.979	1.041	2.003
<i>Skippable ad opt-out</i>	8.088	98	.000	1.750	1.319	2.181
<i>Unskippable ad opt-out</i>	8.949	98	.000	1.806	1.401	2.211
<i>Opting out due to two ads</i>	8.930	98	.000	1.845	1.435	2.131
<i>Platform shutdown custom</i>	8.634	98	.000	1.754	1.351	2-174

Source: Authors

From tables 4 and 5, it is possible to read the results of the T-test performed on particles. Due to the fact that only two answers (yes and no) were possible in the independent variable, the T-test was used for this hypothesis instead of the ANOVA test. The deviation from the arithmetic mean is almost non-existent and amounts to 0.000. It is evident from the results that there is a correlation between people who actively follow certain channels on the YouTube platform and the tendency to give up using the platform. It is also necessary to check the number of respondents who watch the ads to the

end when they appear before the selected video. In this context, it can be mentioned that very few respondents tend to fully watch the pre-roll video ad when it appears. Table 6 shows the descriptive statistics, including the arithmetic mean, of the questionnaire questions related to such behaviour. It can be read from the table that the response intensity in all cases is below 3, which means that users do not have a strong tendency to watch pre-roll video ads and will skip them if possible.

Table 6 Descriptive statistics of how often users view a pre-roll ad

	N	Minimum	Maximum	Mean	Std. Deviation
<i>How often do you watch a pre-roll ad on YouTube until the end, when it appears before the selected video content?</i>	100	1	5	2.07	1.037
<i>How often do you watch a video ad on YouTube to the end, when the topic of the ad interests you?</i>	100	1	5	2.21	1.085
<i>How often do you watch a pre-roll video ad on YouTube until the end, when you have the option to skip the ad?</i>	100	1	5	1.94	1.099
Valid N (listwise)	100				

Source: Authors

Respondents also do not have a great tendency to rate pre-roll video ads up or down if given the opportunity. The majority of respondents rarely rate ads (42%); when asked if they rate ads negatively for the very reason that the ad appeared, the majority of respondents (30%) answered that they never do so. There is also a low tendency to open ads. The majority of respondents never (34%) or rarely (43%) click on an ad to learn more about it. For questions related to how often users give up watching videos or even completely leave the platform due to the appearance of pre-roll video ads, the following data was obtained. Table 7 shows the results of this type of question. From the results, it is possible to read that the majority of users tend to give up watching videos. They even tend to leave the platform due to the appearance of pre-roll video ads, which significantly affects the time users spend on the platform. In all situations, the arithmetic mean is above 3, which represents a higher degree of giving up. The majority of respondents (31%) also claim that pre-roll video ads affect the total time the user is willing to spend on the platform, and the majority of users (36%) also claim that they spend less time on the platform for the same reason.

Table 7 Descriptive analysis of the tendency to give up due to the appearance of pre-roll ads

	N	Minimum	Maximum	Mean	Std. Deviation
<i>How often do you give up watching the selected video, if ads appear before the video?</i>	100	1	5	3.35	1.218
<i>How often do you turn off the YouTube platform completely, if an ad appears before the selected video?</i>	100	1	5	3.31	1.228
<i>Do you have the habit of giving up watching a selected video on the YouTube platform because a pre-roll ad appears before the video?</i>	100	1	5	3.71	1.282
<i>Do you give up watching video content if an ad appears before the video, although you can skip it after 5 seconds.</i>	100	1	5	3.51	1.251
<i>Do you give up watching video content if an ad appears before the video, which you cannot skip?</i>	100	1	5	3.80	1.223
<i>Do you give up watching video content if two ads appear before the video, one behind the other?</i>	100	1	5	3.90	1.243
<i>Do you have a habit of shutting down/exiting the YouTube platform completely because a pre-roll ad appears before a video?</i>	100	1	5	3.62	1.204
Valid N (listwise)	100				

Source: Authors

According to studies on how pre-roll video advertisements affect YouTube users' behaviour, there is a correlation between gender and the risk that users will spend less time on the site if there are more advertisements. With millions of users worldwide, YouTube has emerged as one of the most widely used platforms for sharing videos. Although the traits of users who follow content on this platform differ, some similarities between various demographic groups can be seen. These characteristics affect how users interact with content creators, what they prefer, and how they consume content. One of the most distinctive characteristics of YouTube viewers is the diversity of their interests. Users view a range of content, such as product reviews, tutorials, challenges, music videos, vlogs, and instructional videos. This variety allows users to find content that suits their individual needs and preferences. While some people prefer news channels that offer enlightening commentary or useful advice, others turn to entertainment content that provides an escape from everyday life. These expectations influence how users choose which channels to watch and which content to consume. The results obtained in this research indicate that regular users develop a lower tolerance for ads, which leads them to abandon content more quickly. As previously stated, the study will have a major effect on YouTube's user experience optimization. The findings of the study suggest that frequent YouTube users are less

tolerant of ad-related interruptions to their video viewing. Younger users do give up more quickly than older users, which implies that they have higher expectations for continuous access to content. This may indicate adjusting advertising strategies to meet different demographic profiles. What can become a problem for the platform is the fact that the majority of respondents (34%) answered that they will spend less time on the platform if the number of ads increases in the future. The majority of respondents also believe that the popularity of the platform could decrease due to pre-roll video ads (33% of respondents) and that there is a risk of a decrease in viewing time for the videos posted on the platform (35% of respondents).

According to hypothesis H0, it can be concluded that there is no connection between the gender of the respondents and the tendency that the user will spend less time on the platform if the number of pre-roll video ads on the platform increases, and for this reason the hypothesis was refuted. According to the previously mentioned answers, it can be concluded that this danger certainly exists, regardless the gender of the platform user.

According to hypothesis H1, it can be concluded that there is a connection between users who frequently connect to the platform and the tendency to give up watching the selected video content and even giving up using the platform. *This hypothesis is thus confirmed.*

With hypothesis H2, it could also be seen that there is a connection between users who actively follow certain channels or content creators and the tendency to quit. With the help of the obtained results, *the hypothesis can be considered confirmed.*

Hypothesis H3, from the point of view of the YouTube organization itself, is in a certain sense the most important because it checks whether the largest group of platform users (the youth) and to what extent will abandon the use of the platform due to the appearance of pre-roll video ads. The results are strong enough, and thus we may conclude that *the hypothesis is confirmed.*

4.3 Research limitations and recommendations for future research

The survey questionnaire was sent via the Facebook social network, and it was filled out by 100 respondents, which is a relatively small number considering the total population. The questionnaire was written in Croatian, which also reduces the number of potential respondents. The survey was conducted on a random sample, and due to data protection, the survey questionnaire is anonymous. For this reason, it was not possible to collect more detailed information about the respondents themselves. Only responses from adults were accepted for this research. In addition to the above, due to descriptiveness of the research it was not possible to investigate different cause-and-effect relationships. In this sense, future research should use the experiment method to discover how certain video content (length, ad format, messages, etc.) influence various behavioural constructs of respondents, such as purchase intention, dissemination of positive information online, brand perception, etc. Furthermore, as previously stated, business organizations must join YouTube either themselves or via influencers who

create creative content in an authentic way, spread brand values, and have a strong connection with their subscribers, who are also the target segment of the organization. When selecting an influencer, the company should search for mentions of the brand or product and identify people and content related to the brand or product, channel equipment, and content that influencers share with their followers. After choosing an influencer that matches the values of the brand, the business organizations need to continuously nurture business relationships and clearly define limitations and guidelines as well as the dynamics in creating and publishing video content. Finally, it is desirable for business organizations to open and continuously develop their own YouTube channels. They can create and share videos about their business, employees, products, or services and thus expand their community of users even more and share important events and topics with them, i.e. content that adds some value to users. In this informal way, they can contribute to their image by introducing users to their employees, culture, working atmosphere. In addition, the channel represents an excellent opportunity for direct (e.g., one-to-one) communication with users, monitoring their wishes and needs, resolving complaints, and creating a deeper emotional connection with the brand. Moreover, according to the results of the research, respondents, in addition to music content, watch educational content in large numbers, so business organizations can use YouTube to build their reputation as experts in a certain field. It is possible to record video guides (tutorials) or short video tips on a specific topic close to them, as well as create videos with other experts in their field of interest. Users can be encouraged to ask questions about products, services, or topics related to the business area companies. Videos can be a very good tool to help solve common problems that occur when using the product or showing its functioning. They are also a way to answer frequently asked questions. The answers provide an opportunity for business promotion and the provision of highly visible service to customers, as well as relationship development and the creation of long-term loyal users.

5 Conclusion

In line with the above said, it can be concluded that pre-roll video ads have a certain impact on the time users spend on the YouTube platform. It turned out that users are not completely satisfied with the platform's future direction, especially when it comes to advertising that is carried out on the platform. According to the results of the research, it is evident that the largest and most active groups of users on the YouTube platform, are younger age groups, 18 to 35 years old, who are also the most frustrated group of users, if you look at the very impact that pre-roll video ads have on users' satisfaction with the platform. It has been shown that people in these age groups give up watching selected video content faster than users of older age groups, if pre-roll ads appear before the video. In addition to give up watching the selected video faster, younger people also have a stronger tendency to completely leave the platform, which can create certain problems for the platform itself. Likewise, a trend can be seen among users who frequently connect to the platform, who, for the same reason, give up using the platform faster, in contrast to

people who connect less often. The research also showed that there is a certain danger for content creators on the platform. It has been shown that people who actively follow certain channels, the content creators on the platform, are more likely to give up using the platform because of pre-roll ads than users who do not follow certain channels. For this reason, there is a theoretical danger for the platform, not only of losing users who open videos, but also of losing video content creators themselves. There is a certain group of professional YouTubers who may lose some of their viewing profits due to these user habits, and this may lead to creators looking for other platforms that are more profitable for them. According to the mentioned results, it is possible to conclude that YouTube loses the amount of time that users spend on the platform. The most critical aspect is the loss of the younger population that comprises the majority of YouTube users. If the platform does not begin to focus on different ways of advertising, there is a possibility of losing a large number of users to potential competitors. Although there is no significant competition for the platform at the moment, there is always the factor of the unknown and a strong competitor could suddenly appear, especially if it improves on the potential weaknesses of the YouTube platform. It would therefore be necessary for YouTube to improve these weaknesses in order for the platform to retain users.

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