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Tartalomjegyzék / Contents

TANULMÁNYOK / STUDIES

Editorial preface

This collection of papers presents a critical examination of some of the most relevant features regarding modern societies, issues that cover such broad categories as sustainability, governance, cultural transformation, and social resilience. Using an assortment of cross-disciplinary perspectives, the authors also discuss the intersection of various local and global forces as sources of both problems and possibilities which all contribute to the evolving complexity of contemporary civilization.

The familiar arguments about humanity's problems having global aspects cut across most of the chapters. Environmental degradation, energy crisis, and technology change are not only viewed as independent issues but are seen in the scope of the social and economic context in which these problems evolve. The authors discuss these issues with the hope of offering not just theoretical but also practical solutions for addressing the gaps between the two constituencies. Also, local efforts for tackling global issues have been seen as particularly relevant in this collection of papers. From the strengthening of city and rural populations to the conservation of traditions and roles of women, the papers show how localized efforts have the potential for great impact. At the same time, they portray how the joint efforts and global networks help to magnify these local initiatives, create new ideas, and improve community and institutional coping mechanisms. Most notably, the messages emphasize the need for innovative, inclusive, and sustainable development as ports through which the various issues are dealt with. Seeking solutions for governance challenges, market realities, or education issues, the contributions all appreciate working together and being innovative to create a better and sustainable world. Collectively, they present a big set of tools and ideas which are useful for dealing with the interrelatedness of policy, practice and research.

These articles seek to respond to specific and important questions meaningfully and comprehensively and add to the increasing literature on how best to respond to the evolutionary challenges facing the world today. We expect that this particular collection will not just serve to inform the readers but also encourage them to carry out constructive work that contributes to the enhancement of knowledge and positive development.

Miskolc, December 2024

Dr. Ibolya Török

TANULMÁNYOK / STUDIES

Thandokazi Maxam[1] – Márton Péti[2]

Approaches to energy transition: A comparative analysis of South Africa and Hungary after changes in their political systems

Countries across the world are transitioning from fossil fuel dominated energy to low carbon energy systems. They are adopting initiatives to encourage development of clean energy sources. However, the approaches, strategies and the pace of this transition differs from country to country. This study comparatively examines approaches to energy transition in South Africa and Hungary. The two countries have undergone a significant transformation in their political systems over the past 30 years, this was followed by a series of initiatives aiming to encourage adoption of environmentally friendly energy sources. While Hungary has prioritized nuclear energy as a way to achieve energy security and lower emissions from coal-based energy, South Africa has concentrated on increasing energy access and tackling energy poverty through the integration of renewable energy sources.
Keywords: Energy transition, energy policy, clean energy
JEL codes: Q01, Q40, Q42, Q48

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Introduction

The world is currently undergoing a substantial move away from fossil fuels and towards cleaner energy sources such as wind, solar, hydropower, geothermal, and so on; this is known as energy transition. The primary motivations for this transformation are the need to tackle climate change and environmental damage caused by fossil fuel consumption (Markard, 2018), boosting energy security and independence (Mata Pérez et al., 2019), and high energy costs. Countries around the world have established targets for their energy transition, and they are putting policies in place to help them accomplish those goals and ease the transition. A notable example is the European Union (EU), which has set a target of 32% renewable energy contribution to total energy generation by 2030. States in the United States of America, setting their own targets, Hawaii for example, aims to reach 70% energy independence by 2030, 40% of this will come from renewable energy sources (Gielen et al., 2019). While other countries have made progress in the adoption of renewable energy, some countries are facing challenges such as high upfront costs, resistance from entrenched fossil fuel interests, and the need for infrastructure upgrades to accommodate new energy sources (Babayomi et al., 2022).
This study compares the energy transition approaches of two countries, a developed country located in Europe, Hungary and a developing country, located in the African continent, South Africa. The two countries differ in terms of their geographic, economic, and social contexts. Despite these contrasts, the countries share some characteristics, such as the political transition to democracy over the last 30 years, which may have influenced their energy policies, a rise in renewable energy adoption in recent decades, and energy security concerns and diversification of energy sources. In the late 1980s and early 1990s, Hungary transitioned from a communist state to a democratic system (Bart et al., 2018; Mohammed et al., 2021). Similarly, in the mid-1990s,

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South Africa transitioned from apartheid to democracy (Ayamolowo et al., 2022). This development demanded policy shifts in both countries. Examining the impact of these changes on the energy sector may offer important insights into the relationship between political shifts and energy policy. Furthermore, both countries want to strengthen their energy security because they are dealing with the same challenge, while the causes differ. The goal of this study is to investigate the key drivers and motivations for energy transition processes in South Africa and Hungary. The study is guided by two questions: (i) What are the primary drivers and incentives for energy transformation processes in South Africa and Hungary? (ii) How do South Africa's and Hungary's energy transition strategies differ in terms of policy frameworks, renewable energy adoption, and socioeconomic outcomes?

Methodology

This study used a qualitative document analysis approach to better understand the motivations behind the energy transitions in South Africa and Hungary after major political system changes.
Data Collection and Document Selection Criteria:
The choice of documents used in the study was based on their relevance to energy policies, transition or efforts following political system changes. All the documents considered were published after political changes in both countries i.e., after 1989 in Hungary and 1994 in South Africa. The main sources used to gather information include government reports, policy documents, academic papers, and media reports obtained from governmental websites, and scholarly databases and websites of international organisations such as International Renewable Energy Agency (IRENA) and International Energy Agency (IEA).
Data analysis:
The study employed a comparative analysis based on the energy policies, energy mix, energy market and energy consumption of the two countries. The qualitative information obtained is supplemented by energy related numerical data from both countries and this data is presented using charts.

Energy transition in developed and developing countries

Developed and developing countries have different approaches to energy transition. Several developed countries have deployed clean-energy resources and reduced their primary energy consumption, while fast-growing emerging countries have witnessed a rise in their energy consumption. For instance, European nations have lowered their consumption by an average of 5% during the last two decades, while primary energy consumption increased by more than double in China, India, East and Central Africa, as well as the Middle East (Berdysheva & Ikonnikova, 2021). While reducing emissions is crucial for addressing climate change, developing nations also contend with issues such as indoor pollution and poor health resulting from the use of wood and waste for cooking. As they strive to improve living standards, many of these countries see increased use of fossil fuels as a vital component of their development strategies (Yergin, 2022). Energy poverty is one of the most challenging issues for developing nations, particularly in rural areas due to poor access to affordable, modern and clean energy (Cantarero, 2020). Some of them lack sufficient generating capacity to meet base load demand, forcing utility companies perform scheduled power outages in order to provide some electricity to a large number of consumers (Babayomi et al., 2022; Cantarero, 2020; Yergin, 2022). This is known as load shedding and it is common among countries like South Africa (Uhunamure & Shale, 2021), India and Nigeria (Cantarero, 2020).

Energy transition and energy policies around the world

Over the years, there has been a series of events that resulted in significant impacts on the global energy market and energy policies across the world. One of the most significant events is the Shale

Revolution which led to a major rise in energy production in the United States, resulting in reduced prices and changes in global energy trading patterns. While the shale revolution has had a negative impact in many countries particularly African countries that export oil to the U.S like, Nigeria, Algeria, Chad, Cameroon, Gabon and other oil producing countries, it has also sparked interest on shale development in many countries, including European countries like Hungary, United Kingdom, Poland and the Czech Republic (de Zeeuw, 2014), and other countries like China and South Africa. In 2014, Hungary's interests can be seen on its numerous shale gas exploration wells, according to reports, there are around 1500 billion cubic meters of shale gas in low-permeable plays, which would cover Hungary's current demand for gas for 120 years (Janda & Kondratenko, 2018). On the other hand, the success of the shale revolution in the United States has fuelled South Africa's interest in exploring shale gas reserves in the Karoo Basin. However, environmental concerns, notably over water usage and contamination, have hindered the development of shale gas in South Africa. Fracking requires a lot of water, and the Karoo region is very dry. Environmentalists and local populations in the Karoo region have expressed worry about the possible environmental impacts. As a result, the South African government has been hesitant about permitting fracking to continue (Andreasson, 2018). Furthermore, there are other events like the Fukushima accident in Japan and the 2009 financial crisis which led to a decline in global energy consumption, followed by Covid 19 triggered energy crisis as well as the Russo-Ukrainian war. Russia-Ukraine war led to a rise in natural gas prices affecting countries depending on Russia for gas supply (Lebrouhi et al., 2022).

International communities and organizations such as the United Nations established climate change mitigation and adaptation agreements such as the Kyoto protocol and the Paris Agreement (Dogan et al., 2022). These agreements have also played a significant role in shaping energy policies and encouraging transition to clean energy sources. Following these mentioned events, several countries have tried to find ways to reduce their energy dependency, strengthen energy security and encourage the transition to clean energy sources. For instance, the European Union has introduced several directives setting binding targets for each EU Member State's share of energy from renewable sources. For instance, Directive (EU) 2018/2001 (RED II) sets a 32% target share of renewable energy in the EU's final energy consumption by 2030 (Zygierewicz & Sanz, 2021). However, priorities, approaches and viewpoints to achieving low emissions, energy security and transition differs among the countries. Notably, when it comes to nuclear energy which remains a source of debate among EU member states. Following the nuclear disaster in Fukushima, EU witnessed a gradual shutdown of nuclear power facilities (Bohdanowicz et al., 2023; Simionescu, 2023), in countries like Germany, Spain, Belgium, Austria, Denmark, and Italy due to concerns about the security and potential hazards of nuclear energy (Markard, 2018). Hungary is one of the EU countries that encourage nuclear due to its minimal greenhouse gas emissions, they see it as a vital energy source that is aligned with the environmental goals of the EU (Bohdanowicz et al., 2023; Simionescu, 2023). Similarly, despite the concerns about nuclear development as a result of the Fukushima accident, South Africa still considers nuclear energy as an important component of its energy transition efforts (Van Wyk, 2021). This paper will later touch on the nuclear situation of Hungary and South Africa, exploring their individual stances and implications for their perspectives on energy policies.

Results and Discussion

This chapter discusses South Africa's and Hungary's energy transition processes in relation to motivations, goals, and policies adopted. The first section provides an overview of the energy sector including energy policies in both countries. Second section, describes renewable energy landscape in each country, analysing and comparing their energy sector in relation to energy capacity, production, the structure of the energy market, the role of nuclear and further touches on their just transition agenda.

An overview of South Africa's energy sector

South Africa is one of the biggest CO2 emitters in the world and accounts for around 40% of Africa's total CO2 emissions due to high reliance on fossil fuels (Uhunamure and Shale, 2021). The country is also among the world's biggest energy consumers, with an energy intensity of approximately 8 MJ per unit of GDP produced in 2020 (IRENA, 2023b). According to the recent statistics, primary energy consumption of 119 Mtoe in 2021, a slight rise from 118.4 Mtoe in 2020 (KSH, 2023). This paper uses the total energy supply by source to show the diversification of energy sources in both Hungary and South Africa. Figure 1 shows South Africa's energy supply structure and the contribution of each energy source to the total energy mix. Although the South Africa has several energy sources other than coal contributing to its energy supply, their contribution is very small compared to coal. According to the latest available statistics, coal accounts for 72% of the total energy supplied in the country as shown in Figure 1.

Total energy supply, South Africa 2021

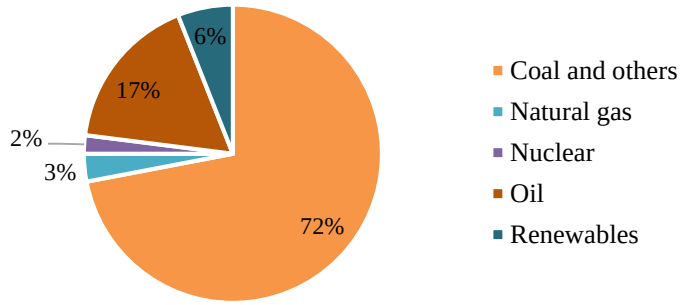

Figure 1 Total energy supply in 2021, South Africa
Source: Modified by author, data from IRENA, (IRENA, 2024b)

Fossil fuels have played a major role on the significant improvement of the country's electrification rate over the years. In 1993, South Africa's electrification rate was about 36% (Sarkodie & Adams, 2020). Throughout the apartheid era, the majority of black South Africans had challenges in getting access to electricity and other essential services due to racial segregation. After the end of apartheid in 1994, attempts were undertaken to remedy historical injustices and provide energy access for economically disadvantaged areas. In 2012, electrification rate was up to 88% (Ayamolowo et al., 2022), despite this improvement, the country still has a notable number of households without access to electricity. In 2018, over 12% of households lacked access to power. The country also has power system restrictions, which have resulted in planned power outages in specific areas to relieve the high demand pressure on the limited electrical supply (Uhunamure & Shale, 2021).

Policies relating to renewable energy adoption

South Africa has implemented several policies to address the energy crisis, including increasing the share of clean energy sources in the energy mix and meeting the country's goal of reducing CO2 emissions by 42% by 2025 (Akinbami et al., 2021). In 1998, the country adopted the White Paper on Energy Policy which was instrumental in shaping South Africa's energy policies. Its objectives were to enhance access to affordable energy particularly by previously disadvantaged communities, lower inequality, stimulate economic development, manage environmental and health impacts associated with energy, and ensure secure energy supply through diversification (Department of Minerals and Energy, 1998; Pathak & Shah, 2019). This was followed by the Renewable Energy White Paper of 2003. Its aim was to accelerate renewable energy and it

established a target of generating 10,000 GWh of renewable energy by 2013. This document also emphasised the necessity of supporting renewable energy in rural areas with limited access to power, as well as encouraging the development of small-scale renewable energy projects (Department of Minerals and Energy, 2003).
The most recent energy policy initiatives are the Integrated Resource Plan (IRP) 2010-2030 and the Renewable Energy Independent Power Procurement Programme. The IRP seeks to increase the energy supply by 42.6 GW by 2030, with 17.8 GW (42%) coming from renewable sources. The plan IRP includes plans to develop new power generation capacity from coal, nuclear, and gas and renewable sources (Pathak and Shah, 2019). The Renewable Energy Independent Power Procurement Programme (REIPPP) was launched in 2011 in response to the IRP, with the goal of encouraging private sector investment in renewable energy and diversifying the country's energy mix, lowering greenhouse gas emissions, and improving energy security. South Africa's REIPPP program has had a significant contribution in increasing renewable energy share (Akinbami et al., 2021). The country installed over 6,000 MW of renewable energy capacity by 2019, this includes solar PV, wind, biomass, and concentrated solar power, according to the International Trade Administration (ITA, 2022). The production also significantly increased from just under 2000 GW in 2012 to over 10 000 GW in 2017 (IRENA, 2019).

Overview of Hungary's energy sector

Hungary's democratic transition enabled it to join the European Union in 2004. As a result, the EU's energy policies and goals influence the country's energy landscape (Bart et al., 2018; Mohammed et al., 2021). Hungary adopted the rules of the EU's electrical market aimed at creating a common and free electricity market. This includes separating the management of electricity suppliers and grid operators, establishing independent regulators, encouraging cross-border collaboration, and expanding retail markets (Antal, 2019). In the past decade, the country's energy demand increased intensifying reliance on imported energy. In 2010, total energy consumption was 708 petajoules (Pj), which was up to 785 Pj by 2021. The industrial sector has contributed the most to this increase, with its consumption nearly doubling from slightly more than 100 Pj in 2010 to more than 190 Pj in 2021(KSH, 2023). Regardless of the country's efforts to diversify its energy supply, Russia remains the country's main source of oil and gas imports. In 2020, energy dependency on imports reached 87%, with Russia accounting for roughly 64% of crude oil and 95% of gas imports (IEA, 2022). The dependency on imports as well as the one-sidedness of those imports as almost all of the imports are from Russia, leaves Hungary in a vulnerable position, threatening the country's energy security (Ministry of National Development, 2017). Since 2000, coal-related CO2 emissions in Hungary have significantly decreased by 58%. Hungary's greenhouse emissions per capita are now lower than the EU average, and the country contributes less than 2% of total EU greenhouse gas emissions (Simoes, 2021). This can be ascribed to an increase in nuclear and renewable energy, as well as the replacement of coal-fired power plants with gas-fired ones (IEA, 2022). As part of the agreement with the EU, Hungary is obligated to reduce emissions by 10% by 2030 (Mohamed, 2019). In 2017 the country produced more than 3000 GW of renewable energy and had installed over 2,000 MW of renewable energy capacity by 2019 (IRENA, 2019). The solar energy contribution to the total electricity production from renewables was nearly 45% in 2020 (Bozsik et al., 2023). However, Hungary made a decision to ban construction of new wind projects despite the potential in wind energy generation (Bozsik et al., 2023). Despite Hungary's progress in reducing CO2 emissions and incorporating clean energy sources, energy continues to be the leading contributor to greenhouse gas emissions, accounting for 71% in 2020 (Simoes, 2021). Figure 2 shows Hungary's total energy supply (%) by source, as presented in figure 2, the country's diversification is more balanced compared to South Africa where one source of energy, coal, dominates the total supply. Hungary's total energy supply is dominated by natural gas (34%) oil (29%), and to some extent nuclear which accounts for around 17% of the total energy supply. According to the data presented in figure 2, coal has a notably less

contribution to the total energy supply, which is a complete opposite of the South African case in relation to coal.

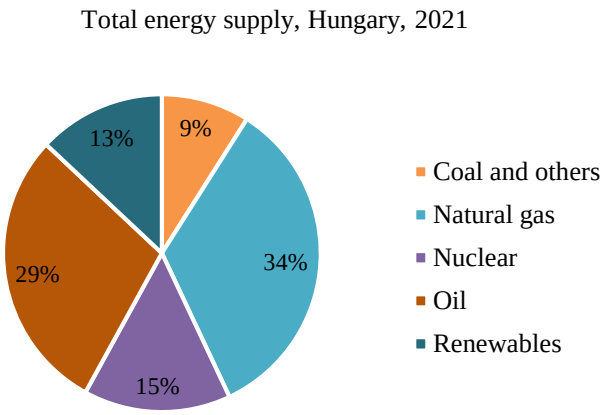

Figure 2 Total energy supply in 2021, Hungary
Source: Source: Modified by authors, data from IRENA (IRENA, 2024a)

Although Hungary has achieved significant progress in providing energy access to its population (with electrification rate at 100% in 2021) compared to South Africa (IRENA, 2023a), energy expenditures, particularly for heating and electricity, can be higher than the average household income. About a third of low-income families have insufficient heating, and nearly 40% of them experience overheating during the summer (Győri et al., 2021).

Policies relating to renewable energy adoption

According to Szabo et. Al., (2021) energy transition in Hungary is primarily driven by the need for energy security and pressure from Western institutions to implement change. Transitioning to cleaner energy sources allows Hungary to minimise its dependency on imports and meet its energy demands through domestic production. To address the issues of energy dependency, security, inefficiency and greenhouse gas emissions, Hungary has adopted several policies including the law that establishes legally binding targets for emissions reductions, energy efficiency, and renewable energy for the year 2030, as well as long-term goal of achieving net-zero emissions by 2050. The Climate Protection Law adopted by Hungary in June 2020. As per the law, Hungary commits to reduce greenhouse gas (GHG) emissions by 40% by 2030. Furthermore, the law requires that renewable energy sources account for at least 21% of gross Final Energy Consumption by 2030 (IEA, 2022). Hungary implemented its National Energy Strategy (NES) in 2011. The policy outlines goals to improve energy efficiency, increase the use of renewable energy sources, diversify the energy mix, reduce greenhouse gas emissions, and retain nuclear energy for stable and reliable power supply (Ministry of National Development, 2017). One technique to achieve energy efficiency, according to the energy plan, which is intensified by outdated heating systems without proper heat isolation in a number of buildings. Hence, energy efficiency is a crucial part of the country's climate policy (Bart et al., 2018). The country also adopted a specific strategy focusing on efficiency on buildings, aligned with National Energy Strategy 2030, the National Building Energy Performance Strategy (NABEPS) which prioritizes energy efficiency and saving by targeting reduced energy consumption in buildings (Ministry of National Development, 2015).

Renewable energy landscape in both countries

Energy Market in Hungary and South Africa

The South African energy market has been controlled by state-owned entities such as Eskom and the formerly state-owned Sasol. Although Eskom remains the country's largest energy provider owning a large share of the country's coal power fleet (Hanto et al., 2022), the country has seen a rise in private sector's participation in the energy sector due to recent energy policies calling for more diversified energy supply (Akinbami et al. 2021). Similarly, before the change of the regime, Hungary's energy industry, was state dominated. The state-owned utility company, Magyar Nemzeti Vagyonkezelő, (MNV) still plays a major role in energy generation and distribution in the country. However, during the 1990s, the Hungarian energy market has seen a considerable liberalization and privatization, and private and international companies are now more prevalent in many sectors of the industry resulting in a diverse energy market (Szabo et al., 2021).

The role of nuclear energy in both countries

Hungary and South Africa intend to continue using nuclear energy in their transition towards cleaner energy sources. For consistent and dependable energy, Hungary's National Energy Strategy promotes long-term use of nuclear (Szabo et al., 2021; Ministry of National Development, Hungary, 2017). According to Aalto et al. (2017) the share of nuclear power in Hungary's electricity generation is the fifth largest in Europe after France, Slovakia, Belgium, and Ukraine. According to Aalto et al. (2017) the share of nuclear power in Hungary's electricity generation is the fifth largest in Europe after France, Slovakia, Belgium, and Ukraine. Since its inception in the early 1980s, the Paks Nuclear Power Plant (NPP), also known as Paks I, has been a major contributor to Hungary's energy mix, with approximately 35% contribution to the country's electrical supply (Aalto et al., 2017; ITA, 2022). The oldest reactors' lifespan, which was initially intended to last for 30 years (ITA, 2022), was extended by 20 years and the Hungarian government intends to delay their final deactivation until the 2040s or 2050s (Aalto, et al 2017; ITA, 2022). In cooperation with a Russian company, Hungary is currently expanding Paks II with two more units (ITA, 2022). The government is adamant that nuclear energy strengthens energy security, despite its nuclear projects' reliance on foreign technology and fuel sources (Szabo et.al. 2021). According to Aalto et al. (2017) the expansion of nuclear energy is especially crucial in view of the frequent interruptions of Hungary's natural gas supply since the middle of the 2000s, which have been caused by conflicts between Russia and Ukraine. However, the country already depends on Russian energy imports, further reliance on Russia for nuclear money and technology may result in geopolitical or economic vulnerability.

South Africa on the other hand, according to Nkosi and Dikgang (2021), is currently the only African country with a commercial nuclear power. South Africa's two nuclear reactors produce nearly 6% of the nation's electricity (Nkosi & Dikgang, 2021; Van Wyk, 2021). The government has shown some interests on nuclear energy and expects to expand its nuclear capacity in the long-term. During his time in office, South African former president, Jacob Zuma pushed for expansion of the country's nuclear energy. In 2011, the South African government under his presidency approved the integrated resource plan (IRP) which highlighted plans to increase the total share of nuclear energy up to 13.5% by 2030. Thereafter, the country began its preparations for nuclear energy development. The country's intentions to expand its nuclear energy attracted international attention leading to the country signing agreements with countries like Russia, the United States, France, China, Japan and South Korea in 2014. However, the plans to expand nuclear were suspended after reports of corruption involving the former president and his government which led to his resignation in 2018. The country was unable to proceed with the nuclear plans due to budgetary limitations and political concerns. Furthermore, South Africa lacks proper infrastructure and technical know-how for nuclear development (Van Wyk, 2021). In 2019, South Africa revisited discussions about the expansion of its nuclear energy. The Integrated resource plan (IRP) of 2019 includes plans to increase nuclear energy by 2030 in attempt to reduce reliance on coal and adopt cleaner energy sources (Pathak and Shah, 2019).

Just energy Transition

Transitioning away from fossil fuels may have serious environmental and economic implications. For instance, mine closures may have long-term environmental consequences and incur costs associated with the restoration of former mining sites (Strambo et al., 2019). In Hungary, the number of coal mines has dropped from nine operating mines in 2015 to only four in 2021 (Rosch & Epifanio, 2022). Areas such as Baranya and Heves county that are hosts to the country's mining industry, will be directly affected by closure of mines. Currently, coal mining directly provides employment to about 2 000 people and indirectly to about 4 700 people, most of them will lose their jobs as mines close (IEA, 2022). However, the country has plans in place to tackle such issues, and the EU has special initiatives such as Just Transition Fund to support communities affected by climate transition in its member states (Rosch & Epifanio, 2022).

According to Strambo, et al. (2019) mining companies in South Africa are obligated to set aside funds for environmental restoration after closure. However, there are more issues connected to mine closure that need attention, for instance the closure of the coal fired powered station operated by Eskom has left about 2300 workers jobless as noted by Cock (2019). South African trade unions have advocated for a "just transition" for coal workers and communities, emphasising the importance of providing viable alternative employment opportunities in affected areas in response to possible job losses in the coal sector (Cock, 2019; Strambo et al., 2019). Furthermore, the projects under the REIPPP programme reflects on some elements of just transition on their socio-economic aspects. The REIPPP contains measures allowing local communities to possess a minimum stake in renewable energy. As one of the requirements for the approval of REIPPP bids, local communities must have a minimum 2.5% of the project's shareholding (Müller & Claar, 2021). There is evidence that about 25% of the projects exceed the minimum percentage going to as far as 40% of community ownership. Another requirement ensures that some of the resources used in projects are locally sourced (Müller et. al., 2021). This encourages community involvement and ownership in the transition process. The projects also support education initiatives and offer hands on training for local communities (Müller et al., 2020; Müller & Claar, 2021).

Conclusion

the comparison of the energy transitions in South Africa and Hungary, reveals a complex landscape that is influenced by a variety of factors, including energy security, energy poverty, nuclear energy interests, intentions to lower greenhouse gas emission, fulfil international climate agreements, energy efficiency, and the impact of change in political systems. Renewable energy and nuclear energy has been part of their strategies to diversify their energy mix and promote sustainability in their respective energy sectors (Antal, 2019; Nkosi & Dikgang, 2021; Szabo et al., 2021; Van Wyk, 2021). Hungary's high reliance on imports, and South Africa's unreliable energy supply and the need for improving energy access necessitate development for a more diversified energy structure in both countries. Hence energy policies in both countries push for energy diversification. While both countries rely significantly on fossil fuels, South Africa's energy supply is largely coal-based, whereas Hungary's energy mix is much more diverse, with major contributions from natural gas, oil, and nuclear energy. Hungary's diversity supports a more resilient energy structure, whereas South Africa's reliance on coal exposes it to the environmental and economic issues connected with this energy source. Transitioning to cleaner and more diverse energy sources will undoubtedly help both countries, especially South Africa, where coal dominates other possible energy prospects.

In the past three decades South Africa and Hungary have undergone significant democratic transitions which to some extent, has an impact on their current energy systems. This influence can be seen on the emphasis on addressing energy access and inequality in the energy policies of the post-apartheid South Africa. This is to ensure that previously disadvantaged communities gain better access to energy. In Hungary, the influence of democratic transition can be seen on the

influence of the European Union's energy goals in Hungary's energy policies after the integration with EU. Hungary's EU membership means that the country is expected to meet the EU's energy and climate targets and has access to EU funds to support its energy transition. In addition, political change has opened the way for the current involvement of private sector in the energy transition process of the two countries. While both countries share common goals such as achieving energy security and reducing greenhouse gas emissions, their specific approaches vary based on their unique contexts and challenges.

Furthermore, this analysis shows how varied energy security problems influence policy decisions and diversification tactics across geopolitical circumstances. Hungary's approach is expanding its energy mix with nuclear energy, renewables, and EU interconnections to lessen reliance on Russian gas. South Africa, on the other hand, is attempting to shift its energy mix away from coal and towards renewables and other sources in order to address supply reliability and environmental concerns. The findings may help policymakers develop appropriate energy diversification policies based on specific national settings. Hungary's reliance on regional energy markets teaches South Africa and other nations the value of cross-border energy collaboration and market integration. South Africa's push for renewable energy, on the other hand, emphasises the necessity of utilising domestic resources and the need for significant infrastructure investment.

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Balázs Mahler[3]

Challenges in defining and measuring social resilience

Over the past two decades, resilience has gained considerable popularity in both social and economic sciences, reinforced by the effects of various economic and social shocks and the pandemic that has spread worldwide. On the other hand, more and more detailed and extensive studies have been launched on the various types of resilience (social, economic, ecological, etc.), which, in addition to the undoubtedly useful scientific results, have highlighted the elusive nature of the phenomenon and the lack of a centripetal force to channel the various lines of research in a single direction and unify the various interpretative frameworks.
The paper attempts to provide a conceptual overview of one type of resilience, social resilience, based on the available theoretical framework. With the help of previous research results, I will define a set of indicators for this concept to test and verify it in the context of empirical research. Refining the indicator set and the definition also provides an opportunity to distinguish between different types of resilience partially, thus contributing to a more accurate scientific understanding. The added value of the paper is that some of the indicator groups have been tested empirically, thus demonstrating the scientific value of the method.
Keywords: resilience, social resilience, indicator set, social science, definition
JEL codes: A10, O35

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Introduction[4]

Resilience can also be defined as one of the star concepts in economics and social sciences of the last decade, given that the growing interest since the global economic crisis of 2008-2010 has been greatly amplified by the social and economic responses to the global pandemic that started in 2020, and the subsequent energy crisis, mainly affecting the European region, and of course the eruption of the Russian-Ukrainian war conflict as a precursor. Academic research is not primarily characterized by immediate and rapid response. Still, we can be sure that resilience studies will emerge over time, in the context of the Israeli-Palestinian conflict, as well as in the aftermath of, or resistance to, shocks elsewhere in the world.
This trend, which has repeatedly confirmed scientific interest, reinforces the methodological need to place resilience somewhere on the axis of a scientific discipline or at least to clarify its role and task to produce more coherent and consistent results in future research. Indeed, the current scientific community does not take a position or does not take a unanimous position, on how we should view resilience. From time to time, the legitimate question arises, as a kind of double dichotomy, as to the role of resilience in the current understanding of science, and different positions are taken on this (Brand and Jax 2007; Keck and Sakdapolrak 2013), however, precise definitions and hence consistent measurement are often lacking, or at least newer research does not necessarily build on previous theoretical findings.
Nevertheless, it is not confident that it is worthwhile to channel such a multifaceted phenomenon into a theoretical framework. However, the various attempts at definition all point in the same direction, so it is still conceivable to create some general theoretical framework that would serve as a basis for future measurements, thus unifying the currently rather extensive and fragmented methodological background. The differentiation of the concept does not make things any easier

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[4] This paper is based in part on my conference presentation on “The meaning of social resilience: interdisciplinary status or a new viewpoint?” and the paper published in the conference proceedings (Mahler 2024)

since researchers now distinguish between at least a dozen types of resilience (technical, ecological, economic, urban, community, etc.).
The aim of the paper is to present the current disparate theoretical and empirical findings on resilience, and social resilience in particular, and to clarify the definition of the concept on the basis of the available theoretical frameworks. It also aims to review the indicators used to measure social resilience and to reconsider them in order to define a set of indicators that measure the concept alone. On this basis, the paper will attempt to demonstrate the validity of this set of indicators by empirically testing part of it.
In line with the above objectives, the paper is divided into three main parts, following a review of the theoretical background, three popular interpretations of resilience are presented, as well as dilemmas related to the concept. I also take a position on whether resilience can be seen as a tool or a new paradigm.
In the second part of the thesis, I further elaborate on previous research findings by presenting a set of indicators of social resilience, which I have purified from indicators specific to other types of resilience.
The third part of the thesis focuses on testing this indicator set, highlighting two sets of indicators that are measured qualitatively and demonstrating their scientific validity in a rural context.

Theoretical background

Many theories have been developed in the field of social and economic sciences in the last decade or two that define the phenomenon of resilience, but it is worth starting from the technical sciences since this is where the concept itself originates. In its original sense, resilience refers to the ability of a flexible material or object to withstand external influences and return to its original, i.e. equilibrium, form. A second step is the interpretation that has emerged in ecological sciences (ecosystem resilience), which refers to the dynamics and absorptive capacity of a phenomenon, i.e. the extent to which a system can withstand external stress before it can assume a new stable form of functioning (Brand and Jax 2007). To date, these two approaches have formed the basis of interpretation in the social and economic sciences.
An important starting point for the theoretical foundation of resilience is the fact of an external effect since resilience can always be interpreted as a response to such an effect (Adger 2000; Folke 2016). A given social, economic unit or group (e.g. a regional economy, a labour market, a particular city, etc.) may encounter different shocks differently. On the one hand, we can distinguish between shocks with a rapid course and, on the other hand, protracted (e.g. demographic) crises (Keck and Sakdapolrak 2013). Both naturally elicit different reactions from the unit under study, and hence, the resilience of the response is different in one case and the other. The other element, different from the existing understanding in engineering, is the emergence of absorptive capacity, i.e. that resilience implies not only the existence of the capacity to "bounce back" but also the existence of a deeper transformation, change or adaptability in response to shock (Brand and Jax 2007; Keck and Sakdapolrak 2013; Martin and Sunley 2015). Furthermore, the lack of resilience also hinders renewal (Pirisi 2017).
Three more dimensions of interpretation are essential to highlight, one is the dynamics of the system, i.e. whether we consider resilience as a process or as an output. (Keck and Sakdapolrak 2013), as this affects both its measurability and its interpretability. The second is the time dimension, in that the measurability and interpretability of resilience in the context of a protracted crisis is different from that resulting from an immediate shock (Grabner 2021). The third is the question of the meaningfulness of resilience, i.e. whether resilience is good or has no moral connotation, since the phenomenon can be positive or negative depending on the external and internal perceptions of the actors (Pirisi 2019; Székely 2015).
The above may well illustrate how complex and multifaceted the concept of resilience has become since its emergence in engineering. This complexity is reinforced by the conceptual differentiation or specialisation, as we now speak of community, ecological, regional, urban, organisational,

social, etc., as well as personal and social resilience (Bueno, Bañuls, and Gallego 2021; Davidson et al. 2016; Keijzer et al. 2021; Kwok et al. 2016; Lester and Nguyen 2016; Maclean, Cuthill, and Ross 2014; Mahler 2023; Martin 2012; Saja et al. 2019; Stone-Jovicich 2015; Suleimany, Mokhtarzadeh, and Sharifi 2022), the latter refers to the individual and collective levels of the phenomenon.

Resilience interpretations

In what follows, I will present three theories that are regular reference points in the resilience literature, and thus play an important character-forming role in the interpretation of the phenomenon.

The first Martin and Sunley (2015) a popular and regularly cited theory in the field of economics, which divides the phenomenon of resilience into three distinct phases, thus extending the traditional engineering concept. The first phase refers back to this in its very name (1), which is technical or engineering resilience, and refers to the rebound from shocks, while the second phase (2) is called 'extended ecological resilience', which assumes an absorptive capacity whereby the system is partially transformed by the shock but does not change its fundamental properties. The third phase (3) is "positive adaptivity", whereby the fundamental properties of the system are also changed in response to the crisis.

The typological approach is further deepened by Davidson at al (2016) who reviewed a significant spectrum of literature to establish a systematic principle and investigate whether resilience can ultimately be considered as a kind of pre-paradigmatic theoretical framework. Their results distinguish three types of resilience, based on different conceptual elements: (1) static (basic), (2) adaptive (adaptive) and (3) transformative (transformative). In their view, resilience can be seen as a pre-paradigmatic phenomenon in its current state, mainly because it is a rather differentiated field in terms of both conceptual frameworks and methodological approaches, and the lack of consensus and unclear positions make it difficult to represent it as a discipline.

The third approach focuses primarily on social resilience, which is particularly advantageous for the present analysis, since the theoretical framework of a subcategory of resilience also almost fully captures the theories presented above. Keck and Sakdapolrak (2013) is also noteworthy because it raises doubts about the suitability of social resilience for describing social phenomena. As mentioned in the introduction, some authors see the interdisciplinary nature of the subject as a positive element, while others criticise it, mainly because it can obscure the social, power, or essentially sociological nature of the processes.

The authors' literature review concluded that three aspects of social resilience can be described, namely (1) resilience capacity, (2) adaptive capacity and (3) transformative capacity. In addition to these, the main determinants of social resilience were taken into account, which are:

- Social relations and network structures (social capital, trust, reciprocity, mutual support, informal social interactions)
- Institutions and power relations (means of individuals' access to resources, the role of institutional determination in relation to socio-economic system and structure, cultural capital, losers and winners in the construction of resilience)
- Knowledge and discourses (the role of culture, perception of danger, preferences, knowledge and experience at individual and peer level)

Besides the various typological experiments, an important finding is that social or societal resilience can be described as a dynamic process rather than as a statement of fact or a characteristic of a social group and is therefore more difficult to capture (Gyurasicsné Fazekas 2024). In the same way, resilience can be understood in relation to a given economic, social, institutional and ecological environment, rather than in isolation, which illustrates the complexity of the concept, but raises the legitimate question of whether there is any basis for comparing the resilience of different regions, areas, social groups, etc. Furthermore, social learning, participatory decision-making and the capacity for collective transformation are seen as central to social

resilience, while technological innovation and power relations naturally have a significant impact on such transformation. It also follows that resilience can be understood in political or power relations.

All the three theories presented above have common elements that represent well the phenomenon of resilience, these are the definition of the three levels of resilience, which are essentially the same in all three theories, i.e. the first (1) when the impact of the crisis is fully absorbed by the system (engineering, static and coping), the second (2) in which the system is partially transformed by the shock (extended ecology and adaptive), and the third (3) in which the system is fundamentally changed by the crisis and continues to function with these new functions (positive adaptivity and transformativity). More or less the same threefold division is confirmed Grabner (2021) in the context of regional resilience.

Thus, it can be concluded that the theories of resilience are pointing in the same direction, there is no particular difference between the various definitions in the social and economic sciences, and the need for unification can be considered justified. I believe that the above division points to several aspects of resilience that are essential both at the level of interpretation and measurement. A further element can complement this, the dichotomy of process and outcome, i.e. the ability to be resilient is seen as an existing outcome or defined as a dynamic process.

This brings us to the other theoretical question of this paper, namely, whether resilience can be seen as a new paradigm or whether it can be presented as a descriptive tool. Some researchers argue that the concept should be split into a well-operationalized, well-specified descriptive element and a borderline object. This vague and malleable concept facilitates transdisciplinary, the involvement and collaboration of other disciplines (Brand and Jax 2007). While others argue that the concept of (social) resilience offers new perspectives for understanding vulnerable groups under stress, fits well with Bourdieu's field theory, the definition of power relations, and finally, the concept recognizes uncertainty, change, and crisis as normal rather than exceptional, thus - not stated but perceived - adding a new dimension to understanding (Chandler 2015; Keck and Sakdapolrak 2013). As the next stage in the evolution of the concept Grabner (2021) argues that (regional) resilience is a well-defined descriptive tool for interpretation, but it needs to be clarified in its application.

Based on all this, my position is that resilience is now more a tool for understanding how communities function in a crisis-ridden and ever-changing world, providing a new perspective for understanding complex phenomena, but one that does not present paradigmatic elements, while at the same time replacing pre-existing aspects (e.g. sustainability).

Indicator set

Given the theoretical framework described above, the set of indicators cannot be defined by a list of indicators, given the phenomenon's heterogeneous nature. It is, therefore, necessary to categorize resilience in some way, break it down into sub-areas, and define the different measurement characteristics at the level of sub-categories.

I distinguish three broad subcategories of resilience (Figure 1): economic, social, and environmental resilience, which can be further subdivided (Mahler 2024). These subcategories have already been introduced in the context of sustainability interpretations, similar to the pillar structure of sustainability (Nagy, Tóth, and Szép 2022). In the present subdivision, economic resilience has not been further subcategorized. However, this can be expanded in the future. Social resilience builds on the resilience built up by social relationships, and as discussed above, it includes community[5] resilience, demographic resilience and institutional resilience. Environmental resilience refers primarily to existing physical assets, which is why infrastructure, urbanization and the ability to cope with disasters are included. This division is based on Yang et

[5] In this study, the word "community" is used in a broader sense than is customary, irrespective of the level of organization. I refer to it as a social group rather than as a community of a particular locality.

al (2022)), but it also contradicts Yang's assumption that urban resilience is the integrating function in their theory, while the three subcategories described above are in the same level.

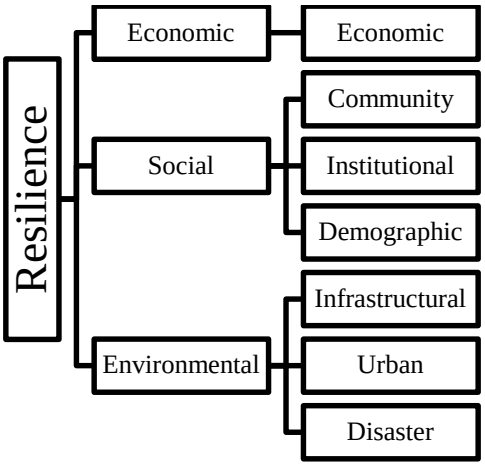

Figure 1: Subcategories of resilience
Source: Own editing

A further condition for defining the indicator set is to take into account two interpretative dimensions, one the individual and collective axis and the other the time dimension also covered by the theoretical framework, i.e. a protracted crisis or an immediate shock. Without going into further detail on these dimensions, in this chapter I will define a set of indicators for the collective and protracted crisis in relation to the social, and within it the community, subcategory at the local territorial level. The latter is also important because resilience can be understood at a transnational or even global level.

A variety of measurement tools have been developed to measure community resilience, perhaps the most popular being the *basic resilience indicators for communities* (BRIC), which have been adapted by many at local level, mainly based on available statistical data (Csizovszky and Buzási 2023) modifying the original set of indicators. The BRIC or similar statistical based index (Cai et al. 2018; Scherzer, Lujala, and Rød 2019) has a rather broad data set, including economic, infrastructure and environmental measures ranging from demographic data, but it is precisely its diversity that imposes limitations on the measurement tool, as it tends to overgeneralise and thus mask problems in sub-areas.

Avoiding this trap, the set of indicators I propose focuses exclusively on the community, examining resilience at the collective level, conditional on the ability of the community to respond to a protracted economic or social crisis.

In my previous research (Mahler 2024), I have analysed three years of literature and identified a total of 177 different indicators measuring social resilience in different studies, which I have classified into 15 categories, 11 of which are social and four of which are mixed. Of these 11 social categories, I selected five (cooperation, demography, education, social capital, deprivation), which I partly narrowed down and partly added new indicator items in line with the above objectives (Table 1). Resilience is always associated with a certain degree of risk-taking, and in the choice of indicators I have therefore sought to measure, among other things, the capacity to take risks. A good example is the equally complex phenomenon of measuring social innovation, for which complex methods of analysis have also been developed (Varga 2021).

Table 1: Proposed set of indicators to measure community resilience

Indicator group	Indicators	Description
deprivation	level of social inequality poverty indicators homeless population proportion of people receiving social benefits number of single-parent households proportion of people receiving home help proportion of disadvantaged population	Deprivation is primarily a group of indicators measuring social disadvantage, poverty, single-parent families and people with special needs, but also includes indicators measuring addictions, social services and language difficulties.
demography	Population over 65 years ageing indicator population density ethnic composition urbanisation rate emigration quality of emigration and resettlement unemployment rate	In addition to the basic demographic indicators (population data, age groups), the set of demographic indicators also includes various household data, urbanisation rates and crime. The indicators refer to a wide range of demographic observations.
Cooperation	social participation social cohesion social exchange of experience and information (knowledge transfer) adaptability and preparedness communication between individuals contact web	Social cooperation, including cooperation based on different social relationships and their outcomes, e.g. cohesion, embeddedness, knowledge transfer. It also includes social safety nets, which measure the existence of communication between actors, the way and direction of information flows.
Education	educational attainment (share of tertiary educated) number of higher education institutions secondary school drop-out rate	This group focuses on the overall level of education at the societal level, with a focus on the share of highly educated people, based on the indicators classified, both at the individual and household level. This is linked to educational infrastructure and various measures of education.
Social capital	social trust number of social innovations social responsibility and engagement social support	The social capital group consists mainly of indicators measuring the experience, strength and cohesion of the local community.

Source: Own editing

If we assume that the phenomenon of resilience is a new tool to better capture the changing world and the uncertain future of a community or social group, then the above indicators - which are well known in the social sciences, but in this case are highly "reusable" - can be of great service in shedding light on the elements of resilience.

A resilient community, based on the theoretical framework above, assumes that it is sufficiently resilient to respond quickly and effectively to problems. The first of the indicator groups listed in Table 1, *deprivation*, is seen as an obstacle to this resilience, as it can be assumed that deprived groups, due to their situation, are less able to react flexibly to problems that arise, and moreover, that they can hinder the whole community from acting.

The *demographic* indicator group can also be a measure of flexibility and responsiveness, as a community of young people is assumed to be able to cope with change more quickly and actively than an older community, and higher mobility is assumed to be easier for a younger community.

The depth of social relations is measured by the *cooperation* indicator group, which shows the density and quality of communication between the two sides, as well as the direction, the way and

the effectiveness of the information flow. It is also partly an indicator of governance through community cohesion, be it civil or local government, and an indicator of group cohesion, the degree of group membership, and thus a measure of effective cooperation in times of crisis.
Education measures the level of education of the community, which may indicate the introduction of innovative and/or complex solutions at community level, on the one hand, and the existence of higher professional competences, on the other hand, which may have an impact on the strengthening of the community's decision-making competence and thus on the ability to react more flexibly or to manage the adaptation process more efficiently.
By measuring trust, empowerment, centres of power and social cohesion, *social capital* helps to gauge the degree of responsiveness within a community during crises, the existence of social support, which can measure the effectiveness of a resilient community's ability to adapt and absorb.
The set of indicators defined above is of course an arbitrary choice, and the empirical test can give an indication of its effectiveness. Another problem we may face is that some indicators are available statistical data series, while others require empirical data collection. This rightly raises the problem of the comparability of indicators, for which there is currently no adequate answer. If it is assumed that resilience is a measurable phenomenon, as the study assumes, then this requires the definition of a range of indicators, and this may involve dimensions that are likely to be known only through case studies or data obtained through qualitative data collection.
Beyond this, I believe that the above set of indicators is a good representation of the fact that if we want to measure a phenomenon as "simple" as resilience, it is not enough to consider only a few indicators, but we need a much deeper and more detailed set of tools. Of course, practice may override the availability and usability of toolkits, but a broader immersion may also lead to a deeper understanding later on.

Qualitative measurement of resilience

A good opportunity to test the qualitative elements of the set of indicators detailed above was provided by the secondary analysis of the records of the thematic workshops held in the southern part of Fejér county in 2022 in 35 municipalities with a total of 377 participants interviewed, in the framework of the project Mezőföldi Mozaik 2022[6] .
The project itself was primarily aimed at developing the capacity for initiative and action of local communities in the field, preceded by a detailed qualitative situation analysis. Although measuring resilience was neither an explicit nor an implicit objective of the research, the analysis of the records allowed me to examine, on the basis of a secondary interpretation, some elements of the above set of indicators, in particular the cooperation and social capital indicator groups. The analysis was thus primarily aimed at finding a link between resilience and the two sets of indicators mentioned above.
The Mezőföld is located in the southern part of Fejér County and in the northern part of Tolna County, the survey covered the settlements of Fejér County. The project is based on the fact that the part of Fejér County south of the M7 motorway is traditionally a more backward region, both economically and socially, which is regularly confirmed by statistical data. In this context, a development policy project has been proposed to support the launching of alternative local development projects, thus boosting the socio-economic development of the region as a whole. The people contacted were primarily active in the municipalities, partly municipal and partly civil, and thus presumably the over-represented group of municipalities in terms of their capacity to act. In the analysis of the notes from the exploratory workshops, I collected information that strengthened or weakened cooperation and social cohesion by settlement, and if there was a

[6] The project was implemented by the Agóra Rural Development Foundation, which I would like to thank for providing me with the opportunity to carry out the second analysis (project ID VCA-KP-1-2022/4-000456).

reference to a crisis or stress situation, I marked it separately in the processing. In all 35 municipalities, ageing, the outward migration of the elderly and the lack of professionals skilled in community building were identified as everyday problems which, on the one hand, erode social cohesion and, on the other, make intergenerational cooperation more difficult. At the same time, local identity, local traditions as a link, the presence of NGOs and micro-communities as identity-builders and active citizens in localities are often highlighted. Another common theme is the issue of immigrants, who are welcomed by most municipalities.

Of the 35 settlements surveyed, only 10 were almost exclusively negative, with respondents highlighting a lack of community and local identity, a lack of cohesion and activity, prejudice against newcomers and internal conflicts. Seven out of the 10 municipalities spontaneously mentioned the difficulties caused by the closure and crisis caused by Covid, five of which had not been able to recover by the time of the survey. Respondents clearly linked the stress situation they had experienced with low levels of cooperation and social cohesion.

However, there were also positive examples in the study, with two municipalities where the pandemic was the catalyst for the strengthening of the local community, suggesting that the community had the potential to regenerate. In other cases, the 2013 snowfall was cited as the community's cooperative response to the crisis.

All this also means that for the indicator groups studied, cooperation and social cohesion were affected by the crisis, and that the weak community was not able to counteract the impact of Covid by reversing the causal relationship. We can assume that, although not pronounced in the other municipalities, Covid played a similar role. This also implies - confirming the theoretical hypothesis - that weak cooperation, weak social cohesion, is a weakening factor of community resilience, which prolongs the recovery from the crisis, weakening the adaptive capacity to a large extent. In conclusion, while the survey described above did not aim to measure any measure of the resilience of municipal communities, the results of the qualitative study confirmed that certain dimensions of cooperation and social cohesion are qualitatively related to the ability to respond to shocks, so they can be an accurate indicators of social resilience.

Discussion and conclusion

In my study, I have discussed the different interpretative frameworks of resilience in the literature, and on this basis, I have shown that the theories share a common ground, so that despite the fragmentation of the literature on resilience, it is actually pointing in one direction. There is, however, considerable variation across the different studies, but this is mainly due to the measurement of different types of resilience and the inclusion (or exclusion) of different dimensions.

Based on the theoretical framework, my view is that resilience is a multifaceted phenomenon that a single set of indicators cannot measure, as this leads to overgeneralisation and obscuring of the problems in the details. However, suppose the type of resilience and the different levels and dimensions of measurement are properly defined. In that case, it is possible to set up a set of indicators and test their usefulness. Of course, the attempts made so far also represent new experiences in the measurement of resilience, on the basis of which it is necessary to define the indicator set. Based on all this, my position is that resilience cannot be considered as a paradigm in its own right, but can be understood as a phenomenon balancing on the boundaries of different disciplines and helping to understand it, and accordingly I have defined the set of indicators needed for its measurement, which focuses exclusively on community resilience at the local level and aims to capture primarily the degree of resistance to long-term crises.

The main scientific contribution of this paper is to test the usability and availability of the defined set of indicators in the field. In the present study, I have used the results of a secondary analysis of a qualitative study to show that some of the indicators identified may be suitable for measuring resilience. Of course, one study is not sufficient to claim with complete certainty that the set of indicators is suitable, but it can be used to further the analysis. Obviously, the level and depth of

availability of certain indicators in the study has already been questioned during the compilation of indicator sets, making testing difficult or impossible for certain indicators without broader methodology. It is also a fact that most of the indicators were not available in statistical form, so the use of case studies or other quantitative or qualitative tools is essential to obtain appropriate measurements, which may be possible due to the methodology.

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Gábor László Porhajas [7]

Agglomeration challenges among the municipalities of Győr[8]

This paper presents the results of my research in the urban area of Győr. My research is based on semi-structured interviews with decision-makers (mayors, deputy mayors) and professional leaders (e.g. chief architects, notaries) of more than 10 municipalities.
The aim of the research was to typify, collect and analyse the challenges that municipalities face due to suburbanisation in a comparative analysis. Another important objective was to identify good practices, in particular to capture the specific challenges of different agglomeration municipalities.
In most cases, health, education and transport services are the most affected by growing population demand, while more affluent neighbourhoods are looking for better leisure, cultural and sports facilities. The integrated, vision-driven development of these emerging agglomeration areas is hampered by the funding structures and 'project mentality' of the municipalities studied.
The main finding of my research is that medium-sized agglomeration municipalities face the main challenges in the study area, where everyday municipal management also poses significant challenges in everyday life.
Keywords: agglomeration, suburbanisation, Győr, local governments, cross-border residential mobility,
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Introduction

The research focuses on the settlements of the Győr functional urban area, one of the most dynamically changing urban areas in Hungary. My research examines the socio-economic processes taking place in the metropolitan area and the agglomeration challenges of the municipalities in the agglomeration through the lens of local government functions. An important aim of my research is also to shed light on what other aspects determine municipal success.
The study of agglomeration areas is particularly acute nowadays, since the data of the 2022 census clearly show that while the population of the core cities is decreasing everywhere except Kecskemét and Sopron, the population of agglomeration areas is growing dynamically, especially in Győr, the second largest agglomeration area after Budapest.
The population of the agglomeration's municipalities (with the exception of 12 municipalities) could increase by 2022 compared to 2011. The most dynamically growing municipalities in the agglomeration are the inter-island municipalities, where the population of Vámosszabadi increased by more than 80%, while the population of Győrzámoly and Győrújfalu increased by 60% and 70% respectively. Overall, it can therefore be said that the inter-island region is one of the most dynamically developing "hotspot" areas in the agglomeration today. This is also confirmed by the fact that, with the exception of Győr, the housing stock in Győrújfalu has grown most dynamically, with an increase of more than 50%. It is also important to note that the housing stock increased everywhere except in Mérges, Vének, Rábaszentmiklós, Kisbabót, Árpád and Bakonypéterd.

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The agglomeration of Győr, although not one of the regions with particularly favourable indicators in Central Europe, is from a Hungarian perspective the most developed region of the country outside the capital, and is considered by a significant part of Hungarian society and politics as a model area where the economic restructuring caused by the regime change in Hungary has been very successful, thanks to internationally significant multinational companies such as Audi Motor Hungária. The region is also a very interesting and valuable location from a geographical and geopolitical point of view. The functional urban area of Győr is located in the middle of the Vienna-Pozsony-Budapest metropolitan area, which has a significant impact on social and economic developments due to its proximity to Slovakia and Austria (the latter being undoubtedly more important) and its excellent transport infrastructure, and thus also gravitates somewhat towards the Hungarian capital, although it is considerably further away than, for example, Bratislava or Vienna.

The proximity of the Austrian and Slovakian capitals also determines the life of local governments, as my research confirmed my preliminary hypothesis that the municipalities of the functional urban area have recently become less attractive because of their proximity to Győr or the prosperous Mosonmagyaróvár and Sopron, but mainly because of their proximity to Austria, while some municipalities are attractive because of their proximity to Slovakia and Bratislava.

On the basis of my research, I want to answer the following main research question: what are the main challenges for local governments in providing and financing services in the growing population and its changing composition in the polycentric urban area of Győr?

My research was based on a total of 15 expert interviews with municipalities belonging to the Győr functional urban area and - for comparison - with two significant municipalities outside the official FUA delimitation, recorded online and in person using a semi-structured methodology between September 2023 and spring 2024. My interviewees were either municipal decision-makers or professional managers of municipalities. The municipalities included in the interview research are: Vámosszabadi, Győr, Gönyű, Győrzámoly, Bezi, Lébény, Öttevény, Koroncó, Mecsér, Mórichida, Gyarmat, as well as Rajka and Fertőszentmiklós, which were included as a conjoint sample. In the present study, I aim to synthesise information from the UNKP survey and the expert interviews conducted during my doctoral research, while also drawing on the KSH settlement statistics data as a secondary source.

Figure 1: Population of the settlements in the agglomeration of Győr, based on the data of the HCSO for 2021. Edited by Teveli-Horváth D.- Szőllőssy A. - Kiss B.-Porhajas G. (2022)

Materials and methods

Many national and international authors have written on agglomeration processes. Among the studies on European agglomeration processes by foreign authors, one should highlight (Ciconne 2002, Gardiner et al. 2011, Burger-Meijers 2017, Foster-Stehrer 2009, Majewska-Truskolaski 2017, Vogel 2012, Szmytkie 2021), while among the works of Hungarian authors (Tímár 1999, Kocsis J. B. 2000, Czaller 2016, Vasárus 2022, Bajmóczy-Jakus 2023, Kiss-Porhajas 2024)
The development of agglomerations has been studied in detail by representatives of many disciplines, such as sociology, social geography, economics, etc. In the present research, we do not aim to explore the reasons for the emergence of agglomeration as a phenomenon in its entirety, but it is important to place our research in a theoretical context. Generally speaking, agglomeration is "a group of settlements resulting from the concentration and centralisation of productive forces, in which the highly developed city and the surrounding settlements are intensively interconnected in the field of economic and social life, and a concentration of population develops around the central city" (Nemes Nagy 2005). According to another approach, 'an agglomeration is defined as a group of settlements surrounding a metropolitan area and a metropolitan area whose population and businesses are in close, everyday contact with each other' (Kőszegfalvi 1995). The UN defines agglomeration as "the close interaction between cities and their surrounding areas as a result of urbanization processes, whereby the economic, social and infrastructural impacts of cities spread to areas outside cities" (UN 2018). This definition emphasizes the interconnectedness between cities and the fact that the economic and social impacts of cities often spread to surrounding rural areas.
Moving closer to the research area; urban sprawl is a typical urban development process in the Central European region, characterised by the transformation of the relationship between the city and its surroundings, the expansion of the urban area and the emergence of urban characteristics in previously rural areas (Kocsis 2023). By the end of the 20th century, this agglomeration process had significantly transformed the face and interrelationship of the city and its surroundings, but Kocsis (2023) points out that the process is characterised by different features and emphases from country to country and region to region, with general and local factors - economic, cultural, social and historical - shaping different local patterns in this matrix of interdependence. Under the concept of suburbanisation creating agglomerations, we use the approach widely accepted among Hungarian geographers, according to which suburbanisation can be a process of suburbanisation creation on the one hand, and on the other hand, suburbanisation is a process of decentralisation and centralisation (Tímár 1999, Bajmóczy 2003). Within the first approach, there are five different approaches (place-based, statistical-based, technical-based, social-psychological-based and human-ecological-based (Tímár 1999, Bajmóczy 2003). The location-based approach is based on the idea that agglomerations are settlements that are located outside the administrative area of the core city, but still within commuting distance (Hall 2018). However, it is important to note that in countries with a socialist past, such as Hungary, this approach is only partially valid, as, for example, suburbs can be identified within the administrative boundaries of the city in many Hungarian cities (Hardi 2002, Vasárus-Makra 2015). Sociological approaches in particular start from the social composition of agglomeration settlements. On this basis, agglomeration settlements are described as communities with specific values and ideals, where young middle-class families, good neighbourhoods or even active community life play an important role. In terms of their political affiliation, they are typically understood as a more conservative and religious community than those living in the core city (Fishman 1987, Bajmóczy 2003, Szebényi 2017). Approaches that interpret suburbanisation as a process of decentralisation and centralisation do not start from the outcome of the process (agglomeration settlement) but focus on the process itself. Some approaches are based on a model of stages of urban development, where agglomeration occurs in the second stage of the urbanisation cycle, the stage of relative deconcentration (Enyedi 1988, Van den Berg 1982). Other approaches consider suburbanisation

as a decentralisation of urban population and activities and thus as a comprehensive part of the urbanisation process (Tímár 1999).

Although I do not intend to explore this in detail in this paper, I think it is important to address the possible causes of suburbanisation, which has been examined from a wide range of approaches from a variety of social sciences. A simpler approach is to divide the causes into two broad (impact) groups. According to this approach, the so-called pull factors (the emerging agglomeration attracts population) and the push factors (the desire to leave existing inner-city residential areas) together shape suburbanisation. The pull factors include the family house lifestyle, quieter living environment, better air quality and a cleaner environment, while the push factors include factors such as dirty, noisy, crowded, slum-like and socially deprived city centres (Csanády et al. 2009, Kocsis 2000). Other approaches distinguish three approaches to suburbanisation: 1. consumer approach; 2. economic approach; 3. socio-psychological approach (Csurgó 2013).

The main feature of the research area under study is that Győr is located in a much wider Vienna-Bratislava-Győr-(Budapest) polycentric urban area. The essence of polycentricity is the principle of decentralised concentration, where the interdependence and interdependence of the city and its catchment area, as well as the interdependence and interdependence of the city and the countryside, are of paramount importance (Somlyódiné 2023, Faragó 2006, Faragó 2008). The essence of polycentric areas is that, when they are created, they create a much more balanced spatial structure, relying on the pull of dynamic centres. Polycentric urban spaces, are spatial elements where urban spaces, by communicating and cooperating with each other, can create dynamic spaces where more peripheral areas are involved in development (Sen 2003, Faragó 2008, Waterhout et al. 2003)

It is important to stress, however, that there is no uniform continuity, consistency or consistency in the academic vocabulary of polycentric areas. While some researchers have referred to polycentric urban areas as global city-regions (Scott 2001), others have used the term polycentric urban region (Kloosterman-Musterd 2001) or even mega-urban region (Hall-Pain 2006). The emergence of polycentric urban regions can be seen as a spectacular element of the economic restructuring in post-Ford. This process has been very successful in regions where firms have adopted a culture of co-opetition and flexible specialisation (Saxenian 1994). The transformation of the economy, with smaller firms co-operating and clustering, has also had an impact on spatial structure, with the increasing value of cheaper agglomeration location choices outside the core cities, a process which has essentially led to the convergence of different metropolitan areas.

In addition to economic restructuring, social influences are also driving the emergence of polycentric urban areas, as in Western Europe, where demographic change has led to major changes in people's lifestyles and mobility patterns, as well as an increase in their need for mobility. (As commuting has become more and more common (with the development of a suitable high-capacity road and rail network), the so-called commuting belt has been steadily moving further and further away from the core city. The growing population in these settlements also had a growing need to spend their leisure time in their new place of residence. As a result, monocentric metropolitan regions have also become increasingly polycentric and, over time, polycentric urban areas are emerging (Kovács-Szabó 2013).

As a consequence of the increase in mobility, polycentric urban areas are characterised by a high level of labour migration from other suburban municipalities to jobs in the urban region. The local workforce moves to other municipalities to work. The result is what is known as 'wasteful commuting' in the regions concerned (Garcia-Palomares 2010). Of course, the historical context of polycentric urban areas should not be ignored either, since in many cases they are based on the fact that, in a particular historical period, the region was able to offer a locational advantage that was highly attractive in a particular economic period and led to an economic boom. Such regions may be, for example, heavy industrial districts built on natural resources such as coal or iron ore deposits (e.g. the Ruhr) or areas along the coastline with a prominent trade and shipping presence, such as the Randstad.

The emergence of polycentric urban areas in the Central and Eastern European region is also facilitated by the fact that the highly compact morphology of traditional socialist cities broke down after the fall of the state socialist system, as different functions and activities were dispersed in a relatively liberal and unregulated environment, and the rate of dispersion was much higher and faster than that observed in Western European cities.

Table 1: Summary table of Polycentric Urban Areas

Term	Definition	Explanation	Example
Polycentric Urban Area	A region with multiple urban centers	A region where several cities or towns are interconnected and interdependent, sharing resources, infrastructure, and labor markets.	Vienna-Bratislava-Győr-(Budapest)
Global City-Region	A type of polycentric area	A region with a global influence, characterized by interconnectedness and competitiveness.	The Randstad region in the Netherlands.
Polycentric Urban Region	A type of polycentric area	A region with multiple urban centers, often focused on specific economic activities.	The Ruhr region in Germany.
Mega-Urban Region	A type of polycentric area	A very large urban region, encompassing multiple cities and towns.	The Tokyo metropolitan area.

Source: edited by the author

The research used a qualitative social science methodology. At the beginning of the study, I identified the municipalities where I would use qualitative methods, interviews, for a deeper analysis, and thus 15 semi-structured interviews were conducted. I chose the selected municipalities to include municipalities of different sizes and to include both those directly affected by rail transport and those not directly affected. Interviews were recorded online and face-to-face using a semi-structured methodology between September 2023 and April 2024. My interviewees were mainly municipal decision-makers (mayors, deputy mayors) or professional managers of municipalities (notaries), who are not mentioned by name due to the sensitivity of the topic and to protect my sources of information. The municipalities included in the interview research are as follows: Vámosszabadi, Győr, Gönyű, Győrzámoly, Bezi, Lébény, Öttevény, Koroncó, Mecsér, Mórichida, Gyarmat, and Rajka and Fertőszentmiklós, which were included as a comparison As part of the quantitative research, statistical analysis of data from secondary data sources was also carried out; the data sources were the settlement statistics database of the Hungarian Central Statistical Office and TeIR, operated by the Lechner Knowledge Centre.

The primary objective of the data analysis was to gain a picture of changes and processes in agglomerations, both in quantitative and visual terms. The importance of qualitative research lay in the fact that we interviewed actors who, through their position or other involvement, perceive the effects of agglomeration first-hand and who experience the positive and negative processes of suburbanisation in their daily work and life. Finally, the qualitative analysis was based on a series of interviews with local authorities, economic operators, NGOs and other stakeholders.

My research was based on the study of the tasks of local government, as I believe that the real situation of a municipality and the challenges of agglomeration processes and polycentricity can be best understood and an accurate view of the level and challenges of a municipality's ability to perform its tasks can be obtained by examining the level and challenges of a municipality. Following the change of regime in Hungary in 1989, the Parliament of the Republic of Hungary adopted a law providing for a wide range of autonomy and a broad set of responsibilities and powers, which is outstanding by international standards; Act LXV of 1990 on Local Self-Government. Although this law has stood the test of time, the local government system suffers from a number of anomalies. A very important element of this was that by 2010, domestic municipalities had accumulated a debt of over HUF 1 200 billion, which placed a heavy burden on the municipal sub-system of the central budget. Some municipalities came close to financial

and operational insolvency. As a consequence, the legislator decided to reform the entire local government sector. A new law, Act CLXXXIX of 2011 on Local Governments in Hungary, drastically reduced the tasks and powers of local governments. At the same time, under Act CXCIV of 2011 on the Economic Stability of Hungary, the central budget took over some or all of the debt of local governments and made further borrowing by local governments subject to central government approval. On the basis of the new Local Government Act, the following types and groups of tasks were identified in our research: settlement development; settlement planning; settlement management (public cemeteries, public lighting, local roads, public parks and other public spaces, parking), basic health care; local environmental and nature protection; water management, water damage control; cultural services (library, cinema, heritage protection, etc.); and local public services (public services, such as public services, such as public transport, public transport, public transport, etc.).)); and local public services (public transport, public transport, public transport, public transport, etc.); child welfare services and care, nursery care; social services and care; housing and premises management; sports, youth affairs; provision of local public transport; waste management.

In the Győr agglomeration, my study area is the core city of Győr and Gönyű, as well as Vámosszabadi, Koroncó and Győrzámoly, Győrladamér, which are hotspot areas for agglomeration migration, Öttevény and Lébény, which are easily accessible by public transport, the classic rural areas of Bezi and Mecsér, and Gyarmat and Mórichida, which are located on the periphery of the agglomeration of Győr, the inner periphery, the inner periphery, the Tét district. For comparison, I extended my research to Rajka and Fertőszentmiklós.

It is also important to focus on the case of Rajka because the Rajka area is the site of what the literature calls cross-border residential mobility (CBRM). The reasons for this process are attributed in the literature not only to the usual suburbanisation phenomena, such as trends in the real estate market, but also to the acceleration of the European integration process (Jagodic 2010). Moreover, it should be borne in mind that the emerging cross-border suburbs serve the European Union's Euro-regional plan, which has the political objective of increasing integration between Member States and further strengthening cross-border cooperation, particularly well (Spierings-Velde 2013).

But the reasons behind the CBRM process are not unique. They are basically the same as those seen in the usual suburbanisation phenomena (Jagodic 2010), where we see the phenomenon of rising house prices and rising costs of living in city centres, leading to more people moving to the suburbs (Gerber et al. This process is being accelerated by factors such as motorisation (more cars in families), the development of road and rail infrastructure, and a preference for a more natural lifestyle away from centres (Jagodic 2010). It is also worth looking at other specific motivational factors. Surveys have shown that the reasons for moving out are generally related to a change in living situation. Examples include a change of job (the distance between home and work is a key factor) and changes in income and family situation (Gerber et al. 2017).

Cross-border residential mobility is transforming the areas concerned. On the one hand, it necessarily becomes more colourful and to some extent internationalised, and on the other hand, the people involved become over time dual identities (Gielis 2009). People increasingly see the border less as a dividing factor, but see cross-border areas as an integral part of the urban region. According to studies in the Croatian-Slovenian border region (in my experience, this is also true for the Rajka region), the ethnic tensions that used to exist have been minimised and ordinary people increasingly feel that tensions between the two ethnic groups are generated only by politics. In essence, the border has become a geopolitical construct in people's minds, which has been transcended by everyday life (Jagodic 2010). This is not surprising, of course, as there is a clear parallel between the more we get to know another people, the more direct experience we have, the greater our prejudices and thus the greater our xenophobia. But opinions differ on the extent to which borders can be broken down in society. Strüver, for example, argues that borders are so embedded in social thinking that their separating function is maintained or at most reduced (Strüver 2005).

Introduction to the Győr Functional Urban Area

The city of Győr has always been one of Hungary's most favourable settlements, becoming a major industrial centre after the Austro-Hungarian unification, which was only strengthened during the socialist period. Thanks 32ot he Rába Hungarian Wagon and Machine Works and many other light industry units, the city became an internationally renowned citadel of machine building and light industry in Hungary.
The city of Győr was not spared the economic shock of the regime change, but within a few years it was able to transform its industrial structure by taking advantage of its extremely favourable infrastructure and transport geography, mainly thanks 32ot he Audi Hungaria Zrt. car and engine factory, which opened in 1992 and is the city's most important employer. In 2021, Audi employed 11 983 people (Source: MTI 2022). As a result, the city and the agglomeration as a whole are dominated by Audi, as there is practically no family that is not at least directly linked 32ot he German Volkswagen Group's engine and car plant in Győr.
Thanks 32ot he rapid transformation following the change of regime and the increasingly important Austrian border, the city and its agglomeration have been an attractive destination for inward migration for decades.
Despite this, Győr's population has been steadily declining 32ot he32 s fall of communism.In 2011, it was 128,193, but the latest figures for 2021 show that the trend has reversed and the city's population has started to grow again, with 132,111 inhabitants.
The city of Győr and its agglomeration are also highly fragmented. The county seat has a significant inner agglomeration zone, which typically includes the parts of the municipalities that were annexed 32ot he city of Győr during the socialist years. These are Pinnyéd, which was annexed 32ot he city in 1950, Bácsa, which was annexed in 1966, and finally Győrszentiván, Gyirmót and Ménfőcsanak, which were annexed in 1970 (Honvári 2014). Based on Suhai's 1984 study, the agglomeration's settlements can be classified into eight clusters using cluster analysis. Although the agglomeration of Győr has changed a lot in the last forty years, the division into cluster groups of the past can still be partially confirmed today. According 32ot he analysis, Győr was considered as an independent cluster. The first cluster includes the settlements in the inner suburbs of Győr, where the number of commuters was already very high in 1984 (e.g. Győrújfalu, Győrladamér, Abda, Öttevény). The settlements in the second cluster have a high degree of functional integration with Győr, they were considered agglomeration settlements and are now the dominant settlements in the agglomeration (Győrújbarát, Győrzámoly, Nyúl).
The fourth cluster included settlements where agricultural activity was dominant, the role of agriculture in these settlements has also declined noticeably, but these settlements managed to maintain their rural, agricultural character (e.g. the sixth cluster was characterised by developed industry, this group includes the settlements of the agglomeration which are now urban (e.g. Pannonhalma, Tét, Lébény). The fifth, seventh and eighth clusters include settlements located 32ot he periphery of the agglomeration, many of which have retained their peripheral status (e.g. Hédervár, Mórichida, Kisbabot, Vaszar, Felpéc) (Honvári 2014).
Nowadays, the second most populous settlement in the agglomeration is Győrújbarát, merged with Győr-Ménfőcsanak, with a population of 8516 in 2021 (KSH 2022). According to official KSH data, the population of the other eight settlements in the agglomeration exceeded 3000 in 2021. These are, in order, Tét (4354), Pannonhalma (4184), Győrzámoly (3866), Győrszemere (3600), Lébény (3391), Abda (3269), Gönyű (3258), Öttevény (3174). However, a significant part of the Győr agglomeration (14 settlements, 20% of the agglomeration) is a so-called „small village", as the population of these settlements is below 500 inhabitants. The smallest settlement in the agglomeration is Mérges, with 122 inhabitants, but Rábaszentmiklós (142) and Vének (193) also have fewer than 200 inhabitants.
The economic activity of the Győr agglomeration is characterised by the fact that more than 80 percent of the settlements in the region employ at least 10 people, and more than 500 people in

Győr, Győrladamér and Kunsziget. The number of enterprises employing more than 500 persons in 2020 was 17 (source: KSH 2020). The economic activity of the region is outstanding, the unemployment rate is very low, for example, only three municipalities have a number of people receiving 33ot he33 sor looking for a job exceeding 2% of the population. These three municipalities are the villages of Pér, Árpás and Lázi. However, as far as spatial disparities in economic activity are concerned, in nearly 85% of the municipalities the per capita business tax revenue is below HUF 5 000 per capita, while in 6 municipalities the per capita business tax revenue is close to or even above HUF 10 000. These 6 municipalities are Bakonypéterd, Mezőörs, Kunsziget, Vének, Győr and Gönyű. Gönyű, home 33ot he Danube port of Győr, has the highest per capita business tax revenue with HUF 22704, followed by the county seat with HUF 16 076.
According 33ot he GKI Economic Research Institute, the per capita income of Hungarian settlements was HUF 1.2 million in 2016. In Győr and in the agglomeration settlements in the immediate vicinity of the city, this amount exceeded HUF 1.6 million per capita, which was only reached by a few agglomeration settlements around Budapest, the wealthier Transdanubian settlements and typically the Buda districts. In the vast majority of agglomeration settlements in Győr, this value is typically above the national average, but below HUF 1.6 million per capita. The only exceptions to this were some of the inner peripheral settlements of the agglomeration – in the district of Téti – which are also disadvantaged in terms of transport geography, with per capita incomes a few tens of thousands HUF below the national average.

Results

As you can see, these municipalities are in many different situations. Some of the municipalities studied are also located in one of the most dynamically developing regions of Hungary, in a priority area. Rajka, inter-island municipalities, other municipalities are in an internal peripheral situation. However, it can be seen that suburbanisation processes are common to all settlements. In this paper, we identify the common and challenging difficulties in service delivery that are common to these municipalities and the specific patterns that are unique to certain areas or municipalities, with visible differences.

Urban development, spatial planning

Urban development and spatial planning is clearly one of the biggest and most important challenges of all the areas examined.
The municipalities studied were all significantly affected by the effects of COVID-19 and the energy crisis, which significantly amplified the agglomeration externalities of suburbanisation processes. One reason for this is the youthful demographic character of many of the municipalities studied, with young adults and people starting families moving to the agglomeration areas, and the growing number of children, which has led to the need to increase nursery and kindergarten capacity. Most municipalities are seeking to implement the energy side of institutional expansion in a sustainable way by installing solar panels and heat pumps to decouple the largest energy consumers from the central grid and ensure a secure long-term energy supply for municipal institutions.
In many cases, municipalities try to implement investments in energy modernisation, infrastructure development and urban development through tenders, so tenders often set the agenda and shape the direction of development, rather than integrated planning and long-term thinking, and conscious, long-term, conceptual urban policy thinking is basically marginalised.
For urban development, it is vital for the municipalities studied to keep population growth within certain limits. If the municipality is a partner in the parcelling out of new land, it must ensure that the appropriate infrastructure is built, developed and expanded, and that the municipality is thoughtfully developed in a complex way, taking into account the needs of the local population, but in many cases these municipalities (as in the north-west of the agglomeration) can be 'full

slabs'. However, the infrastructural developments desired by the new population threaten the traditional characteristics of these settlements. Some municipalities are already finding it difficult to control this process. Inter-island settlements such as Győrzámoly.
On the other hand, there are settlements under study, such as Vámosszabadi, where a new settlement is being created, with a dense suburban development of a similar size to the current settlement, several kilometres away from the current urban area, with inadequate public services. Their provision is far beyond the capacity and resources of the municipality. As a consequence, in the absence of government support or private capital, these developments are unlikely to materialise in the medium term. The example of Vámosszabadi is not unique, as municipalities in areas identified as hotspots for migration have identified this type of challenge to a greater or lesser extent. The study has highlighted that it would be of great help to municipalities if land parcelled out 30 years ago could be 'reclaimed', thus alleviating the burden of what are now clearly long-term mistakes made by previous municipalities, the reality of which is questionable in the light of the benefits lost and the costs already paid for land conversion.
Another major problem is that the needs of the new families differ from those of the municipality, which causes considerable conflict. Often, these families have needs that the municipality or indigenous locals are unable or unwilling to meet or tolerate. This conflict is even more acute in Rajka, where newcomers are typically of a different nationality, namely Slovak.

Health

Health is also a cardinal and common problem in the municipalities surveyed. The radical population growth in the agglomeration areas clearly increases the number of people visiting a doctor's surgery in the area, the number of cases increases, but the number of GPs has not increased significantly in recent decades, the number of patients per GP increases and the size of the surgeries decreases in relation to the population.
The typical problems are in the area of paediatric care, where demand for paediatric care is growing dynamically; as emigrants are usually young couples or families with young children, there are many more patients waiting to see paediatricians. If the assumption that the majority of emigrants are families about to start a family or planning to have children is correct, it is expected that the workload of paediatricians will continue to increase and the demand for paediatric care will also increase. One of the main reasons for this is the central government's Family Support Programme, which provides substantial support for families moving into new-build housing.
At the time of the research, the main problems in the agglomeration hotspot areas were overcrowding (e.g. Győrzámoly) or shared adult and paediatric practices (e.g. Vámosszabadi). In Győrzámoly and the neighbouring Győrújfalu, not included in the study, GPs terminated their contracts with the municipality in 2023 due to high patient card numbers and national health insecurity, and primary health care in this part of the inter-island region has essentially collapsed (Új Szó 2023). Improvements to health infrastructure are particularly needed in the municipality of Vámosszabadi, where the new medical and dental clinic being built in the settlement of Sitia Hill is partly intended to address these challenges.

Settlement management

It is an interesting anomaly that in many cases the more populated a municipality is, the poorer it is, as there are more public workers who could not/would not find a job in the primary labour market. Among the municipalities surveyed, this is only observed in some municipalities on the outskirts of the municipality of Téti. In contrast, in the more prosperous agglomeration settlements, where the tasks to be performed and the infrastructure to be provided increase with the population growth, municipal management costs significantly more, as there are not enough public workers to perform the tasks - or those who remain in public employment are no longer suitable for this.

At the time of my research, it can already be concluded that all the municipalities included in the study successfully weathered the winter energy crisis of 20222/2023 by introducing significant savings measures and rescheduling energy modernisation measures, with some restrictions. It is expected that they will be able to switch to a more sustainable operating model during this period and in the longer term (greater use of renewable energy sources, e.g. use of heat pumps in addition to solar panels, etc.)

The development of the local road network is a challenge in all the agglomeration settlements studied, as one of the most characteristic features of Hungarian agglomeration settlements is that they have not been able to develop the capacity of the local public infrastructure, especially local roads, in line with the pace of the development of the settlement. The issue of parking is a challenge in those settlements, typically those with a significant concentration of new, relatively densely built-up terraced housing estates.

There is also a strong demand for cultural and leisure services in the Győr agglomeration. Many of the municipalities surveyed have serious problems in this area. In the municipality of Vámosszabadi, a new community centre is needed, which is currently one of the main problems of the municipality. A community centre is also needed in Öttevény and Győrzámoly, as the sports hall can only partially meet local needs. An outdoor cultural and leisure facility is needed in Bezi. The main problem is that the cultural and entertainment offer of the agglomerations cannot (and should not) compete with the county in terms of quantity and quality, but the expectations of the population are similar.

Transport

The analysis of the transport and mobility situation was not the purpose of my investigation, as the Mötv. does not mention the provision of agglomeration, urban (inter-urban) transport as a municipal task and the provision of this task is the task of the MÁV Group and the client is the Ministry of Construction and Transport (ÉKM). However, it is important to emphasise that local public transport is a serious problem in Győr, as it is becoming increasingly difficult to ensure its economical operation and the Volánbus, which is entrusted with this task, is seeking to impose ever-increasing costs on the local authority. This is a major problem throughout the country and the local transport system needs to be reformed in terms of financing and organisation. The costs of operators are constantly rising due to higher fuel prices, the increasing cost of staffing and the increasing cost of maintaining the fleet. The situation is made even more difficult by the fact that the average age of local buses in Győr is still very high and renewal is not keeping pace with the replacement of intercity buses. The fare reform introduced on 1 March 2024 has extended the fare structure established in the metropolitan agglomeration to the whole country, which could bring significant changes to transport in the agglomeration areas, although local services are not yet available with national and county season tickets in Győr. (In essence, full integration has been achieved only in Budapest, and among the major rural cities only in Zalaegerszeg, but this was discontinued after the test period due to high revenue losses) The financial burden of the tariff reform on operators in summer 2024 is not yet known, but it is expected that without drastic changes in travel patterns and an increase in the share of public transport, or significant state compensation, the burden on operators will continue to grow in an already resource-poor sector. As a consequence, passengers will ultimately pay the price for cheap travel through a deterioration in service quality. As service quality declines, passenger numbers are also falling year on year.

Resilience of settlements

The resilience of a municipality is a crucial factor for its success. Agglomerations are particularly vulnerable to social and economic change, as dynamic population growth means that any change has a major impact on them. The most important factor determining the resilience of a municipality is its share of independent revenues in its overall budget. These are the resources that municipalities can use to improve the quality of their compulsory tasks and to carry out their voluntary tasks, which ultimately determine to a large extent their future prospects.

Those municipalities that have significant independent revenues over a predictable number of years have, in all cases examined, significant local business tax revenues. Gyönyű, Lébény, Fertőszentmiklós. These municipalities have typically planned their development along a long-term strategy and have been able to control the development of their urban areas and keep it at a level at which the development of public infrastructure can keep pace. In contrast, the settlements without significant independent income, e.g. the inter-island villages of Vámossszabadi, Győrújfalu, Győrzámoly, which are considered to be the hotspot area, were able to cover the development of public infrastructure after a while only by new parcelling out and land consolidation, i.e. by selling land, but this caused a spiral, where the population was constantly growing, so that the public infrastructure had to be developed strongly again and again. Today, in the most affected municipalities in the Szigetköz, the situation has reached the point where further land reclassification is becoming increasingly difficult to imagine, so that the necessary development is no longer possible without public subsidies, and the municipalities have become the recipients of increasingly uncertain public subsidies, and our resilience has been greatly reduced,

Conclusion

All of the municipalities surveyed are feeling the effects of suburbanisation trends, but the challenges posed by agglomeration processes do not affect the municipalities surveyed in the same way. The main challenges for the agglomeration municipalities studied are in the following areas: urban development, urban planning, settlement management, health care.

The potential solutions to the problems identified are well beyond the current capabilities of local authorities, but local authorities have the most technical knowledge and information to solve these problems with appropriate central assistance. In my opinion, by channelling additional resources into the local government sector, strengthening the coordinating role of district and county governments, and enhancing agglomeration-level thinking and cooperation, local governments may be able to mitigate and solve these problems. In this respect, further studies of other agglomerations or agglomerating urban areas could be proposed, although it should be noted that a comparative international embedding of these studies is less possible due to the different regulatory environment for local government in the European Union.

However, it is also important to stress that, especially in the case of some municipalities in the inner periphery of the agglomeration (district of Tét), the provision of additional resources is far from sufficient, as the shortcomings in the human resource capacity of municipal offices have become so deep that the capacity of these lagging municipalities to make effective use of additional resources has been lost. Moreover, the gap between municipalities is widening: successful municipalities are becoming even more successful, while the backlog of less successful ones is widening, and the human resource capacity of each municipality plays a decisive role in this. Typically, municipalities where a high proportion of municipal staff have a tertiary education (in some of the agglomerations studied, 80-90% of municipal staff have a tertiary education) are more likely to be able to initiate projects and attract funding, and thus become more successful.

Overall, one of the main findings of my research is that agglomeration municipalities with high responsiveness and resilience are the ones that are best able to cope with the challenges of a dynamically changing environment due to social and demographic changes. Resilience is determined most of all by the size of their own revenues, with the size of their local business tax revenue (HIPA) playing a key role. In addition, municipalities with high HIPA revenues tend to have a specific settlement development strategy and vision, and as a result, these municipalities have been less affected by uncontrolled in-migration, and have remained overall liveable.

In summary, my research shows that, due to agglomeration spatial transformation, the most exposed settlements in polycentric urban areas are the medium-developed agglomeration settlements. These are sufficiently attractive to inward investors to create new residential areas, but their public infrastructure cannot keep pace with demand due to the scarcity of space and the

lack of significant local business tax revenues. This leaves municipalities in a vulnerable position and in constant need of improvement, makes day-to-day municipal management a major challenge, and leaves no scope for large-scale, long-term development that can respond to future challenges. For all municipalities, the biggest problem is conurbation transport, but the municipal governments, and even the regional governments and counties, have no role to play in shaping and shaping this, as this is a matter of state competence.

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Gabriella Horváth-Csikós[9]

Fostering cultural sensitivity among university students through engagement in international projectspresenting various methods to enhance the cultural intelligence of university students

This study derives its foundation from the outcomes of a Virtual Exchange initiative, involving 73 students from three distinct universities: Budapest Business University, Hungary; University of Sfax, Tunisia and Ismir Democracy University, Turkey. The project provided an in-depth exploration of the three countries from diverse angles, including cultural, social, historical, sociological, gastronomic, and various other perspectives, as observed, and presented by university students. In 8-month research the author examined the cognitive, behavioural, motivational, and cultural aspects of cultural intelligence of university students before and after the 6-week long Virtual Exchange project and compared the pre-and post-project results. The paper summarizes the results of a research carried out in 2024. In this research, the author scrutinized the levels of sensitivity among students both prior to and following collaborative work within a cross-cultural project with their international counterparts. The study aimed to ascertain whether engagement and collaboration within a multinational environment yield supplementary values, as well as identifying the specific soft skills cultivated through such collaborative endeavours. The results indicate that engagement in collaborative international projects with foreign peers can significantly enhance cultural sensitivity.
Keywords: cultural sensitivity; cultural intelligence, university students; project work, collaboration
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Introduction

Virtual Exchange (in short VE) programs use different technologies to allow geographically separated people to communicate and to interact with each other. 73 students from three different universities- Budapest Business University, Hungary; University of Sfax, Tunisia and Ismir Democracy University, Turkey- participated in the project. The 6-week long project provided students with opportunities for intercultural and interactional development through the performance of collaborative intercultural tasks, thus providing them with intercultural experience. The main aim of the international project was to engage students in meaningful discussions on key topics and current issues with international peers, to broaden students' horizons by sharing diverse perspectives of tackling common problems and to experience Peer-to-Peer (P2P) Learning, which involves knowledge sharing, mentoring, and learning from peers, learning from each other.

Literature review

Cultural intelligence means the ability to relate and work effectively in culturally diverse situations. Table 1 summarizes some definitions of cultural intelligence.

Table 1. Definitions for cultural intelligence

Author	Definition
Earley - Ang (2003)	CQ captures a person's capability to adapt effectively to new cultural contexts
Earley - Mosakowski (2004. p 139-146)	"a seemingly natural ability to interpret someone's unfamiliar and ambiguous gestures in just the way that person's compatriots and colleagues would, even to mirror them"

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Sternberg, Wong - Kreisel (2022. p 143-160)	"Cultural intelligence is one's ability to adapt when confronted with problems arising in interactions with people or artifacts of diverse cultures."
Ang et al (2020. p 820-845)	"…merely a special case of general intelligence, but there is at least some evidence that cultural intelligence is a distinct construct that is related but nonidentical to general intelligence…"

Source: own compilation

Based on the above collected definition, it can be stated that you are culturally intelligent if you are open to get to know other cultures, try to find opportunities to meet people from other cultures, if you learn about them, if you are open-minded and fully aware of any cultural assumptions and if you are a critical thinker.

The Bennett Scale (2017) has primarily been utilized to examine individuals' cross-cultural sensitivity, although certain scholars have broadened its scope to encompass organizational communications. The framework describes the different ways in which people can react to cultural differences. Bennett originally proposed that trainers should employ the model to assess trainees' intercultural awareness and facilitate enhancements in intercultural sensitivity, also known as cultural sensitivity. This concept involves the capacity to acknowledge and adjust to a novel and distinct culture.

According to Christopher, P and Mosakowski (2004) people who are detached from their own culture can more easily adopt to new situations, to unfamiliar hosts and can understand the body language easier. It is because individuals detached from their own culture may possess a greater openness to new experiences and perspectives. This openness allows them to approach unfamiliar situations with curiosity rather than with preconceived notions or biases.

Thomson and Esses (2016) suggest in their study that higher education institutions which promote internationalization, should also consider enhancing the social experience of their international students. One of the ways to optimize the international student social and cultural experiment is pairing them with local peer mentors, which is peer-to-peer mentoring. Peer-to-peer mentoring offers several advantages that contribute to its effectiveness, such as relatability, which means that peers often share similar experiences, challenges, and backgrounds, making them uniquely qualified to understand and empathize with each other, thus this relatability creates a supportive environment where mentees feel understood and validated.

Vătămănescu et al. (2019) underscored the constructive impact of organizational policies in promoting knowledge sharing and collaboration. Wangpipatwong (2009) claimed that students' ability to share and a level of competition with group mates are the factors influencing knowledge sharing.

To confirm, Hughes and Wisker (1998) said that giving a peer mentor to the international students help develop their cultural and social experience in the unfamiliar environment, therefore it would be essential to incorporate mentoring foreign students into the curriculum of higher educational as it would support and cultivate better thinking and problem-solving skills in students.

Participating universities

The nationalities of the participating countries in the present research were Hungarian, Tunisian, and Turkish. The first country is European, the second is African and as for Turkey its small part is European, and most of its territory belong to Asia. The three countries differ significantly across various dimensions, spanning from geography and languages to cultures and beliefs. In the context of the VE project, university students were assigned some topics to work on, such as: labour market difficulties in the 3 countries, style/fashion, gastronomy, gender issues, challenges of today's youngsters, university subculture, etc.

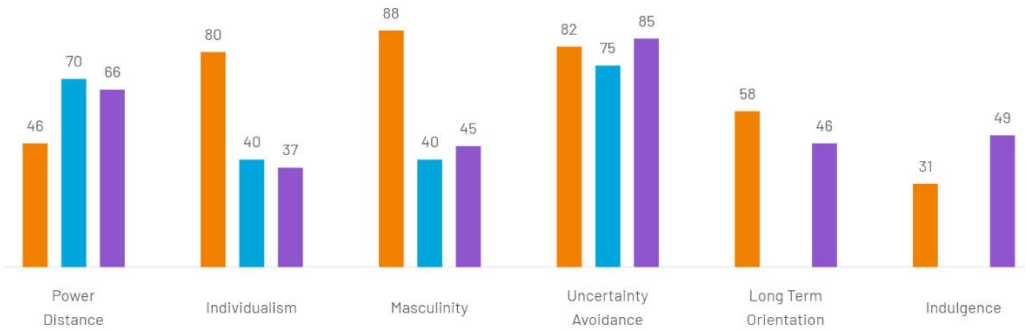
Culture includes codes of manners, dress, language, religion, rituals, art, norms of behavior, such as law and morality, and systems of belief. To understand a culture, it is essential to understand

not only the language differences, but also the differences in knowledge, perceptions, beliefs, attitudes, and behaviors.

Edward T. Hall (1978) believed that context and meaning are interrelated, and he placed different cultures on a continuum of high to low context according to how people from those cultures interpret and perceive the information that surrounds an interaction or event. Based on Edward T. Hall's model-which discusses the differences between high- and low-context cultures, Hungary, Tunisia, and Turkey are examples where high-context communication is used, where most of the information is assumed to be known, which is the common knowledge. Furthermore, there is a lot of nonverbal coding, and most of the communication is heavily reliant on nonverbal cues. High-context cultures focus on collectivism and relationship-building. High-context communication cultures are usually relational and collectivist, and they focus on interpersonal relationships. Hall identifies these cultures as those in which harmony and the well-being of the group is preferred over individual achievement. From this point of view, the three participating nationalities belong to the same group.

Another theory, Hofstede's cultural dimensions theory, which is the framework for cross-cultural communication shows the effects of a society's culture on the values of its members, and how these values relate to behaviour. Figure 1 shows Hungary, Tunisia and Turkey based on the 6 dimensions of Hofstede's theory, where Hungary is orange, Tunisia is blue, and Turkey is represented with purple colour.

Figure 1. Hungary, Tunisia, and Turkey based on the 6 dimensions of Hofstede's theory.



Source: own table, based on https://www.theculturefactor.com/country-comparison-tool

Tunisia scores the highest on Power Distance dimension (70), which means that its members accept a hierarchical order in which everybody has a place, and which needs no further justification. Hierarchy is seen as reflecting inherent inequalities and they accept the different distribution of power. For Tunisian people status symbols of power are especially important to show social position and indicate the respect that should be shown.

As for the second dimension, Individualism, Hungary scores the highest with 80, which means that people prefer a loosely knit social framework where individuals are expected to take care of themselves and their families only.

As for Masculinity, it is again Hungary scoring the highest (88) on this dimension. The high score indicates that the society is driven by competition, achievement, and success. As for the lower scores Tunisia and Turkey, the dominant values in these societies are caring for others and quality of life.

Concerning the dimension of Uncertainty Avoidance, it pertains to how a society manages the reality that the future remains unpredictable, whether they seek to control it, accept it as uncontrollable, or allow events to unfold naturally. All three countries exhibited high scores on this dimension, indicating a significant demand for laws and regulations to alleviate people's anxiety.

Long-term orientation dimension shows how societies can preserve some links with their own past while coping with the challenges of the present and future. Low-score countries want to maintain traditions and norms while high-score countries make efforts to have changes and to modernize systems in their societies.
The last dimension, the Indulgence vs Restraint dimension shows the extent to which people in the given societies try to control their desires and impulses, based on the way they were raised. Hungary scores low on this dimension, which means that in contrast to Indulgent societies, Restrained societies do not put much emphasis on leisure time and control the gratification of their desires.

Research methodology and results

In 2024, the author conducted a survey with university students from three universities: Budapest Business University, University of Applied Sciences, Hungary; University of Sfax, Tunisia and Izmir Democracy University, Turkey. The international project lasted for 6 weeks, starting from the end of February 2024 till the end of April 2024.
The main task of the survey was to examine the participating students' cultural sensitivity and to examine to what extent their cultural sensitivity could change after collaborating with students from diverse cultural backgrounds. Furthermore, the researcher also wanted to see whether there was correlation between the number of languages spoken or the number of countries visited and cultural openness.
From Hungary 23 second-year students majoring in Media and Communication Studies participated in the project, from Tunisia there were 25 third-year students majoring in English Studies and from Turkey 25 students (aged between 19 and 22) studying Psychology and Sociology. Altogether 73 students participated in the project, but 64 out of 73 responded the questions in the pre and in the post-project survey, therefore the research cannot be considered representative, but the author believes that it can give a clear picture of the opinions of the university students.
The questionnaire consisted of 11 questions, most of which were closed questions. The questions were based on nominal and metric scales. The questionnaire could be divided into five groups of questions. The first group of questions asked about the typical characteristics of the sample: in which university they study, their age, what they study, their gender and language skill. The next set of questions asked about the cognitive aspect of cultural intelligence, such as travelling abroad, whether they study the culture and language of the country they visit, whether they read about the country prior to travel, whether they follow the news, and how confident they are in their language skills. The third group of questions looked at the behavioral aspect of cultural intelligence, such as whether they follow the behavioral patterns of the country they are visiting, how students deal with cultural difficulties, how they judge people, how much their behavior depends on local customs. The fourth set of questions looked at the motivational aspect of cultural intelligence, such as how willing they are to collaborate with foreigners, whether they are open to collaborating with them, how well they can build relationships and make friends. Finally, the last area covered the cultural aspect of cultural intelligence, with questions focusing on the acceptance and understanding of foreign cultures.
To analyze the questionnaire, the author used the SPSS 28 statistical program. The following statistical methods were used for the evaluations: univariate and multivariate methods, frequency, mean, standard deviation, cross-tabulation analysis, correlation tests and ANOVA.
The 2 questionnaires (pre-project and post-project survey) was completed by 64 students. The sample specification was as follows:
In terms of gender, 34.4% of men and 65.6% of women answered the questions.
By age, the average age was between 18 and 22 years old (81.3%). By ethnicity, 34.4% of respondents was from Tunisia, while 32.8% was from Turkey and 32.8% was from Hungary. 85.9% of respondents are BA students. 42.2 % of the respondents speak 1 foreign language other

than their native language, 40.6% speak two foreign languages, while 17.2% speak three or more foreign languages. 54.7% of the respondents have never been abroad, 14.1 % has been to 1 or 2 countries, while 29.7% have travelled to 3 or more countries and 1 respondent marked the answer "other".

The following research questions were phrased in the study:

- Q1: Comparing the data received for questions asked before the project started and after the project was completed concerning the cognitive aspect of cultural intelligence where can improvements be seen?
- Q2: Comparing the data received for questions asked before the project started and after the project was completed concerning the behavioural aspect of cultural intelligence where can improvements be seen?
- Q3: Comparing the data received for questions asked before the project started and after the project was completed concerning the motivational aspect of cultural intelligence where can improvements be seen?
- Q4: Comparing the data received for questions asked before the project started and after the project was completed concerning the cultural aspect of cultural intelligence where can improvements be seen?

Results

The author divided the questions on cultural intelligence into 4 categories (cognitive, behavioural, motivational, and cultural). For each of the statements in each category, the respondents were asked to rate how true they thought the statement was for them on a scale of 5 (strongly disagree, disagree, neutral, agree, strongly agree).

The present paper shows the results of the 4 research questions.

Q1: Comparing the data received for questions asked before the project started and after the project was completed concerning the cognitive aspect of cultural intelligence where can improvements be seen?

Regarding the cognitive aspect of cultural intelligence, the students showed an elevated level of agreement on some of the statements even before the programme started. The results show that they are confident in their language skills, do not avoid collaborating with people who are not fluent in their language, follow international news and do not mind work in a minority group. They showed the least agreement about planning ahead for their interactions with people from other cultures. Their answers showed that students were interested in the cultures of the partner countries and wanted to be actively involved in the project. The greatest difference was observed regarding students' willingness to collaborate with individuals who are not fluent in their language. This implies that this statement elicited the least consistent responses among the participants.

The post-project results show that the average response to each statement increased everywhere except for activity in the project. To assess which of these changes were significant, a two-sample t-test was used. The reason for this was that the pre- and post-project responses of each student could not be linked. The results could only be compared at the group level and so the use of a paired sample t-test was not feasible. In case of equality of variances between the two groups, the student's t-test was used, while in the opposite case the Welch's t-test was used.

The test results indicate significant differences in five instances. Post-project completion, students tended to express the sentiment that prior to communicating with individuals from other cultures, they should formulate plans outlining their objectives and approach to interacting with these individuals. They also showed greater agreement that they could immediately sense when something was going well or badly in a new cultural situation and that they could easily find solutions to problems in unexpected situations. A negative change from the previous is that more people agreed that they prefer to avoid working with people who are not fluent in their common language The dispersion of responses after the project is still the largest here, and has even increased compared to before, suggesting that students' responses have become even more

divergent in this respect. Table 2 shows the means, standard deviations, and results of the two-sample t-tests for the pre- and post-project conditions.

Table 2: Cultural intelligence (cognitive)

	PRE		PRO		t test		equal variances
	Mean	Deviation	Mean	Deviation	t	sign	
Before I communicate with people from a new culture. I prepare and plan what I want to achieve.	3.59	0.886	4.02	0.745	-2.916	0.004	No
I plan how I'm going to relate to people from a different culture before I meet them.	3.52	0.943	3.89	0.779	-2.453	0.016	No
When I am in a new cultural situation. I can immediately sense whether something is going well or is wrong.	3.70	0.770	4.00	0.735	-2.232	0.027	No
If something unexpected happens while working in a new culture. I can easily find out the solution.	3.64	0.764	3.95	0.844	-2.197	0.030	Yes
I avoid working with people who don't speak my language fluently.	1.94	1.006	2.72	1.453	-3.537	<0.001	No
I follow international news.	3.80	0.839	3.84	0.912	-0.303	0.763	Yes
It is OK for me to work in teams where I am in a minority.	3.83	0.767	3.98	0.701	-1.202	0.231	Yes
I trust my language knowledge.	3.89	0.758	4.13	0.630	-1.902	0.059	Yes
I want to find information about the 2 partner countries before the project starts. / Before the project I read about the 2 partner countries.	3.58	0.869	3.73	0.930	-0.982	0.328	Yes
I want to be / was active in the project.	4.27	0.718	4.20	0.647	0.517	0.606	Yes
I am interested in the culture of the 2 partner countries.	4.22	0.701	4.27	0.718	-0.37	0.709	Yes

Source: own compilation

The second research question was the following:
Q2: Comparing the data received for questions asked before the project started and after the project was completed concerning the behavioural aspect of cultural intelligence where can improvements be seen?
For the behavioral aspect, it can also be seen that participants showed an elevated level of cultural openness for most of the statements. This is particularly true in terms of their ease in accepting cultural differences in greetings, norms and traditions and their general perception of being able to deal with differences well. Conversely, however there is high agreement with the statement that their judgements of people include how they maintain their cultural norms. The results showed that students were open to getting to know students from the other two countries and thought that their communication skills would improve because of the project. The largest variance was found in statements about whether certain characteristics contribute to how they judge people and whether they would like to take a leadership role in the project. In these cases, students' responses were therefore relatively different from the other statements. After the project was completed, these differences increased.
For the behavioural aspect of cultural intelligence, we get a mixed picture of changes compared to the pre- and post-project averages. As with the previous research question, t-tests were used to evaluate the significance of the differences. In this case, four statements show significant differences between the pre- and post-project states. There was an increase in the ability of students to change their behaviour or expression when required by a cultural situation and an increase in whether they eventually took on a leadership role in line with their prior expectations. Conversely, the students' perceptions regarding whether the project enhanced their communication skills shifted in a negative direction. Table 4 shows the means, standard deviations, and t-test results for the pre- and post-project conditions.

Table 3: Cultural intelligence (behaviour)

	PRE		PRO		t test		Equal variances
	Mean	Deviation	Mean	Deviation	t	sign	
I can change the way I act when a cross-cultural situation seems to require it.	3.73	0.672	4.03	0.616	-2.604	0.010	No
I can alter my expression when a cultural situation requires it.	3.70	0.659	4.00	0.617	-2.630	0.010	No
I modify my speech style (e.g.: accent. speed. tone) to suit people from a different culture.	3.70	0.885	3.89	0.779	-1.272	0.206	Yes
I can easily change my body language (e.g.: eye contact. gesture. posture) to suit people from a different culture.	3.72	0.806	3.89	0.799	-1.211	0.228	Yes
I can easily accept cultural differences in greetings. in traditions and other norms.	4.22	0.766	4.03	0.712	1.435	0.154	No
I can handle cultural differences easily.	3.91	0.729	4.03	0.734	-0.967	0.335	Yes
I judge people how they talk to me.	2.50	1.098	2.59	1.400	-0.422	0.674	No
I judge people how they write to me.	2.50	1.084	2.58	1.412	-0.351	0.726	No

I judge people how they preserve their cultural norms.	3.02	0.766	2.97	1.333	0.244	0.808	No
I am open towards getting to know students from the 2 partner universities in the project.	4.27	0.740	4.09	0.886	1.191	0.236	Yes
I think my communication skills will improve / improved in the project.	4.20	0.800	3.86	0.924	2.250	0.026	Yes
I would like to be the leader / was one of the leaders in our international team.	3.25	0.873	3.61	1.033	-2.126	0.036	No

Source: own compilation

The third research question was the following:
Q3: Comparing the data received for questions asked before the project started and after the project was completed concerning the motivational aspect of cultural intelligence where can improvements be seen?
As for the motivational dimension of cultural intelligence, the participants were already culturally open before the project. This is particularly true for statements relating to good relations and friendship with people from diverse cultures and to tolerant and respectful communication with people from other cultures. The results showed that the students were enthusiastic about working in an international team, thought they could motivate their peers and did not particularly expect language barriers to be a major problem in communication. The largest variance is like the behavioral aspect for statements about factors that influence people's perceptions. and includes the statement about the difficulty of language barriers. Hence, it is in these instances that students' opinions exhibit the most divergence. These differences increased further after the project.
Here as well, the change in attitudes before and after the project is mixed, with both cases where students were more open at the end of the programme and cases where their attitudes changed in a negative direction. In this case, however, only two t-tests show a meaningful change. On the one hand, there was an increase in students' confidence in their ability to deal with unfamiliar cultural situations and, on the other hand, they were more likely to think that they would ask questions and make observations before forming a view about a culture to see if the view was true.

Table 4: Cultural intelligence (motivational)

	PRE		PRO		t test		Equal variances
	Mean	Deviation	Mean	Deviation	t	sign	
I have confidence that I can get on well with people from a different culture.	4.09	0.729	4.11	0.737	-0.121	0.904	Yes
I am certain that I can make friends easily with people from other countries.	4.09	0.729	4.20	0.596	-0.930	0.354	Yes
I can adapt to the lifestyle of a different culture easily.	3.67	0.778	3.91	0.830	-1.648	0.102	Yes
I am confident that I can deal with a cultural situation that's unfamiliar.	3.69	0.732	3.97	0.776	-2.109	0.037	Yes

I am patient and respectful when communicating with someone from a different culture.	4.16	0.781	4.30	0.609	-1.136	0.258	Yes
Before settling on a new belief or idea about a different culture. I use questions and observations to see if it is accurate.	3.81	0.710	4.11	0.693	-2.394	0.018	Yes
I judge the people by their appearance.	1.92	0.931	2.16	1.383	-1.125	0.263	No
I have prejudice against certain people.	2.28	1.031	2.45	1.402	-0.790	0.431	No
I have prejudice against certain cultures.	2.25	1.054	2.39	1.341	-0.660	0.511	No
It is/was difficult to work together while we are having language barriers.	2.39	1.048	2.78	1.266	-1.901	0.060	Yes
I can/could motivate my groups mates in the project.	3.94	0.833	3.78	0.881	1.031	0.305	Yes
I am/was enthusiastic about working in an international team.	4.11	0.779	4.00	0.891	0.739	0.461	Yes

Source: own compilation

The fourth research question was the following:
Q4: Comparing the data received for questions asked before the project started and after the project was completed concerning the cultural aspect of cultural intelligence where can improvements be seen?
Among the various aspects of cultural intelligence, the cultural dimension has the highest pre-project averages, so students have the highest cultural intelligence. This suggests that students are particularly open to learning about other cultures, learning a few words in the language of that culture before their visit, and collaborating with people from other cultures and learning as much as possible about that culture before their visit. Additionally, the results indicate that students are enthusiastic about cultivating and sustaining friendships throughout the project. They also demonstrate openness to meeting new people, visiting different countries, and learning about their cultures as part of the project experience. The most notable variation was observed in the students' perceptions regarding their likelihood of making friends. Similarly, the most divergent responses after the project's completion were noted in the students' views on the success of this friend-finding endeavor.
After the project, the means increased for all but one variable, but only two variables showed significant changes based on t-tests. After the project, students were more likely to agree to talk to their family and friends about their culture. This increase could easily be since exposure to other cultures encouraged students to share their experiences with those close to them and thus to talk about their own culture.

Table 5: Cultural intelligence (cultural)

	PRE		PRO		t test		Equal variances
	Mean	Deviation	Mean	Deviation	t	sign	
I talk about my own culture with my friends.	3.97	0.816	4.28	0.678	-2.357	0.020	Yes
I talk about my own culture with my family.	3.72	0.845	4.16	0.895	-2.845	0.005	Yes
When working with people from a different culture. I research that culture and try to improve my knowledge about it.	3.91	0.706	4.06	0.794	-1.176	0.242	Yes
I prefer to work in teams with people from different cultures.	3.97	0.755	4.11	0.838	-0.997	0.321	Yes
I feel comfortable collaborating with people from very different cultures to me.	3.91	0.684	4.14	0.794	-1.789	0.076	Yes
I try to learn a few foreign words in the language of any culture I visit.	4.13	0.787	4.36	0.601	-1.894	0.061	Yes
I feel a natural drive to connect with other cultures.	3.88	0.745	4.03	0.835	-1.117	0.266	Yes
I am open towards getting to know other cultures.	4.19	0.664	4.38	0.549	-1.741	0.084	Yes
I would like to visit the 2 partner countries after the project is finished.	4.19	0.833	4.36	0.721	-1.248	0.214	Yes
I would like to keep the connection with the students of the 2 partner universities.	4.25	0.756	4.19	0.924	0.419	0.676	Yes
I want to learn about the culture of the 2 partner countries.	4.25	0.756	4.34	0.739	-0.709	0.479	Yes
I will find/have found friends from the 2 partner universities.	4.02	0.807	4.03	1.112	-0.091	0.928	Yes
I would like to meet my foreign groups mates in person in the future.	4.11	0.819	4.19	0.941	-0.501	0.617	Yes

Source: own compilation

Conclusion

The fundamental aim of the study was to examine whether engagement and collaboration within a multinational environment can have supplementary values and to reveal and identify the specific soft skills used through such collaborative tasks.

Participating in international projects that involved collaboration between Hungarian university students and students from countries like Tunisia and Turkey offered several advantages. First engaging with students not from Europe provided firsthand exposure to global issues such as economic disparity, political systems, or environmental concerns, making Hungarian students more informed about global challenges and solutions. Furthermore, collaborating in English (or even exploring other languages spoken in these countries) strengthened communication skills, especially in a multicultural context. This is crucial in business and international settings. Also students encountered different ways of thinking and problem-solving, which led to more innovative solutions as they learned to integrate diverse perspectives. Learning about the educational approaches and industry practices in Tunisia and Turkey helped Hungarian students expand their understanding of global business, economy, and policy. As the project often came with unexpected challenges, it showed students how to remain resilient and flexible in dynamic, cross-cultural settings.

The research results have demonstrated that engagement in collaborative international projects with foreign peers can significantly enhance cultural sensitivity of university students.

The findings indicated that students were receptive to building relationships with students from the other two countries and believed that their communication skills would enhance because of the project. The results show that they are confident in their language skills, do not avoid collaborating with people who are not fluent in their language. The post-project results show that the average response to each statement increased everywhere except for activity in the project. The greatest variance was observed in statements concerning whether specific characteristics influence their judgments of people and whether they aspire to assume leadership roles in the project. In these instances, students' responses were notably distinct from the other statements. Following the project's completion, these differences further intensified. Regarding the motivational aspect of cultural intelligence, participants were culturally open even before the project commenced. There was a rise in students' confidence regarding their capacity to handle unfamiliar cultural situations. Conversely, they were more inclined to believe that they would inquire and observe before forming opinions about a culture to verify their accuracy.

Based on the findings, we can confirm that it is vital to boost university students' cultural sensitivity. Enhancing the cultural intelligence of university students can involve various strategies to develop their ability to effectively interact and work in diverse cultural settings. Our project was an Experiential Learning Projects, which is one type of strategy to develop their cultural intelligence. The project required students to collaborate with peers from diverse cultural backgrounds and engage in group projects with diverse teams in multicultural settings. Intercultural Competency Training is another alternative, where various workshops and seminars can provide practical skills and strategies for navigating cross-cultural interactions. Furthermore Study Abroad Programs and Cultural Exchange Events can effectively enhance the cultural intelligence of university students, thus preparing them to thrive in an increasingly interconnected and diverse global environment.

By participating in such international projects, Hungarian students not only gained academic and professional skills but also became more well-rounded individuals, better equipped to thrive in an interconnected global society. The results of the research might have been derived intuitively but one goal of the study was to articulate the practical applicability of similar international projects by emphasizing the importance of participating in international projects with university students and providing them the opportunity to experience peer-to-peer learning. While this study focuses on collaboration between Hungarian, Tunisian, and Turkish students, the framework can be adapted to other international educational settings. The results might offer practical strategies for universities to design more effective cross-cultural learning experiences, equipping students with critical skills for the global workforce. In the short term, this research helps educators improve their intercultural programs. In the long term, it contributes to producing a workforce better prepared for the globalized economy.

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Conduct analysis of hospitality organisations

Tourism and the hospitality industry that organically joins it are of decisive economic importance worldwide, about 10% of the Hungarian working population works in this sector. The aim of our research is to present the structure of the organizations in the sector, focusing on the different perspectives of managers and subordinates in relation to decision-making, responsibility issues, subordination relations and sustainability. Decision making during operation is important for the successful operation of organizations, so it is necessary for managers to understand the factors that influence the decisions of their subordinates. Although decision-making is always the responsibility of the leader, in an ever-changing, evolving sector that requires quick response is a decisive success factor. Data was collected by conducting in-depth interviews on site in the summer of 2024, during which we interviewed the manager of the catering establishments separately and an employee of our choice.
Keywords: organizational behaviour, hospitality, sustainable management
JEL codes: D23, L25, L83, Q01

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Introduction

Hospitality has thousands of years of history. Dynamic, ever-changing, transforming activity that always adapts to the expectations and fashion of the given age. It has undergone spectacular development in recent decades, and its economic importance is constantly growing. Hospitality is closely linked to tourism and is an indispensable part of the tourist offer. Nowadays we can witness a kind of gastronomic revolution, in which, in addition to the conditions of quality hospitality, local and seasonal ingredients play a prominent role. Gastronomy plays an increasingly important role in people's lives. Nowadays, eating is not only a means of survival, but also conveys a kind of enjoyment value and plays a prestige role. Nowadays it can be felt that hospitality plays an increasingly important role within the tourism system. While it used to appear as an additional service next to accommodation, today it also functions as an independent attraction. When travelling, people usually want to taste food and drink specific to the area and not what they do back home. (Gonda, 2020)

Gastronomy is in the center of interest these days. Michalkó (Michalkó, 2016) interprets gastronomy as a man-made attraction, where gastronomy complements the everyday pleasure caused to the individual with an extra experience realized through the combined effect of the special environment and taste pairings experienced during consumption. For example, visiting a restaurant rated by a rating system or visiting a national cuisine.

According to the report of the Hungarian Tourism Agency (Magyar Turisztikai Ügynökség, 2023), tourism contributes significantly to economic recovery and job creation in Hungary. According to the data of the Central Statistical Office (2021) satellite account, tourism's direct contribution to the economy is 6.8% of GDP, and its contribution, including indirect effects, is 10.7% of GDP. According to the data, the number of jobs in the hospitality and tourism sectors is 428 thousand, 10.0% of the jobs were directly generated by the sector (KSH, 2021).

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Although the sector itself is significant in terms of the number of people employed, it also faces a number of problems. According to a survey by Eventrend Global, 13% of hospitality workers change jobs at least once a year, leave the sector in several cases and return soon after. 26% of respondents have worked abroad for at least 4 months consistently, so we can say that leakage from the country is still a real and persistent phenomenon. Another significant problem, which in many cases can be an obstacle to development, is that only 16% of respondents working in the sector said that they can communicate fluently with their guests in English and 8% in German. (Eventrend Group, 2019) The list of challenges of the sector could certainly be continued, since hospitality is typically a human-centered profession, so our research also focuses on the human factor, taking into account the communication between boss and subordinate, the control powers and the process of decisions.

Organizational culture in the hospitality industry

An organization is built and operated by its employees, who, in addition to achieving leadership goals and visions, also strive to achieve their individual goals. This is no different in any hospitality organization, although several studies suggest that hospitality organizations have different cultures than other industries. In this industry, it is not only important to employ professional, satisfied and integrated employees, whom we can retain in the long run, but also that guests are satisfied with the staff who serve them (Dawson et al., 2023). According to the literature, the performance of employees depends to a large extent on motivation and the organizational culture present (Achmad, 2017). Pizam (2020) defines hospitality organizational culture as, “a system of shared norms, values, beliefs, traditions, and expectations whose ultimategoal is to provide exceptional service and memorable satisfactory experiences to all the organization’s stakeholders”.
Part of organizational culture is what decision-making processes, control powers, information flow and communication systems operate in an organization, what motivational models and tools help management retain employees. The success of the outcome of a decision depends a lot on the person of the decision-maker, their competence, their leadership style and the method they use to make the decision (Paprika et al., 2007). Decisions and their quality and results have an impact on the success and efficiency of the organization (Hussein, 2024), as well as on the performance and attitude of the workforce, therefore it is an important task of the management to pay special attention to the different motivations of employees, which are affected simultaneously by different external and internal influences (Wardhana & Harsono, 2024). In our research, we examined the factors listed above in hospitality organizations.

Description of the research

The research took place between July 15. and August 15. 2024, we conducted in-depth interviews with the head of the organization, mostly the owner and a subordinate employee at various types of catering units. By selecting catering establishments, it was an important aspect that they had not previously prepared an organizational chart, their daily operating routine was developed based on their experience during operation and the manager's ideas. During the research, we visited four confectioneries, four restaurants, four bars and two hotels.
The average number of employees of the companies behind the examined catering units ranged between 5-24 people in the past two years, and their net annual turnover ranged between HUF 31-450 million. Half of the enterprises are owned and the other half are rented premises. On average, their material expenses account for 25% while their personnel expenses account for 20% of their revenues. The business profit of the audited companies decreased sharply in the past three years, and a third of the examined companies had negative profit after tax last year. According to them, the primary reasons for this were high inflation, changes in consumer habits, the rise of home delivery during the Covid pandemic, as well as high VAT rates and special taxes on the sector. At

the same time, all respondents are more optimistic about the future, inflation expected in 2024 is significantly lower than in 2023, and domestic tourism is recovering. The proximity of the Austrian border in the region is a particularly big competitive advantage compared to other regions of Hungary, according to a report by the Austrian Labour Office (Österreichische Sozialversicherung, 2024), in September 2024 127,934 people worked on the other side of the border, most of whom qualify as commuters, so they spend their higher income earned abroad at home.

During our research, we sought answers to the following questions:

1. Do managers and subordinates draw the organizational chart in the same way, do manager's place subordinates on the same level as subordinates places him/herself?
2. How is the flow of information in the organization? Do subordinates know, dare or want to contact the competent manager directly with the problem that has arisen, or do they only report the problem to their immediate superior?
3. Decision-making powers have been examined from several aspects
    - According to the leader, who has decision-making authority in the organization vs. according to the subordinate, who has decision-making power in what?
    - Does everyone in the organization interpret the decision hierarchy system in the same way?
    - What are the topics on which only management can clearly decide?
4. We examined the difference between judging motivational tools arising during the operation of the company. Does management know how best to motivate employees?
5. When examining control powers, we wanted to know whether employees know which superior/superiors/colleagues they have to meet, whether the instructions are clear, if they receive instructions to the contrary from different levels, which ones are they implementing?
6. The examination of development opportunities section discusses whether, when it comes to improving and increasing the performance of the existing unit, is there an additional need for manpower, or is there already enough reserve in the current staff to make this feasible?
7. The last question discusses the topic of sustainability, which is very fashionable nowadays. What do managers and subordinates think about environmental awareness, what steps do they take to ensure that the unit they work for has the lowest possible pollutant emissions?

1. Organisation chart

Different people may perceive, interpret, evaluate things differently, approach and process the same topics from different perspectives and judgments. This is also true for those involved in an organization. Lawrence and Lorsch (1967) investigated the fit of the external and internal stakeholders of the organization – environment-organization-group-individual – its consequences and organizational behavior in 3 dimensions, which can be approached from 2 sides:

- "bottom view": begins to examine fits from the direction of the individual and the group - mainly dominated by the expectations of the individual and the group towards the organization
- "top view": begins to examine the fits from the direction of the environment and organization – mainly the expectations formulated by the organization and the environment dominate towards the individual and group
- Therefore, it is an interesting question how the individual himself, the employee, sees the organization as a whole, the organizational hierarchy, and where he classifies himself in this system. As well as how the manager sees the same thing and what level he puts the employee on.

Depending on whether the owner is the head of the unit himself, the managers of the audited catering establishments basically drew four levels (five where the owner and the actual manager differed), which are shown in *Figure 1*:

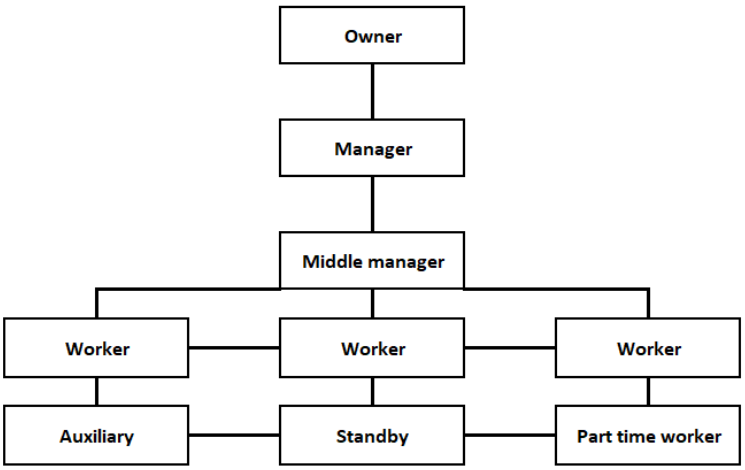


Figure 1. Organisation chart from a managerial perspective
Source: own editing

For employee surveys, only three levels are drawn, which are shown in *Figure 2*:

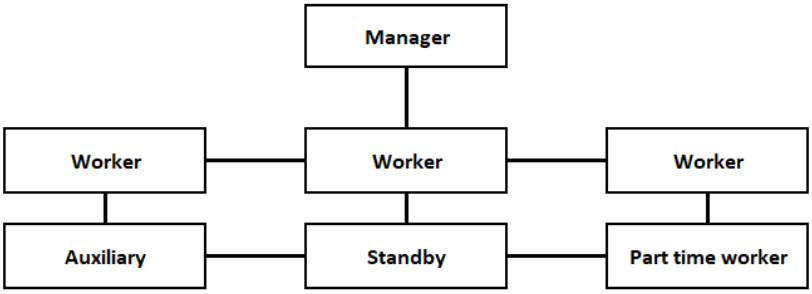


Figure 2. Organisation chart from a subordinate perspective
Source: Own editing

When we asked stakeholders for positions in the unit and the list of colleagues, about 70% of the surveyed subordinates did not name the position with which they have no direct connection without asking about them. These were mostly cleaners, kitchen maids and helpers.

2. Information flow

According to the traditional model of communication, the emitter formulates a message, which is transformed into a form that can be transmitted and received with the help of some kind of sign system, transmitted through some channel to the receiver, who deciphers the signals, i.e. translates the message for himself. This process also takes place in an organization among the stakeholders in the organization. The efficient flow of information and communication within the organization is key to its effective operation. Klein (2009) describes communication as the transfer of information with shared meaning. The information itself is what we transmit in communication. The direction of communication and the flow of information can be done in two ways:

1) along a hierarchy (vertically)
    a. downstream (instruction)
    b. upstream (report)

2) between organisational actors at the same level (lateral) (Bakacsi, 2015)

In vertical communication, information travels through several hierarchical levels, depending on the size of the organization, before it reaches the recipient. The larger an organism is, the more stages it has to go through.

It is worth considering whether there are guiding information flow steps. If there are, how closely should the degrees be followed, can degrees be omitted, can persons be avoided?

When examining the flow of information in the surveyed catering establishments, we found that while according to the managers, information flows directly regardless of position levels, so helpers can also talk to the manager, during subordinate interviews we found that they mostly turn to their own middle manager with their problems, even if the organization is so small that it would not justify taking this step. However, respondents agree that the solution is no longer provided by the middle manager, but comes directly from the manager/owner. *(Figure 3)*

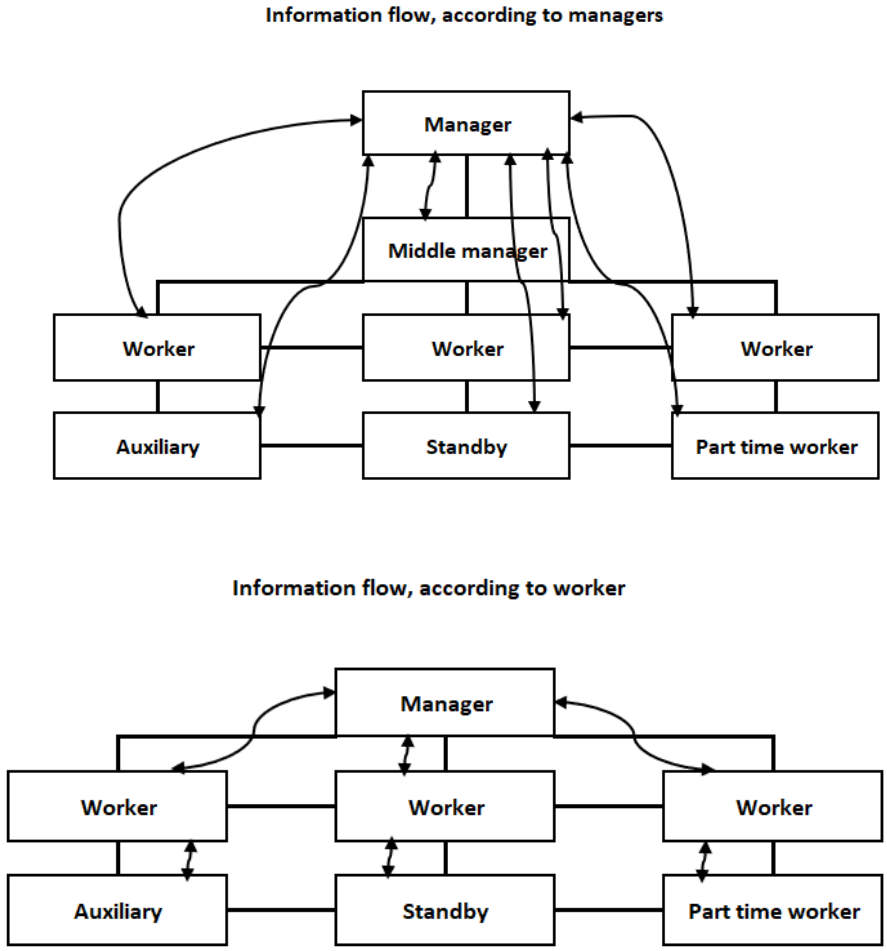


Figure 3. The flow of information according to the different actors of the organisation
Source: Own editing

The question of how far a certain amount of problem goes in the organization also received different answers. Respondents agree that in order for a problem to reach a leader, it must reach a certain level, but both sides think differently about how big this level is.

According to the leaders, they need to know everything:

- problems affecting operation (technical problems, e.g. leakage, machine failure)
- problems related to guest satisfaction (returned food, problematic guest, complaint book entry)
- problems with workforce organization (sudden illness, termination, ill health)
- the supply/logistical problem of important raw materials

The range of problems that managers do not consider to be a top priority and therefore may not be addressed is narrow enough, but they include:

- events that cannot be classified as minor accidents at work (finger cut, minor injury caused by broken glass)
- raw material problems, if they can be solved more efficiently by others (e.g. purchaser)
- failure of non-essential devices, if that problem can be handled more efficiently and quickly by someone else (e.g. maintainer)
- problems with the supply of additional materials (napkins, toothpicks)

According to subordinates, the manager mainly has to solve problems that they encounter in the first place:

- problems affecting operation (technical problems, e.g. leakage, machine failure)
- problems related to guest satisfaction, but there is already a difference here, as according to them, only the entry in the complaint book can be handled by the manager.
- Even during workforce organization problems, only those that result in not having the right number of people during a day are considered important for the manager. Changing shifts, working overtime, leaving earlier, if possible, or someone from the team does extra work is not one of them.

The biggest difference is in the importance of judging raw material procurement. While managers believe that this is one of the most important guarantees of guest satisfaction and quality, and by the way, it is also an important financial issue, the opinion of employees is different, they prefer to notify only the person responsible for purchasing and, if possible, improvise during the preparation processes.

3. Decision-making power

In the course of an organization, members of the organization, especially leaders, have to make a multitude of individual or group decisions every day, which can be short-term (operational), medium-term (tactical) and long-term (strategic). A typical strategic decision is to determine the number of employees or the service structure of the property. As with any business, tactical goals in this sector are mostly aimed at the smooth running of the business, such as creating a menu, defining a marketing strategy, or developing kitchen technology. Operational decisions are mostly made in connection with the day-to-day running of business, such as handling guest complaints, dealing with sudden difficulties in general operation, or ordering goods. While the first two are mainly the responsibility of the management, the decisions of the third category are more up to the subordinates. Several decision-making levels may be present - the larger the organization, the more levels can be isolated. *(Figure 4.)*

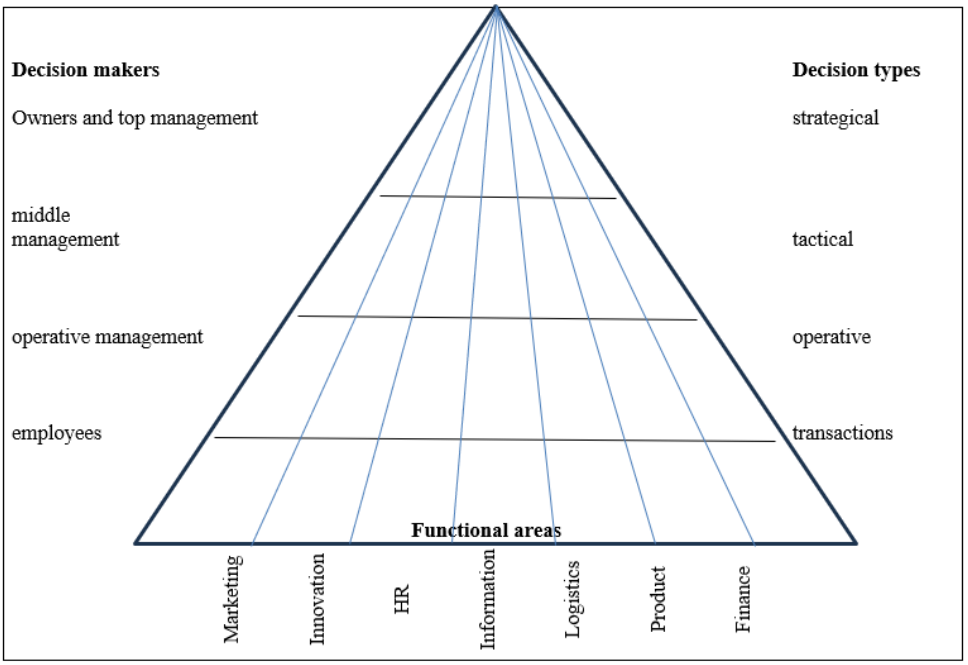


Figure 4. Decision- making levels
Source: (Chikán, 2020)

It is worth examining what rights and powers are associated with the given levels, as well as the extent to which decisions are delegated and what decisions are delegated.

The larger the organization, the more levels can be separated and the more distinct each type of decision is from each other in different fields of activity. Decisions can be programmable if there has been an example and a solution procedure developed for it, e.g. there is a predictable stock shortage for certain products. Or they may not be programmable if a particular problem occurs for the first time, such as a guest complaint, which must always be handled individually. In this case, a solution procedure should be developed as the problem arises (Hussein, 2024). The majority of management decisions are made up of decisions related to everyday operations, in addition to which the provision and efficient use of the necessary resources and the minimization of costs as much as possible in such a way as to maintain or increase the satisfaction of external and internal stakeholders (Rázga-Ilyés, 2024).

When assessing decision-making power, similarly to the handling of problems, we received answers that were identical on several points and different on several points. According to managers, the decision-making power of subordinates is limited to a minimum, they can make decisions in their own area at most, mostly only those for which the manager does not have any competence or are related to improving the guest experience. Typically, such decision situations include:

- compilation of weekly menu
- treatment of various allergies and sensitivities in restaurants (the chef and waiter can decide together how to fulfill the special request)
- consideration of special guest requests: preparation of drinks, mainly cocktails, which are not included in the drink list, but all ingredients are available.
- decorating, serving, serving solutions
- minimum deviation from recipes to increase quality: this is mainly the case when the ingredients do not have the same constant characteristics, e.g. homemade cheese/dairy products, eggs (mainly size), availability of seasonal vegetables

During the interviewing of subordinates, their own decision-making powers ranged from the scale set by the manager, i.e. they were the same as described above, and on the other hand, they arose from ad-hoc cases. In ad-hoc cases, decisions were not fundamentally determined by the type or size of the problem, but by whether the manager of the current area was present at the time of the problem to be solved or, if not, whether he was available. If available, subordinates mostly left the decision to the manager, but in cases where the current manager was not available, they declared that they solved the problem themselves, based on their previous experience. When asked whether their solution was the best they thought was the best or what they thought the leader would have done in the given situation, they mostly made a decision that appealed to the leader.

4. Motivation

An organization is made up of individuals and groups of individuals. Individuals, on the other hand, are motivated to act with varying degrees of intensity to meet their own needs. From this it can be concluded that the individual, the employee, must be motivated in order for the performance to be expected by or exceed the expectations of the organization. In an encouraging, supportive and motivating organization, the individual is much more confident in his own abilities and achievements, which he will use to bring out the best in himself and his work (Arifin et al., 2021). This is supported by a 2024 study (Wardhana & Harsono, 2024), in which self-efficacy performance; self-efficacy motivation; He investigated the motivation-performance paired interactions and the combined incentive effects of the 3 factors in the hospitality industry. Therefore, an important question for every organization and management - and therefore also a task - is how and how it can motivate its employees. It is necessary to find the individual motivations that can best connect to the goals of the organization, and if these are satisfied, the organization will also benefit from them (Bakacsi, 2015). Motivation, in fact, has the ability to accelerate the process by which an individual's behavior or attitude is formed in order to achieve individual goals that are related to organizational goals (Hemakumara, 2020).

If an employee's needs are unmet, it creates internal tension and acts as a driving force that drives the individual to seek a solution to meet that need. If this succeeds, then by satisfying the need, the internal tension will decrease (*Figure 5*) and this can lead to benefits such as loyalty to the organisation; increased performance; desire to develop; motivation.

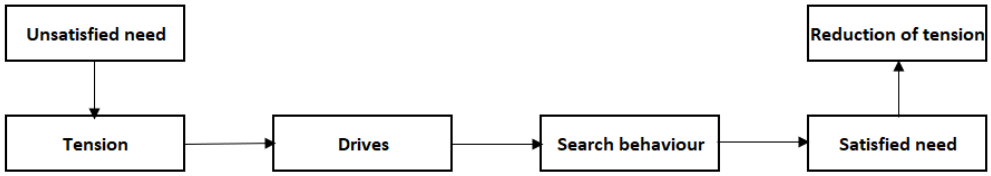


Figure 5: The process of motivation
Source: (Robbins, 1993)

There is agreement between managers and subordinates on the order of motivational tools and their effectiveness. It is important to note that the research was carried out in a town near the Austrian border, where, due to the risk of emigration, we usually found outstanding wages. Money is the main motivator in most cases, but due to the high average wages in the sector in the region studied, it may not be the best incentive. Not everyone is only interested in money, moreover, inadequate wage differentiation often creates controversy and disrupts team spirit (Adrian, 2012). The list of motivational elements is as follows:

- money/housing allowance
- increase the number of free weekends

- fewer working days, even if this does not result in a reduction in working time (e.g. instead of 5*8 hours of work and 2 days free, 4*10 hours of work and 3 days free is more preferred)
- Cafeteria
- other measures: team building trainings, professional development

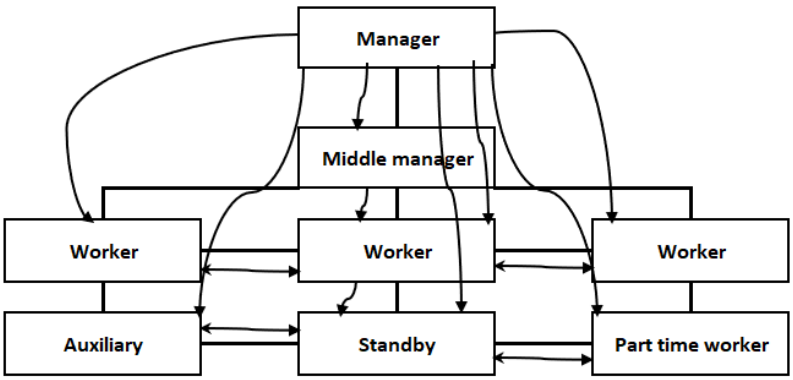
As mentioned earlier, there is an extremely high turnover in the segment, as all the examined catering establishments are located in Sopron, where Burgenland and Vienna have a very high exhaust power. The population of the city over the past ten years has increased by about 50 thousand people. The real estate market cannot keep up with this growth, so the majority of those moving in live in apartments, the price of which has doubled on average recently, already rivaling the capital, so the main motivation is still to raise salaries or provide housing allowance. The sector is characterized by 7/7 opening days and an uneven distribution of work, i.e. traffic increases on weekends and in the summer season. The immediate family members of a significant number of hospitality workers do not work in the sector, so the role of free weekends is intensifying. Most respondents would be satisfied with 2 free weekends per month, but now this number mostly averages 1.

Reducing the number of working days is also an attractive solution for research participants, even if it does not explicitly involve a reduction in working hours. Around 75% of respondents would be willing to work more hours on fewer days, improving work/life balance. At the very end of the line are measures to improve the working atmosphere, according to the respondents, these are not the events that can bring the team together due to fluctuation in the sector.

5. Control powers

In our research, we also wanted to know how the internal control system is evolving in each of the organisations we studied. The assessment of audit powers is best illustrated in *Figure 6*:

Inspectorial rights, according to managers



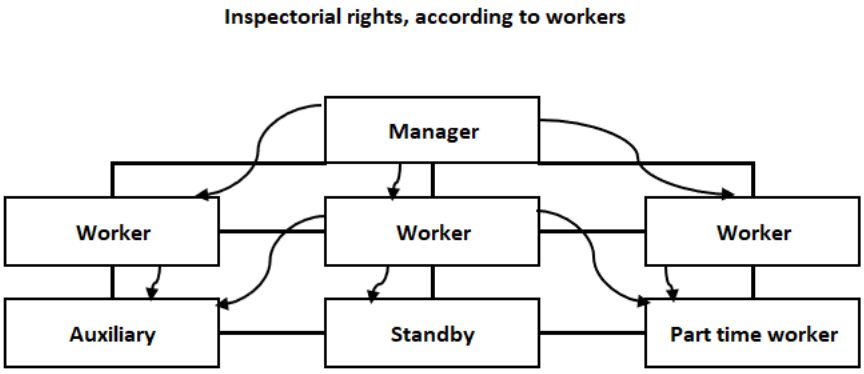


Figure 6: Inspectorial rights by different actors in the organisation
Source: Own editing

In response to our question about which instructions subordinates carry out if they receive different instructions, the answers were as follows (*Figure 7*):

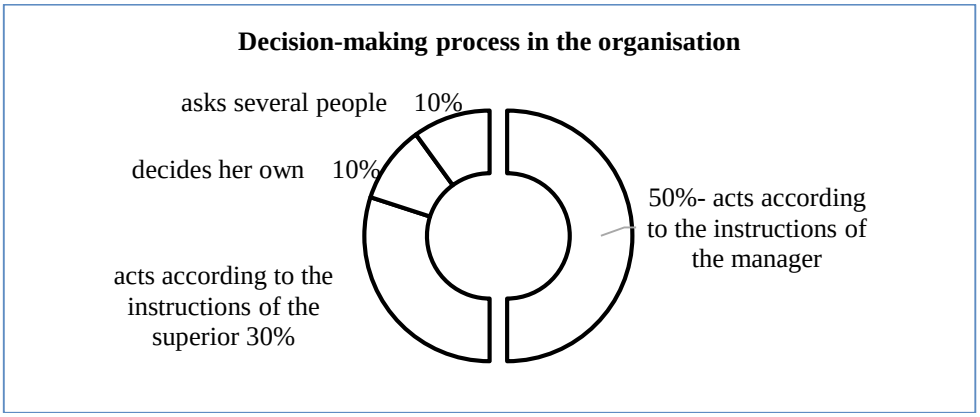


Figure 7: Decision-making process in the organisation
Source: own editing

6. Unit development

Organizations are exposed to many external and internal influences during their operations, which constantly shape both organizational structure and culture. As a result of changes in the external environment and in order to adapt to these changes as quickly as possible, organizations undergo a continuous process of development and learning.
In our sixth question, we wanted to know three things:

- How do respondents evaluate the current economic performance of the company, if 100% is the ideal state when the restaurant operates with a full house from opening to closing and all rooms in the hotels are booked for 365 days?
- What steps would they take to achieve the ideal state outlined?
- If the above-mentioned ideal state were to occur, how much resource expansion would the company have to make?

The greatest similarity between the responses lay in the fact that, in the opinion of both managers and subordinates, the current state of the unit was not set up for this state, so expansion is definitely necessary, but there is no consensus on the level at which this expansion should take place. Since different sectors require different specialized workers, the answers are presented in several parts: In case of full occupancy, the position to be expanded compared to the current one, according to managers (*Table 1*):

Table 1: Jobs to be expanded by manager

Hotel	Hot kitchen restaurant	Property without kitchen
- maid/cleaning staff - breakfast staff - repairman - housekeeping - office (finance/corporate governance)	- Waiter - Kitchen maid/ preparation - Dusting - Dishwashing staff (white+black)	- Waiters - Barbeck (preparer) - Auxiliary waiter/cup picker/dishwasher

Source: Own editing

Looking at the answers, we can say that if the given place reaches 100% occupancy, in the opinion of the managers, mainly those jobs should be expanded, which are often invisible to guests, but nevertheless provide the physical conditions for basic operation.

In case of full occupancy, the position to be expanded compared to the current one according to subordinates (*Table 2*):

Table 2: Jobs to be expanded according to subordinates

Hotel	Hot kitchen restaurant	Property without kitchen
- Receptionist - Cleaning staff - Repairman	- Chef - Bartender/beverage maker	- Waiters - Auxiliary waiter/cup picker/diswasher

Source: Own editing

Based on the answers of the subordinates, it can be concluded that in their case the majority of the jobs in need of expansion are mainly those involved in the specific process of hospitality, positions above them or not related to them on a daily basis were ignored.

7. Sustainability

Sustainable hospitality is a very complex topic, which is why its precise definition is often a source of conflict among experts in the field. In many cases, published articles focus specifically on the cooking process, the source of ingredients, how vegetables and fruits are grown, how they are sold, and how food ends up on consumers' plates. This can be seen as a "narrow interpretation" of sustainable hospitality. The Food and Agriculture Organization of the United Nations understands that "sustainable gastronomy (...) it means a cuisine that takes into account where ingredients come from, how ingredients are grown, how they end up on the market, and finally on our plates" (FAO) The sustainable operation of hospitality establishments can not only have an impact on natural resources, but can also contribute directly or indirectly to many other sustainability efforts through

the previously described hospitality value chain or its impact on other ecosystem actors. There are several parallels between the UN 17-goal framework adopted in 2015 and sustainable gastronomic operation (*Table 3*):

Table 3: UN relevant sustainability goals for the study

Sustainable Development Goal	Example
1 – Poverty eradication	Charity initiatives in catering establishments.
2 – Ending hunger	Delivering leftover food to the hungry at the end of the day.
3 – Health and well-being	Health-conscious menu compilation.
5 – Gender equality	Ensuring equal working conditions for men and women.
12 – Responsible consumption and production	Fight against food waste.
14 – Protection of oceans and seas	Combat overfishing by using responsibly sourced fish.

Source: www.sdgs.un.org/goals (2024)

The raison d'être and familiarity of the topic is shown by the fact that there was the greatest agreement between managers and subordinates on this issue, everyone rated it a seven on a scale of one to ten. The following diagrams (*Figure 8 and 9*) illustrate what the employees of the surveyed companies think can best reduce the carbon footprint of the property.

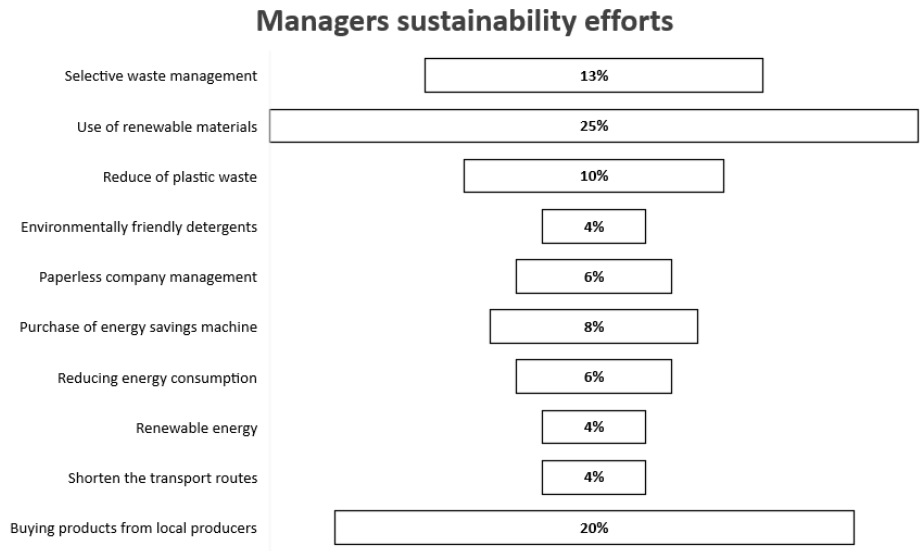


Figure 8: Managers sustainability efforts
Source: Own editing

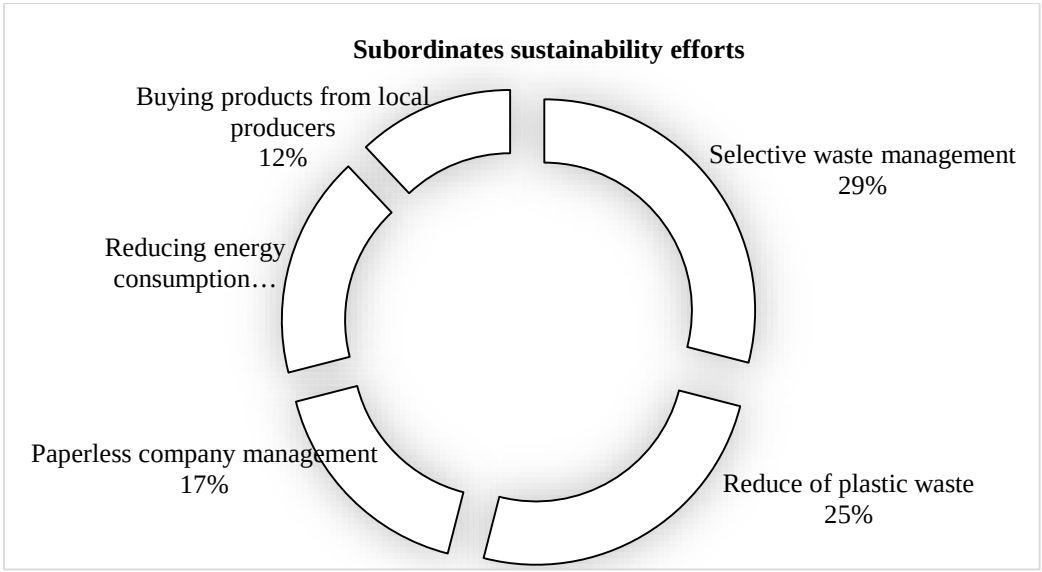


Figure 9: Subordinates sustainability efforts
Source: Own editing

It can be seen that managers' knowledge of the topic is diverse, while that of subordinates is mostly limited to information that is directly related to the tasks encountered during their work. The most important difference between the two groups is that managers' sustainability efforts are often related to reducing operating expenses, such as reducing gas consumption, which was mostly due to changes in heating settings. The managers surveyed reduced the average temperature of restaurants by an average of 1.5 degrees during the winter months. At the same time, it is interesting that the preference of local producers has received special attention not only because of the shortening of transport routes, but the promotion of the products of local businesses, mainly small family companies, often has marketing value in addition to outstanding quality.

8. Summary

The present study focused on the decisions of hospitality workers, in particular it tried to shed light on the organizational behaviour in tourism and hospitality and their responses to the given problems encountered.
As we pointed out at the beginning of the thesis, this sector is of great economic importance, therefore the changes and the new environment affecting the sector must be seriously addressed. In our view, these new trends have changed the economic conditions so far, and the response to them calls for a systemic solution.
However, in order to find systemic solutions to emerging problems at macro level, it is primarily necessary to identify at micro level where significant resources need to be invested.
This study also aims to serve this purpose. As the data of Eventrend Global have shown, there is a need to change the motivation and qualifications of employees and those working in the sector. During our research, we wanted to know how employees see their own position within an organization, how they perceive the flow of information, decision-making powers, motivational tools, control powers, etc. We then asked the same questions to the leaders of the same organization(s) and compared the answers. Based on the results of the research, the difference between the views of managers and subordinates became clear in each topic.
At the beginning of the research, of course, we also assumed that the employee was less informed about the operation of the organization. This hypothesis of ours was confirmed during research.

Overall, we believe that due to the significant "brain drain" effect in this sector, managers need to pay even more attention to employee motivation factors than in other sectors. If employees can be persuaded to work and stay with various motivational tools, the fluctuation that currently dominates the sector will surely decrease in the long run.
If the subordinate is sufficiently motivated, of course, he will not work with the same approach as a manager or even an owner, but he will perform the tasks assigned to him more thoroughly and carefully, and will look at his own and the company's goals in a different spirit.

9. Limitations and future research

In view of the results of the research, it is essential to mention that the average salary in the region is higher than in other parts of the country, so although the results are universal, some of their elements cannot be applied to Hungary whole. During the Covid pandemic, the well-skilled, middle-aged stratum leaked out of the sector, the average age of the service staff of the surveyed catering establishments is 28 years, i.e. they mostly represent generation Z, who have different views than the members of generation X and Y who make up the leading stratum both in their work ethic and attitude towards the workplace (Ruzsa, 2018).
As we have indicated several times, the results of the research are currently valid only for one region with relatively special conditions, therefore, if we want to get a representative picture of the whole Hungarian context, it is recommended to carry out similar studies in Budapest and several other county seats, including the eastern, western, northern and southern regions as well.

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Tihamér Tibor Sebestyén [12]

Bioeconomy starts Local – a Case study on Multi-Level Participative Governance and Circular Bioeconomy Development in Romania

This paper examines the implementation of a multi-level participative governance approach to address demographic change in rural areas, with a focus on the local rural municipality of Ghelinta. The paper will present through a case study approach, strategical responds on rural-urban challenges. The project responds to the rural exodus driven by better employment opportunities and prospects in urban areas were realized, resulting in depopulation and an aging, increasingly unskilled population in rural regions. Utilizing Circular-Bioeconomy as a tool for regional development, the Godanubio project fostered sustainable economic practices by transitioning from a fossil-resource-based economy to one that emphasizes biological resources and processes. This strategy aims to enhance value creation through new collaborations, business models, and value chains, thereby increasing the attractiveness of rural areas for young people.
In Ghelinta, several working group meetings were conducted, involving young citizens in participatory governance and developing the 2021-2030 Local Bioeconomy Development Strategy. The key objectives of this strategy include fostering cooperation among local stakeholders, involving young people in the decision-making process within the local council, creating new business ideas in the bioeconomy sector, improving public services for young people, and providing training on bioeconomy topics.
The overarching aims are to mitigate the gap between rural and urban areas, increase the visibility and attractiveness of rural areas through the development of the bioeconomy sector, and improve the overall well-being in rural regions. The long-term goal is to enhance the socio-economic status of these regions, contribute to environmental, climate, carbon sequestration and resource protection, and foster sustainable development (Sebestyen, 2024). This research highlights the importance of an ecosystem for systematic multi-level governance, engaging actors from the public, academia, industry, and political decision-making. By creating space for co-creation and integrated urban-rural cooperation, the project aims to increase institutional capacity to tackle demographic change and promote the active involvement of societal actors in the political system.
Keywords: Circular Bioeconomy, Renewable Energy, Participatory Governance, Rural – Urban Economic Relations
JEL Codes: Q57, Q42, P25

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1.Introduction

The Danube regions and cities are currently undergoing significant societal transitions driven primarily by demographic changes. A predominant challenge is the (Grignoli et al., 2024) . This migration trend results in the depopulation of rural areas, leaving behind an aging population (Vaishar et al., 2020) with a dwindling workforce and a decreasing pool of skilled individuals (Anon., 2023). Consequently, these regions face the dual burden of sustaining an elderly demographic while grappling with a reduced economic base and diminished human capital (Giannakis, Bruggeman, 2019).
The demographic shift towards urban areas exacerbates several socio-economic issues in rural regions. The outflow of young, skilled labor leads to a critical imbalance, causing rural areas to

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suffer from a lack of innovation (Yin et al., 2022), entrepreneurship (Cunha et al., 2020), and economic dynamism (Havadi , 2016). This situation not only hampers local economic development but also increases the dependency on urban centers for essential services and economic support (Cattaneo et al., 2022). The resultant demographic profile, characterized by an aging and increasingly unskilled population, poses significant challenges for the sustainability and vitality of these rural communities (Castro-Arce, 2020).

Addressing these challenges necessitates a comprehensive, multi-level participative governance approach (Chatzichristos , 2023). Such an approach involves the active engagement of various stakeholders, including local communities, governmental bodies, academic institutions, and the private sector. By fostering collaboration across different levels of governance, it is possible to leverage existing competencies and development potentials effectively (Miller et al., 2023). This participative model ensures that the unique needs and perspectives of rural populations are incorporated into policy-making processes, thereby enhancing the relevance and impact of development strategies (Mantino et al., 2021).

In conjunction with participative governance, there is a pressing need to build new institutional capacities that can drive sustainable development in these regions (Diemer et al., 2022). Developing institutions capable of addressing the multifaceted challenges of demographic change involves enhancing administrative competencies, fostering innovation, and creating frameworks that support economic diversification (Adamowicz, 2021). These institutions must be equipped to implement and manage development projects that not only mitigate the adverse effects of rural depopulation but also create new opportunities for growth and revitalization (Mack et al. , 2020).

A critical component of this process is the co-creation of future strategies aimed at increasing the attractiveness of rural areas. By involving local populations, particularly the youth, in the decision-making process, it is possible to generate innovative solutions tailored to the specific contexts of these regions (Kostiukevych et al., 2020). This inclusive approach can help identify and nurture new business ideas, particularly in emerging sectors such as the circular bioeconomy, which focuses on sustainable production and the utilization of biological resources (Brandao , 2022).

The circular bioeconomy offers a promising avenue for fostering regional development by transitioning from a fossil-resource-based economy to one that emphasizes sustainability and resource efficiency (Kardung et al., 2021). By capitalizing on the circular bioeconomy's potential, rural regions can develop new value chains and business models that enhance local economic resilience and create attractive employment opportunities for the youth (Stojanova et al., 2022). This sector not only promotes environmental sustainability but also catalyzes interdisciplinary cooperation and cross-sectoral innovation, further strengthening the socio-economic fabric of rural communities (Navarro-Valverde, 2022).

In summary, the Danube regions are at a crossroads, facing profound demographic and socio-economic challenges. However, by adopting a multi-level participative governance approach and building robust institutional capacities, these regions can harness their existing strengths and co-create sustainable development strategies. The focus on the circular bioeconomy provides a viable pathway to revitalizing rural areas (Ciervo et al., 2024), fostering economic growth, and ensuring long-term resilience against demographic shifts. Through collaborative efforts and innovative thinking, the Danube regions can navigate these transitions and emerge as dynamic, thriving communities (Cattaneo et al., 2022).

The EU Strategy for the Danube Region (EUSDR), adopted by the European Union in 2011, aims to harness the economic potential of the Danube region, improve environmental conditions, and enhance the overall prosperity and quality of life for its population (Ionescu et al., 2023). Central to achieving these goals is the transition from a fossil-based to a bioeconomy, a major focus of the circular bioeconomy (Ronzon et al., 2022). This transition is particularly pertinent within the framework of the Danube Transnational Programme (DTP) 2021-2027, which emphasizes sustainable economic development, environmental stewardship, and climate resilience (Koev et al., 2023). The DTP supports smart regional and urban solutions, alongside advanced technologies related to the circular bioeconomy (Lichtner, 2023).

This paper seeks to explore how the EUSDR can better align with regional strategies, particularly focusing on the circular bioeconomy. Despite the ambitious macro-regional plans for sustainability and circular economy, there remains a significant gap between these plans and their implementation at the regional level. While regions like Baden-Württemberg and Bavaria have developed comprehensive circular bioeconomy strategies, many other regions within the Danube area lack such frameworks (Giurca et al., 2022). This disconnect hampers cross-regional cooperation and critical mass bundling, essential for the success of macro-regional strategies.
In this context, the municipality of Ghelinta serves as a case study for implementing a multi-level participative governance approach. The Godanubio project in Ghelinta involved working group meetings with young citizens, leading to the development of the 2021-2030 Local Bioeconomy Development Strategy. This strategy focuses on fostering local stakeholder cooperation (Havadi et al., 2015), involving youth in decision-making, creating new bioeconomy business ideas, improving public services, and providing bioeconomy training. Moreover, during the implementation of Godanubio project several circular bioeconomy related business ideas were created through participative interaction by involvement of business incubator house, experts from different clusters as well as policy makers and local decision maker bodies. In second stage these business ideas were put into implementation by establishment and mentoring of up to 26 startups creating over 22 new jobs on local level. The overarching aims of this initiative are to mitigate urban-rural economic disparities, enhance the visibility and attractiveness of rural areas through bioeconomy development, and improve overall well-being. By creating an ecosystem for multi-level governance and fostering integrated urban-rural cooperation, this project seeks to increase institutional capacity to address demographic changes and promote active societal engagement in the political process

2.Data and Methodology

This study employs a mixed-methods approach combining qualitative and quantitative data collection and analysis to comprehensively evaluate the implementation and impact of the multi-level participative governance approach and circular bioeconomy strategies in the Danube regions, specifically focusing on the region in which municipality of Ghelinta is also located.
The municipality of Ghelinta was selected as the focal case study due to its active involvement in the Godanubio project and the development of the 2021-2030 Local Bioeconomy Development Strategy. This selection allows for an in-depth analysis of the participative governance approach and its effectiveness in fostering local stakeholder cooperation, youth involvement in decision-making, and the creation of new bioeconomy business ideas.
The document analysis covered the assessment of relevant policy documents, reports, and strategic plans from the EU Strategy for the Danube Region (EUSDR), the Danube Transnational Programme (DTP) 2021-2027, as well as National and Regional Development Strategy. Review of project documentation from the Godanubio project, including meeting minutes, action plans, and progress reports.
In the second step was distributed a structured questionnaire to local stakeholders, including young citizens, local government officials, businesses, regional cluster experts, policy makers as well as to the general public.
The sample size of the survey was realized based on the following random sampling approach:

- Population size represents the total number of people in the researched municipality was 5000 inhabitants
- Confidence level was 96 %, which means measures how sure can be that the population choose an answer within a certain range.
- Margin of error which is a percentage that shows how accurately survey results reflect the opinions of the whole population was 7 %
- Sample size was 208, as it was crucial to reflect the overall population accurately.

The survey aimed to gather data on perceptions of governance effectiveness, stakeholder engagement, and the impact of bioeconomy initiatives.
In the third step semi-structured interviews were conducted with key informants, including project coordinators, local decision-makers, business owners of the newly established startups, and representatives from regional cluster experts, academic institutions and private sectors. These interviews provided qualitative insights into the challenges and successes of the participative governance approach and bioeconomy strategies.
In forth step field observation was realized in Ghelinta municipality to observe the implementation of bioeconomy-related business ideas, public service improvements, and training programs. Field observations helped to verify the data collected from other methods and provide a contextual understanding of the local environment.
Last but not least a quantitative assessment of local economic environment, especially the newly established startups was done, highlighting the changes in local employment, economic turnover, investment return, market demand and bioeconomy market outlook, profitability, etc.
The triangulation, namely the use of multiple data sources and methods (documents, surveys, interviews, focus groups, observations) ensured the validity and reliability of the findings. By employing this comprehensive methodology, the study aims to provide a detailed evaluation of the participative governance approach and circular bioeconomy strategies in the Danube regions, offering insights and recommendations for policy makers, practitioners, and researchers.

3.Results and Discussion

3.1. Topdown Bioeconomy Development Strategies from National to Local

Romania's strategic directives for bioeconomy development align closely with the European Union's broader goals of sustainability, innovation, and economic resilience (Fritsche et al., 2020). The Romanian Bioeconomy Strategy emphasizes the transition from a fossil-based economy to a bioeconomy, promoting sustainable agricultural practices (Cristea, 2020), forestry, and the utilization of biological resources for energy (Sebestyen, 2019), materials, and food production (Bara, 2023). The key objectives include:

- Sustainable Agriculture and Forestry: Enhancing the sustainability of agricultural and forestry practices through the use of advanced technologies and sustainable resource management.
- Bio-based Industries: Promoting the development of bio-based industries that utilize renewable biological resources to produce materials, chemicals, and energy.
- Research and Innovation: Investing in research and innovation to develop new bio-based products and processes, fostering collaboration between academia, industry, and government.
- Circular Economy Principles: Integrating circular economy principles to reduce waste, enhance resource efficiency, and promote recycling and reuse of biological materials.
- Rural Development: Leveraging bioeconomy initiatives to drive rural development, create jobs, and improve the quality of life in rural areas (Dumitru et al, 2021), (Voicilas, 2023).

The Central Development Region of Romania has tailored its bioeconomy strategy to address specific regional challenges and opportunities.
This region's strategy focuses mostly on:

- Regional Innovation Hubs: Establishing innovation hubs to foster research and development in bio-based sectors, encouraging collaboration between local universities, research institutes, and businesses.
- Sustainable Resource Management: Implementing sustainable management practices for regional natural resources, including forests and agricultural land, to ensure long-term productivity and environmental protection.
- Bio-based Enterprises: Supporting the creation and growth of bio-based enterprises, particularly small and medium-sized enterprises (SMEs), through funding, training, and business development services.

- Local Stakeholder Engagement: Engaging local stakeholders, including community groups, farmers, and entrepreneurs, in the development and implementation of bioeconomy projects to ensure their relevance and sustainability.
- Education and Training: Providing education and training programs to develop the skills needed for the bioeconomy, targeting both the current workforce and future generations (Sakellaris, 2021).

The Godanubio project was funded by Interreg Danube Transnational Programme, implemented by the involvement of the Municipality of Ghelinta, serves as a practical example of implementing bioeconomy strategies through a multi-level participative governance approach. The project discovered the and provide insights into the effectiveness of the participative governance model and the impact of bioeconomy initiatives on local development.

On the working group meetings during this project implementation were involved the local stakeholders, including young citizens, local government officials, and business representatives. These actions highlight the collaborative decision-making process and the contributions of various participants.

In Ghelinta was elaborated a long-term bioeconomy development strategy, in which comprehensive action plans detailing the steps needed to achieve the goals, including timelines, responsible parties, and resource requirements.

The periodic diagnoses made to monitor, identify challenges and making necessary adjustments to the strategy by involvement of regional and national policy makers.

In conclusion, the integration of bioeconomy strategies in Romania, particularly in the Central Development Region, is driven by a commitment to sustainability, innovation, and regional development. The Godanubio project exemplifies how participative governance and collaborative efforts can successfully translate strategic directives into tangible local benefits, fostering economic resilience and environmental sustainability.

3.2. Surveying Stakeholder Perceptions: Evaluating Governance, Engagement, and Bioeconomy Impact

In the second step, a structured questionnaire was distributed to local stakeholders, including young citizens, local government officials, businesses, regional cluster experts, policymakers as well as to the general public. The survey aimed to gather data on perceptions of governance effectiveness, stakeholder engagement, and the impact of bioeconomy initiatives. This comprehensive approach facilitated the collection of diverse perspectives, providing valuable insights into the strengths and areas for improvement in the implementation of bioeconomy strategies within the region.

According to the results, 37% or 77 out of 208 respondents have no knowledge on bioeconomy and related issues, while 35% or 73 out of 208 respondents have limited knowledge. Only 18% of the respondents (37 respondents) have some general knowledge and 7% have detailed knowledge or 3% have consolidated technical and professional knowledge on bioeconomy topics (Figure 1).

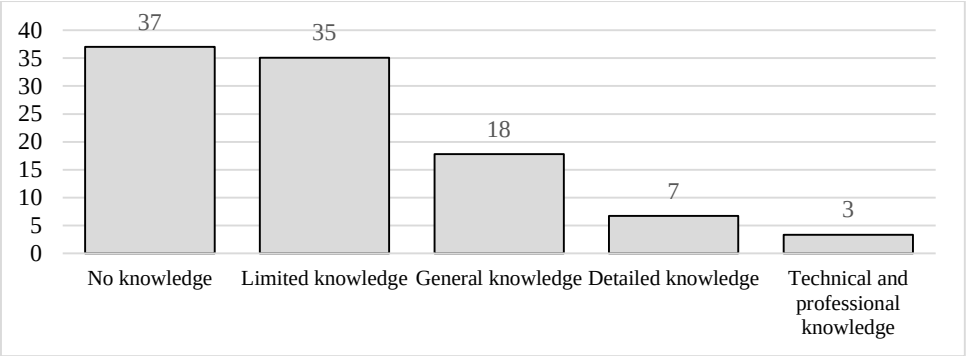

Figure 2 Knowledge levels related to bioeconomy concept
Source: Own compilation

The 2 Figure illustrates the results of a survey question regarding the participation of public institutions in informing stakeholders about the bioeconomy. The local inhabitants responded as follows:
Definitely no support from central or decentralized institutions (1): The highest number of respondents, totaling 101 – 49% of the respondents, indicated that central or local public institutions definitely do not participate in informing stakeholders about the bioeconomy. No support: 49 respondents (24%) reported that there is no support from public institutions in this regard. Neutral: 34 respondents (16%) were neutral, suggesting an ambivalence or lack of clear opinion on the matter. Some support: 18 respondents (9%) acknowledged that there is some support from central or local public institutions. Serious support: The least number of respondents, totaling 6 (3%), indicated that public institutions definitely participate in informing stakeholders about the bioeconomy.
The data indicates a significant lack of perceived participation by public institutions in educating stakeholders about the bioeconomy, with the majority of respondents selecting the lowest levels of support.

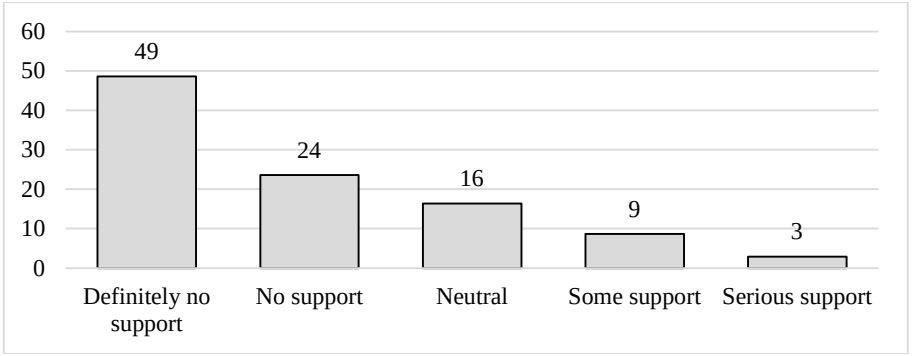

Figure 3 Support from public institutions in development of bioeconomy sector
Source: Own compilation

The Figure 3 represents the expectations of respondents regarding the development of the bioeconomy while the results are categorized into five distinct areas. Only 12% of the respondents (25 out of 208 respondents) expressed concerns that the bioeconomy might slow down the local economic progress. In the same time, 24% of the respondents (50 out of 208) think that the bioeconomy development could ensure sustainable development in rural areas. Even though the environmental assets in rural and mountain region is significant, the benefits on environmental protection is considered only by 9% of the respondents (19 out of 208), expecting that the

bioeconomy will provide environmental benefits. As new opportunity to local youth, 42% of the respondents (87 out of 208) believe that the bioeconomy will create new opportunities for local youth and it will slow down or stop the emigration from rural areas. The equilibration in society was selected by 13% respondents (27 out of 208) foresee that the bioeconomy will help achieve equilibration in society.

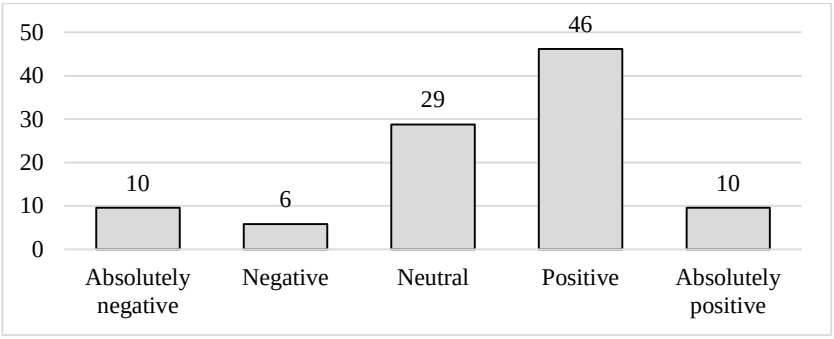

Figure 4 Expectations regarding the development of the bioeconomy
Source: Own compilation

The general public was also asked about their thoughts on bioeconomy development in their settlement. According to the results, 46% (96 out of 208) respondents think that it will positively influencing the local environmental, societal and economy dimensions, while 10% (20 our ot 208) respondents are convinced that absolutely positive impacts will realized. Since the knowledge on bioeconomy is lacking or very limited, a significant number of respondents, 29% (60 out of 208) are neutral regarding to this domain, while 6% (12 out of 208) respondents think this will bring negative impacts and 10% (20 out of 208) think that this developments and investments will bring absolutely negative impacts (Figure 4).

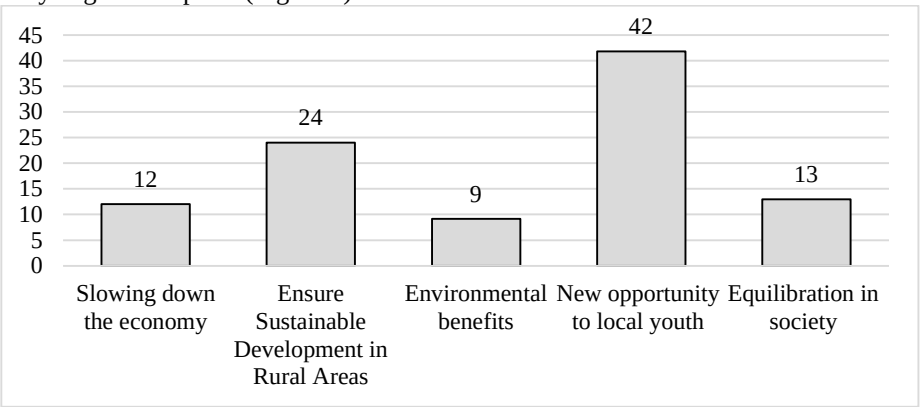

Figure 5 Opinion on environmental, societal and economic impact of bioeconomy developments on local level
Source: Own compilation

The survey results indicate a robust engagement in bioeconomy practices within Ghelinta rural municipality. Most areas show a high prevalence of good practices and consolidated habits, particularly in energy efficiency, valorization of renewable energies, and waste management (Sebestyén et al., 2019). These findings suggest that the bioeconomy development project has been effective in promoting sustainable practices within the community. Future efforts can focus on further enhancing the initiatives where the responses indicate lower engagement, such as the switch from fossil fuels to organic materials. Figure 5 represents the results from the questionnaire

survey, assessing the prevalence and maturity of various bioeconomy practices within the community. The data is categorized into seven key areas: upcycling old products, energy efficiency, raw material and energy savings, switch from fossil fuels to organic materials, valorization of renewable energies, recycling municipal waste, and collecting municipal waste. Each area is evaluated based on a five-point scale, ranging from "1. Not typical at all" to "5. Consolidated habit".

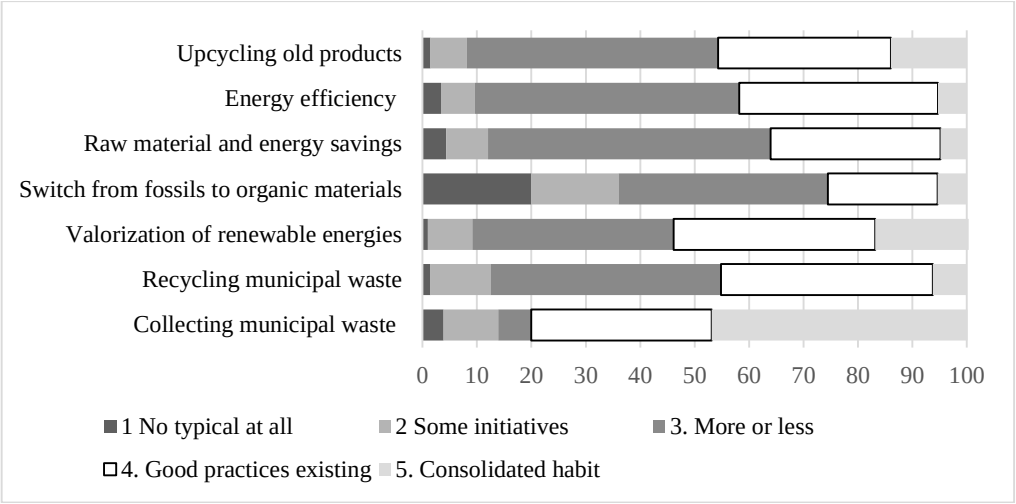

Figure 6 Analysis of Bioeconomy Practices in Ghelinta Rural Municipality
Source: Own compilation

The involvement rate in decision making process was also analyzed across different educational degrees among respondents in Ghelinta rural municipality. In Figure 6, the y-axis represents the level of involvement in decision-making on a scale from 1 to 5, with higher values indicating greater involvement. The x-axis categorizes the respondents based on their highest level of education degree. The key observations are the followings: all respondents who have post-university degree are involved in local decision-making process, the interquartile range (IQR) is 4. very narrow, indicating high consistency among respondents, while there are no outliers, suggesting most respondents in this category are highly involved in decision-making processes. Regarding to respondents with university degree, the median involvement score is approximately 3, with wide IQR, indicating substantial variability among respondents, while several outliers appeared, suggesting diverse levels of involvement in decision-making. Those with higher education show a wider distribution of involvement scores with a median of approximately 3. The substantial interquartile range and presence of outliers suggest that higher education does not uniformly translate to higher involvement in decision-making; rather, it varies significantly among individuals. In case of respondents with high school involvement the median is 2, the IQR is moderate, indicating a wider range of involvement levels among respondents, with the presence of several outliers at both low and high ends, suggesting varied experiences in decision-making involvement. Even if the vast majority of respondents have elementary school degree in Ghelinta, the median involvement is up to 2, with similar IQR to the High School category, indicating a moderate range of responses, with a few outliers. Respondents with only high school or elementary school education tend to have lower median involvement scores, around 2, with moderate interquartile ranges. This suggests that individuals with lower levels of formal education are less involved in decision-making processes.

The involvement in decision-making processes appears to be strongly influenced by the level of academic achievement. The findings suggest that individuals with higher education, particularly those involved in research and development, are more engaged in decision-making within the bioeconomy project. This could imply that education and specialized knowledge play critical roles

in facilitating active participation in community-driven projects. Conversely, the lower involvement scores among those with elementary and high school education highlight the need for targeted interventions to increase engagement and inclusivity among less formally educated community members.
Overall, these insights can inform strategies to enhance participatory decision-making by fostering educational opportunities and inclusive practices within the bioeconomy development framework in Ghelinta rural municipality (Maier et al., 2019).

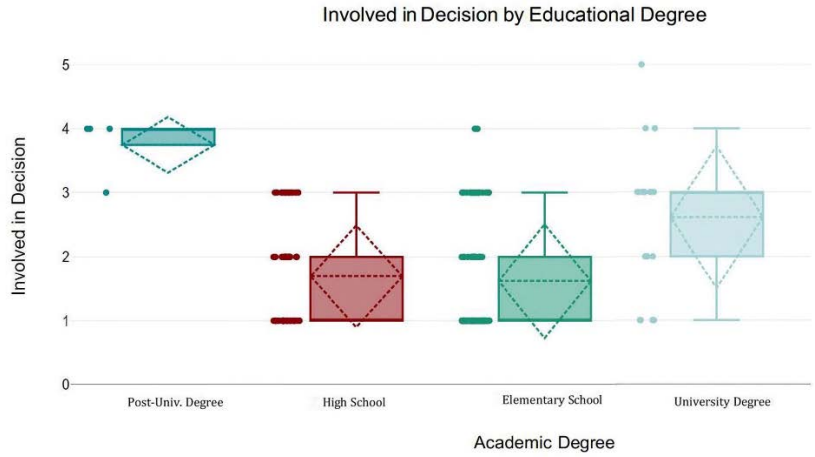

Figure 7 Involvement rate in decision making process across different educational degrees in Ghelinta
Source: Own compilation

The Figure 7 presents the distribution of responses from a questionnaire survey, aiming to identify the types of support needed for the development of the bioeconomy. The responses are categorized into five types of support: dissemination, financial support, technical support, mentoring in entrepreneurship, and involvement in Local Action Groups (LAGs). The largest segment, 38% (79 out of 208 respondents), indicates a strong need for dissemination activities. This suggests that the community places high importance on the spread of information, knowledge sharing, and communication strategies to enhance understanding and engagement in bioeconomy initiatives. Financial support is a close second, with 30% (62 out of 208 respondents) indicating its necessity. This highlights the critical role of funding and financial resources in enabling the community to develop and sustain bio-based projects, suggesting that economic constraints are a significant barrier to progress especially in a rural region.
Technical support is the third most requested type of assistance, with 25% (53 out of 208 respondents) highlighting its importance. This reflects a significant demand for expertise and technological resources to aid in the implementation and maintenance of bioeconomy activities.
The mentoring in entrepreneurship is noted by 5% of respondents. Since such approaches are not common in rural areas, this is a smaller segment, but it underscores the need for guidance and mentorship to foster entrepreneurial skills and business acumen within the bioeconomy sector. The smallest segment, 2%, represents the need for involvement in Local Action Groups. This may indicate that while some respondents see value in collective community actions and local governance, it is not as pressing as the other types of support.
The survey results provide a clear indication of the community's priorities in terms of support needed for developing the bioeconomy in Ghelinta rural municipality. Dissemination of information, technical and financial support are the foremost needs, underscoring the importance of education, resources, and funding in fostering sustainable bioeconomic growth. Addressing

these areas through targeted interventions could significantly enhance the efficacy and impact of the bioeconomy development project in the region.

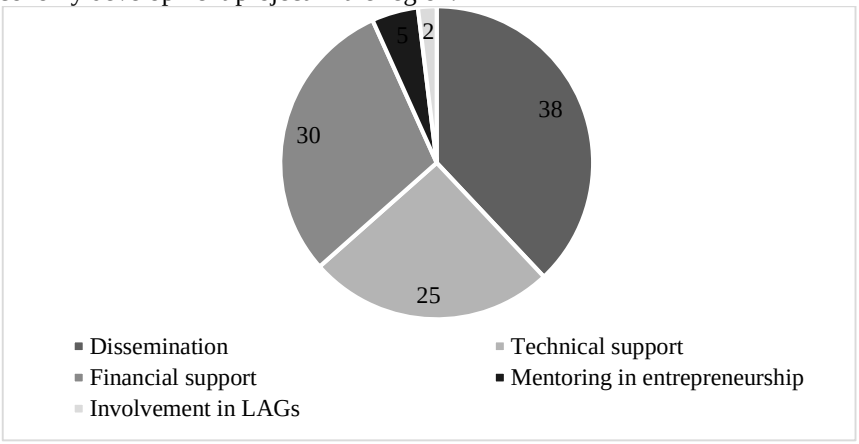

Figure 8 Analysis of Support Needs for Bioeconomy Development in Ghelinta Rural Municipality
Source: Own compilation

3.3. Qualitative Insights from Key Informants on Bioeconomy Development in Ghelinta

One of the primary challenges identified through the interviews was the complexity of integrating various stakeholders into the decision-making process. Project coordinators and local decision-makers highlighted the difficulty in aligning the interests and priorities of diverse groups, ranging from small business owners to academic researchers. This complexity often led to prolonged discussions and delays in decision-making, which, although beneficial for ensuring inclusivity, sometimes hindered the swift implementation of bioeconomy projects.

Additionally, business owners pointed out the challenge of maintaining consistent engagement from all participants. While initial enthusiasm was high, sustaining this involvement over the long term proved difficult. Factors contributing to this decline included limited time availability among busy entrepreneurs and a perceived lack of immediate benefits from participating in lengthy governance processes. These issues were further compounded by the varying levels of knowledge and understanding of bioeconomy concepts among stakeholders, necessitating ongoing education and communication efforts by local public institutions and promoters.

Despite these challenges, several successes were noted, as new council members were involved in local council from young generation. The participative governance approach fostered a sense of ownership and community among stakeholders. Local decision-makers emphasized that involving a broad spectrum of participants led to more comprehensive and robust decision-making, as it incorporated diverse perspectives and expertise. This inclusivity was particularly beneficial in addressing complex issues related to sustainability and bioeconomic development, ensuring that solutions were well-rounded and widely accepted.

Business owners of newly established startups reported that the collaborative environment facilitated by the project provided valuable networking opportunities. These interactions not only enhanced their business operations but also sparked innovative ideas and collaborations that might not have occurred otherwise. Furthermore, the support from academic institutions and regional cluster experts proved invaluable in providing technical knowledge and validating the feasibility of various bioeconomy initiatives.

A recurring theme in the interviews was the critical role of education and dissemination in the success of the bioeconomy project. Representatives from academic institutions underscored the importance of continuous education to bridge the knowledge gap among stakeholders. This

involved not only formal training sessions but also informal knowledge-sharing practices, such as workshops and community meetings. Effective dissemination of information was seen as essential for ensuring that all participants were well-informed and could contribute meaningfully to discussions and decision-making processes.

Project coordinators also highlighted the need for targeted communication strategies to maintain stakeholder engagement. Tailoring messages to address the specific concerns and interests of different groups helped sustain their involvement. For instance, providing tangible examples of how bioeconomy practices could benefit local businesses directly addressed the practical concerns of entrepreneurs, thereby increasing their commitment to the project.

Interviews revealed that financial and technical support were pivotal in overcoming some of the barriers faced by stakeholders. Financial support, whether in the form of grants or subsidies, was crucial for enabling startups to invest in necessary infrastructure and technologies. Business owners noted that without such support, many bioeconomy initiatives would have been financially unfeasible.

Similarly, technical support provided by regional cluster experts and academic institutions played a critical role. This support included offering expertise on advanced technologies and sustainable practices, which were essential for the successful implementation of bioeconomic projects. Entrepreneurs particularly valued hands-on technical assistance, which helped them navigate the complexities of adopting new technologies and integrating them into their business models.

3.4. QUANTITATIVE ASSESSMENT OF LOCAL ECONOMIC ENVIRONMENT

Ghelinta, a rural municipality in Covasna County, hosts 293 registered economic agents, including companies, individual entrepreneurs, and authorized persons engaged in economic activities. The local total turnover at economic agencies reached 22.7 M EUR in 2023, with a total number of 444 employees, with a net realized profit of 1 M EUR. An economic assessment based on available data highlights the distribution and economic impact of businesses, with a particular focus on bioeconomy-related enterprises (Table 1). The economic landscape of Ghelinta is diverse, with notable contributions from various sectors. Key sectors include food industry, manufacturing of timber products, forestry, and retails, and services. The data reveals the presence of businesses involved in activities such as furniture manufacturing, metal recycling, and forestry exploitation.

Table 1 Total 1 The main 10 economic domains in Ghelinta

No.	Economic domain	Turnover (M EUR)	No. Employees	Net Profit (Thousand EUR)
1	Forest exploitation	6.55	118	31
2	Retail sales of hardware, paints and glass	4.26	26	291
3	Retail with food and beveries’	3.25	52	32
4	Manufacture of timber	2.93	73	76
5	Manufacture of bread, fresh pastry goods and cakes	2.10	63	163
6	Wholesale on a fee or contract basis of wood and construction materials	0.89	26	23
7	Transport and logistics	0.46	7	45
8	Dismantling of all types of wreckage	0.34	14	30
9	Retail sale of medicines	0.30	8	34
10	Forest Management	0.15	15	20
Total		21.23	402	745

Source: topfirme.ro

The quantitative assessment of the local startup ecosistem in Ghelinta rural municipality provides detailed insights into the development and performance of various economic domains from 2020 to 2023 (Table 2). This analysis is critical for understanding the impact of bioeconomy

development projects in the rural region. The quantitative assessment of the local economy in Ghelinta highlights a diverse range of economic activities with significant potential for bioeconomy development. Key sectors such as construction, manufacturing of textiles out of wool, timber manufacturing, food industry and biomass production play a pivotal role in the region's economic landscape. The data indicates robust entrepreneurial activity, particularly in consultancy and IT services, which are essential for modernizing and supporting other economic domains. The strategic focus on integrating bioeconomy practices within these sectors can drive long-term economic growth, create employment opportunities, and promote environmental sustainability.

Table 2 The main startups between 2020-2023 established in Ghelinta

No.	Economic domain	No. Established startups between 2020-2023	No. Employees	Turnover in 2023 (Thousand EUR)
1	Consultancy in Business Development	2	2	56
2	Consultancy in IT and Communication Technology	5	2	21
3	Holiday and other temporary accommodation services.	5	2	16
4	Construction of residential and non-residential buildings.	5	3	89
5	Manufacture of timber	4	3	16
6	Biomass production	1	2	30
7	Manufacture of fruit and vegetable juice	1	2	23
8	Manufacture of made-up textile articles (except apparel)	1	2	13
9	Manufacture of other furniture	1	2	30
10	Manufacture of other products of wood, cork, plaiting materials	1	2	26
Total		26	22	320

Source: topfirme.ro

Ghelinta's economic landscape is characterized by a mix of traditional and emerging sectors, with a growing focus on the bioeconomy. Sustainable practices in forestry, recycling, and manufacturing are pivotal for the region's economic development. Addressing financial and operational challenges while leveraging opportunities for innovation can significantly enhance Ghelinta's bioeconomy, contributing to sustainable rural development.

4. Conclusions and Recommendations

4.1. CONCLUSIONS

The strategic directives for bioeconomy development in Romania are well-aligned with the European Union's broader objectives, emphasizing sustainability, innovation, and economic resilience. This alignment ensures that policies and initiatives in Romania can leverage EU support effectively, maximizing both funding and developmental impact. The Romanian Bioeconomy Strategy underscores the transition from a fossil-based economy to a bioeconomy, promoting sustainable practices in agriculture and forestry, and utilizing biological resources for energy, materials, and food production. These efforts are essential for enhancing productivity while ensuring environmental protection. However, the realization of these strategies starts on local level.

There is a notable emphasis on promoting bio-based industries that utilize renewable biological resources. This shift is critical for long-term sustainability and is supported by significant investments in research and innovation. Collaboration between academia, local industry, and the

central to local government is fostering the development of new bio-based products and processes, which is crucial for driving innovation and economic growth. Furthermore, the focus on rural development through bioeconomy initiatives is creating jobs and improving the quality of life in aging and emptying out rural areas, addressing regional disparities and ensuring inclusive economic growth.

The participative governance model, exemplified by the Godanubio project, has proven effective in engaging local stakeholders. This model ensures that a broad spectrum of participants, including young citizens, local government officials, and business representatives, are involved in decision-making processes. However, there is a significant need for increased education and dissemination of information regarding bioeconomy concepts. The survey results indicate a lack of knowledge among many stakeholders, which hampers effective engagement and participation.

Governance and stakeholder engagement face several challenges, including the complexity of integrating diverse interests and maintaining consistent involvement. Addressing these challenges requires continuous education and targeted communication strategies to keep stakeholders informed and engaged on local level. Financial and technical support is also crucial for enabling startups to invest in necessary infrastructure and technologies, which are essential for the successful implementation of bioeconomy projects.

4.2 Recommendations for Developing the Local Bioeconomy Sector

To further develop the local bioeconomy sector in Ghelinta and similar rural municipalities in Central and South-Eastern Europe, several strategic recommendations can be made. First, there should be a concerted effort to enhance educational and dissemination activities related to the bioeconomy. This can involve formal training sessions, workshops, and community meetings to bridge the knowledge gap among R&D people and local stakeholders. By increasing awareness and understanding, through applied innovation the stakeholders can contribute more effectively to bioeconomy initiatives.

Financial support is paramount for the success of bioeconomy projects. Providing grants, subsidies, and other forms of financial assistance can enable startups and existing businesses to invest in the necessary infrastructure and technologies. This financial backing is essential for making bioeconomy initiatives economically viable, particularly in rural areas where financial constraints can be significant barriers to progress.

Technical support is equally important. Regional cluster experts and academic institutions can offer valuable expertise on advanced technologies and sustainable practices. Hands-on technical assistance can help businesses navigate the complexities of adopting new technologies and integrating them into their operations. This support is critical for ensuring that bioeconomy projects are implemented successfully and sustainably.

To foster greater stakeholder engagement, targeted communication strategies should be employed. Tailoring messages to address the specific concerns and interests of different stakeholder groups can help maintain their involvement. For example, providing tangible examples of how bioeconomy practices can benefit local businesses directly addresses the practical concerns of entrepreneurs, thereby increasing their commitment to the project.

The creation of regional innovation hubs can also play a significant role in supporting bioeconomy development. These hubs can foster research and development in bio-based sectors, encouraging collaboration between local universities, research institutes, and businesses. By providing a platform for innovation and collaboration, these hubs can drive the development of new bio-based products and processes, further enhancing the region's bioeconomy.

Additionally, integrating circular economy principles into bioeconomy strategies can enhance resource efficiency and sustainability. This involves reducing waste, promoting recycling and reuse of biological or other materials, and implementing sustainable management practices for natural resources. By adopting these principles, the bioeconomy sector can contribute to environmental protection while driving economic growth.

Engaging local stakeholders, including community groups, farmers, and entrepreneurs, is crucial for the success of bioeconomy projects. Ensuring that these stakeholders are involved in the development and implementation of bioeconomy initiatives can enhance their relevance and sustainability. This participative approach fosters a sense of ownership and community among stakeholders, leading to more robust and widely accepted solutions.

In conclusion, the development of the local bioeconomy sector in Ghelinta and similar rural municipalities in Central and South-Eastern Europe requires a multifaceted approach that includes enhancing education and dissemination activities, providing financial and technical support, fostering stakeholder engagement, and integrating circular economy principles. By addressing these areas through targeted interventions, the bioeconomy development project can significantly enhance its efficacy and impact, driving sustainable economic growth and improving the quality of life in rural regions.

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Gender equality in Romania: challenges and progress

The aim of the study is to examine the achievement of the fifth Sustainable Development Goal, gender equality, in Romania. Using quantitative research techniques, the analysis focuses on a number of social and economic variables, comparing them to the EU average to give a more complete picture of the state of affairs in the nation. The findings demonstrate that while Romania has come a long way in the last several decades, there are still many obstacles in the way of gender equality. Based on the analysis, the study proposes recommendations for developing necessary strategies at the political and social levels.
Keywords: SDG 5, gender gap, caregiving responsabilities, political representation, education equality
JEL-Code: J16

https://doi.org/10.32976/stratfuz.2024.43

Introduction

In addition to being a fundamental human right, gender equality is also essential to a world that is affluent, peaceful, and sustainable. Even with significant progress made in recent years, attaining gender equality by 2030 is still a long way off (di Bella et al. 2020). Since women and girls make up half of the world's population and, thus, half of its potential, it is vital that this issue be addressed. Globally, persistent gender disparity still impedes social advancement and economic growth. Achieving the fifth goal would lead to equal access to education for women and girls, including those who have previously been unable to access it due to discrimination. This would also fulfill part of the fourth goal, which focuses on quality education. Reducing discrimination against women and girls would also make the tenth goal more attainable, which aims to reduce inequalities by supporting their participation in elections, fair employment, and economic growth.

A lot of studies address the question of gender inequality worldwide. Rivera-Mata (2022) analyzes economic gender inequalities in Spain and Portugal, advocating for the measurement of power structures and the adoption of fiscal policies to promote gender equality. Harman (2023) investigates gender pay gaps in Slovakia, emphasizing the impact of vertical segregation. The study reveals that while women often possess superior human capital characteristics compared to men, these are strongly linked to their choices in professions and fields of education, perpetuating sectoral and professional segregation. Jayarani and Sudha (2023) examine gender inequality in India using the Gender Development Index. Their analysis highlights significant disparities across states, with those prioritizing women's rights and empowerment ranking higher on the GDI. Quatami and Hamdam (2023) explore the impact of COVID-19 on female workers around the world, noting an increase in gender inequality. The findings indicate that many women faced challenges stemming from societal gender roles, workplace discrimination, and insufficient support and empathy at home and in professional settings. Jansen and Vyas-Doorgapersad (2023) identify barriers to workplace gender equality and connect these challenges to broader sustainable development goals. Masood (2023) discusses the persistent state of gender inequality across cultural and professional contexts, underscoring its role as a significant barrier for women, even in countries known for gender equality. Bush and Zetterberg (2024) address global concerns regarding gender equality, drawing attention to a recent "backlash" against the progress made in this area.

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In Romania, following the fall of communism, feminist organizations worked to address the cultural and political disparities that had developed compared to the West. In the early 1990s, the emphasis shifted towards equal rights, contrasting with the more entrenched feminist values and advanced debates seen in Western countries. During this period, domestic violence became a public issue for the first time, as the communist regime had previously ignored the problem of family abuse. Legal reforms were introduced to prevent and combat domestic violence. Despite these advancements, deeply ingrained ideologies and attitudes persisted, indicating that societal change is a gradual process (Miroiu 2004). New movements and organizations emerged, leading to the creation of new laws, such as the 2000 Ordinance No. 137, which spoke out against discrimination, and the 2002 Ordinance No. 202, which proclaimed equality of opportunity for women and men (Miroiu 2015). An important movement was the 222 Program, which started around 1995-1996, aiming to have 222 women elected to the Romanian Parliament in the long term. This means that at least half of the parliament members would be women. They introduced a new initiative, the 2,2,2 format, meaning the alternate representation of male and female candidates. Female candidates were assisted in launching their election campaigns, but this did not receive widespread public support (Miroiu 2015).

According to recent studies, the EU and Romania have made major efforts to advance gender equality by implementing strong policy frameworks. In an effort to reduce gender disparities and encourage equitable involvement in all areas of life, the European Commission has put in place a number of policies, such as the Gender Equality Strategy 2020–2025 (EC 2020). Gender mainstreaming and intersectionality form the integrative approach of the aforementioned strategy (Vinska-Tokar 2021). Similarly, Romania has improved women's representation in decision-making processes and fought gender-based violence by aligning its national policies with EU directives (Romanian Government 2020). According to surveys conducted by the European Institute for Gender Equality (EIGE), the EU scored 70.2 out of 100 in the Gender Equality Index in 2023, while Romania scored 56.1, placing it last among EU countries. Studies reveal enduring disparities in employment and income between genders in Romania and throughout the European Union. In comparison to their male counterparts, women still have difficulty finding high-quality jobs and frequently receive lesser pay (EIGE 2021). Although there has been improvement, the rate of change is still modest, and there are still significant gaps. Women's political participation has seen some improvements, yet significant gaps remain. Compared to other EU nations, Romania still has a comparatively low percentage of women in the parliament and other political positions (Council of Europe 2017). In order to guarantee more equitable representation, the EU has been pushing for policies like gender quotas; nevertheless, member states' acceptance and efficacy of these policies differ (EC 2023).

While Romania has made substantial progress towards conforming with EU gender equality requirements, there are still some sectors that need more attention when compared to the larger EU environment. For example, Romania has a smaller gender pay gap than some other EU nations, but the proportion of women in senior economic and political positions is still lower. Gender-based violence is still a major problem in Romania and the European Union. Numerous research and reports emphasise how commonplace sexual harassment, domestic abuse, and other gender-based violence are (EIGE 2021). The EU and Romania have strengthened legal protections and support networks for survivors, but practical issues and cultural differences still stand in the way of advancement. In Romania and the EU, women are becoming more educated than men, with a greater proportion of women than men graduating from higher education. Though it has not fully translated into equal chances in the job market, this tendency is a promising sign of progress towards gender equality (EC 2020). Still common is the "over-qualification" syndrome, which sees women being employed in positions below their educational attainment. The comprehensive policy frameworks of the European Union offer a benchmark for guidance, but the efficacy of these policies is contingent upon national implementation and cultural circumstances.

In the following section, we will explore the key indicators used to assess gender equality within the context of sustainable development. The paper will conclude with a synthesis of the main challenges related to SDG 5 and policy recommendations to address them.

Materials and methods

To analyse gender equality in Romania, we utilized various official data sources, including the Tempo Online and Territorial Observatory databases from the National Institute of Statistics (NIS 2024), as well as the Eurostat database, the official EU source for statistical data (Eurostat 2024). Our analysis focused on tracking the evolution of the following statistical indicators: early school leavers, physical and sexual abuse of women, the gender pay gap and employment gap, the share of women with higher education and those involved in caregiving activities, women's political participation, and the proportion of women in leadership positions.

Results and discussion

Early leavers from education and training

The school dropout rate in the European Union has been trending downward in recent years. This rate was 10.6% in 2012, fell below 10% in 2014, and has been stable at 8% since 2018. Romania, on the other hand, has greater rates. The percentage of female students who dropped out of school was close to 17% in 2012 and 15% in 2022. Although there has been a 2% decline in the last ten years, the country is still well behind the EU average. For men, a similar decreasing trend in school dropout rates can be observed across the European Union. In 2012, the dropout rate was 14.5%, which decreased to 11.1% by 2022. In Romania, the dropout rate for men was 18.5% in 2012, reaching nearly 20% in 2014-2015, and has stabilized around 15-16% in recent years. Although the dropout rate for men is higher, it is closer to the EU average than that for women (Figure 1).

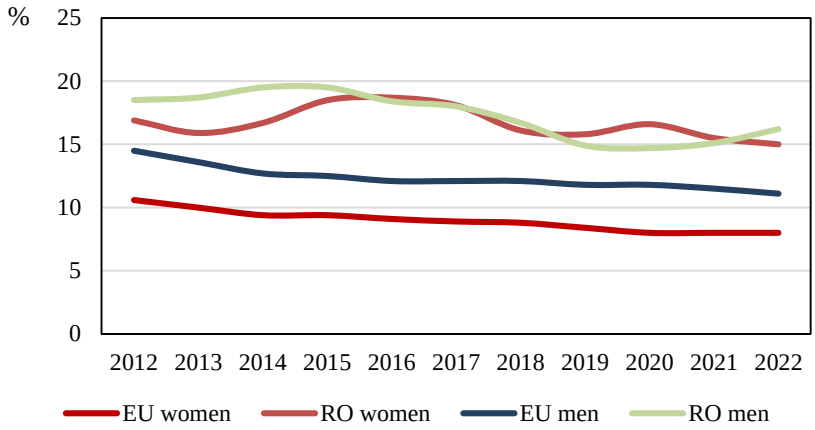

Figure 1: The rate of school dropouts among men and women aged 18-24 in Romania and the EU (2012-2022)
Source: Eurostat

In Romania, several factors contribute to the high school dropout rate, which poses a significant social problem. One of the most important factors is the country's ethnic composition, particularly the cultural customs and traditions of the Roma communities. In these communities, it is common for girls to leave school at a young age to marry early and start a family, which significantly contributes to the high dropout rate. According to a survey by the European Union Agency for Fundamental Rights (FRA), 93% of Roma in Romania leave education after the tenth grade, compared to 50% among other ethnic groups (FRA 2016). Additionally, economic

difficulties play a significant role. In low-income families, children are often forced to work instead of attending school, further contributing to the dropout rate. This issue is particularly acute in rural areas, where infrastructural deficiencies make access to education more difficult, leading to exceptionally high dropout rates. Parents' low educational levels and their attitudes toward the importance of education also exacerbate this (Apostu 2014). Children in these areas often suffer from a lack of adequate transportation and educational facilities, which increases their likelihood of dropping out of school. Furthermore, parental migration negatively affects children's school attendance.

All these highlight, that the highest number of school dropouts is found in villages, with the rate reaching nearly 25% in 2022. This is followed by communes, which show a 10-15% lower rate, and then cities, where the dropout rates are even lower than the EU average. In the EU, no significant difference is observed between communes and villages, and cities have approximately 5% lower dropout rates compared to the other two geographical areas. This statistic supports the assumption that in Romania, students in villages with more underdeveloped infrastructure and educational opportunities, due to their geographical location, leave education at a younger age at a higher rate than in more developed cities, which offer more opportunities and easier accessibility. Overall, the school dropout rate in Romania significantly exceeds the EU average for both genders. This is due to the combined effects of various social, economic, and cultural factors. To improve the education system and prevent early school leaving, comprehensive measures are needed, with particular attention to the Roma communities and rural areas. Emphasizing the importance of education, providing adequate infrastructure, and offering economic and social support can help reduce the early school dropout rate and improve young people's chances of achieving successful careers (Alexa-Baciu 2021).

The Romanian Ministry of Education created the Strategy for Reducing Early School Leaving in Romania in accordance with the EU's plan (Ministry of Education 2015). The purpose of this national plan is to accomplish the ambitious goals of the Europe 2020 strategy as well as the national agenda. It was created to ensure a cohesive and coordinated approach to addressing early school leaving (ESL) (Popa 2020). The strategy's immediate goal was to address the primary causes of early school departure by putting in place an efficient framework of laws and regulations that prioritised prevention, intervention, and compensation. Young people between the ages of 11 and 17 were the target audience for this approach. The objective was to reach a maximum of 11.3% by 2020 among young individuals between the ages of 18 and 24 who had just completed lower secondary education and were not engaged in any type of education, as a medium-term target. By lowering the number of people at risk of unemployment, poverty, and social exclusion, the plan long-term aims to support Romania's intelligent and inclusive growth (Ministry of Education 2015).

The prevalence of physical and sexual abuse against women

Physical and sexual abuse of women is a significant problem in Europe, particularly in Central and Eastern European countries. According to the Eurostat database, the rate of physical and sexual abuse is highest among women aged 18 to 29, with this group experiencing an approximate rate of 13%. In contrast, Romania has a lower rate of about 9% in this age group. However, in older age groups, particularly among women aged 40 to 49, Romania shows above-average rates, with 10% compared to the EU average of 8%. For women aged 50 to 59, as well as those over 60, the rates are nearly identical to the EU averages.

Among Central and Eastern European countries, Romania shows better values compared to Hungary, Bulgaria, and Slovakia, and even lower rates of abuse compared to some Western European countries like Finland, Denmark, Sweden, and the Netherlands. Among women aged 18 to 29, these countries have a rate of 22%, which means that nearly a quarter of women were victims of physical or sexual abuse in the last 12 months. The rates are also higher for women aged 30 to 39, especially in Finland (14%) and Belgium (13%). The significant variation in these values,

especially the higher rates in more developed countries compared to lower rates in less developed ones, can be attributed to several factors. In Central and Eastern European countries, physical and sexual abuse often remains a taboo subject. The legacy of communism treated domestic violence as a private matter that was not reported to authorities. In contrast, in more developed countries, reporting abuse is more accepted, although women there also fear the consequences and the possibility of further abuse. Another factor is the fundamental perception of gender equality, where Romania lags slightly behind more developed countries. In these countries, movements actively work towards achieving equality in the workplace, pay, and sexual rights. Another contributing factor is the higher alcohol consumption, which is often associated with domestic or intimate partner violence. According to Eurostat, 13.8% of men in Belgium, 12.7% in Denmark, 11.4% in Luxembourg, and 10.2% in the Netherlands consume alcohol daily, compared to only 5.6% in Romania. When looking at weekly consumption, 55.5% of men in the Netherlands and 50.4% in Luxembourg consume alcohol, compared to 32.2% in Romania (Eurostat 2024). These statistics suggest that in countries with higher alcohol consumption rates, there might be a stronger correlation with domestic violence incidents, including physical and sexual abuse. However, this does not negate the influence of cultural, societal, and structural factors that also contribute to the differing rates of abuse between regions. A third factor that must also be considered is the issue of urbanization. As cities grow larger, the number of crimes, including violent incidents, tends to increase proportionally. This is why in countries with densely populated capitals and large cities, where residents come from diverse cultures and nations, the rate of violence against women tends to be higher.

The physical and sexual abuse of women is a complex problem influenced by various factors, including cultural differences, the level of development of countries, and attitudes towards gender equality. Additional factors, such as living conditions, alcohol consumption habits, and the degree of urbanization, also play significant roles. Addressing this problem requires a comprehensive approach that considers the combined impact of these factors and implements targeted measures to improve the safety and well-being of women. In recent years, support organizations for women have begun to emerge in Romania, which, in addition to providing psychological support to victims, encourage women to speak out about their situations and stand up for themselves. This has contributed to the issue of physical and sexual violence becoming less of a taboo topic in the country.

The unadjusted gender pay gap between men and women

The gender pay gap (GPG) is one of the key indicators of income differences between men and women. In the European Union, the average gender pay gap was around 16-17% in 2012, gradually decreasing over the years to below 13% recently. In Romania, the gender pay gap was 6.9% in 2012 and continued to decrease steadily until 2020. However, the pandemic caused a slight increase, although Romania still maintains one of the most favourable gender pay gap rates in the EU (Figure 2).

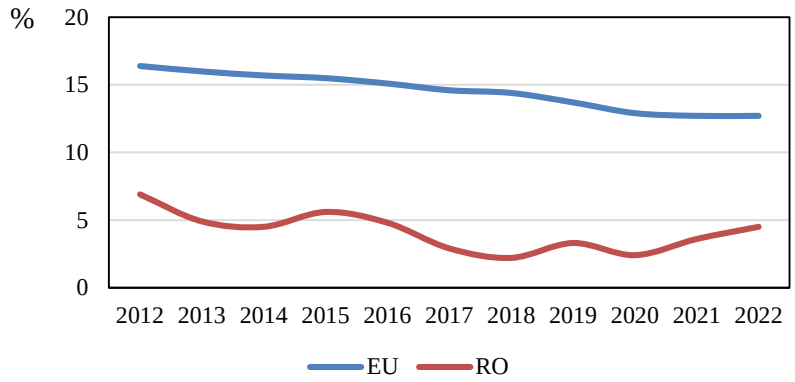

Figure 2. The unadjusted gender pay gap between men and women (2012-2022)
Source: Eurostat

This result is partly due to the differing wage disparities between the public and private sectors across various countries. In many EU countries, such as Sweden and Finland, the public sector tends to offer lower wages. In contrast, in Romania and Luxembourg, employees in the public sector receive higher salaries. The higher representation of women in better-paying public sector positions in Romania contributes to the relatively narrow gender pay gap observed in the country. Thus, the wage levels in the public sector are indeed a key factor in shaping the gender pay gap. Additionally, cultural factors, such as traditional gender roles and the perception of women's participation in the labour market, also influence the pay gap. In countries where women's participation in the workforce is more strongly supported and accepted, the gender pay gap is generally smaller.

Overall, Romania is in a favourable position compared to other EU countries regarding the gender pay gap. While there have been positive changes across the EU in recent years, the gender pay gap still exists and remains an important issue. Achieving gender pay equality requires comprehensive and targeted measures, including policy reforms, cultural shifts, and continued support for women's participation in the workforce.

Gender employment gap

Examining the gender employment gap is crucial for uncovering inequalities and understanding the structural issues within the labour market. The opportunities for developing a social economy touching on the issue of gender inequality, particularly in the field of employment was a major concern even in Northern Hungary at the beginning of the new millennium (G. Fekete-Solymári 2004).

In terms of full-time employment, the gender employment gap in Romania is notably higher than the EU average. In 2012, the gap in Romania was 17.2%, and it has increased over the years, reaching 20.1% in 2021. This rise can be partly attributed to the economic impacts of the COVID-19 pandemic, which disproportionately affected women's employment opportunities. In contrast, the EU average shows an improving trend. In 2012, the gap was 11.8%, and from 2020 onwards, it has remained below 11%. One of the primary reasons for the gender employment gap lies in the unpaid caregiving responsibilities that women often undertake (Nassar et al. 2021). Women are frequently engaged in caregiving tasks such as caring for children and elderly parents and managing household duties, for which they receive no financial compensation. Additionally, hiring discrimination and the low representation of women in leadership positions also contribute to the widening employment gap. Romania's increasing gap indicates that more targeted measures are needed to address the specific challenges women face in full-time employment. These might

include enhancing support for working parents, providing greater access to childcare, and addressing cultural norms that may discourage women's full participation in the workforce.

When it comes to part-time employment, the gender gap presents a different picture. In the EU, women are much more likely to work part-time than men are. In 2012, the average gender gap in part-time employment in the EU was -23.5%, which improved to -20.3% by 2023. This indicates that while there has been some improvement, significant disparity remains, with a substantial majority of part-time workers being women. The negative value reflects the fact that a much higher proportion of women work part-time compared to men. In contrast, Romania shows a relatively low gender employment gap in part-time jobs. Between 2012 and 2023, this gap remained consistently below 1%, indicating that the proportion of men and women working part-time in Romania is nearly equal. This suggests that part-time work is less common overall in Romania and that both men and women who do work part-time are almost equally represented. Considering regional differences and cultural influences, Romania stands out in the EU for having the smallest gender gap in part-time employment, with only a 0.7% gap in 2023. In contrast, countries like Germany, Austria, and the Netherlands show gender gaps around -40%, indicating that far more women work part-time than men in these nations do. These figures reflect the deep-rooted cultural norms regarding traditional gender roles, which significantly influence women's participation in the labour market. These disparities underscore the importance of addressing the underlying causes of the gender employment gap, such as the unequal distribution of unpaid caregiving responsibilities and the structural barriers that women face in the workforce. Promoting policies that support work-life balance, ensure equal opportunities in hiring and advancement, and provide adequate support for caregiving can help narrow these gaps and promote greater gender equality in employment.

Overall, while progress has been made, particularly in some EU countries, there remains a need for ongoing efforts to address the root causes of the gender employment gap. These efforts should focus on promoting equal opportunities, supporting work-life balance, and challenging cultural norms that perpetuate gender inequalities in the labour market.

Share of women and men with higher education degrees

The proportion of women and men with higher education degrees is an important indicator of gender equality in access to education and opportunities in the labour market. Across the European Union, the trend in recent years has shown that women are increasingly achieving higher levels of education compared to men.

In Romania, the proportion of women with higher education degrees has gradually increased over the past decade, though the growth has been modest at just 3%. In 2012, 25.6% of women aged 25 to 34 had a higher education degree, and by 2022, this figure had risen to 28.4% (Figure 3). While the proportion of women with higher education increased by 3%, the growth among men was barely above 1% over the past decade. The latest data from 2022 shows a 7.2% difference between women and men, indicating a significant disparity. Although women are more likely than men to attain higher education degrees, this does not necessarily, translate into higher full-time employment rates for women. Emphasizing the importance of education and ensuring access to further education opportunities are crucial for achieving gender equality.

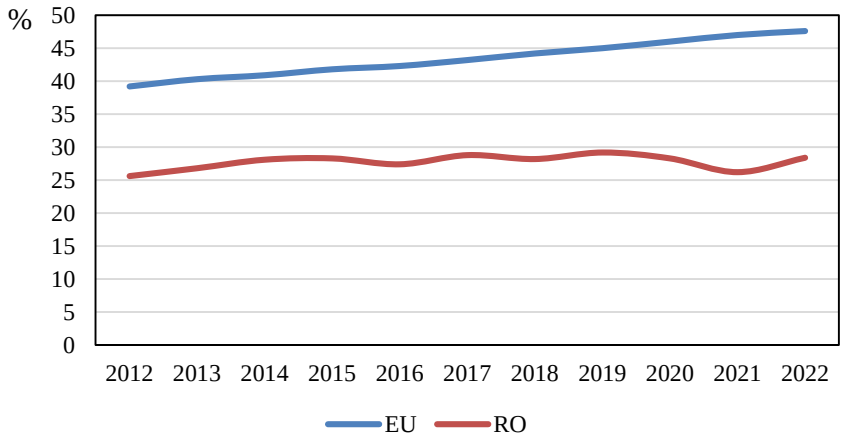

Figure 3. Percentage of women aged 25-34 with higher education in Romania and the EU between 2012 and 2022
Source: Eurostat

In 2012, 39.2% of women in the EU had a higher education degree, and this figure rose to 47.6% by 2022, representing an 8.4% increase. This growth is nearly three times that of Romania, where the increase was just 3% over the same period. Currently, Romania lags behind the EU average by 19.2%, highlighting a substantial difference.

Cultural differences, the presence of Roma communities, and the importance of agricultural work are all contributing factors to the lower proportion of individuals with higher education degrees in Romania. Many students, particularly in rural areas where agriculture remains a leading sector, choose to work in agriculture after completing 12 years of schooling rather than pursuing higher education. Additionally, teenage pregnancy plays a significant role in preventing women from continuing their education. The quality of the education system and the limited opportunities offered by educational institutions also contribute to the trend of many young people choosing to study abroad.

Targeted steps must be taken to address these difficulties in order to improve the situation. This can entail raising educational standards, expanding access to postsecondary education, especially in rural regions, and helping adolescent girls overcome obstacles like early pregnancy. Romania can strive to provide better gender equality in employment and education by tackling these variables and reducing the gap with the EU average.

Share of women and men engaged in caregiving activities

The ratio of women to men engaged in caregiving activities is a significant indicator of gender roles and responsibilities within households and society. Caregiving typically includes tasks such as caring for children, elderly family members, or relatives with disabilities, as well as managing household chores. This unpaid work is often disproportionately carried out by women, which can affect their participation in the labour market and overall economic opportunities.

The proportion of women in the non-active population who are involved in caregiving tasks has been steadily increasing in Romania. In 2012, 28.7% of non-working women were engaged in caregiving, and by 2020, this figure had nearly reached 40%. This indicates that a significant portion of non-working women are occupied with caregiving responsibilities, reinforcing the persistence of traditional gender roles in Romania. In contrast, the proportion of men involved in caregiving in Romania is much lower than that of women (3.1% in 2020). The data clearly indicate that traditional gender roles remain strongly present in Romania, contributing to challenges in

balancing private life and career. The unequal distribution of household tasks limits women's participation in economic life, leading to lower employment rates and a wider gender pay gap. Moving away from traditional gender roles or presenting them in a more nuanced way, along with a more equitable distribution of household responsibilities, could significantly enhance women's participation in the labor market. This would not only help reduce the employment and pay gaps but also positively impact the country's economic performance.

Comprehensive laws and initiatives that boost women's economic engagement and call for a more equitable distribution of caregiving obligations are required to advance gender equality. Better daycare availability, flexible work schedules, shared parental leave, and public awareness efforts to question and alter gender roles in society are a few examples of such projects. Encouraging an atmosphere in which women and men may equally contribute to and benefit from economic growth requires taking these steps.

Proportion of seats held by women in national parliaments and governments

The political participation of women and the achievement of gender equality within political institutions are crucial issues in modern democracies.

The proportion of women in national parliaments across the EU has been steadily increasing over the past decade. While in 2012, the proportion of women was 25.3%, by 2022, this figure had surpassed 33%. In contrast, in Romania, the proportion of women remained around 10-12% until 2017, after which a significant increase occurred following the 2016 elections, with the proportion rising by 7%. However, since then, there has been stagnation, and no significant changes have occurred in recent years (Figure 4).

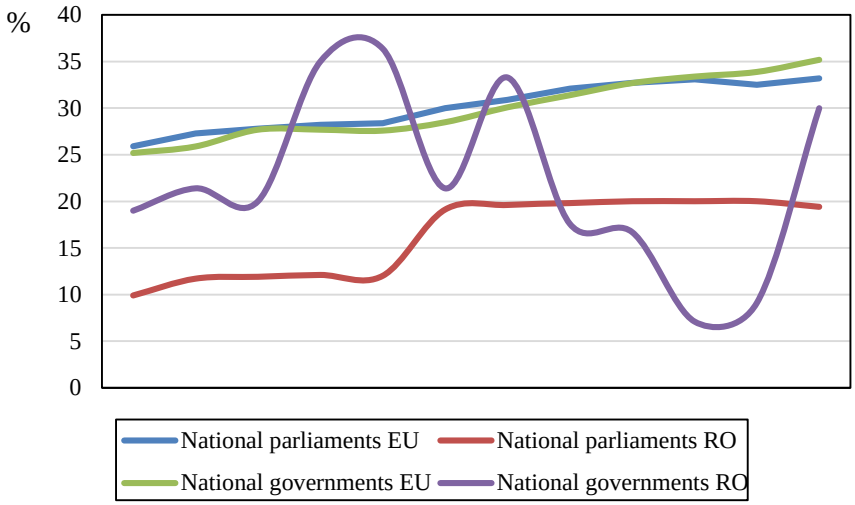

Figure 4. Proportion of seats held by women in national parliaments and governments in Romania and EU (2012-2023)
Source: Eurostat

The proportion of women in national governments also shows a varied picture. In the EU, there has been a steady increase over the past decade; in 2012, the proportion was 25.2%, and from 2018 onwards, it surpassed 30%. However, in Romania, significant fluctuations can be observed. Between 2012 and 2014, the proportion of women in the national government was around 20%, but from 2018 onwards, there was a continuous decline, with the proportion dropping to just 7.1% and 9.1% in 2021 and 2022, respectively. In 2023, however, there was a significant increase of 20%, bringing the proportion up to 30%.

In Romania, only four of the parties represented in the national parliament have women's organizations: AUR, PNL, PSD, and RMDSZ. These organizations have set various goals, such as increasing women's political participation, achieving equality, and supporting women in the public sphere. However, the activities of these women's organizations often aim to promote a traditional, family-oriented image and do not always focus on achieving equality (Bălută-Tufiș 2021).

The low proportion of women in politics can be attributed to two main factors: supply-side and demand-side issues. On the supply side, women are generally less inclined to participate in political life, while on the demand side; there is a problem with societal prejudices against female political figures. Women's willingness to engage in politics is also influenced by the lack of support for their participation and their self-perception of not being adequately qualified (Höhmann 2024). The importance of family in women's lives is another factor on the supply side, as women in leadership positions often face the challenge of choosing between their careers and their families, which holds them back (Le Barbanchon-Sauvagnat 2019). On the demand side, the perception of women's roles and responsibilities, which is closely tied to cultural norms, plays a significant role. While supply-side factors focus on what women think of themselves, demand-side factors are shaped by the opinions of voters and citizens. In countries where traditional female roles are emphasized, the population is less likely to vote for female candidates (Le Barbanchon-Sauvagnat 2019). According to the World Value Survey conducted between 2017 and 2020, 40% of respondents in Romania strongly agreed with the statement: "Men make better political leaders than women." In contrast, in the Nordic countries, the percentage was below 15%. This highlights how cultural differences significantly contribute to the low participation of women in political life (Le Barbanchon-Sauvagnat 2019).

Many institutional and cultural elements influence women's political engagement. Family responsibilities and conventional gender roles frequently discourage women from pursuing careers in politics. Women's growth is additionally hampered by societal stereotypes and a lack of support in politics. The encouraging developments seen throughout the EU suggest that women's political engagement may be raised with the right policies.

The proportion of women in senior management positions

Gender equality in leadership positions is an exceptionally important issue for modern economies. In the EU, the proportion of women in board positions has steadily increased over the past decade. In 2012, the proportion was around 16%, which doubled by 2023, reaching 33.8%. In contrast, the growth in Romania has been less remarkable (Iorga 2018). Between 2012 and 2020, the proportion fluctuated between 8% and 13%, then from 2021 onward, there was a significant increase, with the proportion rising to 21.8% by 2023. This indicates that Romania is currently at the point where the EU was ten years ago.

The low proportion of women in leadership positions in Romania and the EU can be attributed to similar factors. Cultural differences and traditional gender roles, which often see men as natural leaders, play a significant role. Women's caregiving responsibilities, such as managing the household, raising children, and caring for elderly relatives, are difficult to reconcile with the demands of leadership positions. These responsibilities limit women's opportunities and roles, contributing to their lower representation in leadership. Studies indicate that the areas where gender prejudice is most prevalent, for both sexes, are related to women's managerial skills, work-life balance, and domestic duties. The primary causes of the unequal distribution of unpaid domestic work and the restriction of women to the private sphere account for the low level of economic empowerment of women (Helgeson 2012, Offer 2016, Bîrsănuc-Man 2023).

Increasing the proportion of women in senior management could contribute to economic growth and gender equality. Having more women in leadership positions would not only improve corporate performance but also have a positive impact on the country’s economic performance. However, to achieve this, traditional female roles and the distribution of caregiving

responsibilities need to be modernized. The data shows that while there have been positive changes in the proportion of women in senior leadership in Romania, these results are not consistent and often fluctuate. Compared to the EU, Romania still lags significantly in the proportion of women on boards, while it occasionally exceeds the EU average in executive roles. Cultural changes and the modernization of traditional gender roles are crucial to ensuring that more women can attain leadership positions, which in the long term could also contribute to the country's economic growth.

Conclusion

Gender equality is a cornerstone of sustainable development and social progress. Realising gender equality in leadership roles, tackling inequalities in education and work, and preventing gender-based violence are essential for Romania and the EU to meet their Sustainable Development Goals (SDGs). Though there has been some progress, there are still many obstacles to overcome, especially in Romania where structural constraints, cultural norms, and traditional gender roles prevent women from fully participating in different facets of public and economic life. In order to solve these issues and achieve gender equality, this essay examines the policy consequences and suggestions that are required.

Among the most urgent problems is the high number of early school dropouts, especially in Romania. Gender equality is largely fuelled by education, which lays the groundwork for women's social and economic empowerment. Targeted assistance for at-risk children is necessary to lower the number of pupils who drop out of school early, particularly in rural and marginalised regions. In order to maintain students' interest in learning, financial aid, mentorship programs, and community-based educational efforts can be extremely important. Expanding technical and vocational training programs also provides students who might not pursue traditional higher education with alternate career paths. We can decrease dropout rates and improve economic prospects for women by matching these programs to the requirements of the local economy and giving young people the skills they need for the workforce.

In Romania and the EU, gender-based violence continues to be a significant obstacle to gender equality. In order to counteract this, comprehensive victim support networks need to be established and reinforced. This entails offering easily accessible shelters, therapy programs, and legal support, especially in remote and underprivileged locations. Campaigns for public awareness are also crucial in challenging cultural norms that support violence against women. Through the involvement of educators, journalists, and community leaders, these programs aim to influence cultural perceptions and foster a climate that values women's safety and respect. In addition to being morally required, addressing gender-based violence is a critical first step in empowering women to fully engage in society.

Even while Romania's unadjusted gender pay gap is smaller than the EU average, it nevertheless shows underlying structural disparities. Robust enforcement methods in addition to tougher legislation requiring equal pay for equal effort are required to close this disparity. There should be fines for employers who fail to perform periodic pay audits and report on gender pay gaps. Pay structure transparency is also essential since it makes discrepancies easier to find and fix. We can lower the overall gender employment gap and improve women's financial security by making sure they are fairly compensated for their labour.

Another major issue is the gender employment gap, which is a result of uneven caregiving obligations and traditional gender norms. Women cannot manage caregiving responsibilities and stay in the workforce without policies that promote work-life balance. Examples of these policies include prolonged parental leave for both parents, flexible work schedules, and remote work opportunities. It is equally crucial to increase access to high quality, reasonably priced childcare and elder care services since it frees up women to pursue full-time jobs and lessens the stress of caring for others. We can develop a more inclusive labour market that recognises and encourages the contributions of women by removing these systemic obstacles (Robayo-Abril et al. 2023).

One important area where gender equality needs to be achieved is political representation. Cultural norms and the design of political institutions play a major role in Romania's low percentage of women in national parliaments and governments. Gender quotas within political parties should be strengthened or instituted in order to boost the representation of women. By guaranteeing that women are fairly represented on candidate lists, these quotas improve the likelihood of women getting elected. Furthermore, programs designed especially for women to provide mentorship and leadership training can aid in developing the abilities, self-assurance, and networks required for success in the political sphere. We can guarantee that the needs and viewpoints of both men and women are taken into consideration when formulating legislation by advocating for gender parity in political leadership.

One major obstacle to workplace gender equality is the under-representation of women in senior management roles. In order to solve this, businesses should be urged to implement gender diversity programs, such as establishing goals for the percentage of women in management roles and giving them access to chances for leadership development. Removing bias from the workplace is also essential, necessitating the use of diverse hiring panels, blind hiring procedures, and gender-neutral assessment standards. We can provide women with opportunities to progress into leadership positions by cultivating an inclusive corporate culture, which will eventually help businesses and the economy as a whole.

Lastly, a more significant cultural transformation is needed to achieve gender equality. Gender roles and the significance of equality can be instilled in children at an early age through educational changes that incorporate gender equality into the national curriculum. In order to question established conventions and advance an inclusive society, public involvement and advocacy are also essential. Through collaborating with civil society organisations, community groups, and the media, we can promote societal change and increase awareness of the advantages of gender diversity.

In order to alleviate gender disparity in Romania, the following specific policy proposals are based on the main issues raised in this analysis:

a). Lowering School Dropout Rates: Encourage at-risk students to continue their education by implementing mentorship programs and offering financial aid, with an emphasis on rural and marginalized populations.

b). Increasing Vocational Training: Create technical and vocational education programs that are suited to the economic demands of the area and provide women in particular with workforce-ready skills and other career pathways.

c). Addressing Gender-Based Violence: Provide victims with all-encompassing support networks, such as shelters, counselling, and legal assistance, with a focus on making sure access is available in rural and underprivileged areas.

d). Enforcing equal pay laws and implementing work-life balance-promoting measures, such flexible work schedules, can help women's financial stability and professional prospects.

e). Improving Political Representation: To guarantee fair representation on candidate lists and boost the number of women in leadership positions, political parties should implement gender quotas.

f). Increasing Workplace Equality: Encourage the presence of women in senior management by establishing goals for representation and creating conditions that help women grow as leaders.

Gender equality in Romania and the EU is a difficult goal that calls for a multipronged strategy. Considerable progress towards accomplishing the SDGs can be made by putting the policy suggestions discussed in this essay into practice. In addition to enhancing women's prospects and well-being, these policies will strengthen social cohesiveness, economic growth, and societal resilience. Beyond being an aim in and of itself, gender equality is necessary for both sustainable development and the full realisation of everyone's human rights.

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Urban empowerment factors and issues in the context of international networks

City diplomacy, reflected in the increasing role of cities and the diminishing exclusivity of nation states in international relations, is a relatively recent phenomenon in scholarly literature. From the perspective of the nation state, it produces a vertical fragmentation of national foreign policy, while horizontal processes dominate the relations within international organisations (Marchetti 2021). Globalisation, metropolisation and the rise of networks are among the main explanatory variables behind the quest of cities to „gain a seat at the table of global diplomacy" in the post-Paris landscape of hybrid multilateralism (Bäckstrand et al. 2017, Dzebo et al. 2019). International regimes such as the UNFCCC framework rely on multistakeholder partnerships involving states and non-state actors (cities, regional governments, NGOs, corporations, financial institutions) that address global problems, with a view to improving the legitimacy of the international system. Networked forms of collaboration between cities transcend the multilateral frame, with soft power politics as the dominant means to achieving the common objectives of international organisations. The paper examines city diplomacy based on the exercise of soft power in various global policy fields. It argues that city diplomacy, as practised within transnational networks such as ICLEI, C40, U20 or the Global Covenant of Mayors, allows cities to tackle global challenges more efficiently whilst advancing their specific viewpoints and local interests in the international arena.
Keywords: city diplomacy, city power, collaboration, networks
JEL-code: H7, F6, R11

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Introduction

Various studies have discussed the role of cities as leading actors on the world stage by virtue of their economic, political and symbolic capital, reflecting the diminishing exclusivity of state-centric international relations. The connection between globalisation and networking is crucial. Elements of economic activity are spatially segregated, while the competitive structure of large firms and competition is becoming increasingly internationalised (this is true not only for advanced business services or new industries, but also for traditional sectors and decision-making methods). This internationalisation, the emergence of global networks, also applies to other sectors (e.g. research, climate change) and can be interpreted in terms of inter-city relations (competition/collaboration/lobbying). Analysis of European and global cooperative alliances of cities is essential for their contribution to global goals and the effective functioning of participatory democracy. The importance of examining (all types of) inter-city relations has become a priority in the 21st century, as it is no longer only nations or regions that can represent economic and political power, but also cities themselves.

The term paradiplomacy first entered academic literature in the pioneer work of Duchacek (1984) as the abbreviation of „parallel diplomacy", denoting the international activities or political agency of subnational governments and their ancilliary and subsidiary nature in the context of R. Nixon's "new federalism". Duchacek argues that these non-central actors "perforate" state sovereignty, by promoting their particularistic interests through cross-boundary, trans-regional

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and global connections (Duchacek 1988, cited by Acuto 2013b). The paradiplomacy of cities, or municipal foreign policy (Leffel 2018) gaining growing traction since the 1990s, is a relatively understudied area in mainstream political analyses of international relations (IR), particularly in non-federal contexts (see Chan 2016, Amiri 2022, Clausen 2022). According to Ljungkvist (2014), what distinguishes paradiplomacy from city diplomacy is its overwhelming focus on subnational regional actors due to its origins in comparative federalism studies. To quote Marchetti (2021, 44), city diplomacy is struggling to find a place in the traditional theoretical frameworks of international relations, which „tend to ignore the subtleties of subnational-national-international interactions". Szpak et al. (2022) note that in general, urban areas have been under-represented in IR domains, such as foreign policy analysis and the literature on international law. Likewise, the global agency and influence of cities, i.e. their ability to pursue and produce meaningful effects on the world (Gordon 2019) has received scant theoretical attention from IR scholars (Curtis 2011, Acuto 2013, Tavares 2016, Amiri-Sevin 2020, Balbim 2023, Acuto et al. 2023)**.** The United Nations (UN) provides a particularly fertile ground for exploring notions of city agency within a traditionally state centric system (Acuto et al. 2023). The limited scholarly discussions of relevance include Chadwick Alger's work on the UN system and cities in global governance where the international relations of the world are interpreted as relations among cities, and the tyranny of the nation-state unit of analysis is rejected (Alger 2014, 35). Several factors contributed to the growing legitimacy and authority of cities and local governments in international relations, *inter alia*, the development of the city focus of global governance by the UN and other international organisations (IOs) in the 1970s-1990s, and the growing prominence of the paradiplomacy of cities in the international arena since the 1990s associated with UN conferences on human rights, environmental, social and urban issues. The New Urban Agenda (NUA), for instance, was the first UN declaration that granted direct responsibility to local authorities for protecting, respecting and promoting human rights in all fields of local competence (see Da Silva 2018). The role of the United Nations Human Settlements Programme (UN Habitat) was paramount in the gradual penetration of cities to the UN system. In 1999, the UN Advisory Committee of Local Authorities was established as an advisory body to United Nations System (UNACLA website), composed of a group of mayors representative of the global networks of local and regional authorities, involved in the implementation of the Habitat Agenda. A landmark event for international municipalism was the setting up of the Global Taskforce of Local and Regional Governments as a consultative and coordination mechanism bringing together the major international networks of local governments, with an advisory role in key policy areas such as climate change and the New Urban Agenda. Notwithstanding their increasing advocacy for formal recognition as legitimate actors in their own standing in UN bodies, local and regional governments are still lacking formal decision-making functions despite being consulted and taken into account (see Salomón-Sanchez 2008, De Losada-Galceran-Vercher 2022).

The increasing influence of cities in economic and political decision-making

In the emerging literature on city diplomacy, "municipal internationalism", "transnational municipal networking" municipal foreign policymaking" or "paradiplomacy" are used interchangeably. The concept of city diplomacy was first introduced into academic literature by Jan Melissen and Rogier van der Pluijm (2007, 6), who define city diplomacy as the „*institutions and processes by which cities engage in relations with actors on an international political stage with the aim of representing themselves and their interest to one another*". Pluijm and Melissen (idem) see the role of city diplomacy as the decentralisation of international relations management, with cities as the main actors. The emphasis here is on the direct actions of cities and regions undertaken independently of the national sphere, with an overwhelming focus on building bridges, confidence and capacity in conflict or post-conflict areas (Terruso 2016).

According to Swiney (2020, 245) what distinguishes the city networks of earlier times focused on city-to-city twinning or providing fora for exchanging best practices from the

international city networks active today, is the attempt to access and influence the international policymaking process in novel and unprecedented ways. Acuto (2013b) conceptualizes cities as loci of governance capable of formulating collective agency in function of their embeddedness in transnational municipal networks, presented, in an actor-network theoretical framing, as "multiscalar assemblages of global governance". Taking the C40 Climate Leadership Group as an example, Acuto demonstrates how cities are not merely passive actants, but actors that can purposefully develop networked responses to engage in world political problems such as climate change and also how networks of cities (or assemblages) such as the C40 might 'supervene' the agency of their members. As pointed out by Acuto (2013b), earlier studies tended to treat cities either as the locus of international relations or subsumed as lower level governmental entities with a limited reach, whereas through their paradiplomatic engagements, cities may circumvent state-centric assumptions labelling them as „mere places". More recently, a volume of studies exploring the role of cities in international relations (Amiri-Sevin 2020, 4) has used city diplomacy as an umbrella term to describe the actions of local governments intended to raise the global profile of their cities and to influence global policies in ways that promote the interests of their constituents, highlighting the conditions under which city networks may exert agency as actors *per se*, with a capacity to shape both the global governance agenda and local governance activities. This requires, according to Balbim (2023), overcoming two limiting perspectives: (1) the Durkheimian view of cities as an additional layer of new international bureaucracy; (2) treating city diplomacy as a phenomenan exclusively related to IR. Instead, Balbim proposes a definition of city diplomacy as the constitution of spaces of power. The transforming role of cities and their networks in the state-centric global governance architecture is analysed by Szpak et al. (2022), with a deliberate focus on Europe, where larger world cities are scarce (with the exception of Paris and London). The volume fills an important lacuna in political science as it adopts a new approach to the study of cities and their networks as emerging actors in global multi-level governance, participants in international relations and entities with some degree of legal subjectivity, despite being partial subjects in international law with barely emerging legal personalities (idem, p. 43). Salomón and Sanchez (2008) highlight the "mixed actor" (partially sovereignty-bound, partially sovereignty-free) character of subnational governments acting internationally vis-à-vis the UN system and its governing body composed of nation-states. The positioning of the city network "United Cities and Local Governments" (UCLG) in 2004 as the main interlocutor within the UN can be interpreted as the emergence of a new global political actor (with over 240,000 towns, cities, regions, and metropolitan areas and over 175 local and regional government associations in 140 UN member states among its members, UCLG is the world's largest organisation of local and regional governments, representing 5 billion people, or 70% of the world's population), albeit with limited power resources (Salomón-Sanchéz 2008). A study by Martinez (2022) discusses the legitimation strategy of UCLG vis-à-vis the multilateral system, as a global actor acting with a single representative voice committed to the global agendas adopted by the international community of states, in particular, the UN 2030 Agenda and the Sustainable Development Goals (SDGs) of 2015. UCLG highlights its role in bringing local views to the global stage, in particular, by being a co-funder of the Local 2030 Network, a multistakeholder hub led by the UN Secretary General's Executive Office to accelerate the implementation of SDGs (UCLG 2019). In the context of efforts to achieve the 2030 Agenda, they are working together with other networks and municipal alliances in the Global Taskforce of Local and Regional Governments (GTF), which was facilitated by the UCLG. UCLG, on behalf of the GTF, produces the annual "Towards the localisation of SDGs" Report since 2017, analysing local and regional governments' initiatives and contributions to the SDGs – ending poverty (SDG1&2), fight against climate change (SDG13), or achieving cities and territories of peace and rebuild trust (SDG16). UCLG also facilitates the convening of the World Assembly of Local and Regional Governments, the joint voice of local and regional leaders from around the world. It is the main supporter of the annual gathering of human rights cities, the World Human Rights Cities Forum. In 2023, UCLG launched a global campaign "10, 100, 1000 Human Rights Cities and Territories by 2030", aimed at

gathering 1000 local and regional governments from all over the world to strengthen the global network of Human Rights Cities and Territories.

A growing body of literature is arguing for a need to reform the multilateral system to be more inclusive of local and regional goverments, with more national assistance in linking cities to global governance (Leffel 2021, Galceran-Vercher 2021, Bilsky-Cibrario 2023). Kurz (2022) argues that instead of treating them as stakeholders or implementers of international agreements, cities should be included in negotiations with IOs such as the UN, participating as acknowledged partners and an important level of government. A survey of the global ecosystem of city networks (Acuto-Leffel 2020) reinforces this view, arguing that networks need to be recognised as institutions with agency in the political geography of (international) urban development, not merely as spokes connecting nodes (i.e. cities or local governments) as suggested by quantitative analyses of city networking (e.g. GAWC index). The Global Parliament of Mayors (GPM) is a case in point: being much more than a network, it is described as a blueprint for a governance body of, by and for mayors, connecting cities and harnessing the power of city diplomacy (Kurz 2022).

Kamiński and Ciesielska-Klikowska (2023) highlight the numerous benefits of paradiplomacy, whereby sub-state actors establish links with foreign (state and non-state) partners and contribute to a pluralisation of diplomacy, creating an alternative political channel of communication with foreign partners in various low-policy issues (e.g., waste management, public transport, education) even against the backdrop of conflictual international relations among national governments.

Herrschel and Newman (2017, 94) stress the urgency of bridging the conceptual gap between IR, ie., political science, and the largely economy-centric urban studies and highlight the role of paradiplomacy as a possible connector between the two distinct academic traditions. The authors attribute the „thickening" or sometimes „growing disorder" of international governance" () to the deeper and multi-layered vertical engagement of subnational actors seeking to tackle global and increasingly interconnected economic environmental and other challenges, defying the flat and one-dimensional perspective of traditional IR studies fixated on the nation-state. Tavares (2016) describes paradiplomacy as a direct consequence of globalisation and the ICT revolution that empowered decentralised networks, unsettling state-centred hierarchies. For Nijman (2011), the urbanisation of international relations is underlined by well-established phenomena – city diplomacy, urban offices for international relations, urban missions to international organisations, etc. – that are the markers of a global society. In her seminal work, Sassen (2006a) calls on urban scholars to rethink conventional views of cities as „sub-units of their nation-states" in the case of increasingly transnationalised and interconnected global cities. Global cities as the backbone of the global economy concentrate corporate headquarters and „corporate service complexes" (Sassen 1991), i.e. sophisticated networks of finance, legal, management, accounting, and advertising firms. Sassen (1991) coined the term „global cities" to describe cities that are not only the highly concentrated command points of the world economy but also advanced postindustrial production sites, for financial innovations and markets for these products and innovations. In line with the world city hypothesis, centrality in the network of world cities connected by intercity flows of capital correlates with a city's power in the world economy, conventionally measured by the world city hierarchy.

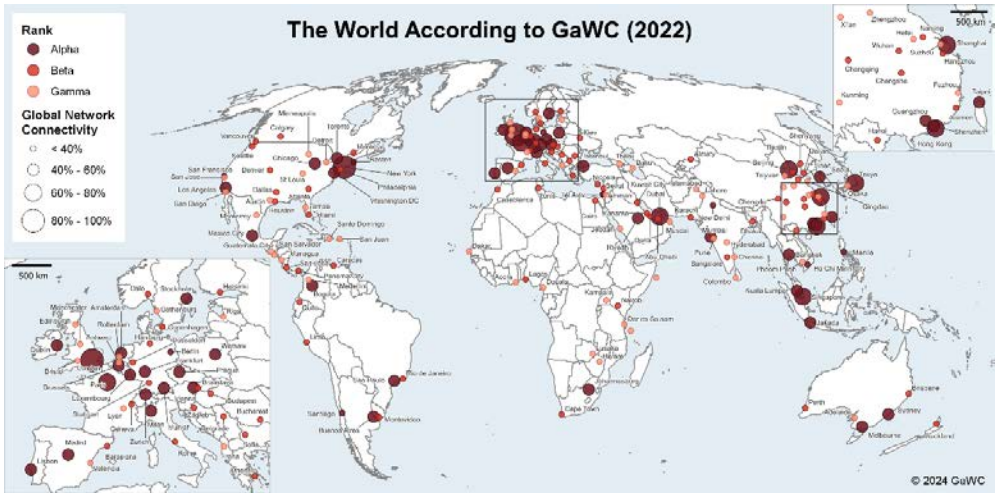

Figure 1 The World According to GaWC (2022)
Source: https://gawc.lboro.ac.uk/wp-content/uploads/2024/09/GNC2022.png

Elsewhere, Sassen (2006b, 347) treats the cross-border networks of global cities as one of the key components in the architecture of international relations. Taking account of Sassen's definition, the Globalization and World Cities Research Network (GaWC), founded in 1998, has published a biannual analysis of the global city hierarchy with a focus on the external business service connections of world cities (Taylor 2020). The GaWC group treats global cities not as discrete and independent entities but as sites for certain service economy activities, which are interconnected in a network where the different hierarchical tiers exhibit varying degrees of flow control, resulting in the oft-cited alpha-beta-gamma-sufficiency-unranked typology (see more about GAWC website). Using a limited set of economic indicators, a city's integration into the world city network is computed in terms of the prevalence of advanced producer services (APS) firms involved in accountancy, advertising, banking/finance and law (Figure 1).

Globalist accounts view cities not only as nested in their national urban system but as actors directly participating in global governance (Brenner - Kiel 2020). Overcoming the economic reductionism of global city theory that presents major cities as global financial centers, as headquarters locations for TNCs or as agglomerations for advanced producer services (APS) industries, the authors offer a new perspective on global cities as the main drivers of restructuring urban governance, whose analysis should take into account the new social, cultural, political, ecological, media and diasporic networks. By virtue of their strong economic capacity, image and institutional capacity global cities can assume leadership when national governments are falling short of their international commitments (Tavares 2016, Martinez 2022). In the case of the largest global cities whose economic weight allows for a large degree of liberty from their national territorial and institutional embeddedness, it is the state that becomes dependent on or constrained by their policy choices. As argued by Manfredi-Sánchez (2023), this group is capable of setting standards in a wide range of fields of public policy, to be eventually adopted by similar cities and then followed by countries.

An important hiatus in academic research on city diplomacy is its overwhelming focus on global cities as a marker of success, with a strong correlation detected between city size and the level of international activities (Grandi 2020), and the corresponding lack of visibility and recognition of the international activities of small and intermediary cities and towns (Nugraha et al. 2023). The latter trend is reinforced by the scarcity of city diplomacy activities in the case of small towns and mid-sized cities (see Clerc 2021, Koelemaij-Derudder 2022). Balbim (2023) sees an urgent need to overcome the reductionism of global city theory in order to explain the internationalisation of ordinary cities and their active participation in the constitution of new

power spaces. For the sake of greater inclusivity, Manfredi-Sánchez (2023) urges a transition from „city diplomacy" to „urban diplomacy", arguing that all cities can participate in the implementation of the global agenda irrespective of their capacities, economic strength or and size, as the most pressing global issues can be addressed at the local level. Citing examples of the expression of identity, the inclusion of the gender perspective and the impact of climate change, policies on migration, mobility, and digital transformation, Manfredi-Sanchez (idem) theorizes urban diplomacy from the perspective of citizens' demands for a global approach to local problems, an extension of citizenship above and beyond the nation-state.

Cities' international engagements: On the road to achieving formal recognition?

Diplomatic activities can be underpinned by normative goals conceptualised within the framework of a world society (desire for peace, security concerns, solidarity with refugees, fighting populism), de-emphasising financial or material gains (Leffel 2018, Amiri-Grandi 2021) or else these can defy state-based one-size-fits-all approaches or contrast with the national interest (negative paradiplomacy). Considering city diplomacy's relationship with public institutions at the national level, Marchetti (2021) distinguishes cooperative and competitive interactions, competitive collaboration and indifference: the state can use city diplomacy as an instrument of national foreign policy, resulting, in some cases, in the concession of foreign rights to cities, but competition is the more typical, where the city develops its diplomatic activities independently of the state in ways that might challenge the established national foreign policy. Manfredi-Sánchez (2021) describes the processes and practices of global cities and city diplomacy as constitutive of „urban soft power", highlighting city diplomacy's ability to achieve global impact without use of force or coercion. Through the example of the C40 Climate leadership Group, Acuto (2013b) demonstrates how political agency of worldwide significance can also be identified as an emergent property of the global city as a "group agent" capable of undertaking diplomatic activities quite similar to more traditional international actors.

Lacking hard power (security, defense, binding legal instruments and actions), consular relations or a grand strategy as the traditional features of state diplomacy, cities appear powerless, despite a notable increase in their soft power arsenal. The partnerships, agreements and cooperation in cultural, economic, environmental spheres that result from cities' engagement in diplomatic relations within non-hierarchical and polycentric transnational networks are non-binding by nature and cooperation is informal and voluntary. In the absence of coercive measures and hard law international frameworks, networks use the power of persuasion and soft governance instruments – information sharing, rule setting, capacity building – to steer members toward the desired objectives (Busch et al. 2018). Accordingly, Nijman (2011, 228-229) envisions a substantial increase of "soft law" made by cities or city involvement in networks, in parallel to the "urbanisation of (hard) international law", whereby the interests of the state will be increasingly defined by the interests of its cities.

The paradiplomacy or international action of cities, based on the shared values of peace, culture and sustainability, reflects city leaders' aspirations to extend their influence beyond the confines of their settlements and to engage in matters beyond their competencies. As pointed out by Acuto (2013a), the transnational agency of mayors in global governance, put in practice by city diplomacy, has primarily rested on mayor's self-appointment to the central stage of global policymaking, who act as policy implementers and governance facilitators of broader agendas. By harnessing the power of significant international city networks such as ICLEI, UCLG, C40 or and the Global Parliament of Mayors, cities operate beyond their own local and national borders, using these as conduits to exert influence on global agendas, development goals and international norms. This allows them to formulate a new counter-narrative to the nation-centric international system (e.g. cities can save the planet), to transcend IR-dominated theoretical frames of reference, bypassing scalar (globe, state, region) as well as political (supra-national, governmental, regional and local) hierarchies (Acuto 2013b).

Transnational networking relies on the hybridization of governance structures (Acuto 2013a), i.e. the growing involvement of the private sector in city governance as well as the growing reliance of local governments on public-private governance structures not only for essential service delivery, but for their transnational paradiplomatic activities (idem, 488-490). The New Urban Agenda stresses the need for "an enabling, fair and responsive business environment based on the principles of environmental sustainability and inclusive prosperity" and their connection with subnational and city-level governments in functional and accountable governance partnerships (UN 2016, p. 17). Article 90 (idem, p. 24) expressly states that „We will encourage appropriate regulatory frameworks and support to local governments in partnering with communities, civil society and the private sector to develop and manage basic services and infrastructure, ensuring that the public interest is preserved and concise goals, responsibilities and accountability mechanisms are clearly defined." The hybridization of governance is crucial for filling capacity gaps of local governments in the pursuit of implementing the SDGs, it is not surprising therefore that the largest number of formalised business partnerships are found within environmentally focused networks (Acuto-Leffel 2020). While the second half of the twentieth century already saw a proliferation of networks of local governments (Gilbert et al. 1996), their expansion has gained true momentum since the turn of the millennium, with four new networks emerging each year (Rapoport et al. 2019). In the environmental and sustainability dimension, Acuto et al. (2017) document over sixty networks dedicated to such policies active by the second half of the 2010s. Some of the most important networks emerged in this more recent period, such as the UCLG (United Cities and Local Governments) in 2004, 100 Resilient Cities (2011), and the Global Covenant of Mayors. A survey conducted by the Connected Cities Lab (Acuto-Leffel 2020) demonstrates a significant internationalisation and institutionalisation of cities' networking partnerships, with 20% of the total sample of 202 networks comprising international networks, some 26.5% constituting regional-based networks, and the largest group, 53%, made up of national networks.

Transnational networking as a common form of city diplomacy facilitates policy diffusion between cities and catalyses policy influence of cities in international relations and policies (Acuto 2013a, Acuto et al. 2017), enabling cities to pursue their city goals beyond their municipal as well as their national borders (Marchetti 2021). To cite Herrschel – Newman (2017, p. 19) they serve as amplifiers for local governments' international policy agendas, particularly in instances where local actors are lacking capacities or confidence due to economic weakness, constitutional constraints or limited size. As argued by Gordon (2019, p. 25), transnational municipal networks work to activate and augment the individual agency of cities, notably, by sharing information and ideas, demonstrating the benefits of particular courses of action, establishing and incentivizing rules to guide member behavior, or facilitating access to material resources. The benefits of membership can range from access to services, information, funding, technical support, exchange of best practices, policy learning, developing projects, and the representation of sub-national interest (Tortola-Couperus 2022). A survey by Busch et al. (2018) focusing on German cities shows that all kinds of cities benefit from their membership in transnational municipal networks, not just the pioneers or frontier cities that visibly dominate international agendas. Furthermore, as noted by Szpak et al. (2022) a strong city network secretariat is a key facilitator of city-to-city cooperation and learning and a crucial tool for cities striving to strengthen their international position.

Durmus (2021) examines cities as rising soft power actors, noting that a growing preference for soft law in urban contexts over the past decades has allowed for circumventing issues of subjectivity in international law and focusing instead on the widest possible societal consensus. The use of soft law instruments including guidelines, declarations, covenants, ethical codes, and standards mirrors the new regulation and governance model for urban spaces that seek to address long-term challenges and modes of thinking (e.g., sustainability). Recent examples of such non-binding agreements and guidelines include the Sustainable Development Goals, the UN Guiding Principles on Business and Human Rights, or the Sendai Framework for Disaster Risk Reduction.

The New Urban Agenda as a soft law instrument (Mosmouti 2020), ratified by all member states of the UN in 2016 has enabled cities to employ soft law with the primary aim to assert their position on the international stage. The inclusion of a standalone SDG focused on cities (SDG11 "Sustainable Cities and Communities") within its framework is considered as the most significant joint achievement of cities, city networks and the UCLG. In the literature, the strategies of local governments to act beyond their scope are qualified as soft law (Voorwinden-Ranchordás 2023), including the creation of intercity alliances through transnational municipal networks, or the drafting of international charters for local self-governments (e.g. the European Council's European Charter of Local Self-Governments of 1985). From the turn of the century, the rising significance, influence, assertiveness of cities and ability to shape outcomes at the international level (i.e. their soft power), underpinned by their city diplomatic activities, has led various authors to treat them as emerging *lawmaking actors* in areas such as human rights, migration or climate mitigation (Nijman 2011, Lin 2018, Swiney 2020, Szpak et al. 2022). The European Charter for the Safeguarding of Human Rights in the City (signed in Saint Denis, 2001) is an example of a global law initiated by cities, connected to the cities for human rights movement, and complementing the intergovernmental human rights conventions ratified by states (Szpak et al. 2022). Cities (large and small) across the globe have positioned themselves as *human rights cities* (with Rosario as the first such city established in 1997), setting good examples of the localisation of international human rights law as a core municipal task (Da Silva 2018). The NGO "The People's Movement for Human Rights Learning" (PDHRE 2007) defines the human rights city as "the city or a community where people of good will, in government, in organizations and in institutions, try and let a human rights framework guide the development of the life of the community" (Voorwinden-Ranchordás 2023). Cities such as Graz, Vienna, Middelburg, Lund, Utrecht, Boston, York or Bogota have experimented with a bottom up (not necessarily legal) approach by formulating a commitment to human rights, albeit varying in their approach to implementing these rights, designing their human rights policy or setting up their local charter. Barcelona, for instance, adopted the 2010 Charter of Rights and Duties in its quest to redefine itself as "the city of rights", integrating the human rights approach to its public policies. The City Council of Graz, an Austrian city with 302,749 people in 1. January 2024 (citypopulation.de), declared itself a human rights city in February 2001 and set up a Human Rights Council in 2007 involving members from politics, administration and civil society organisations, nominated by the mayor (Oomen-Baumgärtel, 2018). As pointed out by Pieterse (2022), with the voluntary adoption of international human rights obligations and their mainstreaming into urban governance policies, the above cities have asserted a human rights-based governance vision (centered around socioeconomic rights) as a way of enhancing their autonomy and capacity *vis-à-vis* their national governments.

According to Lin (2018), global cities and their networks play an important normative role in the fragmented, decentralised and polycentric "transnational regime complex" for climate change management, comprised of a plethora of loosely connected governance institutions and actors (Abbott 2013). Lin (2018, p. 128-130) coined the term "urban climate law" to refer to the norms, practices, and voluntary standards (i.e. soft law) developed by global cities and implemented through their transnational networks, and highlights its important complementary role to the international climate regime. According to research by Manfredi-Sanchez and Perez (2020), in the field of climate change mitigation, city-based public diplomacy is more effective than bilateral public diplomacy and horizontal networks of cities have emerged as the major promoters and advancers of climate policy, alongside or sometimes in defiance of nation-states. With the adoption of the Urban Agenda in 2016, Habitat III was instrumental in the recognition of cities as the drivers of sustainable development, initiating a city-centric shift in global policy making (see Parnell 2016). This was evident in the highly political nature of the discursive shift away from cities as sites of developmental intervention (Habitat II of 1996) to cities as vectors of change, no longer represented as „sustainability problems" but as „sustainability solutions" (Angelo-Wachsmuth 2020). As prime examples of global urban diplomacy, the Global Covenant

of Mayors for Climate and Energy, ICLEI Local Governments for Sustainability and the C40 Cities Climate Leadership Group stand out for their efforts to enhance city-level commitment in concrete actions and advocacy for the global recognition of cities' leadership in climate change mitigation, setting ambitious urban GHG emission reduction targets (Grandi 2020). ICLEI was among the earliest networks with a distinctively environmental agenda launched in 1990 by 200 cities at the World Congress of Local Governments for a Sustainable Future in New York. Today it is the world's largest global city network with regional offices present in 2500 cities of 125 countries, and covering 25 percent of the world's urban population. According to their website, the Global Covenant of Mayors brings together 13,500 cities and local governments voluntarily committed to implementing ambitious climate and energy objectives on their territory. The London-based *C40*, established in 2008 by the then mayor Ken Livingstone, has greatly enhanced the soft power of London, with membership bringing extensive benefits to the city. C40 as an elite group of the world's global cities, sponsored by the Michael Bloomberg Foundation, showcases the pivotal role of mayors in policy development, as indicated by the oft-cited assertion that „while nations talk, cities act". According to Acuto (2013b, 139), the C40 showcases not only the capacity of global cities to engage in cross-border collective action, but also their pooled influence in creating a transnational structure which can also acquire international agency. Membership is not based on fees but performance indicators, with over 60 of the member cities implementing bolder climate action plans that go beyond national commitments to the Paris Agreement, as reported by the organisation's webpage. Using the C40 Climate Leadership Group as an example, Gordon (2019) highlights the role of cities as „global climate governors" in transnational municipal networks as a new dimension of the ongoing disembedding of cities from national contexts, whose collective identity is underpinned by a shared understanding of their role as crucial participants in the global response to climate change as well as their particular governance practices and standards (e.g. uptake of the Global Greenhouse Gas Protocol for Cities). On the other hand, the author warns that city diplomacy can contribute to growing urban inequality between global cities actively shaping the global agenda and small-and medium sized cities where mayoral impact is less evident. Moreover, as Gordon (2019) notes, the agency of networks and cities is always limited and contingent on structural, local political, institutional and demographic conditions, despite their ability to act as an entrepreneur, facilitator, or enabler in encouraging the diffusion of norms, policies, and practices through processes of learning and emulation. Given their inability to enforce compliance with nominal commitments (Gordon 2016), they are compelled to rely on alternative sources of authority (material resources, reputation, organisational capacity).

Conclusion

The various global networks are becoming increasingly extended (both geographically and in terms of political power), with cities and city-regions integrated into global systems becoming nodes of varying importance in these networks. These world cities, global cities, have the highest concentration of population, economic, institutional, and power concentration, and their distinctive international network functions are partly derived from this and partly a consequence of each other. This process of transformation is significantly influenced by the drivers of economic transformation – new industries and innovations, the spread of digitalisation, changes in transport costs and economic growth, and periodic crises – as well as by various supranational integrations and economic policy agreements.

In the next phase of the research, our empirical results can help to identify the main features of effective advocacy and networking at the international level, by showcasing successful good practices that have contributed to organisational learning in local government, to the enrichment, diversification and empowerment of resources not only in cities but also in small and medium-sized towns, and deepen the culture of cooperation.

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An attempt for analysing the agricultural performance and potential in Romania on NUTS3 county level

Present study proposes to give a snapshot view on the Romanian agriculture regarding its potential and performance. The analysis is made with recent datasets referring to the year 2020. County level (NUTS3) calculations have been made to give a more detailed view of the territorial diversity of the Romanian agriculture. A scoring model had been constructed in order to reflect the agricultural potential and performance level of each Romanian county.
Keywords: agricultural potential, agricultural performance, regional analysis
JEL Codes: Q10, Q15, Q18, R10, R14

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INTRODUCTION

Agriculture plays an essential role in the Romanian economy. This fundamental phenomenon justifies our choice to study the agricultural performance and potential of Romania's counties, since, beyond the uniform national data, there are significant differences between counties in this respect. We believe that the results of our research can be a useful starting point for policy makers when defining the measures of the Common Agricultural Policy: we cannot consider the country as a single entity when such significant differences exist in terms of crop production and livestock farming as well.

RESOURCES

Land use

Land is a primary resource of agricultural production. Agricultural land is dedicated to various agricultural sectoral activities, involving the systematic and controlled use of various life forms, especially crop and livestock production, in order to produce food. Agricultural land dominates as the primary land use category in 2020 the EU (37.8%), and in Romania (61%) as a member state as well. (EUROSTAT, 2024)

Machinery

Advantages of Agricultural Machinery lie in the fact that utilizing agricultural equipment and machinery is essential for modern crop production as well as for livestock production. With more effective use of machinery, farmers can cultivate larger areas more efficiently, resulting in higher yields while placing less strain on natural resources.
Sustainable mechanization in agriculture can enhance land productivity by ensuring timely and quality cultivation, offer opportunities to alleviate labour shortages and help households better withstand shocks, minimize agriculture's environmental impact when paired with proper conservation practices, and reduce poverty while enhancing food security and people's livelihoods. (FAO, 2024)

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Human Resources

Agriculture is considered a big employer sector in the EU: those working in the fields of crop and animal production, hunting and related service activities had a share of 4.2% out of total employed. Among all member states, Romania is the one with the highest share of those employed in agriculture: in 2020 every fifth person (20.9%) working in the country is active in the agriculture sector. (EUROSTAT, 2022) However after joining the European Union in the year 2007, Romania faces a decreasing share of those employed in agriculture as compared tot he total employed population. Back then, the share of agricultural employment was over 30%.

Wast majority of farmers activating in the EU only have practical experience. In 2020 seven farmers out of ten (72.3%) only had practical experience, almost two out of ten (17.5%) had basic agricultural training, and one in every ten (10.2%) of those managing a farm owned full agricultural training knowledge. Romania belongs to those member states where the share of fully trained farm managers is extremely low: 0.7%, while the share of those having only practical experience is the highest: 94.5%. (EUROSTAT, 2022)

AGRICULTURAL ACTIVITY

There are two basic branches of agricultural activity: crop production and livestock farming. Both crop production and livestock farming play a major role in the agricultural production. Crop and livestock production are complementary. They have a prominent statusin the economy, with certain branches of the sector providing a steady source of income and regular employment of those involved in the sector throughout the year. (Benk, 2018)

According to the data of the Romanian General Agricultural Census 2020[20], there have been a total of 2887 thousand agricultural holdings in Romania using 12.8 million hectares of agricultural land. As compared to data from the year 2010, the number of agricultural holdings decreased by 972 thousand, meaning a 25.2% decrease and the utilized agricultural area decreased by 543 thousand ha that means 4.1% during the last decade. (General Agricultural Census in Romania, 2020) Concentration process of agricultural land is noticeable in Romania. The country however occupies an extreme position in the EU taking into account the average farm size. Luca, 2009 refers to Romania as „a country with two agricultures" identifying the large amount of subsistence and semi-subsistence farms having an extremely low average farm size on the one hand, and the very few extremely large size farms on the other hand.

In order to measure the economic size of farms and to classify them by type of farming we use the calculation of Standard Output (SO). Standard output can be calculated for each agricultural product, both for crops and for livestock. SO refers to the average value in monetary terms of the agricultural output (at farm-gate price) and it is expressed either in euro per hectare or in euro per head of livestock. There are regional SO coefficients defined for each crop and for each type of animals: calculated as averages for a reference period. The economic size of a farm thus can be expressed in monetary terms, calculated in euro by summing up all the SO per hectare for each crop and all the SO per head of livestock existing in that specific agricultural unit. (Eurostat Statistics Explained, 2024)

PERFORMANCE

Labour productivity

Productivity is an important aspect in agricultural development strategies due to its impact on economic and social progress. Enhancing productivity generates the wealth needed to address

[20] As the most recent Romanian Agricultural Census data is available for the year 2020, all other datasets used in within present study refer to year 2020 (even where there were already available more recent data) for consistency reasons.

current needs and invest in future improvements. In general, productivity measures the efficiency and effectiveness of resource use to produce the goods and services society requires over the long term. Labour, capital and natural resources represent basic resource inputs for agricultural activities. (Ukeje, 2000) Among these, we considered to highlight as one of the performance indicators the labour productivity. The value of labour productivity can be calculated as the average daily value generated by an individual working in the agriculture sector.

Average net monthly salary earnings

Average net monthly salary earnings refers to all remuneration received after deduction of the employees contributions and taxes. Consequently, this reflects the average sum of money an agricultural worker earns as a disposable income each month. When analysing the sectoral performance of agriculture it is highly important to have a look at the monthly wages realised in the sector.

Agricultural enterprises

Enterprises play an essential role in sectoral performance. When analysing the agricultural sector, it is important to have a look at the number of firms operating in this sector. The calculation of agricultural enterprises per 1000 inhabitants in each county (NUTS3 level) reflect the predominancy of the agricultural sector on subregional level.

In our study we considered a total of ten indicators that cover, by theme: resources used in agriculture, agricultural activity and agricultural performance. Within these, the following have been quantified on county level:

Table 1: Indicators

	Land use	**RESOURCES**
M1	Average farm size (ha), 2020	
M2	Share of agricultural land in total land fund (%), 2014	
	Machinery availability	
M3	Number of tractors per 100 ha of arable land (tractor/100 ha), 2020	
	Human resources	
M4	Share of farm managers under 35 years with full agricultural training (%), 2020	
M5	Share of those employed in agriculture (%), 2020	
	Crop production	**AGRICULTURAL ACTIVITY**
M6	SO value of crop production (EUR), 2020	
	Livestock farming	
M7	SO value of livestock (EUR), 2020	
M8	Labour productivity in agriculture: value produced (RON/working day/person), 2020	**PERFORMANCE**
M9	Average net monthly salary earnings in the agricultural sector (RON), 2020	
M10	Number of active agricultural enterprises per thousand inhabitants (number/1000 inhabitants), 2020	

Source: Authors' own edition

PERFORMANCE

M8: Labour productivity in agriculture: value produced (RON/working day/person), 2020
M9: Average net monthly salary earnings in the agricultural sector (RON), 2020

M10: Number of active agricultural enterprises per thousand inhabitants (number/1000 inhabitants), 2020

The data used in the analysis refer to the year 2020, with the exception of the agricultural area as a percentage of total area (%), where the most up-to-date county series were available for the year 2014. The data on which our calculations are based were extracted from publications of the Romanian National Statistical Office (INS) and from its online database. We further used the county data series of the General Agricultural Census 2020 (Recensământul General Agricol) published in December 2022 and the INS TEMPO database tables. The results of the calculation of the ten indicators at county level were displayed on maps, and the Excel module of the Microsoft Office was used for data visualisation.

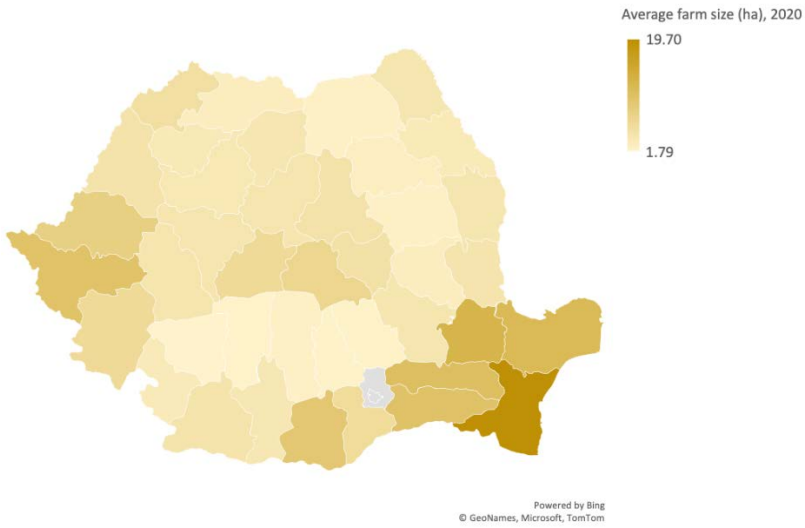
The aggregated results of a ranking on ten indicators were used for the analysis. Each indicator was calculated for each county. We deliberately excluded Bucharest and Ilfov from the county ranking, as the urban character of this region would bias our results for the agricultural performance potential study.

Results

M1: Average farm size (ha), 2020

Average of the utilised agricultural area (UAA) shows the average value of a farm. On country level, in Romania, most recent data referring to the year 2020 (RGA, 2020) shows an average farm size value of 4.42 ha. This value is considered extremely low on European level: average mean size of an agricultural holding in the EU was 17.4 ha in 2020. Romania is the Member State with the highest number of farms in the Union. The evolution of farms and farmland between 2005 and 2020 shows that largest reductions among all member states were recorded in Romania: a minus of 1.4 million farms, that equals a decline of 32 %. (Eurostat, 2022)

Map 1: Average farm size (ha), 2020



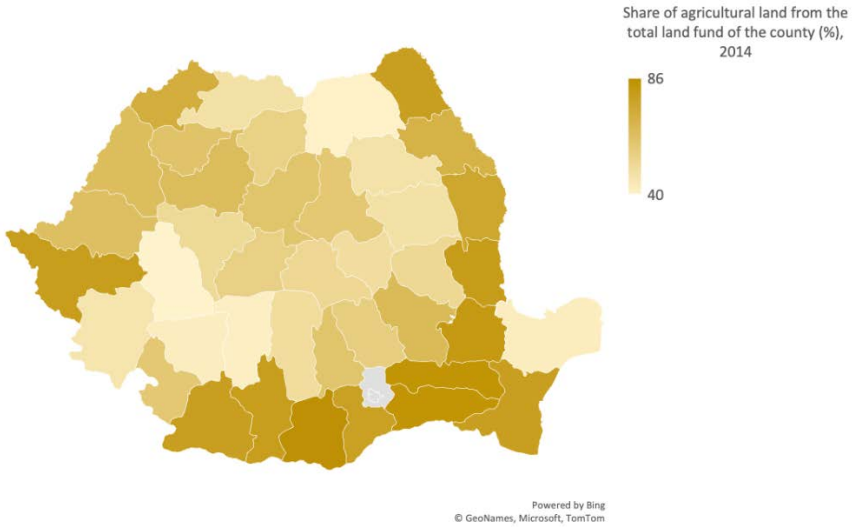
Source: Authors' own edition

Large differences on county level are noticeable in Romania regarding the average physical size of farms. Counties of the South-Muntenia and South East region as well as those of the West region have higher average physical farm sizes than the rest of the country. Highest value can be observed in Constanța county: 19.70 ha / farm, while lowest value in Gorj county: 1.79 ha / farm. (Map 1.)

M2: Share of agricultural land in the total land fund of the county (%), 2014

In terms of the share of agricultural land in the total area per county the Romanian national average is 61%. This value highlights the importance of the agriculture sector on country level. Southern and Eastern counties located along the border have higher shares of agricultural land than other counties. Teleorman is the county with the highest share of agricultural land: 86%, while Hunedoara is the one with the lowest share of the agricultural land: 40%.

Map 2: Share of agricultural land in the total land fund of the county (%), 2014



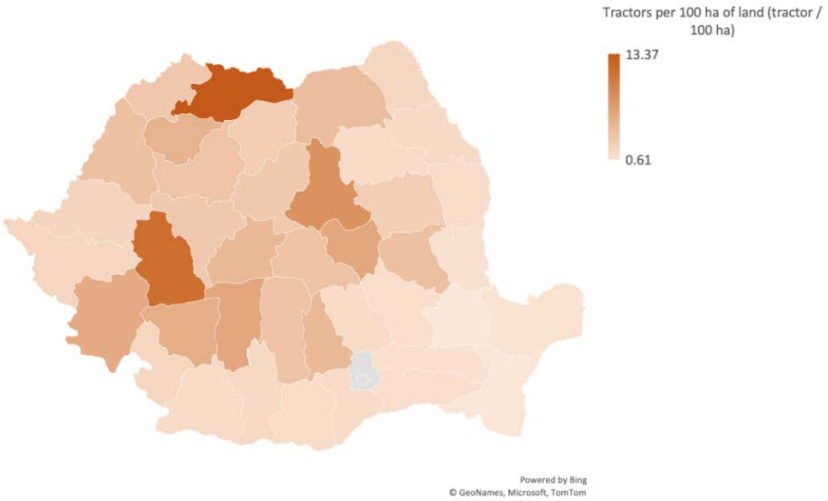
Source: Authors' own edition

When speaking about regional and cultural identity in the European Union, agricultural output, food supply as well as gastronomic traditions play a crucial role. The wide variety of agricultural products is provided by the various farming techniques as well as by various landscapes and climate conditions. In the territory of the whole Union, there have been 9.1 million farms in 2020, operating on a total area of 1.55 million km². This means that on EU level, 37.8% of the total land fund is used as agricultural area. (Eurostat, 2024)

M3: Number of tractors per 100 ha of arable land (tractor/100 ha), 2020

As an indicator of the degree of mechanisation, the number of tractors per 100 ha of arable land had been calculated in Romania, on county level. Here the statistics do not allow us to distinguish between smaller and larger machines. The level of tractor stock in Romania in 2020 clearly shows the positive results of the EU support system, i.e. the access of funds available through the Common Agricultural Policy's Rural Development pillar that were implemented in the country after its accession tot he Union, since 2007. Moreover, both quantitative and qualitative increase of mechanical resources in the Romanian agriculture were noticeable even in the pre-accession period, due to the accession by farmers of pre-accession funds. (Constantin and Ciobanu, 2011)

Map 3: Number of tractors per 100 ha of arable land (tractor/100 ha), 2020



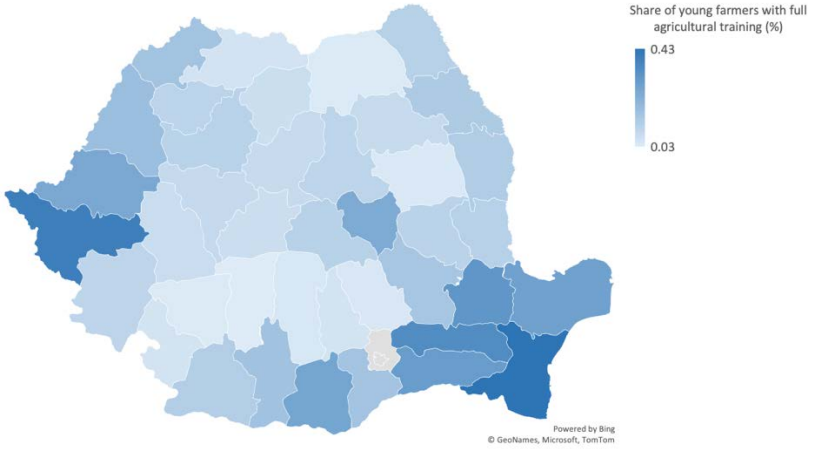
Source: Authors' own edition

On average, in Romania, in 2020 there were 2.48 tractors available for each 100 ha of arable land. No additional technical information was available regarding the capacity of these tractors. Maramureș was the county with the highest average value: 13.37 tractors / 100 ha of arable land, while Brăila was the one with the lowest level: 0.61 tractors / 100 ha of arable land.

M4: Share of farm managers under 35 years with full agricultural training (%), 2020

When analysing the human resource potential in agriculture, we considered the share of young and fully trained farmers in the year 2020 as a forward looking indicator. Romanian county values show extremely low levels in this respect. National average is as low as: 0.12%. Highest value belongs to Constanța county: 0.43%, while lowest value belongs to Vâlcea: 0.03% of young farm managers are fully trained in agricultural studies.

Map 4: Share of farm managers under 35 years with full agricultural training (%), 2020

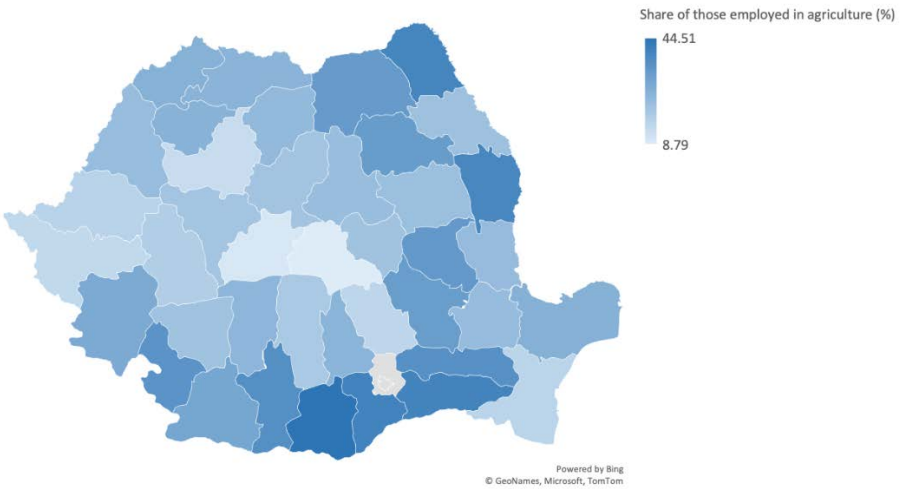


Source: Authors' own edition

M5: Share of those employed in agriculture (%), 2020

Agricultural sectoral employment has been traditionally high in Romania, and still is, however with a decreasing trend in the last decades. In 2020 the share of those employed in the agricultural sector was 19.92%. Large differences are noticeable when we take a closer look on the country, as on county level the share of agricultural employment is 44.51% in Teleorman county on the one hand, and is 8.79% in Brașov county on the other hand. Geographycal factors as well as the predominance of other sectors contribute to very diverse levels of agricultural employment in Romania. Southern and Eastern development regions of the country have generally higher values of agricultural employment than other ones.

Map 5: Share of those employed in agriculture (%), 2020

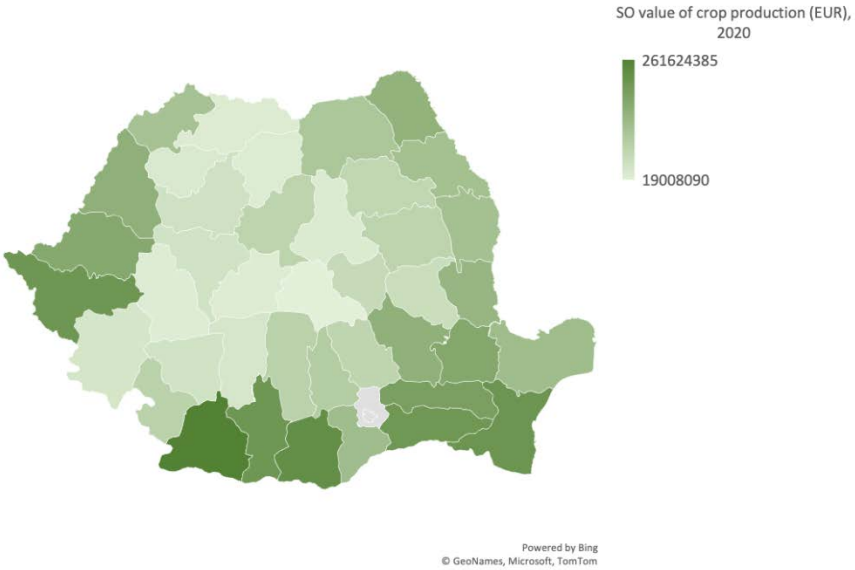


Source: Authors' own edition

M6: SO value of crop production (EUR), 2020

We considered important to calculate the size of crop production in Romania in economic terms. For this, we have chosen the following crops: wheat, maize, sunflower, rapeseed, potato. These are the predominant crops, that occupied more than 70% of arable land countrywide, in 2020. We calculated an average wighted SO value of crop production for the above mentioned five types of crops and for each county. Our results show a national total crop output value of 4.46 billion EUR in terms of Standard Output in Romania. The county with the highest crop production value was Dolj: 0.26 billion EUR, while the county with the lowest level of crop production was: Brașov with 0.02 billion EUR.

Map 6: SO value of crop production (EUR), 2020

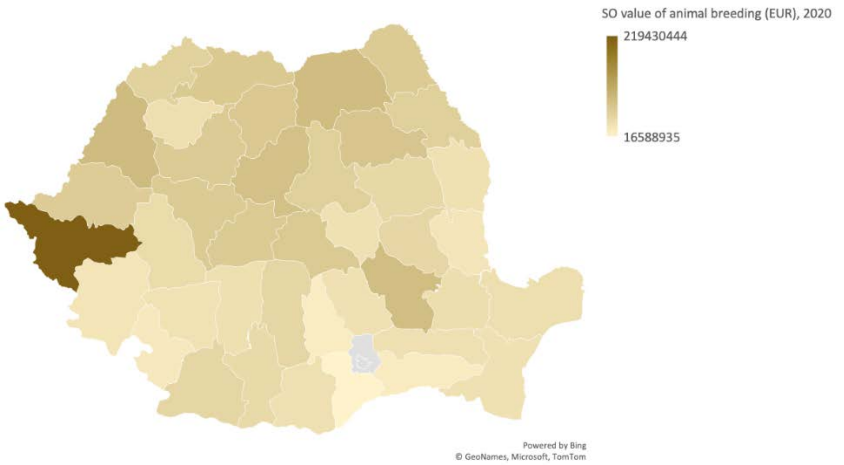


Source: Authors' own edition

M7: SO value of livestock (EUR), 2020

We also considered essential to calculate the economic size of livestock production in Romania. For this, we took into account the following livestock units: cattle, sheep, goat and pig, calculating their values using SO coefficients for each category. These animals are predominat in the Romanian agriculture. Their total value countrywide means in terms of SO 2.40 billion EUR. Timiș county is the one with the highest value of livestock SO in Romania: 0.22 billion EUR in 2020, while Giurgiu is the county with the lowest value, that of: 0.017 billion EUR.

Map 7: SO value of crop production (EUR), 2020



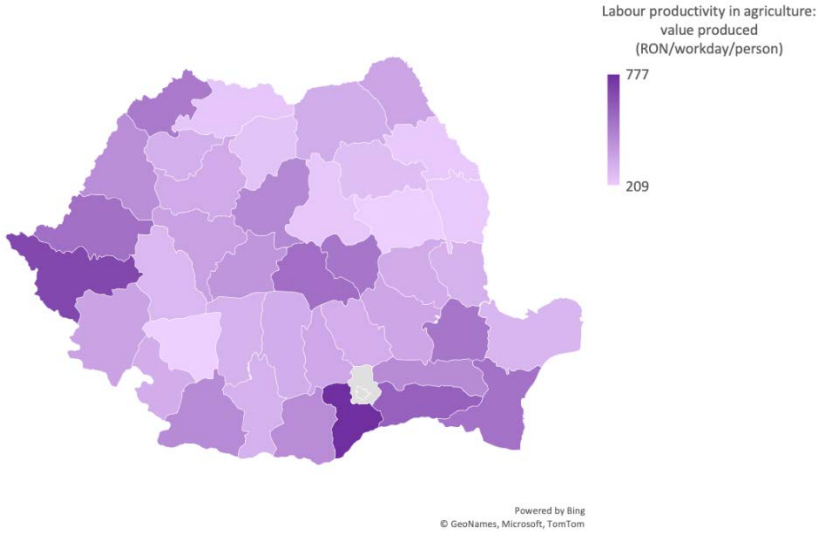
Source: Authors' own edition

When analysing the evolution of livestock units during Romania's post-accession period, we notice between 2007 and 2020: a general decreasing trend of cattle with 33%, a general decreasing trend of pigs with 43% and an oscillating trend of sheep and goats with an increase of 27%. (INS, 2023)

M8: Labour productivity in agriculture: value produced (RON/working day/person), 2020

In the performance indicator group, we first looked at the value produced by a person working in agriculture sector on an average working day. This was measured in monetary terms. Compared to the national average in the year 2020, which was 368 RON, in Bacău county this value was only 209 RON, while in Giurgiu county it has been 777 RON. It is noticeable that there are large territorial differences regarding the daily value produced in the agriculture sector in Romanian counties.

Map 8: Labour productivity in agriculture: value produced (RON/working day/person), 2020

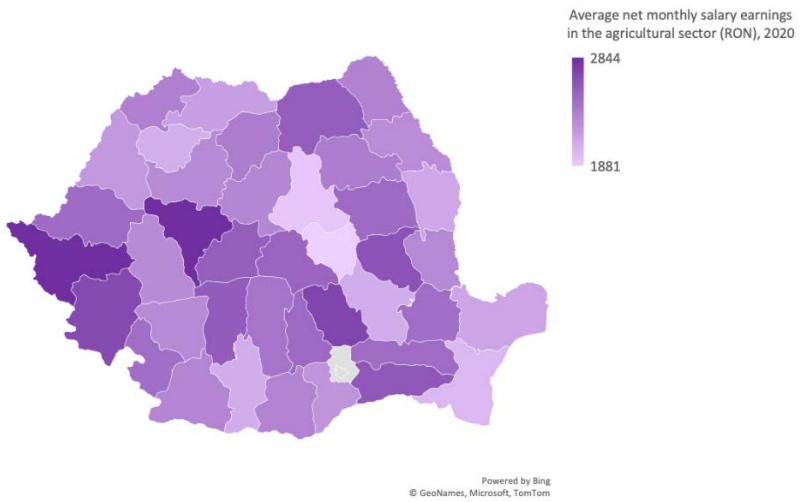


Source: Authors' own edition

M9: Average net monthly salary earnings in the agricultural sector (RON), 2020

Our second performance indicator is the average net monthly salary earnings in the agriculture sector in Romania on county level. In terms of average gross monthly wages those realised in the agricultural sector are considerably lower than the country average considering all sectors. Sectoral data of the Romanian Statistical Yearbook 2020 shows that the average gross monthly salary earning was 4853 RON, with a value of 3773 RON in the Agriculture, forestry and fishing sector. In the same year average gross monthly earnings in Romania in the Information and communication sector was: 9012 RON, in the Financial intermediation and insurance sector 8269 RON, while in the Public administration and defence sector was 8234 RON. (Statistical Yearbook, 2020)

Map 9: Average net monthly salary earnings in the agricultural sector (RON), 2020



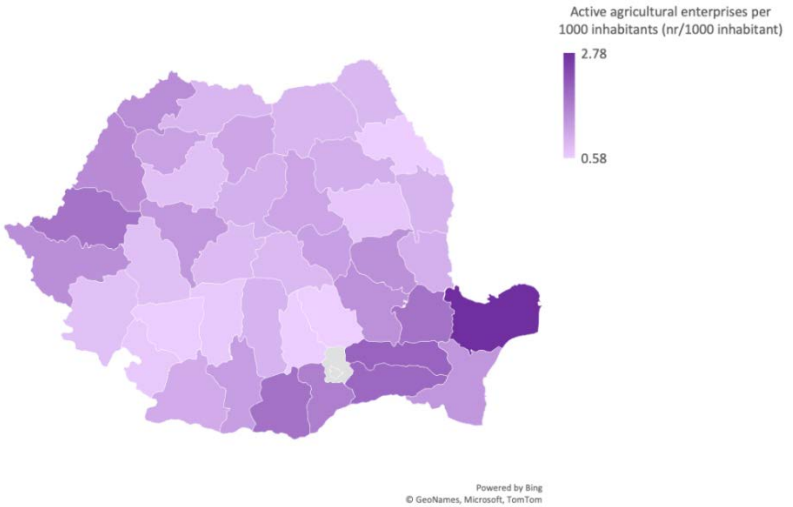
Source: Authors' own edition

Taking into account gross net monthly salary earnings in the Agriculture, forestry and fishing sector in Romania, the average national value in year 2020 was 2412 RON. Territorial differences are noticeable in terms of the farmers net monthly earnings: highest value in Alba county: 2844 RON, while lowest value in Covasna county: 1881 RON.

M10: Number of active agricultural enterprises per thousand inhabitants (number/1000 inhabitants), 2020

The number of active agricultural enterprises per thousand inhabitants is generally low in Romania: 1.03 enterprises/1000 inhabitants. We detected highest value in Tulcea county: 2.78 agricultural enterprises/1000 inhabitants, lowest value in Prahova county: 0.58 enterprises/1000 inhabitants.

Map 10: Number of active agricultural enterprises per thousand inhabitants (number/1000 inhabitants), 2020



Source: Authors' own edition

RESULTS AND CONCLUSION

We have calculated the county rankings for all ten indicators. The best performing county received 40 points and the worst performing county received 1 point for each indicator. The scores for each indicator were summed up in order to give a final score for each county, which gives us an indication regarding the agricultural performance and potential.

Territoarial differences on subregional level are noticeable regarding the agricultural performance and potential of the Romanian counties. This diversity should be reflected in the measures of the National Rural Development Programme. Common Agricultural Policy funds should also target specific needs of different counties regarding their agricultural performance and potential. One national strategic agricultural policy would not fit the specific needs of the development regions. It is questionable whether LEADER Funds within the CAP are enough to meet these specific sub-regional level agricultural and rural development needs in Romania or more funds should be allocated for these purposes. Further research should be made in order to analyse the evolution in time of the agricultural performance and potential of the Romanian counties. The analysis of the absorption of CAP funds should also be analysed in time within the framework of further research in order to detect whether the gap between low potential regions and high potential regions is shrinkening or enlarging. To study whether agriculturally rich regions become richer, and poor regions become poorer as time goes by.

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Leveraging Digital Transformation for Enhanced ESG Performance

Digital transformation plays an important role in achieving ESG (environmental, social and governance) goals, as modern technologies support sustainability efforts. Digital tools such as cloud computing, smart robotics and IoT enable companies to manage their resources more efficiently, reduce their environmental footprint and operate more transparently. The aim of this study is to explore how digitalisation contributes to the success of ESG strategies, in particular environmental sustainability, and how it helps companies to achieve their sustainability goals, focusing especially on Hungarian companies.
Key words: digital transformation, information and communication technologies (ICT), ESG, environmental sustainability
JEL code: M14, Q56

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1. Introduction

At the UN summit in September 2015, the world's 193 member states pledged to end poverty, fight injustice and tackle climate change. The 2030 Agenda (United Nations, 2015) was adopted, setting out sustainability goals in 17 areas to guide countries, regions, organisations and companies on how to protect the planet and achieve social and economic prosperity.
The European Union will set further targets for its Member States under the Green Deal and provide solutions and tools to achieve them. The European Green Deal aims to "transform the EU economy into a modern, resource-efficient and competitive economy" (European Commission, 2019). In their study, Papp et al. (2022) point out that the state and central institutions must also play an active role in the green economic transition. This requires a financial system that integrates sustainability aspects into capital allocation decisions and provides financial resources to support industries using environmentally friendly technologies.
Some studies (Raihan and Tuspekova, 2022) and (Lopolito et al., 2022) see the realisation of sustainability through technology. Hódiné (2023) identifies technology as a key element of an integrated model of sustainability. It expands the traditional dimensions of sustainability - environmental, social and economic - with additional aspects such as human, corporate, political/governance, cultural and technological (*Figure 1*). And "*technology permeates and supports the whole sustainability framework, as it is the basis and also one of the tools for achieving sustainability*" (Hódiné, 2023). While (Kocziszky & Szendi, 2023) emphasizes the importance of conducting both ex-ante and ex-post sustainability assessments to ensure that development projects are sustainable and effective in the long term.

The importance of technological innovation, including digitalisation, is also highlighted by the EU in its "European Digital Decade" (European Parliament and Council, 2022) and "Digital Agenda 2030: A European way to achieve the Digital Decade" (European Commission, 2021a). As it writes: "*Digital technologies such as artificial intelligence, 5G, cloud computing, edge networking and the Internet of Things can accelerate and maximise the impact of climate and environmental policies. Digitalisation also offers new opportunities for remote monitoring of air and water pollution, and for monitoring and optimising the use of energy and natural resources*". In these Communications, the European Commission also stresses the need for Europe to take advantage of the opportunities offered by the digital switchover, which is also essential to

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achieving sustainability objectives. Recognising that sustainability and digitalisation are not only two priority areas for the EU economy and competitiveness, but also mutually supportive and interlinked issues, the EU published in 2022 its strategic report "Aligning the green and digital transition in the new geopolitical environment" (European Commission, 2022), which identifies areas where digitalisation can support sustainability and the achievement of sustainability goals by helping to achieve climate neutrality, reduce pollution, restore biodiversity, greener transport, green buildings, smart agriculture and green energy.

Figure 1: Eight dimensions of sustainability
Source: Hódiné, 2023

IT and digitalisation therefore contribute significantly to the achievement of sustainability goals by improving resource efficiency, helping to protect the environment and reducing environmental impacts in different sectors of the economy. The link between digitalisation and sustainability has been explored in several studies, such as (Brenner & Hartl, 2021), (Del Río Castro et al., 2021) and (Irajifar et al., 2023).

2. Literature review

Businesses have a key role to play in achieving the goals set in today's rapidly changing world of sustainability and digitalisation. Sustainability and digital transformation are becoming increasingly important for businesses as well, as they have a significant impact on the long-term success and growth of organisations. Several studies have addressed the relationship between sustainability and digitalisation in the corporate context, for example (Cai et al., 2023), (Dabbous et al., 2023), (Broccardo et al., 2023) and (Lipták, 2024).
ESG is a company-level approach to sustainability (BÉT, 2021), which includes factors that assess the non-financial performance of companies, that is Environmental, Social and Governance. In the long term, companies that integrate ESG aspects into their corporate strategy will remain competitive. However, new tools and methods are needed to achieve the new objectives. In this process, digitalisation and the exploitation of the opportunities offered by digital transformation can be an effective way to achieve ESG goals, especially as the use of technology is key to the long-term sustainable operation of companies, as these two major challenges of our time are increasingly interlinked. Information and Communication Technologies (ICT) and digitalisation play a significant role in achieving sustainability goals, taking into account social, environmental and economic aspects, although primarily supporting environmental goals (Vacchi et al., 2021), (Charfeddine & Umlai, 2022), (Horváth et. al. 2023) and (Qayyum, et al., 2024).

For companies, environmental sustainability, or the "E" leg of ESG, means that they need to consider and mitigate not only direct but also indirect environmental impacts. In other words, it is not enough for a company's operations to be environmentally sustainable, the products produced, and services provided must also be sustainable (Hódiné, 2022). Digitalisation enables companies to operate more efficiently and sustainably, minimising environmental pressures and reducing social and environmental risks, while contributing to environmental measures and sustainability goals.
The WEF (2021) has published a guide entitled "Bridging Digital and Environmental Goals" to help business leaders align their digital and environmental goals to achieve results that serve both sustainability and business interests. The recommendations are built around seven digital transformation dimensions (*Table 1*).

Table 1: The seven business dimensions of digital transformation in achieving ESG goals

Business dimension	From…	To…
New value	A linear value chain, shareholder value	A dynamic value map, stakeholder value
Business models	Digital channels for products	Data-led services or outcomes, digital ecosystems
Operating models	Hierarchical, isolated, on-premise	Agile, AI-enhanced, platform-based
Supply chain	Globalized, low-cost, just in time	Localized, resilient, efficient, ethical
Decision-making	Manual, based on historical data	Predictive, real-time, intelligent, at the edge
Finance/investments	New tech capabilities and growth objectives	De-risking cost/revenue, finding new revenue, hitting ESG targets
Talent	Closing known skill gaps	An elastic, rapidly upskilled digital workforce, talent-on-demand models

Source: WEF, 2020, p.8

According to a survey of Bain & Company and the World Economic Forum (Anderson & Caimi, 2022), the main areas where digitalisation will help companies to achieve their sustainability goals are:

- strengthen data privacy and security;
- optimize resources;
- enhance employee work and safety;
- enable data gathering and storage;
- increase energy, water, or fuel efficiency;
- upgrade product safety;
- facilitate new hybrid working models;
- optimize processes;
- reduce carbon emissions;
- make supply chains traceable and transparent.

3. Material and methods

In 2021, the European Commission carried out a survey under the "Business survey on the use of digital technologies" programme, which focused on the use of information and communication technologies (ICT) by firms and their environmental actions. This is the first EU-wide study to explore how digital technologies support the environmental sustainability of businesses in the EU and how this could be further strengthened in the future.

The study covered the use and impact of the following digital technologies:

- The Internet of Things (IoT)
- Management Information System
- Transaction platforms
- Collaboration platforms
- Intelligent robotics
- Audiovisual technologies
- Artificial intelligence
- Cloud computing or cloud storage

The survey was carried out between 25 January 2021 and 29 March 2021, covering 29 countries in Europe, the EU 27 plus Iceland and Norway, and involving nearly 10,000 businesses (European Commission, 2021b).In this study, we used this EU survey database to find out what digital technologies are used by Hungarian businesses, what they do with them and how they use them to protect the environment. By analysing the data, we can gain valuable insights into the relationship between the use of digital technologies and sustainability. Our research analysed the main reasons for the adoption of digital technologies by European companies, especially in Hungary, and their impact on environmental sustainability. For data analysis and visualisation, we used several different digital tools. For data preparation, initial processing and some visualisations we used Microsoft Excel, while for other visualisation charts we used the RStudio and Microsoft Power BI environment, which allowed for easy-to-understand, interactive visualisation.

4. Results

Based on the topic of our research, we investigated the following areas: the main reasons for the use of digital technologies by European companies, with a focus on Hungary, and the impact of digital technologies used by companies on the environment and environmental sustainability.

4.1. Main reasons for using digital technology in European companies

First, we look at the reasons why companies use digital technologies and the areas where digitalisation is taking place in their operations. This is shown in *Table 2*, broken down by company size. Based on the survey, the following reasons were identified by companies, ranked in order of importance. The results of the research show that, overall, large companies have a higher-than-average identification with the motivations examined in the study. When analysing the specific data, the development of products and services emerged as the top priority for all business categories, with 76% of large enterprises and 66% of micro enterprises, particularly in supporting digitalisation. In addition, sustainability considerations, such as “ecological” motivations for the use of ICT technologies, were also more frequent among large enterprises. The results clearly show that both the adoption of digitalisation and its economic role increase with the size of the company.

Table 2: Main reasons for digital technology use by company size (% of companies)

Description	Micro	Small	Medium-sized	Large enterprise
Improve products or services	66	71	72	76
Reduce operating costs	67	69	73	76
Opportunities to grow the business	63	67	70	70
Capture information or metrics	64	68	67	68
Improve customer experience	58	61	62	65

Description	Micro	Small	Medium-sized	Large enterprise
Decrease environmental footprint	57	58	60	62
Increase sales	53	57	53	54
Virtualise products/services	45	45	46	54
Reduce the use of raw materials or other inputs	40	42	44	47
Reorganise value chain	37	40	45	46

Source: edited by the authors based on European Comission, 2021b, N=3404

Overall, large enterprises are integrating digital technologies more intensively and more widely into their business processes, thus exploiting the opportunities offered by digitalisation to a greater extent than smaller enterprises. The study by (Csiszár, 2023) also emphases that the uptake of digital technologies by businesses remains uneven, varies depending on the technology concerned and varies significantly between Member States and economic sectors.

4.2. Main reasons for using digital technology in Hungarian companies

We examined the main reasons for digital technology use in domestic firms relative to the 27 EU Member States (*Figure 2*). The results illustrate the percentage of firms that identified the following factors as reasons for technology use. When comparing the data, we see that while EU companies use digital technologies primarily to improve products or services, reduce their operating costs (70-70%) and grow their business, in contrast to the EU average, domestic companies use digital technologies mainly to capture information and metrics and decrease their ecological footprint (59%). The least important aspect for companies in both the EU and Hungary is the reorganisation of the value chain. The biggest difference in the reasons given by EU and domestic companies is also found in this area and in the improvement of products or services.
It may be interesting to note that while in the EU27, product/service development is the main reason, it is not present at all in Hungary's top three. Likewise, reducing the ecological footprint is a top priority for Hungary, but does not feature in the EU27 top3.

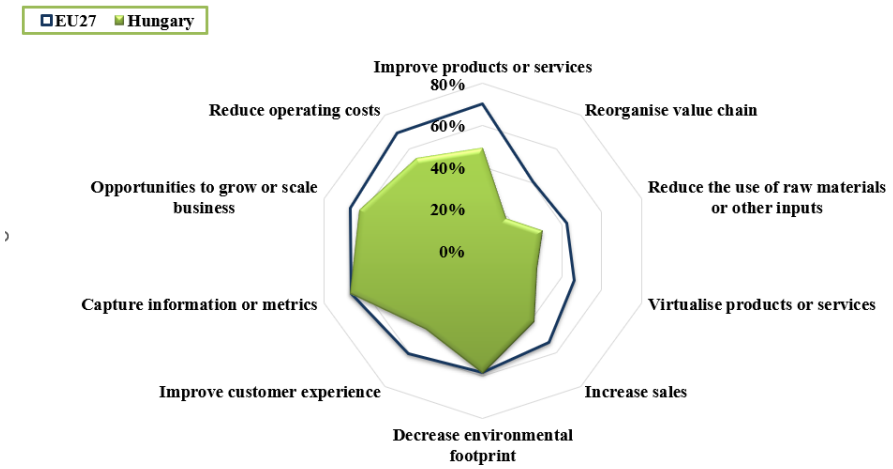

Figure 2: ***Main reasons for using digital technology***
Source: edited by the authors based on European Commission, 2021b N=604 (HU); N=3404 (EU27)

4.3. The impact of digital technologies on your company's environmental footprint

The authors examined how companies perceive the impact—whether positive or negative—of the digital technologies they employ on their environmental footprint, underscoring that these perceptions may not necessarily reflect the actual environmental consequences. The figures below (*Figures 3 and 4*) show the results for each technology, according to whether businesses judged it to have a positive impact, a negative impact, neutral (that is no impact) or could not know it. In the figures, each technology is ranked in descending order of high positivity value, illustrating which technologies are perceived to have a greater impact on the environmental footprint of the business. The findings indicate that collaborative platforms hold a prominent position among ICT tools utilized by businesses, specifically as digital technologies with the most substantial positive influence on reducing environmental footprints. Seventy-eight percent of EU enterprises evaluated the environmental impact of collaborative platforms as either very positive or highly significant. Subsequently, cloud computing and smart robotics exhibited significant beneficial effects. In contrast, the adverse environmental effects linked to these technologies were negligible.

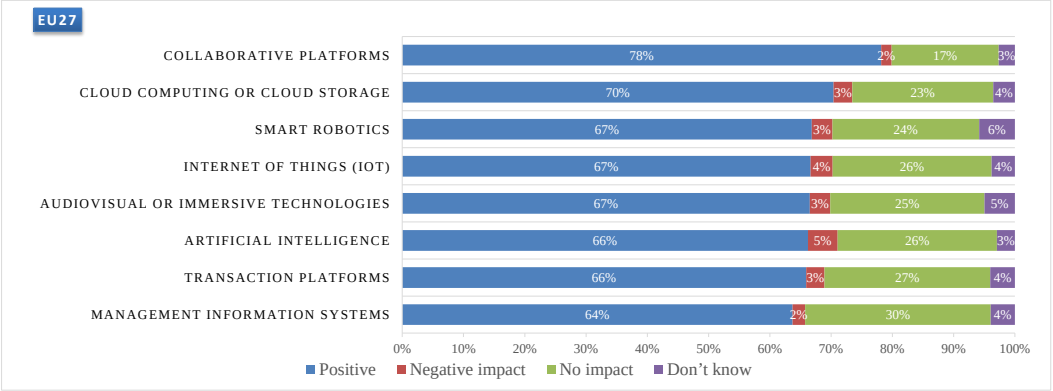

Figure 3: The impact of applied digital technologies on the environmental footprint, EU27

Source: edited by the authors based on European Commission, 2021b, N=3404

However, 5% of businesses using artificial intelligence and 4% of those using the Internet of Things reported that the use of these technologies had a negative impact on the environmental footprint of their business. However, collaboration platforms (2%) and management information systems (2%) have the least negative impact on the environmental performance of companies. The research did not provide a detailed explanation of the precise nature of the negative impacts and although only a small percentage of businesses report that these technologies have a negative effect, the actual environmental costs could be significant. For instance, artificial intelligence relies heavily on data centers, which consume vast amounts of electricity and require significant cooling, leading to substantial carbon dioxide emissions. Similarly, IoT devices often lead to increased electronic waste and their production involves the extraction of rare minerals, which has considerable environmental impacts.

Comparison of EU results with domestic outcomes reveals the following trends. In general, Hungarian companies rated the use of the above-mentioned digital technologies as having a lower impact on their environmental performance than the EU average. The largest difference is in the case of artificial intelligence, as Hungarian companies overall perceive artificial intelligence as having the least positive impact on reducing their environmental footprint of all digital technologies, with many even rating it as having a negative impact, but with the highest proportion of companies unable to assess the impact of the technology. There is also a mixed picture of which

types of ICT are most positively assessed in each country as having an impact on business performance. When looking at the top 3 areas in the EU27 and Hungary, collaboration platform leads, followed by cloud computing, management information systems in Hungary comes third and smart robotics in the EU. In Hungary, the most divisive area is in the assessment of the potential of artificial intelligence, with the highest perception of negative impact and the highest uncertainty in this category, with a quarter of businesses unable to assess whether ICT has any impact on their environmental performance.

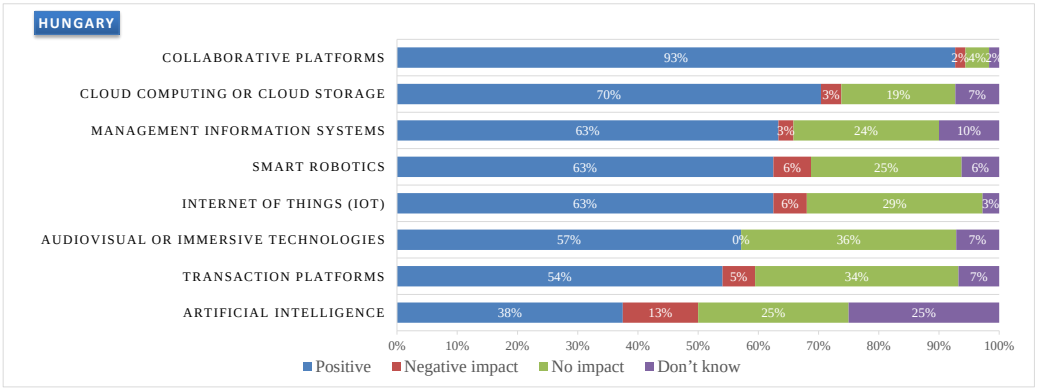

Figure 4: Impact of applied digital technologies on the environmental footprint in Hungary

Source: edited by the authors based on European Commission, 2021b, N=604

Figure 5 below shows companies' views on the extent to which they agree that the digital technologies used by their company can have an impact on different environmental dimensions. The figure shows the percentage of respondents who fully or partially agree with the statement. Pollution prevention, greenhouse gas reduction and climate change management show the highest percentages. EU27 companies tend to show higher levels of agreement than Hungarian companies on all environmental dimensions, which may indicate either a higher level of digital inclusion or greater confidence in the environmental benefits of digital technologies. The biggest differences are observed in the protection of biodiversity and the sustainable use of water resources, which can probably be explained by territorial characteristics.

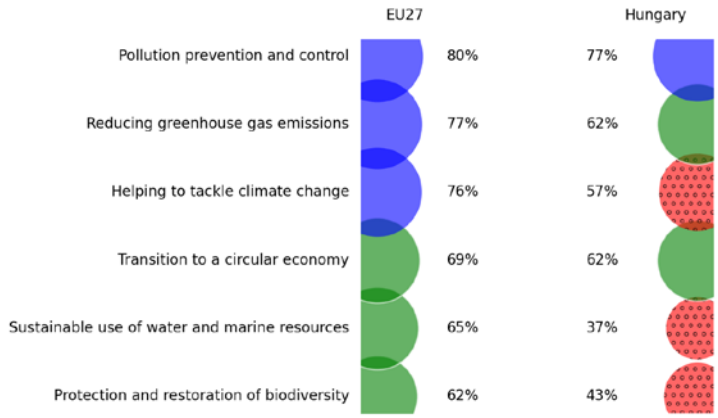

Figure 5: Assessing the environmental impact of digital technologies

Source: edited by the authors based on European Commission, 2021b, N=604 (HU); N=3404 (EU27)

Overall, the data reflect a strong link in the potential of digital technologies to address environmental challenges. Differences between Hungary and the EU in general may reflect differences in technology adoption, sectoral composition or environmental policy focus. Further studies may be useful to better understand and address these factors. The survey also looked at the areas where digital technologies used by companies have helped them.

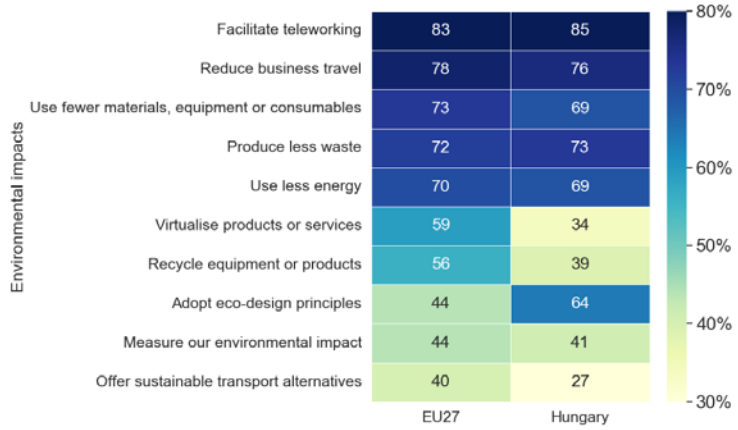

Figure 6: Impact of digital technologies on environmental sustainability, EU27-Hungary

Source: edited by the authors based on European Commission, 2021b, N=604 (HU); N=3404 (EU27)

Figure 6 shows the proportions of businesses that answered yes to the question that digital technology had helped them in this area. Of these areas, EU businesses reported that digital technologies helped them most in facilitating teleworking (83%) and reducing business travel. In addition, the areas of using less materials, less waste or using less energy were also mentioned relatively often by businesses. According to EU companies, ICTs contributed least to sustainable transport alternatives (40%), adopting green design principles and measuring environmental impact. Hungarian companies are around the EU average in terms of the areas where digital technologies help them, with only a few areas that differ, one positive and three negative. Hungarian companies are well above the European average in adopting eco-design principles, while they are well below the European average in virtualisation of products or services, recycling of equipment or products and sustainable transport alternatives.

The authors analyzed the relationship between digital technologies and environmental measures (*Figure 7*) by assessing levels of agreement with specific statements. *Figure 7* illustrates the proportion of responses indicating either a strong or moderate level of agreement, highlighting the perceived alignment between digital technology adoption and positive environmental outcomes.It appears that businesses have different views on the link between digital technologies and sustainability. The analysis reveals that over half of Hungarian businesses recognize digital technologies as accelerators of environmental initiatives. Examining the frequency of environmental actions among businesses, findings indicate that highly proactive companies in environmental matters are more likely than average to support both positive views on digital technology's role. The study also explores how EU businesses utilize ICT to advance environmental sustainability. In Hungary, businesses report a lower perception of digital technologies' impact on their environmental footprint (73%) compared to the EU27 average (81%).

Additionally, the influence of environmental objectives on technology choices appears consistent across both groups, suggesting a comparable integration of sustainability factors in technology-related decisions. However, technology acceleration driven by environmental measures is notably

lower in Hungary (46%) than the EU27 average (60%), possibly reflecting a slower pace of green innovation adoption.

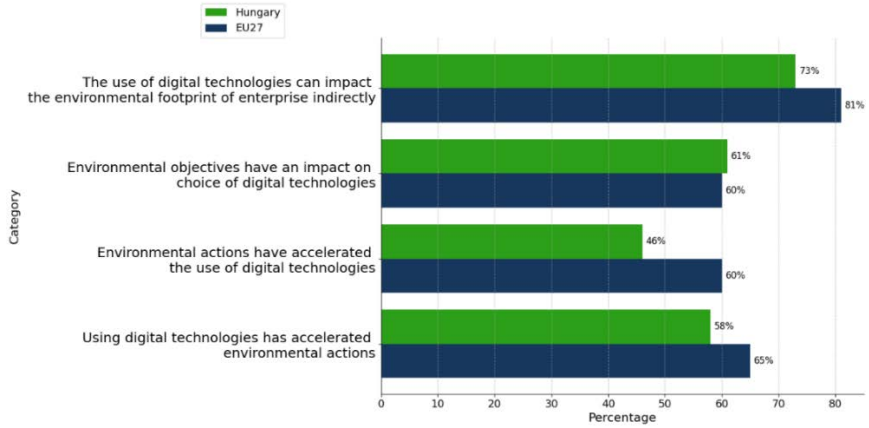

Figure 7: The link between digital technologies and environmental measures
Source: edited by the authors based on European Commission, 2021b, N=604 (HU); N=3404 (EU27)

The impact of digital technologies on environmental protection measures is also lower in Hungary compared to the EU27, which may indicate that the introduction of digital tools has not triggered as much environmental improvement in Hungary as the EU average. Overall, these results suggest that more attention needs to be paid to the integration of digital technologies and environmental protection in Hungary to ensure that innovations contribute more effectively to achieving sustainability goals. This issue was also examined in terms of how the degree of digitalisation influences the results obtained. The results show that, in line with the EU average, both less digitised and highly digitised companies are slightly more likely to say that the use of ICT has accelerated their environmental activities, rather than that environmental measures have accelerated the use of ICT. The level of agreement for each statement varies depending on the digital intensity of the business. Highly digital businesses are more likely to acknowledge the link between digital technologies and sustainability. This comparative analysis shows that the link between digital technologies and sustainability may vary across countries and that the level of agreement may partly depend on the digital sophistication and environmental sensitivity of businesses.

5. Conclusions

The study supports the claim that the use of ICT plays a significant role in the environmental sustainability actions of EU enterprises. The research has shown that while ICT can significantly enhance environmental performance by optimizing resources and reducing carbon footprints, the actual utilization and effects of such technologies can be inconsistent across different enterprises sizes and sectors. Larger enterprises are more likely to integrate digital technologies extensively into their operations, realizing greater benefits from digitalization compared to smaller companies. Digital technologies effective adoption and the realization of potential benefits depend greatly on company size and the capacity to implement such technologies. Enterprises, especially in Hungary, should invest in thorough impact assessments of their technology use to ensure that the environmental benefits are maximized and the adverse effects are minimized. Furthermore, the comparison between EU and Hungarian companies reveals that Hungarian firms are somewhat behind in acknowledging the environmental benefits of digital technologies, particularly in areas like artificial intelligence where there is a significant perception of negative impact. This indicates a need for Hungarian companies to enhance their understanding and management of digital tools

to better align with environmental sustainability practices observed in other EU countries. This analysis also points to a broader implication for policy-makers and business leaders: to foster an environment where digital technologies are not only adopted but are also effectively utilized to advance sustainability objectives. Encouraging the adoption of green ICT practices, supporting smaller enterprises in their digital transformation, and promoting rigorous impact assessments could bridge the existing gap between perceived and actual impacts of digital technologies. The results will allow companies to further develop their use of digital technologies for sustainability, which could contribute to improving the environmental performance of the whole region.

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György Kocziszky[23] - Zsolt Harangozó[24]

The Role and Sustainability of Social Enterprises in the Hungarian Economy

The economies of the Central and Eastern European countries have suffered a significant decline as a result of the geopolitical changes of 1989-90. A number of enterprises with low efficiency, obsolete technology and product structure closed down. The lack of new productive capacity led to a sharp rise in unemployment. The recession, inflation and employment problems particularly affected Hungary's regions. A series of social enterprises have been set up to improve employment in disadvantaged municipalities, as a result of local and government initiatives. In their study, the authors review their spatial distribution, their impact on the local economy and society, and the challenges related to the sustainability of their operations.
Keywords: social innovation, disparity, sustainability, Entrepreneurship
JEL-CODE: O35, Q56, L31, M14

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Introduction

The output of the economies of Central and Eastern European countries, the competitiveness of products and services declined significantly as a result of the geopolitical changes that took place in 1989-1990. A series of companies with low efficiency, outdated technology and product structure have closed. Due to the lack of new production capacities, unemployment has skyrocketed. Recession, inflation and employment problems did not affect regions Hungary same extent. In the former so-called heavy industrial areas, a number of mines and metallurgical plants have closed. As a result, unemployment in these cases was higher than the national average.
In order to improve employment in disadvantaged areas and settlements, local and government initiatives have led to the establishment of a series of social enterprises since the early 2000s. However, some of them became inoperable after the end of the subsidy period and were liquidated. In their study, the authors analyse the territorial distribution of social enterprises in Hungary, the reasons for their choice of location, their impact on the local economy and society, and the challenges related to the sustainability of their operations. Our aggregate sustainability index, calculated on the basis of our questionnaire survey, confirms that the sustainability of enterprises consciously generating social innovations and striving for renewal is better than that of enterprises lacking innovation.
Hungary economic, employment and demographic structure has changed as a result of geopolitical changes after 1989. The loss of Eastern European markets has exposed shortcomings in the international competitiveness of domestic products. The decline in economic output has affected different regions of the country differently. In the eastern part of the country, where heavy industry (mining and metallurgy) used to dominate, the crisis was more severe, while the western part of the country was able to regenerate faster with the appearance of foreign capital.
As a result, a vicious circle of the economy developed in the eastern part of the country: the shrinking employment capacity of traditional manufacturing industry meant that the low-skilled became unemployed and then long-term unemployed. At the same time, the number of people living below the poverty line increased, private consumption fell, which had a negative impact on production, etc. Nearly 60% of the higher-skilled workforce left these regions in search of a better living.

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Literature background of the topic, research questions

The concept and idea of social (social) innovation and entrepreneurship appeared in the literature in the second half of the 1980s. The aim is to bring disadvantaged groups back into the world of work and to provide them with income through new and novel, i.e. innovative solutions.
There are many definitions of social innovation in the literature. *Kocziszky et al*. (2017) define social innovation as a concept that aims to help groups lagging behind, in difficulty, and to develop and apply new and novel employment solutions, structures and incentives.
According to *Ziegler* (2017) "Social innovation is the implementation of new combinations of capabilities" (p. 256).
According to *Howaldt and Schwarz* (2010, 2016), social innovation is a new combination of social action. Innovation is therefore social in the sense that it is socially accepted. This definition is also used by *Agostini et al.* (2019) and *Kaletka et al.* (2012).
According to the *Stanford Center for Social Innovation* (2009), it is a new solution to a social problem. This definition is also used by *Prasad and Manimala* (2018) and *Svensson and Bengtsson* (2010).
According to *Phills, Deiglmeier, and Miller* (2008), it is a novel solution to a social problem that is more efficient and sustainable than existing solutions, and the value created affects society as a whole, not individuals. This definition is also used by *Prasad and Manimala* (2018) and *Scaffidi* (2019).
Moulaert, MacCallum, Medmood, and Hamdouch (2013): considers practices related to certain forms of social justice and the transformation of existing power relations as social innovation. This definition is also used by *Pradel-Miquel* (2017).
According to *Neumeier* (2016), social innovation is a change in the attitude, behavior or perception of a group of people through the interconnection of a network of coordinated interests that, relative to the horizon of the group's experience, lead to new and improved ways of collaborative action within and beyond the group. This definition is used by *Soma et al.* (2018).
According to *Mulgan, Tucker, Ali, and Sanders* (2007), social innovation is a set of innovative activities and services that are motivated by the satisfaction of social needs and are predominantly developed and disseminated by organizations whose primary goals are social in nature. This definition is also used by *Prasad and Manima* (2018).
European Commission (2010): Social innovation is a new idea that seeks to urgently address unmet needs. Innovations that are social in both their ends and means. Social innovations are new ideas (products, services and models) that simultaneously meet societal needs (more effectively than alternatives) and create new social relationships or collaborations. This definition is used by *Heinze and Naegele* (2012).
Nelson and Sampat (2001): includes social technologies such as forms of division of labor and modes of coordination.
Our literature analyses clearly confirm that since the early 2000s there has been a sharp increase in the number of studies dealing with social innovation, including its economic issues. (Figure 1)

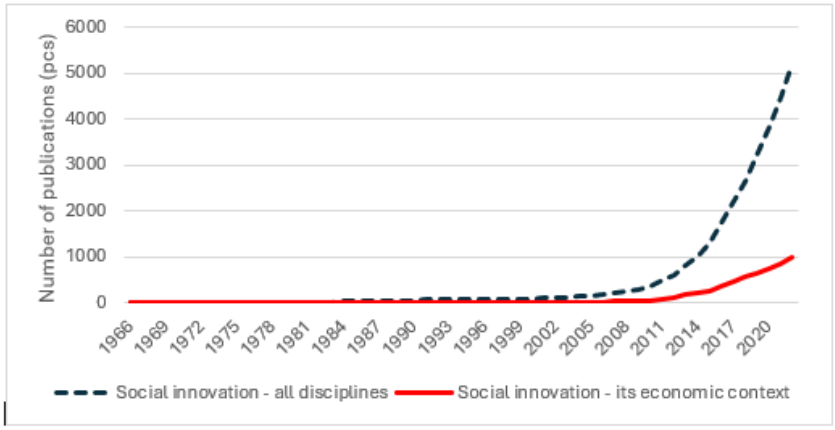

Figure 1: Development of the number of relevant publications (1966-2022) - (pcs)

Source: own editing

Most of these studies mention problems (poverty, lack of economic sustainability, unemployment, ageing, infrastructure deficiencies, environmental sustainability problems, etc.) that the authors seek to solve with the help of social innovations. (Figure 2)

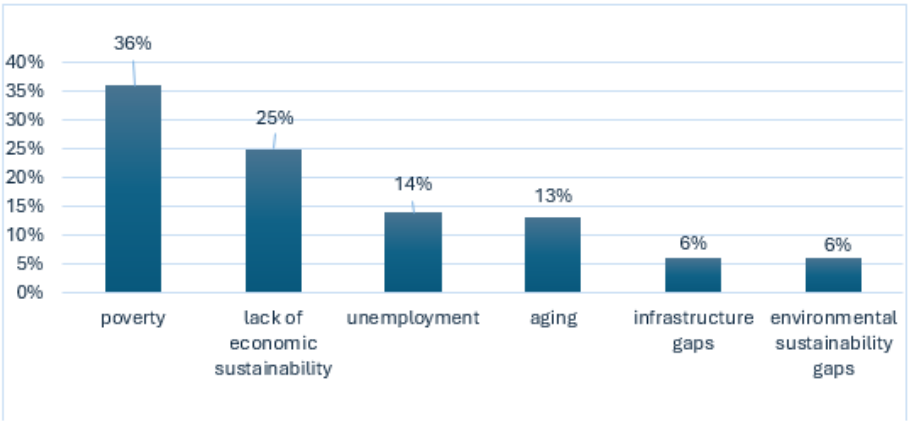

Figure 2: Distribution of social problems outlined in studies in 2022 (%)

Source: own editing

About 40% of the studies are theoretical, where the authors propose new frameworks and models for studying social innovation; barely thirty percent discuss solutions (e.g. Heinze & Naegele, 2012). Most studies use qualitative methods or focus on a single case (e.g. Agostini et al., 2019). The authors rely on in-depth interviews and secondary data (reports, websites, databases, archives, etc.) for their empirical analyses.

A similarly colourful picture is encountered by anyone who wants to get a comprehensive picture of definitions related to social enterprises. We understand that the purpose of social entrepreneurship is complex: it integrates business and social expectations, unlike private sector organisations, which are normally motivated by business goals.

It follows from the above definition that social enterprises essentially seek to solve problems at local level. The scope of most of them is therefore local. Those who see social enterprises as an engine of social change must be right (Crowther et al., 2022 and 2024).

Foundations and mutual insurance funds can be considered as the forerunners of social enterprises (Defoumy et al., 2009; G. Fekete & Lipták, 2011). The attention of those working on the subject, as evidenced by the increasing number of publications, has increased since the 1990s.

At the same time, the profile of social enterprises has become increasingly complex over the last three decades, as local communities increasingly recognise the need to solve problems locally. On the other hand, there is a growing need to strengthen entrepreneurship.
In the course of our research, we seek answers to three questions:
1) What is the role and weight of social enterprises in the Hungarian economy?
2) What justifies assessing the sustainability of social enterprises?
3) What are the conditions for the sustainability of social enterprises and how can they be ensured?
The structure of our study follows the answers to the above questions.

The relevance of social innovations and entrepreneurship in the Hungarian economy

After 1989, fundamental social and economic changes started in the Central and Eastern European region, including Hungary. As a result, the competitiveness of domestic products has decreased. The loss of previous markets has created a vicious circle in the economy, which has led to increased unemployment, a fall in private consumption and an increase in the number of people living below the poverty line. (Figure 3)

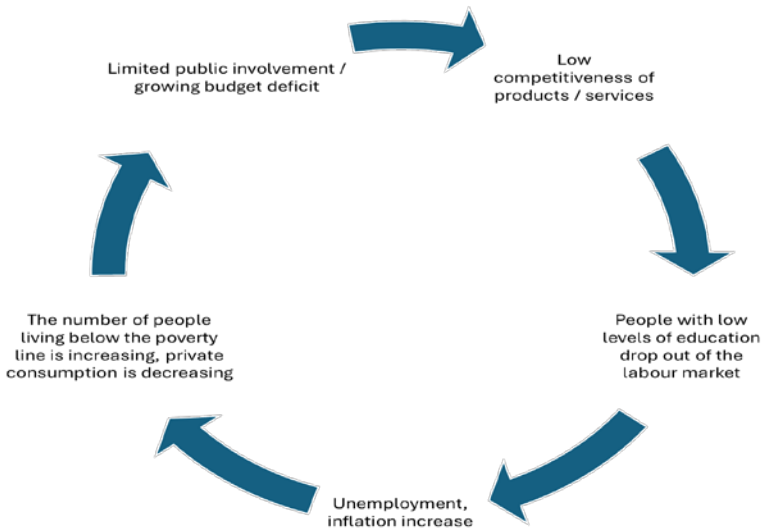

Figure 3: Logic of negative changes in the Hungarian economy after 1989
Source: own editing

Between 1989 and 1993, gross domestic product fell by 18% in Hungary and the number of people employed decreased by 15%.
This process lasted until the end of the 1990s. Subsequently, economic expansion began to grow spectacularly, which was broken by the 2008 financial crisis. (Figure 4)

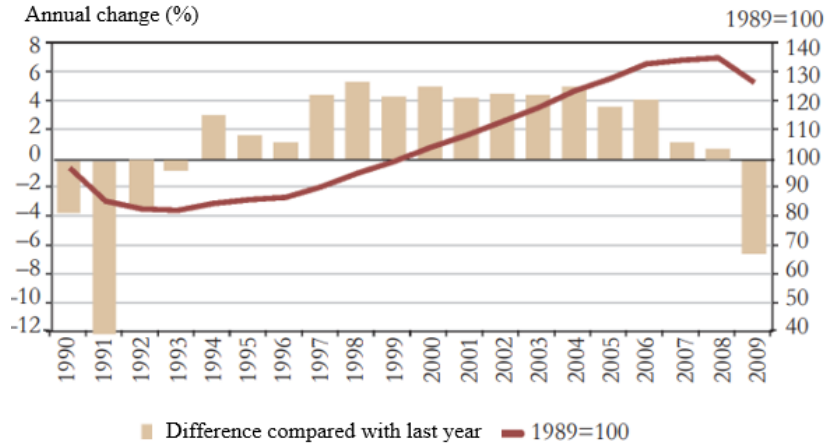

Figure 4: Development of the volume of gross domestic product in Hungary (1990-2009)
Source: KSH, 2010. p. 30.

With the economic downturn and rising unemployment, the number of people receiving social assistance has increased. (Figure 5)

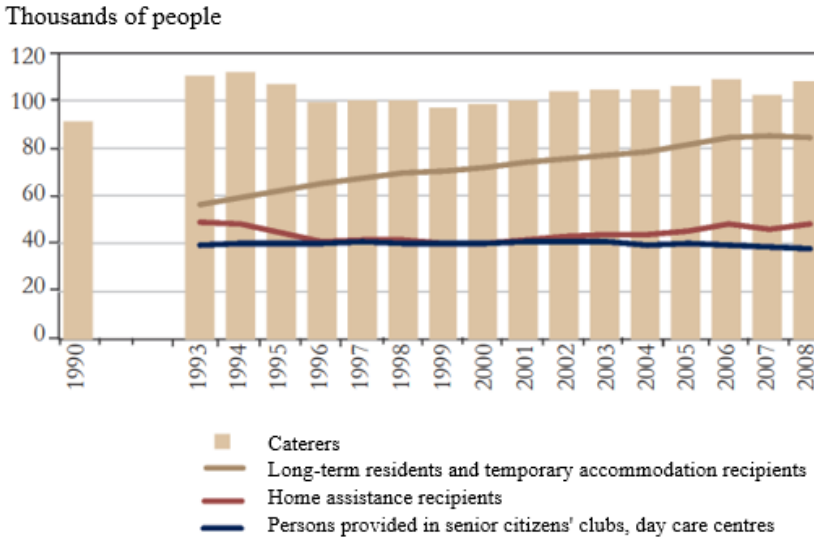

Figure 5: Number of persons receiving social assistance (1990-2008)
Source: KSH, 2010. p. 21.

Due to the income situation, the deterioration of employment, the increase in unemployment, the former regions of heavy industry (mining, metallurgy) were particularly affected. As a result, significant territorial disparities have developed in the country, which the state budget could only undertake to a limited extent due to lack of resources.
Employment and existential tensions had an adverse effect on demographic and social processes. The number of live births decreased, the dependency ratio increased, and the activity rate deteriorated. The risk of children growing up in families with low-level unemployment benefits finding it more difficult to integrate into the labour market has increased, in the absence of positive examples.

As a result of mostly government (top-down) initiatives, social innovations have gained in value and the first social enterprises have been established, especially in disadvantaged, crisis-stricken regions with a lower human development index. (Figure 6)

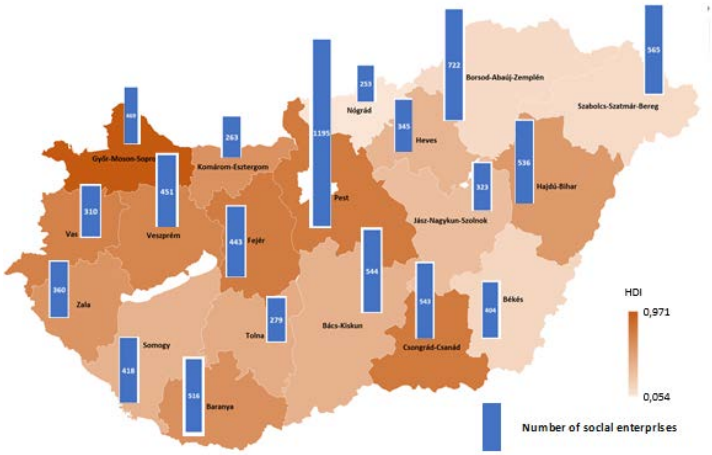

Figure 6: Number of HDI and social enterprises in Hungary (2022)
Source: own editing

There are three relatively distinct phases of social entrepreneurship in Hungarian practice.
Top-down period (basically 2000-2010). In the first period, society received this form of enterprise, which was mostly supported by government initiative and resources, with reservations. Due to the lack of social acceptance and prepared management, most of these startups turned out to be short-lived (Harangozó, 2022). An important result of the period was the detection of the fundamental problems that society expected answers from these enterprises (Table 1).

Table 1: Problems that social enterprises can address

Social problems	Economic problems	Ecological problems
- high rates of female unemployment, - underemployment of low-skilled people, - long-term unemployment of disadvantaged people, - extreme poverty, - exclusion, - family breakdown, - permanent disengagement from the world of work.	- low local supply and demand, - the exodus of more skilled workers, - impoverishment, - economic infrastructure.	- locally generated waste, - ecological degradation of the living environment, - lack of regenerativa resources, - land depletion, -reduction of green spaces, - increase in environmental damage.

Source: own editing

Period of emergence of demand for social innovations (2010-2020). It was then that it became clear that social enterprises could not be operated permanently without local initiatives, innovations and innovators. An increasing number of social enterprises have partnered with universities, research and consulting organisations to generate innovations.

Table 2: Typical social innovations

Social area	Economic area	Ecological area
- cultural heritage management, - educational support programmes, - public catering programs, - active care programs for the elderly, - Dementia prevention programs, - self-confidence building programs, - sensitization in relation to persons with disabilities, - development of narrative skills.	- social market, - social employment, - development of local brands, - organization of farmers' days, - generating start-ups / smart programs.	- waste recycling, - ecological routes, ecological school operation, - generation of conscious ecological lifestyle programs, - operation of an ecological forum.

Source: own editing

A key feature of the third period is the focus on operational sustainability (from 2020). At the beginning of the decade, the recognition that sustainability is a fundamental criterion for running social enterprises was reinforced. In connection with this, more and more attention has been paid to quality employment, supporting social mobility, improving well-being, making better use of capacities and building network connections.

Rationale and model for sustainability proofing of social enterprises

The first social enterprises appeared in Hungary at the end of the 1990s as one of the options for dealing with cumulative ecological, social and economic problems. However, these organizations proved to be short-lived after the end of government subsidies (Harangozó, 2022).
There were several reasons for this, including: lack of acceptance of bottom-up initiative, lack of management preparation, lack of ideas to support the continued operation of organizations, unfounded business plans, high turnover and lack of prior (ex-post) sustainability assessment of ideas. For more than five years, therefore, our attention has turned to examining the sustainability of social enterprises.

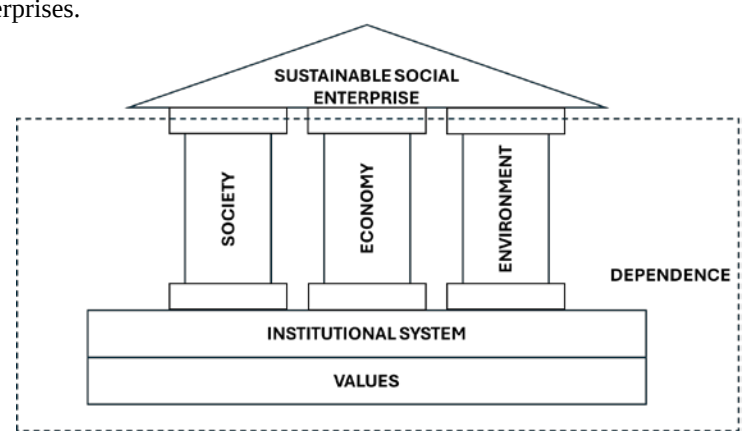

Figure 7: Pillars of sustainable social enterprise
Source: own editing

Sustainability traditionally looks at environmental, ecological sustainability. Social enterprises, on the other hand, require a complex, institutional, social, economic and ecological approach. (Figure 7)

The basis of sustainability is the value system of the given community, which allows or hinders the creation, help and support of community enterprises. It acknowledges or protests against the state using part of its tax to help disadvantaged groups and regions catch up.

Such elements of the value system that support the establishment and operation of social enterprises:

- respect for resources,
- social sensitivity,
- spatial justice,
- transparency,
- individual and community responsibility,
- diligence,
- respect for laws and regulations,
- respect for built and intangible heritage.

The objectives of social enterprises differ from those of private enterprises. Priority is given to improving local employment, securing income and reducing the number of people receiving benefits.

The legal and regulatory background supporting the establishment of social enterprises, civil and/or governmental organizations play a decisive role in the value system. The value system shapes the institutional system in a good or debatable direction. Values and institutions can provide the social, economic and environmental pillars of social enterprise sustainability.

In other words, the state of values, institutions, society, economy and environment are closely dependent and causal.

With this in mind, the sustainability process of social enterprises can be developed (Figure 8).

The formulation of goals starts with a governmental (top-down) or local (bottom-up) initiative. The result of the development of new or novel ideas is the project, which should be an ex-ante sustainability assessment as an integral part of its feasibility assessment. Based on the project's outputs, an ex-post examination of municipal/territorial impacts and operational sustainability of the enterprise can be carried out.

Monitoring sustainability is not a one-off task, but a permanent one, and its results have a fundamental impact on the lifespan of social enterprises.

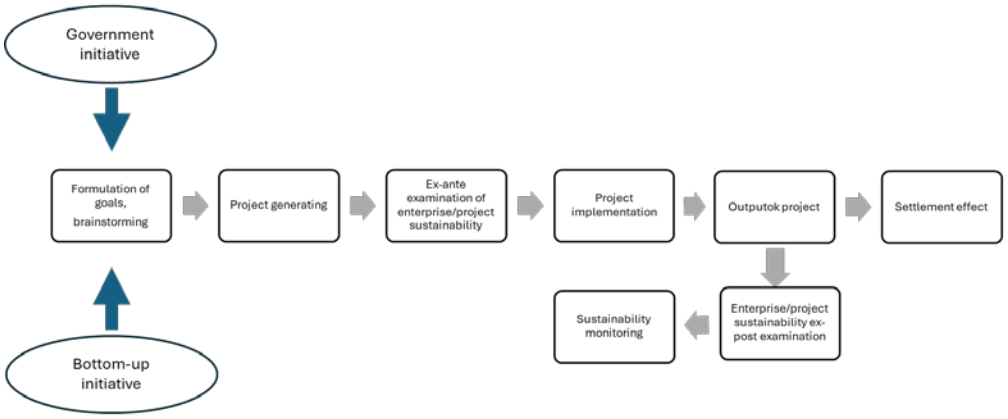

Figure 8: Place of sustainability proofing in the operational process of social enterprises
Source: own editing

Analysis of sustainability is a permanent task and part of the microprudential toolbox. Reaching the built-in critical indicator levels (institutional, economic, social, ecological) of a well-structured monitoring system draws attention to the need for intervention.
The lifespan curve of a social enterprise consists of the same phases (foundation, growth, fulfillment, aging, decline) as that of organizations belonging to the private sector. However, there is an interesting difference in the duration of each phase. According to our studies, nearly two-thirds of social enterprises go bankrupt or close to liquidation after 2.5-3.5 years after foundation.

Model output indicators and definition of the aggregate sustainability index

The sustainability assessment is based on economic, social and environmental output indicators. (Table 3)
When defining the indicators, we aimed for simplicity and easy quantification. Economic sustainability was examined using 12 indicators, social sustainability with 6 indicators and environmental sustainability with 6 indicators.
The indicators express a percentage change, which facilitates comparability over time and across organizations. Based on the indicators, six sub-indicators (employment, management, income, network, emissions and circular economy) were formed.

Table 3: Model sustainability indicators

Name of partial index	Name of subindex	Name of sustainability indicator
Economic sustainability (GRI)	*employment status of entrepreneurship RÉ(1)*	a1 - change in the number of employees (%)
		a2 - unemployment rate in employment (%)
		a3 - share of early school leavers in employment (%)
		a4 - change in female employment rate (%)
		a5 - change in staff turnover (%)
	economic status of entrepreneurship RÉ(2)	b1 - change in net sales turnover (%)
		b2 - change in value added (%)
		b3 - change in balance sheet profit (%)
		b4 -change in subscribed capital (%)
		b5 - change in liabilities (%)
		b6 - change in cash flow ratio (%)
		b7 - change in labour productivity (%)
Social sustainability (TRI)	*workers' income situation RÉ(3)*	c1 - change in wage level (%)
		c2 - share of women in business management (%)
		c3 - change in dependency ratio (%)
		c4 - change in female-male earnings gap (%)
	social relations RÉ(4)	c5 - change in non-profit relationships (%)
		c6 - change in for-profit organizational relationships (%)
Environmental sustainability (KRI)	*emission effects RÉ(5)*	d1 - change in greenhouse gases (CO2 equivalent) (%)
		d2 - change in the amount of solid waste emitted (%)
		d3 - change in public water consumption per employee (%)
	circular economy RÉ(6)	d4 - share of renewable energy sources in total energy consumption (%)
		d5 - circular material use rate (%)
		d6 - share of area under organic farming (%)

Source: own editing

The Aggregate Sustainability Index (AFI) was determined in three steps (Figure 9):

1. In the first step, six sub-indices were formed based on the percentages of sustainability indicators by simple arithmetic averaging.
2. In a second step, economic (GRI), social (TRI) and environmental sustainability (KRI) partial indices were defined.
3. In the third step, we determined the Aggregate Sustainability Index by multiplying the three partial indices as follows:

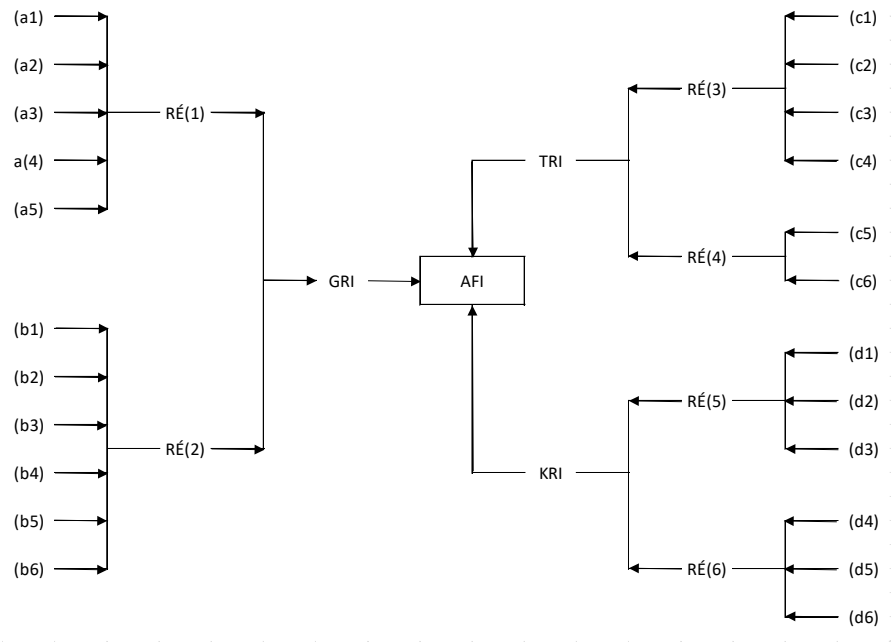

Figure 9: Logic of creating an Aggregate Sustainability Index
Source: own editing

The individual indicators and sub-indices draw attention to the weak points of the organization and the decisions that can be made based on them.
Ultimately, an aggregate index expresses the sustainability of a social enterprise in the form of a single number between zero and hundred.
For each partial and sub-index, risk levels have been determined on the basis of experience as follows:

- 0 - 30% – danger zone;
- 31 - 40% – high risk;
- 41 - 60% – medium risk;
- Above 61% – low risk.

Results of empirical studies

Our questionnaire and interview survey to examine sustainability indicators was first conducted in 2019 and then in 2023. We assessed responses from 132 organisations to ensure comparability over time.

Profile of organisations
The organisations covered by the study are mainly active in agriculture (37%), social welfare (25%), waste processing (12%) and woodworking (6%). Organizations classified in other categories (26 years) have the longest history, but associations (20 years) and foundations (16 years) are also above average. The youngest are social cooperatives (7 years) with a low employability (5 people). The largest employers are foundations (27 people) and other non-profit organizations (25 people).

Management of organisations

94% of respondent organisations are still operating; 2.3% are newly formed organizations and 3.7% are currently non-operating organisations. 12% of organisms are in the start-up phase of the life curve, most (47%) are in the growth phase, 36% are in the maturity phase, and 5% are in decline. More than half of the surveyed companies rely on tender funds not only to start their activities, but also to maintain their continuous operation. 30% of respondents answered that they did not rely on tender funds at all at the start.

The largest proportion (36%) of revenue in 2021 was income from basic and public benefit activities, central state support (22%), tender support (19%), income from business-type activities (10%), municipal support (8%), other subsidies (6%).

58% of the organisations surveyed reinvested their profit after tax into their social activities.

Staff conditions of organisations

A significant majority of female employees are present in the organizations surveyed (63%). In terms of age group, most employed people (60%) are aged 25-49, nearly a quarter are aged 50-64, 10% are aged 16-24, and only 3% are over 65.

Most work full-time (79%). The share of part-time employees is 2%. The vast majority of employees (65%) are employed. The frequency of all atypical forms of employment (agency contracts, public works, voluntary work, simplified employment, member employment relationships) is below 10%.

The majority of organisations (86%) employ people with full capacity. 46% employ workers who are disadvantaged in the labour market.

Sustainability of organisations

Our calculations confirmed that the sustainability of the organizations examined is scattered. The differences in employment, emissions (Δ=34) and farming (Δ=30) are particularly great, depending on the population of the settlement, the profile of the enterprise and its situation within the country.

The smallest difference was found in circular economy sustainability (Figure 10).

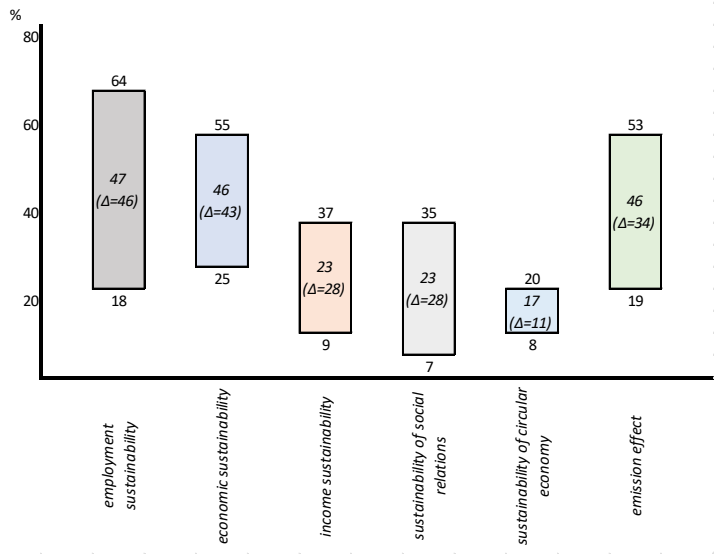

Figure 10: Minimum, maximum values and average of sustainability sub-indices
Source: own editing

The calculations confirmed that 53 of the 132 organizations examined had an aggregate index of high risk, while 72 companies had an index classified as medium risk. Only 7 entrepreneurships (5 %) had low sustainability risks (Figure 11).

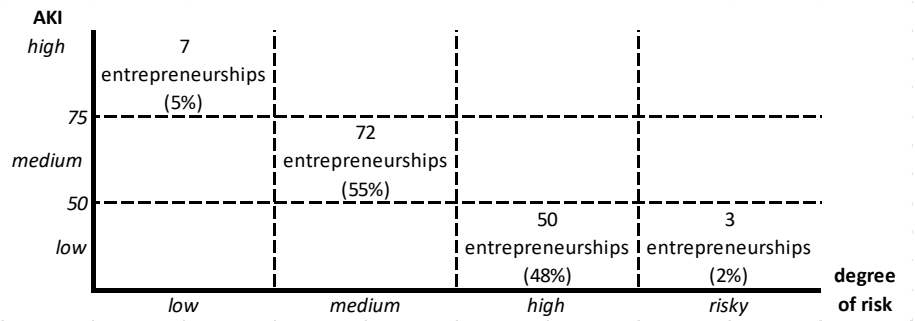

Figure 11: Risk matrix of the 132 social enterprises examined by the aggregate sustainability index

Source: own editing

This risk measure is also expressed when summarizing data from individual organisations (Table 4).

Table 4: Sustainability indices (%) of the 132 social enterprises examined

Partial index		Sub-index		Aggregate index value
name	*value*	*name*	*value*	
employment	47	economic sustainability	47	32
economic status	46			
income satus	27	social sustainability	25	
social relations	23			
emission effects	46	environmental sustainability	28	
circular economy	17			

Source: own editing

Between 2020 and 2023, 37 (47%) of businesses with low and medium sustainability risk (79 in total) consciously sought to innovately renew their operation, profile, marketing and image: they are open to their environment.

Final thoughts

The geopolitical shift and the transition to a market economy caught both theorists and practitioners in countries belonging to the former Eastern European bloc unprepared. This has had and continues to have serious social and economic effects over several years.

It is no coincidence that in the case of so-called transition economies, including Hungary, the role and importance of social enterprises has increased, especially in the case of disadvantaged regions and social groups. One of the priorities of the European Union's planning periods 2014-2020 and 2021-2027 is to give special support to the development and implementation of social innovations. Our research shows that the importance of social enterprises will continue to grow in the future. Therefore, it does matter how stable their operation is.

More than 60% of Hungarian social enterprises were established between 2010 and 2020 through top-down initiatives. Of these, nearly 42% will have to limit their operations within two years of the end of support. This creates tensions at both macroeconomic and municipal levels.

Since the early 2020s, there has been a substantial change. During their operation, more and more enterprises consciously engaged in generating innovations (relying on their own resources or involving external experts). As confirmed by our primary and secondary data collection, this

significantly contributed to the economic, ecological and social sustainability of the social enterprises surveyed.
Ex-post and ex-ante examination and monitoring of sustainability can contribute to the stable and predictable operation of social enterprises.
The model presented in our study and its sub- and aggregate indices, which can be calibrated between zero and one hundred based on the model, are intended to help this "good-host" type of thinking.

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Market Dynamics at Play: The Convergence Phenomenon in Carbon Credit Project Valuations

This study examines the capital market valuation of carbon trading projects in the growth stage, focusing on the impact of project size and classification. We analyze four projects launched in 2021 and 2022, using changes in market capitalization as a proxy for valuation, based on investor perception. A major conclusion of the paper is that the market capitalization of different projects converged over the study period. This phenomenon was evident despite the differences in the amount of capital raised, launching market caps, size of partner networks and timing of launching. We argue that the novelty of the sector fosters investor focus on sectoral narratives, leading to converging project valuations. This convergence in market capitalization should be factored into tokenomics design and market-making activities to ensure the financial sustainability of these blockchain projects.
Key words: carbon credit, green token, cryptocurrency, startup
JEL Codes: G14, G24, G32, L94, O33, Q54

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Introduction

In the face of an escalating environmental crisis, the world is urgently seeking innovative solutions to mitigate its impact and foster a sustainable future. Blockchain technology holds immense potential to revolutionize environmental solutions, particularly in the context of climate change mitigation and adaptation. Blockchain's inherent characteristics of transparency, immutability, and decentralization can address critical challenges in environmental management and foster collaboration among diverse stakeholders. In carbon emissions tracking and trading, blockchain projects are developing platforms to facilitate transparent and verifiable carbon credit markets. By leveraging blockchain's immutable ledger, these platforms can ensure the integrity of carbon offsets, incentivize emission reduction efforts, and promote sustainable practices among industries.

The convergence of blockchain technology and sustainability has given rise to a burgeoning field of blockchain based project projects dedicated to combating climate change and promoting environmentalism. These projects, often called climate credit „crypto" projects, leverage the unique features of blockchain technology to facilitate carbon offsetting, incentivize sustainable practices, and promote transparency in environmental impact measurement. Climate change is one of the most pressing challenges facing humanity today. The scientific consensus is clear: human activities are causing the Earth's climate to change unprecedentedly, with potentially devastating consequences. In response to this crisis, many individuals and organizations seek ways to reduce their carbon footprint and support sustainable initiatives. Blockchain technology, the underlying platform for cryptocurrencies such as Bitcoin and Ethereum, offers several potential benefits for environmental initiatives. Blockchain can be used to create tamper-proof records of carbon emissions, which can help to ensure that emissions reductions are accurately tracked and verified. Blockchain can be used to create decentralized marketplaces for carbon offsets, making it easier for individuals and businesses to offset their emissions. Blockchain also can be used to create smart contracts, which can automate the enforcement of environmental regulations. In recent years, there has been a surge in the number of crypto projects focused on addressing climate

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change. These projects vary widely in their approach and functionality, but they all share the goal of using blockchain technology to impact the environment positively.

The costs of climate change

Climate change refers to long-term shifts in temperature and weather patterns, primarily caused by human activities, notably the burning of fossil fuels that release greenhouse gases into the atmosphere. Although our planet can absorb greenhouse gases through photosynthesis, forests and oceans cannot offset such a large amount. These changes are already having a significant impact on the global economy, and the effects are expected to intensify in the coming decades. (Turrentine et al.,2021) Moreover, extreme weather events, such as violent storms and floods, are wreaking havoc, causing accidents, contaminating drinking water, and leading to widespread community displacement. These adverse health consequences underscore the urgent need to address the escalating climate crisis. Climate change continues to exert a profound and far-reaching influence on industries and industrial assets worldwide, manifesting in direct and indirect impacts. Recent research has shed light on the financial burdens associated with extreme weather events, which disrupt industrial operations and lead to significant economic losses. While the precise cost of these damages remains to be fully quantified, current trends underscore the inevitable negative repercussions of climate change on urban economies. (Gasper et al., 2011) For cities, climate change is an external effect that causes energy supply problems, infrastructure stresses, food and water shortages, and disrupts various projects. All of these changes influence fiscal policy and slow down expansionary projects as the money and human resources that would be used and deployed in projects are more likely to be used for reconstruction. (Allam & Jones, 2019) The overall impact of environmental shifts on economic growth is uncertain, but the costs of mitigating environmental shifts, such as reducing greenhouse gas emissions, are substantial.

Blockchain as a solution

Emerging technological advancements provide a promising avenue for confronting the challenges of climate change mitigation and adaptation. Within this context, a range of innovative solutions, including those leveraging blockchain technology, offer the potential to significantly curtail greenhouse gas emissions, optimize energy utilization, and foster sustainable practices. The global drive to mitigate climate change hinges on reducing greenhouse gas emissions, notably carbon dioxide (CO2). Blockchain projects are developing platforms to facilitate transparent and verifiable carbon emissions tracking and trading, ensuring the integrity of carbon offset programs and promoting sustainable practices among industries. One notable example is Regen Network, a blockchain-based platform that enables transparent and verifiable carbon credit trading. Regen Network, for instance, utilizes smart contracts to ensure accurate and authentic carbon credit transactions, instilling trust in carbon markets. This technology's immutable and decentralized ledger reinforces the integrity of carbon offset programs. Blockchain-enabled traceability platforms empower consumers to make informed choices. Furthermore, blockchain-based renewable energy trading platforms facilitate peer-to-peer energy trading, enabling individuals and communities to generate, sell, and consume renewable energy more efficiently. Finally, secure environmental data management support research, policy decisions, and community action, fostering environmental monitoring, informed decision-making, and public engagement. In summary, blockchain-based solutions are emerging as pioneering instruments to tackle climate-related issues. The immutable and decentralized nature of blockchain's ledger system facilitates transparent and verifiable tracking and trading of carbon emissions. Furthermore, it enables the sustainable management of supply chains, the creation of platforms for trading renewable energy, and the secure handling and sharing of environmental data.

Carbon credit cryptography projects

Carbon credit projects tackle climate change through a multipronged approach. They focus on either preventing future emissions (e.g., renewables replacing fossil fuels), removing existing atmospheric carbon dioxide (e.g., afforestation), or directly reducing emissions from ongoing activities (e.g., building efficiency upgrades). These diverse efforts generate tradable carbon credits, quantifiable units representing the project's positive climate impact. Several organizations, including the UN and World Bank, recognize blockchain's suitability for managing voluntary carbon credits. Compared to legacy systems, blockchain offers advantages like transparency and immutability, facilitating robust accounting and preventing double-counting. Tokenized carbon credits are a cornerstone of Regenerative Finance (ReFi), a branch of Decentralized Finance (DeFi) focused on using digital assets for climate solutions. (Fullerton 2015) ReFi encompasses a diverse range of applications studied across various disciplines like business, law, economics, and computer science. (Gibbons 2020).Research on tokenized carbon credits explores their impact on energy sectors, including sustainable energy transitions and grid efficiency through peer-to-peer trading. Additional research areas include solutions for measurement, reporting, and verification (MRV), and sustainable supply chains. Beyond these areas, studies examine climate market design, ReFi applications and initiatives, the impact of blockchain technology in sustainability, green fintech applications using blockchain, and integrations with legacy carbon markets. (Woo et. al 2021)

Valuation of cryptography projects

While ReFi offers promising avenues for climate action, effectively valuing carbon credit projects remains crucial for ensuring the integrity and impact of the market. While traditional valuation methods offer a starting point, the unique characteristics of environmental projects necessitate a more nuanced approach. The following section analyses four carbon credit projects and explores non-fundamental factors influencing the broader sector. This analysis aims to inform the development of a more comprehensive framework for evaluating carbon credit projects within the ReFi context, paving the way for a more robust and impactful market.

Market capitalization (market cap) reflects the overall market perception of a project's value and future potential, with a higher market cap indicating a higher total value placed on the project by investors. This normally results from solid demand for the project's token exceeding the available supply. (Polk et. al 2004) While „market cap" is not a direct measure of sentiment, a rising market cap can often indicate growing investor confidence in a project's future potential. (Raza et. al. 2019) Additionally, the market cap is frequently used as an indicator for comparing size and valuation within a specific market or ecosystem. (Hu et. al. 2021)

Previous research has shown that non-fundamental factors like speculation and the overall market sentiment can significantly impact crypto asset prices. (Liebi 2022) Launching a token in different climates has different chances of growing. While research on fundamental and non-fundamental drivers of crypto asset prices is relatively extensive, the carbon credit space within the blockchain ecosystem presents a unique situation. Here, a project's ability to generate real-world environmental impact becomes a potential fundamental factor. However, whether this environmental impact translates into higher market valuations for carbon credit projects remains an under-explored question. The factors influencing the expected return on crypto assets remain unclear. These digital assets operate within complex networks of users interacting online. Some theoretical models suggest that the core value of a crypto asset is positively correlated with its network size. This is because a more extensive user base can increase transactional benefits and positive network effects, as documented by Cong et al. (2021). These effects can potentially drive up crypto asset prices and make them more attractive to a broader range of users and investors. In our study we are going to take a look at the related factors and their influence on capital market appreciation of carbon projects. (Liebi 2022)

Data and methodology

The selection of four projects for this study was a deliberate process. After an extensive review of numerous projects in the climate credit crypto space, four were deemed suitable for in-depth analysis based on the following criteria:

1. Project Maturity: The selected projects have a demonstrable track record of operation, indicating stability and a commitment to long-term impact. This was assessed by examining the project's launch date, team experience, and community engagement.
2. Partnership Strength: The projects have established partnerships with reputable organizations, such as research institutions, environmental groups, and blockchain companies. These partnerships demonstrate the project's credibility and potential for impact. The strength and diversity of partnerships were evaluated.
3. Resource Traction: The projects have raised significant capital through token sales or other fundraising mechanisms. This indicates investor confidence in the project's potential and ability to achieve its goals. The amount of capital raised and the sources of funding were considered.
4. Market Liquidity: The project's tokens are actively traded on public exchanges, ensuring investors can quickly enter and exit positions. This liquidity is essential for both investors and the project itself, as it facilitates price discovery and provides a measure of market confidence. Trading volume and market capitalization were pre-evaluated using simple document-studying methods.
5. Data Availability: The projects have a comprehensive public presence, providing detailed information on their operations, impact, and financial performance. This transparency allows for in-depth analysis and comparison. The availability of whitepapers, technical documentation, impact reports, and financial statements was assessed.

By selecting projects that meet these criteria, the study ensures that the findings are based on a robust and representative sample of the climate credit crypto space. The four projects included in the study are KlimaDAO, Toucan Protocol, Regen Network, and Moss Earth. The selection of four projects for this study represents a form of non-probability sampling. This means that the sample only represents some of the population of climate credit crypto projects, and the findings cannot be generalized to all projects in the space. This allows for more in-depth analysis and comparison of these leading projects.

Our study establishes four categories grounded in practical considerations to differentiate the projects under investigation based on their spectrum of activities. While specific projects, like Regen Network's direct tokenization of verified offsets, demonstrably belong to a single category (e.g., "Tokenized Carbon Credits"), many others, such as Moss's blended marketplace and direct project financing model, defy straightforward categorization due to their multifaceted nature. KlimaDAO aligns with the "Carbon Emission Project Financing" category. It primarily raises funds through its KLIMA token, utilizing them to purchase and retire high-quality carbon offsets. Additionally, it incorporates community governance, allowing token holders to vote on DAO operations and carbon offset selection. Toucan Protocol falls under the "Carbon Emissions Marketplaces" category. It is a decentralized marketplace for buying, selling, and fractionalizing tokenized carbon credits. Integrating DeFi protocols like Lido and Curve, it offers liquidity and staking opportunities, connecting carbon offsets to broader DeFi ecosystems. Regen Network belongs to the "Tokenized Carbon Credits" category, explicitly focusing on regenerative agriculture. It creates and manages Regen Credits, tokenized representations of verifiable carbon reductions. The platform allows farmers and project developers to register and sell their credits, facilitating verification and monitoring processes. Moss Earth operates as a "Carbon Emissions Marketplace" project while incorporating elements of "Financing Carbon Emission Reduction Projects." Individuals and businesses can purchase high-quality carbon offsets generated through rainforest conservation projects on their platform. Additionally, some of their revenue directly supports these projects, contributing to their long-term sustainability.

Readily available metrics like retained carbon credits, tokenized carbon credits, and withdrawn carbon credits offer initial insights into the activity volume of climate credit crypto

projects. Retained carbon credits as a metric reflects the total amount of carbon sequestered by a project and is valuable for understanding the overall impact. However, it must provide information on credit issuance or retirement, limiting its ability to capture the complete picture of project activity. Tokenized carbon credits indicate the number of carbon credits represented as tokens on a blockchain platform. It highlights the market availability of the credits but does not directly translate to environmental impact or actual retirement. The metric of withdrawn carbon credits represents the number of credits permanently retired from circulation, demonstrating a direct contribution to emissions reduction. However, it must consider the total credit generation or tokenization strategy, potentially providing an incomplete view of project activity. From a measurement viewpoint different metrics measure different aspects. Retained credits do not reflect credit retirement, tokenized credits do not capture impact, and withdrawn credits ignore project goals.

Despite belonging to distinct categories based on their primary functions, the four examined projects exhibit interesting commonalities and overlaps. Notably, all projects aim to mitigate climate change by facilitating carbon offsetting and promoting sustainable practices. Each project employs elements of decentralization, leveraging either blockchain technology or community governance structures. This facilitates transparent operation, fosters increased accessibility and offers potential resistance to censorship. Although the specific applications differ, all projects integrate tokenization in some form. KlimaDAO and Toucan utilize tokens for fundraising and governance, while Regen and Moss tokenize carbon credits. This paves the way for fractional ownership, enhanced liquidity, and the creation of new investment opportunities.

Analysis

The primary objective of this study is to understand the factors influencing the capital market perception of carbon credit projects as measured by changes in market capitalization. The study acknowledges the multifaceted nature of project size, encompassing various contributing elements. Beyond the traditional metric of total capital raised, we incorporate factors like pre-launch fundraising, activity volume, and collaborative project count to create a more comprehensive picture. Additionally, the year of launch is considered to account for potential market maturity effects. In our analysis, we also highlight the possible case-specific influencing factors, utilizing the benefits of a case study approach, and delve into the possible influence of the attributes of crypto markets.

Effect of scale

Acknowledging the multifaceted nature of project size, we studied factors beyond traditional capital raised, such as pre-launch fundraising, activity volume regarding carbon credit management, and collaborative project count.

Capital raised

Initial capital raised through token presales is potentially influential in the future trajectory of the market capitalization of climate credit crypto projects. This early influx of funds is foundational for subsequent growth, shaping investor expectations, project development capabilities, and overall market dynamics. This analysis's premise rests on the notion that presale capital acts as a seed funding mechanism, potentially influencing a project's trajectory in several ways. Larger presales raise investor confidence, potentially leading to higher initial market capitalization and subsequent expectations. Increased funding allows for enhanced development efforts, potentially leading to faster innovation, broader market reach, and as a consequence higher market capitalization. Presale success can generate positive publicity and attract further investment, influencing overall market sentiment.

Table 1.: Key metrics of the examined four projects (in order of capital raised)

Enterprise/ project	Starting year	Capital raised before token launch (Million $)	Number of affiliated projects	Retained carbon credits (Million)	Tokenized carbon credits (Million)	Withdrawn carbon credits (Million)
Regen	**2022**	**10,5**	**15**	**1**	**1**	**0,5**
KlimaDao	**2022**	**17**	**20**	**17,5**	**20**	**1,5**
Toucan	**2021**	**25**	**50**	**21**	**20**	**0,3**
Moss	**2021**	**27,5**	**100**	**1,5**	**1,5**	**1,5**

Source: edited by authors based on project websites, whitepapers and official social media

While the preliminary observations suggest no direct linear correlation between presale capital and current market capitalization, the analysis reveals some intriguing insights. While KlimaDAO and Toucan Protocol, despite moderate presale funding, experienced modest market capitalization growth, Regen Network witnessed a significant increase despite a smaller presale. Conversely, Moss Earth, with the highest presale capital, saw a substantial decline.

Table 2.: Market cap changes of examined projects

Enterprise/Project	Initial market cap (M$)	Actual market cap in 2023 October (M$)
Regen	**2,6**	**4**
KlimaDao	**5,1**	**5,4**
Toucan	**3,5**	**3,9**
Moss	**15**	**4,5**

Source: edited by authors based on data from www.coinmarketcap.com

These initial findings highlight the complexity of the relationship between presale capital and market capitalization in climate credit crypto projects, but at the same time, give new perspectives for conclusions.

While presale funding might not directly determine market performance, it interacts with other factors, such as project development, market dynamics, and investor sentiment, to shape a project's overall trajectory. Further research is necessary to comprehensively understand these intricate relationships and their combined effect on the market capitalization of climate credit crypto projects.

Activity level

Toucan and KlimaDAO boast 21 million and 17.5 million tons retained since launch, leading the pack in carbon retainment, respectively. Their higher numbers suggest larger-scale carbon sequestration efforts than Regen (1 million tons) and Moss (1.5 million tons) since their respective launch dates. However, it is essential to consider that different methodologies can lead to varying carbon sequestration estimates. Toucan and KlimaDAO might focus on larger-scale projects (e.g., forestry), while Regen and Moss might prioritize smaller, community-oriented projects. While KlimaDAO and Toucan both tokenize 20 million carbon credits, Regen only has 1 million, and Moss has 1.5 million, highlighting differences in their tokenization strategies. Withdrawn credits remain low across all projects, and several possibilities emerge: limited current impact, cautious credit retirement strategies, or a focus on tokenization for fundraising or liquidity. Projects with high activity performed relatively well. However, we can not prove **clear correlation** between activity and market cap changes with such a small sample. Further analysis with a larger data set, controlling for confounding factors, and considering different valuation metrics alongside market cap might be necessary to reach a more conclusive answer. For this study, the emphasis is on something other than the exact approach used for the correlation questions.

Extent of network

The true impact and reach of sustainability crypto projects can be more comprehensively evaluated by examining their partnership network. Partnerships can indicate a project's ability to collaborate, integrate with the broader ecosystem, and potentially achieve larger-scale environmental impact. While a carbon credit project's sheer number of projects may initially indicate its market value, a more nuanced analysis is necessary to understand the interplay between project scope and capital market perception. The "Economy of Scope" theory posits that firms can achieve cost efficiencies by sharing resources and capabilities across diverse products or services. However, this diversification also presents potential challenges, as managing a broader portfolio can introduce logistical and communication complexities, potentially impacting operational efficiency and transparency. The observed case of Moss Earth, with its extensive network of partnered projects, exemplifies the potential limitations of solely focusing on project quantity. While their vast portfolio might initially suggest a robust market position, it could also indicate vulnerabilities associated with over-reliance on specific project types or partnerships. Focusing solely on rainforest conservation might limit their exposure to emerging markets or investor preferences. Additionally, managing many diverse projects could introduce logistical and communication challenges, potentially impacting efficiency and transparency.

Our analysis of four sustainability-focused crypto projects reveals a surprising lack of correlation between the size of a project's partner network and its market capitalization appreciation. Counterintuitively, the project with the highest market capitalization growth, Regen Network, has the lowest number of partnerships (15). In contrast, Moss, the project with the highest market capitalization decline, has the highest number of partnerships (100).

Effect of timing

Older projects had a longer time to develop, establish partnerships, and build a track record, potentially leading to higher market cap valuations. While all the projects are in the early stages of development, KlimaDAO and Regen had less time to demonstrate their impact and attract long-term investors.

Also, a project launched in a bull market might benefit from increased investor sentiment and have more time to establish itself before facing significant competition. The two factors mentioned regarding timing are interrelated and can amplify each other's effects. KlimaDAO and Regen launched in 2022, while Toucan and Moss launched in 2021. The crypto market experienced significant growth in 2021, potentially benefiting Toucan and Moss by attracting early investors and liquidity. 2022 saw a market downturn, which could have impacted KlimaDAO and Regen's market outlooks. Despite the assumptions, the better-performing projects were launched in 2022, and Moss, with a severe decline in market cap, launched in 2021. It is also a factor that, according to our methodology, we compared projects' starting and actual (2023) market caps so that the market downturn could be reflected in all of the market caps regardless of the launch date.

Case-specific influencing factors

Naturally, market cap changes in the climate credit crypto space are influenced by a complex interplay of factors beyond what was discussed. A closer look at KlimaDAO, Regen Network, and Toucan Protocol reveals a more nuanced picture. KlimaDAO's stagnant core function and focus on internal governance may explain its modest increase. Regen Network's success in project implementation, partnerships, and DeFi integration likely fueled its significant growth. Toucan Protocol's continuous DeFi engagement, market expansion, and strong community contribute to its slight increase. According to this, the study method highlights the multifaceted relationship between project characteristics and market cap performance. While quantitative measures can play a role, it is crucial to consider factors such as project implementation effectiveness, strategic partnerships, DeFi integration, and ongoing market engagement.

Influence of market dynamics

The crypto space is known for its volatile market sentiment and trends. Suppose a particular category of projects experiences significant positive performance. In that case, investors may extrapolate this success to other projects within the same category, leading to expectations of similar returns even if the projects have fundamental differences. This phenomenon can be further amplified by social media and news coverage, which often focus on broad trends rather than individual project nuances.

Social media and news coverage often play a significant role in amplifying herd mentality. These platforms frequently focus on broad trends and headline-grabbing narratives, potentially overlooking the critical nuances that differentiate individual projects within a specific category. This can lead to oversimplification and misinformed investment decisions, as investors may need to pay more attention to crucial factors such as Project-specific implementation, strategic partnerships, DeFi integration, and Community engagement. For example, for KlimaDAO, the project's stagnant core function and focus on internal governance might be particularly susceptible to herd mentality. If investors perceive the broader climate credit crypto space experiencing a downturn due to unforeseen factors, KlimaDAO's limited perceived innovation and impact could exacerbate negative sentiment towards the project. Conversely, Regen Network's focus on effective project implementation, strategic partnerships, and DeFi integration might offer some protection against the herd mentality. Their strong fundamentals and tangible impact could mitigate the adverse effects of broader market fluctuations.

Limitations of the research

This research employed market capitalization changes following exchange listings as a gauge of investor sentiment towards four climate credit crypto projects: KlimaDAO (KLIMA), Toucan Protocol (TOUC), Regen Network (REGEN), and Moss Earth (MOSS). While this approach offers valuable insights, we need to acknowledge several limitations inherent to this methodology:

1. Market cap primarily reflects fluctuations in token price, offering only a partial glimpse into investor sentiment. While other factors like community engagement and transparency might be crucial, exploring them requires additional analysis of token velocity, DeFi integration, and engagement on alternative platforms. However, market cap remains valuable due to its simplicity and widespread application, allowing for identification of emerging projects, tracking market trends, and conducting basic project performance comparisons.
2. As discussed earlier, the analysed projects belong to distinct categories with unique functions and target audiences. Attributing solely market cap changes to investor sentiment without considering these category-specific differences could lead to misleading conclusions.
3. Market-wide trends, cryptocurrency price fluctuations, and regulatory changes can significantly impact market cap movement. Isolating the specific impact of exchange listings on individual projects within this dynamic environment can be challenging.
4. The limited sample size (four projects) raises concerns about generalizability to the broader sector. However, this case study approach, while not definitive, offers valuable insights into these specific projects. Case studies are a recognized research method, allowing detailed exploration of real-world situations and fostering critical thinking and business acumen.

Further Research Directions

This study examined the capital market valuation of carbon trading projects during their growth phase. The findings suggest that despite initial market capitalization differences, project valuations converged over the studied period (2021-2023). This highlights the importance of market narratives and investor perceptions in shaping project valuations. Several avenues for future

research are proposed to investigate these findings further and broaden the study's implications. The study could be extended to examine different token types within the carbon trading cryptocurrency space, such as utility tokens, governance tokens, and stablecoins. Expanding the time frame and collecting more data points enable a more comprehensive analysis of trends and changes in market convergence over time. Qualitative methods, such as interviews with investors and project developers, could provide valuable insights into the factors driving market convergence. Network analysis could be applied to explore the interconnectedness of projects and how their valuations influence each other. The study could be extended to examine how the regulatory landscape affects market convergence.

Conclusions

This study investigated how capital markets evaluate carbon credit projects during their growth phase. We explored the influence of project size, activity type, and sector on market cap changes from the token launch to the last year's available data. Our main finding reveals that despite initial market capitalization differences, project valuations converged over the studied period (2021-2023). This suggests investor judgment goes beyond project size and fundamentals, likely influenced by sector-specific narratives and perceptions. Investors seem to categorize carbon trading projects similarly and compare them to other investment opportunities within this category. Notably, the convergence occurred even though the project with the lowest market cap experienced a significant increase, while the one with the highest market cap suffered a substantial loss. Despite partnership advantages, network size, and financial resources, the more extensive project did not outperform. This finding suggests that project tokenomics and market-making strategies could benefit from considering the impact of market narratives. Based on the results, aligning initial token prices with sector-specific value perceptions and implementing proactive measures to ensure liquidity as market convergence occurs may be valuable strategies.

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Szerzőink figyelmébe

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PÉTERI G. (1991): Az önkormányzatok és oktatási intézményeinek viszonya, finanszírozási kérdések. In: Önkormányzat és iskola. (szerk.: Kozma T.) Budapest: Oktatáskutató Intézet, 122-154.

Köszönjük!

Szerkesztőség

Notes for Contributors

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