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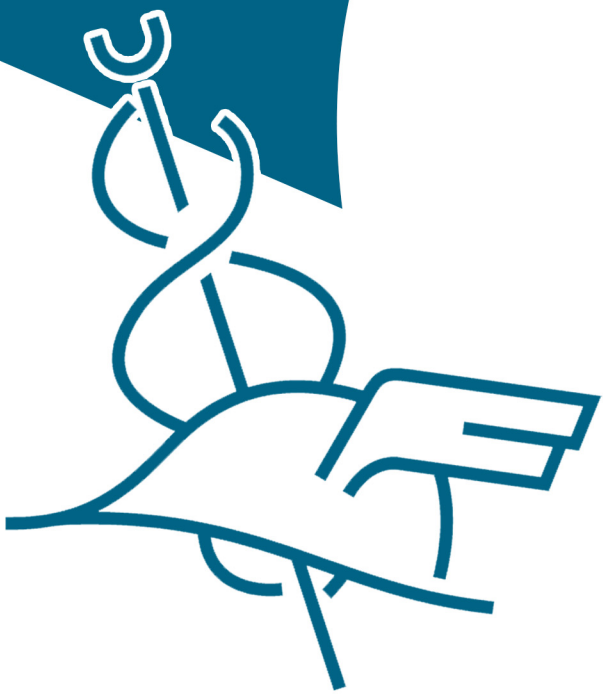
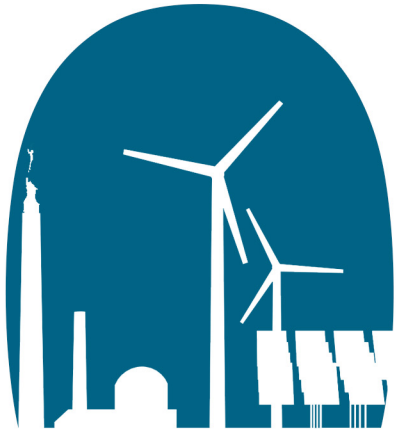
Challenges in the Turbulent Economic Environment and Organizations' Sustainable Development





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Challenges in the Turbulent Economic Environment and Organizations' Sustainable Development

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Zlatko Nedelko

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KEYNOTE SPEECHES

The Role of Human-Machine Dichotomy in Depicting Next Balances in Sustainable Development

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Sustainable development has been a widely discussed topic since the publication of the Brundtland Report in 1987, with significant inter- and trans-disciplinary contributions. Despite the considerable efforts and attention devoted to this topic, achieving a balance among economy, society, and environment remains an ongoing process. Both managerial and social sciences continue to explore conceptual and interpretative paths to define effective and long-term strategies for ensuring sustainable development for all.Recent advancements in computer science offer intriguing contributions in this regard, particularly considering the evolution of human-machine relations in digital and knowledge society. The complex and evolving dynamics of the human-machine dichotomy present interesting opportunities for reflection on potential pathways to ensure effective sustainable development in the coming decades. Through the interpretative lens of systems thinking, the role of new technologies can be analyzed as 'variety aligners' opening up new possibilities where machines are not merely seen as instruments but rather as key facilitators for ensuring the alignment of required information and cognitive proximity necessary for sustainable development.

keywords:
sustainable development, human-machine dichotomy, digital and knowledge society systems thinking, green growth

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Responsible Venturing: How to Create Desirable Futures through Supererogatory Management

Matthias Fink
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Keywords:
responsible venturing, supererogatory management, sustainability, proactive perspective on innovation and risk acceptance, company growth and development

In his talk, the author will share critical thoughts on potentials of responsible venturing for addressing the challenge to create desirable futures. After establishing a shared understanding of sustainability as the key element of responsible venturing he will introduce three major misunderstandings in the current scientific and public discourse. Each of these pitfalls will sharpen our understanding of a proactive, innovative and risk accepting perspective on sustainability, which opens our sight on how responsible venturing can be enacted. Especially, the author will carve out the role of the interplay of reason and emotions in the appraisal of managerial options and highlight the potentials of supererogatory management as a possible key to create desirable futures. This input will establish responsible venturing as a positive notion that needs to be embraced by the individual, community and society level to make this planet a better place.

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PROCEEDINGS

Sustainable Leadership Skills Development – Learning From Bees

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The paper aims to present the development of sustainable leadership skills based on the metaphorical organization of the bees. I hope to identify mechanisms educators could use when developing team leaders. The method used is the qualitative analysis of primary and secondary sources and the analysis of the educational exercise I implemented as a pilot study. I present the exercise I carried out at the School of Economics and Business at the University of Ljubljana for international and domestic students in the winter semester of 2023/24. I have incorporated the research question: "What can we learn from bees in developing future leaders?" into the Stanford Social Innovation Questionnaire. Students have been searching for possibilities to exercise communication, teamwork, and creative problem-solving based on the functioning of bees. The findings show that a limited number of exercises are available that incorporate into leadership skills development natural environment elements. More common is a combination of sports or art as a "playing ground" for developing games or simulations of leadership context. The research limitation in my endeavor is time, as my study is still at its beginning, and I hope to be able to do interdisciplinary research on the topic in the future.

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1 Introduction

"*Organisations are organic entities whose survival depends on the environmental harmony they achieve within their dynamic ecosystem*" (O'Keeffe, 2005, p. 775). Highly cooperative and socially integrated animal groups like beehives are called "superorganisms." Also, one of the metaphors of organizations is an organism (Morgan, 2006) with the hope of acting as a superorganism and aligning common goals. The colony acts like an organism in such species despite each animal's physical individuality. Their features include (Kesebir, 2012): (1) mechanisms that integrate individual units, (2) mechanisms that achieve unity of action, (3) low levels of heritable within-group variation, (4) a common fate, and (5) mechanisms to resolve conflicts of interest in the collective's favor. Group identification is a key mechanism that activates human superorganismic properties, and threats to the group are a key activating condition. Global warming has raised the attention of management scholars to research if we can learn from such superorganisms how to unite our efforts toward solving global problems that concern all of us, not only managers but every citizen on this planet. Global leadership is necessary, and people need to act toward a common goal of a dignified existence (Fien, 2014; Gloor et al., 2024).

Human learning organization compares to beehive in several ways (O'Keeffe, 2005, p. 768):

"*For example, worker bees are totally flexible with regard to their assigned task and will change jobs without a moment's thought towards personal gain or loss of status. Bees will respond to the needs of the hive even when the welfare in the hive demands the ultimate sacrifice. Worker bees reassign themselves (without supervision) to alternative workstations as one or more sections of the hive come under pressure (bottlenecks), which can be determined by a small change in hive temperature and airflow movements or a sudden shift in the dance routine (board meeting). The queen (chief executive) is elected by popular vote of the workers, not by the old boys' network or a directive from on high. The communication system is the bee equivalent of broadband, sophisticated, efficient, responsive, open to everyone, and honest*".

In developing the "bee" approach (Kesebir, 2012; O'Malley, 2010; Sousa et al., 2010) to sustainability leadership, the traditional model of the hierarchical leader with strong authority is replaced by the participative leader who works in a team where goals are created through a collaborative decision-making process. Such an approach is essential to leading in times of uncertainty and where the evidence upon which decisions can be made is ambiguous. Leading leadership journals warn us that women can act as queen bees and hinder the promotion of other women (Arwate et al., 2018; Derks et al., 2016). Raja and Riaz (2022) state that not all women exhibit

the queen bee phenomenon. Some women in leadership roles actively support and mentor their female counterparts. Which in turn facilitated their professional advancement opportunities.

2 Methodology

Our method is the qualitative analysis of primary and secondary sources. Qualitative researchers aim to explore people's lived realities and experiences (Green, 2021, p. 114). The interview is a reciprocal negotiation in which "meaning is being made through stories" (Green, 2021, p. 125). The organization is a collective storytelling system (Boje in Mills, 2021, p. 157). Narratives are the outcome of distributed collaborative action as socially constructed discursive forms negotiated between actors who engage each other in storytelling (Mills, 2021, p. 159).

We present the exercise we carried out at the School of Economics and Business at the University of Ljubljana for international and domestic students in the winter semester of 2023/24. We have incorporated the research question: "*What can we learn from bees in developing future leaders?*" into the Stanford Social Innovation Questionnaire. Students have been searching for possibilities to exercise communication, teamwork, and creative problem-solving based on the functioning of bees (O'Keeffe, 2005). The findings show that a very limited number of exercises are already available that incorporate leadership skills development natural environment elements.

3 Findings

On 13th December 2023, we gave our students an exercise where they followed the Stanford Social Innovation methodology. In the second phase, we incorporated the following questions inviting students to think about: 1) What is the role of bees in our food production system?; 2) How can bees become a symbol of sustainable organization?; 3) Can you find similarities in teamwork with beehive organization?; 4) What can we learn from bees?; 5) How often do you eat honey?; 6) How would you raise awareness about the meaning and importance of bees for human existence?

Students discussed in pairs how they developed as managers. They liked the exercise of teamwork, where teamwork leaders gained experience in leading a team and taking on responsibility for the project's outcome. They also practiced asking questions to

the managers, which in the artificial intelligence arena will be one of the most necessary skills (according to Van Quaquebeke, 2023). Prof. Dr. Niels Van Quaquebeke (2023) from Kühne Logistics University, Hamburg, Germany, is one of the top 100 best scientists in the field of business ranking WirtschaftsWoche, and he sees artificial intelligence mostly as the force that will demand the shift in research). On 7th December 2023 at the School of economics and business, University of Ljubljana, prof. dr. Van Quaquebeke shared the process and methods of implementing artificial intelligence in research at the business school.

Communicating with other people about the books and papers students read is also important in managing book clubs, which was one of the exercises in the course. Time management is also a valuable skill they would like to excel personally as a student.

Business students perceive the role of bees as our main pollinators. For the students bees are hard-working and efficient and have a clear structure inside their beehive. They have the complex social structure of a bee colony, communication methods, and the division of labor. Students would educate others via the metaphor of the bee so that they would make a theater play and simulate a bee colony that picks »pollen« - knowledge brings it to the company – »home«. It uses it not only for the colony's benefit but also for the human.

We need to state that the students helped themselves with Google and Chat GPT to find information about bees. In this case, with the exercise, they broadened their horizons. They connected knowledge from natural science with social science findings by reading the papers on e-tutor Management regarding teamwork, learning organization, social innovation, and sustainable leadership.

With the exercise of social innovation, students reflected on their management development and thought about their future developmental needs and priorities. Students expressed the need to learn how to encourage people, as this is important for team projects where students needed to manage a team of international students from at least three countries during the semester. Ideas for how students could do this were: 1) long discussions; 2) act as a role model; 3) come up with a good strategy; 4) share your value as a team leader with others; 5) presentation (talking in front of a large audience). Students decided that the best developmental outcome would

come from the competition, where the reward would make them leave their comfort zone and try something new with the team leader. We decided to act on students' feedback and invited company Lek to present their innovation strategy and design a management challenge at the end of our course where the best three solutions to the real-life corporate management challenge would be rewarded in future implementation of the course.

Expert prof. Dr. Valentina Kubale Dvojmoč (19th December 2023) shared a few game ideas for developing teamwork, communication, and creative problems inspired by the bees:

1. *Queen bee*: One member of each team is the "queen bee" and has special duties or rights. Queens must work with other bees (team members) and use their unique abilities to solve common challenges. In doing so, we can encourage creative problem-solving and dependence on each team member.

2. *Bee language*: We can develop a special "bee language" for participants during in-game communication. This language may include special words or symbols that players must use to solve tasks and communicate with each other. We encourage creativity in developing language and using it to solve challenges successfully.

3. *Honey competition*: Each team must develop their bee colony and collect "honey" (points) by solving challenges. Challenges can be related to various fields, from math and science to art and creativity. Teams must decide how to spend their "honey" points to improve their bee colony.

4. *Farming challenge*: Teams must plan and develop a "bee garden" together by choosing the right plants and flowers. To achieve their goals, they must consider how bees choose their flowers and how best to interact with the environment. The game can also include actual garden activities or creating a virtual garden.

5. *Bee industry*: Participants are divided into teams representing beehives. We equip each team with tasks that they must complete to successfully maintain their "hive" (project, task, or challenge). The team must collaborate, communicate, and share information to achieve the hive's goals. For added challenge, we can also add elements of competition between teams, where the winning team receives special

prizes or recognition. Importantly, the game focuses on collaboration, communication, and creativity, encouraging players to think about teamwork in innovative ways.

4 Conclusion

Our globalized world faces many challenges that demand our mindset change and interdisciplinary collaboration. In this paper, I tried to think about what we, as social scientists, can learn from natural science to overcome global challenges. By comparing the complex phenomenon of learning organization (Dimovski et al., 2009; Huybrechts et al., 2020) with the cross-functional activity within a beehive, we aim to stimulate further debate on the true nature of leadership within sustainable organizations (O'Keeffe, 2005). I hope to do further research on the topic with colleagues from both social and natural sciences and develop educational material to develop teamwork, communication, and creative problem-solving.

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A Departure From Customary Practice – Options to Reduce the Use of Materials in Tramway Track Structures

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The track system traditionally used in tramway track design is 59Ri2. Due to technical progress, the rigidity of modern flexible track structures has become sufficiently rigid and durable, and as a result, track systems with much lower inertia, such as Ts52, have also appeared. The use of the 59Ri2 rail system continues to dominate in embedded rail structures, which is not only statically oversized, but also significantly increases the amount of pouring material used, considering that both rail systems are suitable to carry road rail loads and their service life is considered similar (same wear allowed). This is not only an economic issue, but also a manufacturing and logistical one. Due to the scarcity of resources, a greater length of track can be built at unit cost by minimising the use of materials, and the amount of pouring material available on the market has been periodically limited in recent years. In this article, we use the side results of our previous finite element models to show the impact of track system dimensions on the amount of pouring material, and also detail the extent of material savings with PVC pipes and concrete material saving blocks.

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1 Introduction

In 2014, Zoltán Major made the following observations on the cost-optimal design of embedded rail structures in an article (Major and Kulcsár, 2014).

The practical design of embedded rail structures is currently based on costly laboratory tests, with one variant tested at a time. Their optimisation is not addressed at all in Hungarian practice, and only rarely in international practice, although correctly chosen parameters can lead to significant cost savings and more accurate compliance with environmental load requirements. Other research groups (Markine et al., 2000) have presented the optimisation of embedded rail structures for several parameters. In this paper, the optimisation process also considers variations that are "redundant" for practical design, since the range of available materials and rails is considered given, and therefore variations are only possible for specific cases in engineering practice. For example, there is no point in describing the variation in rail thickness during optimisation as a function, since these are values specific to a particular rail system and even if an optimum is found, no new rail type will be developed taking into account the values obtained. Thus, the properties to be optimised are summarised below:

- elasticity properties,
- the amount of casting material,
- maintenance needs,
- acoustic properties.

In this article we will focus in detail on the issue of the quantity of the pouring material, as it is the most costly component of the track structure and its availability to contractors has been limited at times. The price of a typical material used in Hungary from 2023 (SIKA, 2023) is 14,529 HUF/kg. This corresponds to a price of 36.3 Euro/kg at an exchange rate of 400 HUF/Euro. The density of the material is 0.9 kg/liter, so the price per volume is 40.4 Euros/liter.

2 Theoretical Background

The general knowledge (Darr and Fiebig, 2006) and design (Freudenstein et al., 2018) of ballastless track structures are discussed in detail in the literature. However, the literature available typically deals with the issue of track structures with embedded rails in less detail. The study of these structures from an ecological economics point of view can also be considered as a new field of research, which was also addressed by Major et al. (2023a). For these structures, the use of a well-chosen type of pouring material, precisely designed pouring dimensions and, if necessary, elastic tapes can have a positive influence on the development of stresses in the rail, the vertical and lateral deformation of the rail under vehicle load, as well as safety against vertical thermal expansion and gap opening due to rail breakage. Due to the homogeneous support, the stresses and deformations of the rail are more favourable than in other tracks, allowing the use of rail systems with lower mass than conventional designs. The amount of pouring material is not independent of the spring constant to be used, so optimisation is only possible by considering these two factors together. The quantity is influenced by the chosen rail system, the geometry of the rail channel and the pouring, the use of material savings items. Based on the known geometry, it is possible to determine the specific material consumption, which is the amount of pouring material per metre of rail. The general layout of the structure is illustrated in Figure 1.

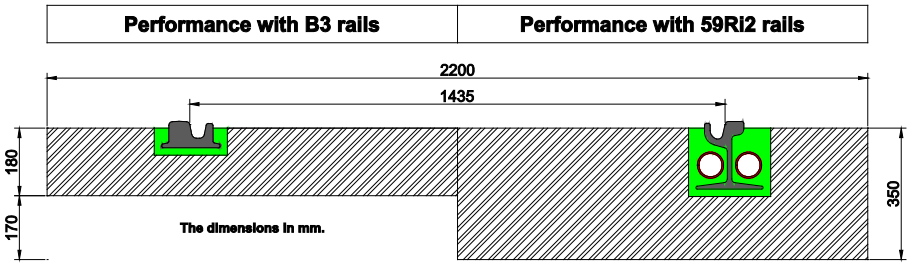

Figure 1: The performance of embedded rai structure (two structures)
Source: author's own illustration

3 Methodology

Numerical modelling allows the analysis of a large number of variations, replacing much of the time-consuming and costly laboratory testing. The results of finite element analysis can be used to select the optimal variation. In addition to the results of the structural analysis, additional tests can be performed for each variation based on side results such as the amount of pouring material. Our models also allow us to deal with the practical problem of placing a PVC pipe or a material saving concrete block in the pouring material or using a different rail system in the superstructure. In our investigations, we have used several different models to explore the differences in behaviour of each variant. These models were as follows:

- reference model: channel with full pouring (Figure 2),
- model with concrete material saving blocks (Figure 3),
- model with PVC pipes of different diameters (Figure 4).
- block rail/smaller rail model (Figure 5).

In this article, we will not examine structures with concrete material saving blocks due to space constraints and less used application in Hungary.

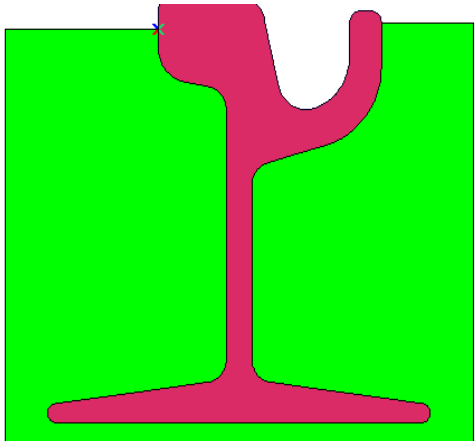

Figure 2: Finite element model of the reference structure
Source: Axis VM program

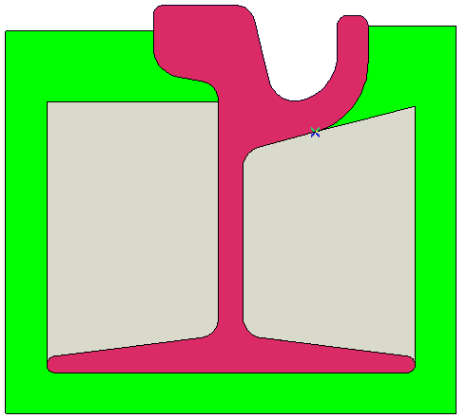

Figure 3: Finite element model of a structure with concrete material saving blocks
Source: Axis VM program

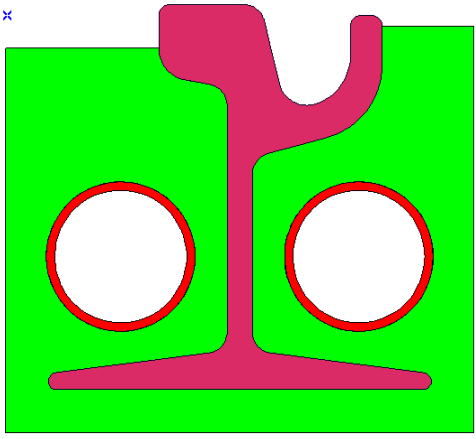

Figure 4: Finite element model of the structure with PVC pipes
Source: Axis VM program

Figure 5: Finite element model of the block rail structure
Source: Axis VM program

4 Results

The amount of pouring material is one of the most important descriptors of the chosen superstructure design, as it can have a major influence on the cost of installation. The quantity depends to a large extent on the desired flexibility, the rail system chosen and any material saving items used. In order to get an accurate picture of the variation of the pouring material as a function of the underpouring thickness, we have plotted the material consumption of our finite element models and fitted a linear function to the values. This is illustrated in Figure 6.

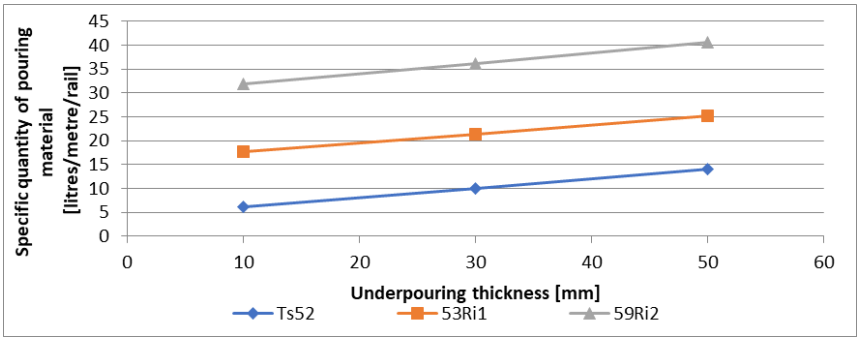

Figure 6: Specific pouring volume of investigated rail systems
Source: author's own illustration

Based on the amount of material and the specific price, we determined the material cost of the rails, which is illustrated in Figure 7.

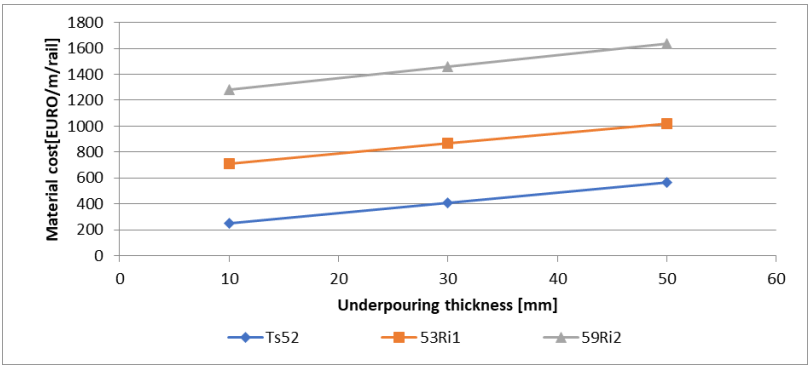

Figure 7: Material cost of investigated rail systems
Source: author's own illustration

Figure 7 clearly shows that the rail system used significantly affects material costs. Significant cost savings can be achieved by using the Ts52 rail. In the case of the 59Ri2 rail, it is possible to install material saving items to reduce costs. In Hungary, the use of concrete material saving blocks is currently still discouraged, while the use of PVC pipes is restricted only in certain cases. One such restrictive design case is road crossings, where cross traffic also uses the road structure. The contractors are trying to lift this restriction and concrete over PVC pipes. In this article, we will therefore only deal with the impact of PVC pipes on the volume of the pouring material. For different track systems, different diameters of pipes can be installed in the sling chambers, the diameters in use being 32, 40, 50 and 70 mm. In the case of block rails, PVC pipes cannot be used.

The amount of pouring material that can be saved with PVC pipes is summarised in Table 2. In this table, we have also summarized the price of the pipes (Termofix, 2024) at an exchange rate of 400 HUF/EURO, as well as the value of the savings that can be achieved with them.

Table 2: Amount of pouring material saved per pipe diameter

Diameter [mm]	Specific exclusion [litres/metre/pipe]	Specific exclusion [EURO/metre/pipe]	Price [EURO/m/pipe]	Saving [EURO/m/pipe]
32	0.8042	32.5	1.6	30.9
40	1.2566	50.8	1.9	48.9
50	1.9635	79.3	2.3	77.0
70	3.8485	155.5	3.5	152.0

As can be seen in Table 2, in the case of using 2 drab 70 mm diameter pipes, savings of up to 300 EURO/meter can be achieved, which makes the costs of using the 59Ri2 rail fiber more favorable. Nevertheless, these costs are still much higher than when using the Ts52 rail. Based on the obtained values, the costs can be significantly reduced with the careful use of materials, and thus it is possible to make more significant investments even in periods of lack of funds.

5 Discussion

As we have the possibility to complement the existing data by considering costs and CO_2 emission values, we plan to further research the development of a more complex method for the multi-criteria analysis of spilled duct structures, taking into

account life cycle engineering considerations (Gáspár et al., 2011). This analysis requires special data analysis solutions, which have been addressed in detail by Kocsis (2014).

6 Conclusions

In this article, we have presented in detail the possibilities of reducing the amount of pouring material in embedded rail structures and their effectiveness in optimising the materials used in the structure. Reduced material use results in a lower environmental impact, the positive effects of which can be further enhanced in urban environments. To this end, efforts should be made to develop green corridors, the general aspects of which are described in detail by Kappis et al. (2014) and guidance on the level of CO_2 emission reductions that can be taken into account is provided by Major et al. (2023b). Based on this, the CO_2 emissions saved during the building process can be added to the CO_2 sequestered by vegetation on an annual basis, which needs to be summed up to the end of life (analysis period) in order to make the individual removals comparable.

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Possible Applications of Modern Technologies to Reduce Disruption on the Railway Network

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The revenues of the railway infrastructure managers are proportional to the volume of the traffic on the railway lines, supplemented by other revenues and subsidies. To maximise their revenues in a changing economic environment (where there is a tendency for the state to withdraw from funding), it is important to have and operate an infrastructure with sufficient capacity. In the event of inadequate track conditions, they will not only face a loss of revenue from network charges, but also additional penalty costs. One of the key elements in achieving stable, good track condition is to ensure that the formation conditions are adequate. In practice, the use of large-scale mechanised subgrade rehabilitation is becoming increasingly common, ensuring a sufficiently fast job and consistent quality. Another advantage of its technology is that it allows 100% of the logistical tasks of renewal to be carried out on the track and reduces the amount of new raw materials to be installed. In this article, we will present the application possibilities of large-scale mechanised subgrade rehabilitation and highlight the savings in newly installed raw materials. With this thought-provoking article, we aim to raise the interest of the professional audience to learn more about this technology.

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1 Introduction

The rail network, much of which was built 100-120 years ago across Europe, needs to undergo major renewal and modernisation every cycle, with ongoing maintenance. As rail passenger and freight capacity has developed, so has speed and axle load. Reinforcing and rebuilding the formation entails high costs and traffic disruption compared with conventional technologies. Already in the second half of the 1970s, in Austria and Germany, the need arose for a new technology that would allow rapid reinforcement of the formation under the existing tracks without demolishing them. The development of the technology for large-scale mechanical railway formation rehabilitation required not only innovation from a mechanical point of view, but also new thinking in terms of track and geotechnical design and engineering control procedures. Over the last forty years or more, the mechanical and engineering background has been further refined and the emphasis on recycling processes has increased. The use of this technology has both economic and environmental benefits. Lichtberger (2022) and Esveld (2014) have dealt with the general aspects of railway track maintenance in detail, while the basics of the life cycle engineering approach have been described by Gáspár et al. (2011).

2 The evolution of formation rehabilitation machines

Railway undercarriage rehabilitation chains are integrated structures that can be divided into three main sub-assemblies. At the front of the chain is a section of equipment for transporting the excavated material, known as the "excavator section". MFS wagons. These special wagons are equipped with conveyor belts which, while continuously filling the last unit of the assembly, allow the conveyor belts to transfer the excavated old fill and aggregate to the first wagon and fill the assembly from front to back. The next part is the working unit, which houses the scraper chains for extracting the old crushed stone, protective layer and filling material, the grating, crushing and washing units, depending on the type of machine, the spreader and compacting plate vibrators used for laying the new protective layer, and the crushed stone spreader unit. At the rear of the assembly are wagons equipped with gantry cranes consisting of so-called cushion wagons for the transport of the new materials to be installed.

Table 1: Main characteristics of formation rehabilitation machines

Year of production	Machine type	Installation of geosynthetics	Crushed stone regeneration	Protective Layer Material Recycling
1980	PM 200-1 BR/C	yes	no	yes
1994	AHM-800-R	yes	no	yes
2000	RPM 2002	yes	in part	yes
2002	PM 200-2R	yes	yes	yes
2009	PM 1000 UHM	yes	yes	yes

The machines listed in Table 1 represent the main steps in the evolution of the technology. Initially, the material for the old protective layer was delivered in its entirety, while the crushed stone was crushed by the crushing equipment on the machine and mixed with the new protective layer material delivered to build the new protective layer. In the upgraded versions, the partial and then the complete recycling process is then carried out. The PM 1000 UHM is the most advanced of all. With its three scraper chains, it is able to separately extract the crushed stone to be recycled, which is then recycled as a sub-bed after screening, bouncing and washing. The second scraper chain lifts the mixed zone consisting of the old bedding and the old protective layer. Crushed stones with a grain size of more than 45 mm are fed into the first chain's crushed stone recycling process. Material with a grain size of less than 45 mm will form the basis for the additional intermediate and support layers under the new protective layer. A soil stabilising material, such as cement, can be added to this support layer.

Key benefits of the technology:

- high working speed, significantly less cutting time compared to earthmoving technology, no need to dismantle the track and all operations are carried out in the cutting zone,
- no damage to the top of formation (e.g. due to longitudinal material transport), as all material transport is by rail and is less sensitive to adverse weather conditions,
- homogeneous and durable installation quality, geotextile / geogrid can be laid by machine at the same time.

However, it is also true that:

- the thickness of the protective/reinforcing layer to be installed is limited, soil replacement and classical soil stabilisation are not possible,
- additional measures in response to deficiencies discovered during construction can only be implemented to a very limited extent,
- the control of construction quality (compactness, load capacity) is limited in space and time.
- a very weak (E_2 < 5...10 MPa) top of formation is not suitable for this technology.

3 Nationalisation of design and technical control specifications

The formations of the sections to be rebuilt are often in a very poor condition and can only be made suitable for the required load-bearing capacity by the installation of an additional reinforcing layer. In Hungary, the design guidelines in Instruction D.11 are the standard for formation requirements. The renewal of the Instruction D.11 was very important for the introduction of large-scale formation rehabilitation in Hungary. The introduction of rapid and technology-specific design methods is essential for the optimal use of mechanical formation rehabilitation technology. The modernisation of field measurement methods in the design and quality control processes has resulted in a great deal of time savings.

In the Hungarian design practice, geotechnical design using CPT sounding data was introduced in the context of the design of large-scale formation rehabilitation works, which does not exclude the traditional large live cutting operations with relatively long train-free times, but instead this much faster method can be used.

The main features of the applicability of CPT probing are:

- A complete picture of the formation layers down to a depth of 2 m,
- non-destructive testing, without introducing local track defects,
- continuous load line,
- a quick, efficient survey method,
- the measurement frequency can be easily compressed,

– requires little live work and can only be carried out during the cutting season.

Prior to the introduction of the test method, hundreds of measurements were made using CPT probing and conventional sectioning in the same cross-section and the results were presented in a design review. The results spoke for themselves, and it is now used as an accepted method. The next element of the practical implementation was the search for a fractured aggregate supplementary layer material with a suitable grain size distribution and rock physics. A trial mix of mines in Hungary with suitable rock physics properties was used to produce a mix with the designation SZK1, which was suitable in all respects. In addition to the technical criteria, the logistical transport and production capacity aspects were also important.

4 Experience gained in construction work

In addition to designing the technical handover method and identifying the materials to be incorporated, the most suitable machines for the task were put into operation in Hungary. The RPM 2002-2 was the first machine type used for the rehabilitation of the formation of the Budapest - Biatorbágy, Kecskemét - Városföld and Sopron - Szentgotthárd lines. In 2011, the PM1000 URM, the most powerful state-of-the-art machine chain, was used for the first time on the Tárnok - Székesfehérvár line. Figure 1 shows the machine chain at work.

Figure 1: PM 1000 UHM during the installation of the additional layer
Source: photo by Róbert Horváth

Using this technology, a total of 217,509 metres of track rehabilitation work was completed in 2016, the main quantities of which are summarised by line in Table 2.

Table 2: Large mechanical formation rehabilitation works between 2009 and 2016

Project name	Project period	Track length [vfm]	Target price [days]
South shore of Lake Balaton I. Phase I	2014-2015	26,740	64
Gyoma-Békéscsaba (left track)	2013-2015	4,556	11
Gyoma-Békéscsaba (right track)	2013-2015	4,556	9
Nagyút-Mezőkeresztes	2014-2015	35,604	53
Szajol-Püspökladány (left track)	2011-2015	56,517	80
Szajol-Püspökladány (right track)	2011-2015	56,517	93
Tárnok-Székesfehérvár (left track)	2011-2013	6,600	10
Tárnok-Székesfehérvár (right track)	2011-2013	6,600	10
Sopron-Szombathely-Szentgotthárd	2009-2011	25,687	49

During the works, great emphasis was also placed on monitoring the completed installations during operation. By testing the in-service properties of the completed formations using subsidence gauges installed at the top and bottom of the additional layer, it was found that, under the soil characteristics of average Hungarian railway lines, the 40 cm thick crushed stone protection layer installed over an area with a design load of 10-15 MPa distributes the vehicle load so well that stresses on the lower plane of the layer hardly cause any deformation. One of the characteristics of the material is observed in the installation of dolomite rubble pavements from mines in Hungary. For the installation of a fracture-crushed material corresponding to the SZK1 boundary curve, its water content must be kept at an optimum level of between 5 % and 7 %. The levelling beam of the formation rehabilitation machine chain spreads the material evenly according to the required profile, and the layer is then compacted using high-power vibroplates. A geotextile is placed between the top of earthwork and the additional layer to act as a separator, while a geogrid is placed in the crushed stone layer. The geogrid is placed either directly on the geotextile or in the overlying granular layer up to a height of 5-25 cm. Immediate measurements in a uniformly distributed SZK1 granular supplementary layer installed by vibratory compaction give significantly lower bearing capacity values than measurements after (1 week) pore water pressure has been released due to increased pore water pressure. After the pore water pressure is released, the bearing

capacity of the additional layer is correspondingly developed. In all projects, back measurements were taken at the time of installation and at 1 week of age. It was found that, at installation, the protective layer could meet the design load capacity, which in this case was E_{vd} = 45 MPa i.e. E_2 = 90 MPa, when the top plane of the additional layer had a load capacity of E_{vd} = ~35 MPa.

5 Environmental assessment of large-scale mechanical formation rehabilitation

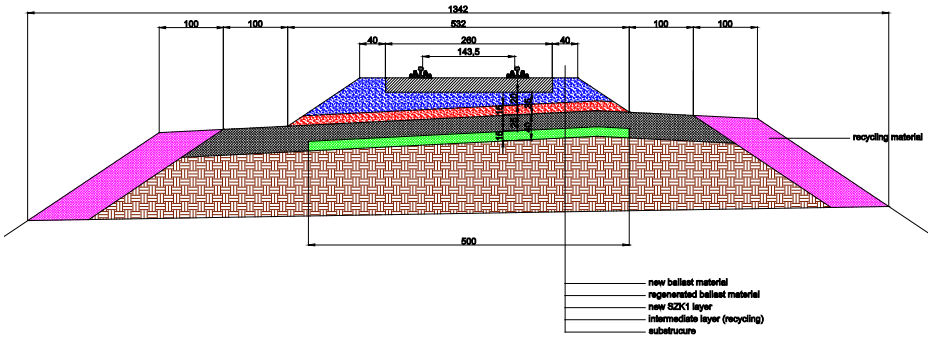

Figure 2: Possible cross-section of the track cross-section during the rehabilitation of the formation with a machine chain
Source: author's own illustration, dimensions in cm!

In Hungary, Act CLXXXV of 2012 on Waste was the first piece of legislation to set out specific requirements to reduce or eliminate the treatment of materials generated during construction and demolition works as waste. The PM1000 URM machine line is fully compliant with the requirements of the Waste Act. The total amount of additional layer to be installed per linear metre during the construction of the cross-section as shown in Figure 2 is approximately 3.2 m^3 . During the application of the formation rehabilitation machine chain, approximately 0.8 m^3 of intermediate layer is installed without leaving the work area. Up to 25% of the total cross-section volume is made from locally recycled material, with material savings of around €23/metre at current Hungarian prices. Reclaimed crushed stone will also be incorporated into the crushed stone bedding as described in Chapter 2. Depending on the condition of the ballast material of the track section to be rehabilitated, up to 0.8 m^3 of reclaimed crushed stone can be recovered from 2.1 m^3 of ballast material

per linear metre, which is 40% of the total ballast requirement, with material savings of €31/metre at current Hungarian prices. By using the technology, the in-situ incorporation of waste material results in significant savings, which translated into business terms, provides a significant competitive advantage for contractors, and reduces the cost of the project for the client.

Materials that are no longer suitable as load-bearing plywood and are not incorporated during bedding regeneration are not necessarily landfilled as waste. If embankment widening is required to create a new railway track, it may be used as fill material or, if the trackbed environment allows, as replacement embankment on site. The machinery chain in Hungary has a new Mobile Use Permit, which allows the classification of the materials generated during the recycling process by product (e.g. soil and stones EWC 17-05-04). By using the reclaimed interlayer and crushed stone material on site during the recycling process not only saves on transport and landfill costs, but also reduces material costs by up to €54 per metre and reduces CO2 emissions from the construction process. The fundamentals of ecological economics have been previously discussed in detail by Major et al. (2023a and 2023b). It is easy to see that large-scale formation rehabilitation using the recycling process can achieve significant environmental benefits for each kilometre of track reclaimed simply by reducing the amount of material that has to be supplied. The correct choice of the reconditioning strategy also has a decisive influence on the lifetime of the structure, the analysis of which and its impact on the ecological footprint has been discussed in detail by Eisinger et al. (2022).

6 Conclusions

In this article we summarised the experiences of the rehabilitation works carried out on the Hungarian railway network between 2009 and 2016 with the use of a large machine track rehabilitation machine chain. We briefly presented the essential elements and machines of the technology, and described the design and control aspects introduced during its application in Hungary. We pointed out the benefits of the recycling process carried out by the machinery chain and the CO_2 emission reductions achieved by its use. The technology presented is a typical example of technology development that achieves increased eco-efficiency as a result of economic improvements made in the interests of the company. In fact, the economic benefits are accompanied by a reduction in emissions. As a further

direction of our initiated research, we intend to investigate further options, both from the technological (Koch et al., 2023) and raw material side (Gáspár (ed.), 2005), to increase the capacity of the railway network with the lowest possible environmental impact. This complex approach will require a specific data analysis method, an example of which can be found in Kocsis (2014).

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Creating a More Accurate Model - Options to Reduce the Use of Materials in Tramway Track Structures

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Since the 1990s, road rail has once again become a key element of public transport in liveable modern cities. The design of these structures is greatly complicated by their complexity and the limited availability of data on the pouring material. While the railway designer typically deals only with the rails and the pouring material, the structural engineer, ignoring these elements, often considers only the supporting beam as a single structural element. Breaking with this approach, a method is presented that, when implemented in an MS Excel environment, can be used to create an efficient tool for the joint analysis of the embedded rail structure and its supporting beam. The internal forces in the beam obtained by this method are more favourable than those calculated by the conventional method and thus provide the opportunity to optimise (minimise) the amount of material used. In this article, we present the potential applications of the complex model and, based on the calculations performed, highlight the material savings that can be achieved in the design of the supporting beam, which also proportionally reduces the costs, which are limited in the changing economic environment.

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1 Introduction

In the case of an embedded rail structure, it is generally accepted practice to consider the supporting beam as infinitely rigid when calculating the stresses and deflections of the rails. When the beam is designed, this can be done as a resiliently embedded support. In general, the beam is investigated for stresses from concentrated loads, which is an approximation in favour of safety, but leads to significant oversizing, since the load-distributing effect of the rails is not present. In this paper, we present a solution to more accurately determine the stresses on the beams. Taking the original derivation further, we have implemented the solution in MS Excel and created a program that allows us to take into account not only the effects of a single axis, but also those of groups of axes.

2 Theoretical Background

The general knowledge of ballastless tracks is discussed in the book Feste Fahrbahn (Darr and Fiebig, 2006). The special design of these structures, such as green tracks for urban environments, is discussed in detail in Kappis et al. (2014). The designing of slab tracks with discrete rail supports is presented in Freudenstein et al. (2018). In the paper by Yen and Lee (2007), the practical case where an "infinite" long rail is supported by an "infinite" long beam is described. The system of differential equations describing the problem is summarized in Equations 1 and 2. While the problem is illustrated in Figures 1 and 2.

$$E_S I_S \frac{d^4 y_1}{dx^4} = p_1 \quad , (1)$$

$$E_C I_C \frac{d^4 y_2}{dx^4} + p_1 = p_2 \quad . (2)$$

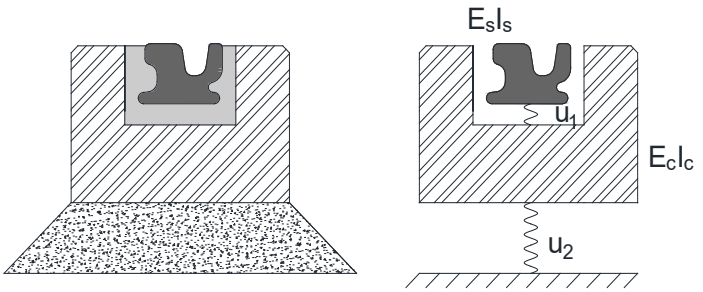

Figure 1: Schematic diagram of the problem under study 1
(source: author's own illustration)

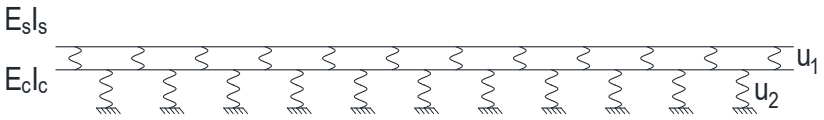

Figure 2: Schematic diagram of the problem under study (2.)
Source: author's own illustration

The factors in the derivation, the input parameters of the model:

- E_sI_s: the bending stiffness of the rail [kNm²],
- E_cI_c: bending stiffness of the beam [kNm²],
- u_1: support stiffness of the rail [kN/m/m],
- u_2: support stiffness of the beam [kN/m/m].

The differential equation system can be solved by following the steps below:

Step 1: Determine the auxiliary quantities needed to simplify the calculation.
Step 2: Calculate the Zimmermann's influence functions.
Step 3: Calculate the deflection and bending moment of the beam.
Step 4: Transform the original functions to take into account the effect of the axis group.
Step 5: Determination of the shear force function by applying the finite difference method.

Knowing the internal forces, the designer has the opportunity to design the the beam. You can modify the dimensions and material quality, design the reinforcement for bending and shear. With a design that matches the internal forces more and more, it can ensure the minimum use of materials, which can result in less environmental impact. Furthermore, it can also reduce the amount of transport in the urban environment. Smaller intra-city transportation disturbs traffic less, causes less noise and vibration, and also reduces the emission of air pollutants.

3 Methodology

For problem validation implemented in MS Excel environment, two models were prepared and their results were compared with the results reported by the Axis VM finite element modeling (FEM) program. In one of them we used SA42 rail and in the other one we used 60Ri1. The beam has a cross section of 70x40 cm. In both cases the support stiffness of the rail is 50 N/mm/mm. The bedding factor under the beam is 0.05 and 0.20 N/mm^3 respectively (the support stiffness under the beam is thus 35 and 140 N/mm/mm.) The applied load is a single 125 kN wheel load. The results are summarized in Table 1.

Table 1: Calculated and modelled (FEM) results

C=0.2 N/mm^3	Analyst	FEM	
SA42	27.39	27.46	kNm
60Ri1	17.53	17.55	kNm
C=0.05 N/mm^3	Analyst	FEM	
SA42	44.38	44.41	kNm
60Ri1	32.62	32.60	kNm

The obtained values show that the accuracy of the derived relations is equal to the accuracy of the finite element models, so they can be used for approximate dimensional surveys and inspections.

4 Results

Our validated program has also been applied to groups of axles to verify the effectiveness of the load-distributing effect of the rail. In the model, 4 wheel forces of 75 kN were placed at a distance of 2.2 m from each other, which corresponds to the static value according to the Hungarian regulations. A 60Ri1 rail was used in the

model. The supporting beam has a cross section of 70x40 cm. The supporting stiffness of the rail is 30 N/mm/mm. The bedding factor under the beam is 0.10 N/mm^3 (the supporting stiffness under the beam is thus 70 N/mm/mm). The calculation was performed both with and without the load-distributing effect of the rail, which is possible with our software. The results are shown in Figures 3 to 6, while the calculated values are summarized in Table 2.

Table 2: Results calculated by the programme

	Without load distribution	With load distribution	
Bending moment (+)	20.94	6.99	kNm
Bending moment (-)	8.31	6.94	kNm
Shear force (+)	31.81	8.24	kN
Shear force (-)	31.81	8.24	kN

The results in Table 2 show that the model selected and applied at the site can significantly reduce the calculated results and thus the amount of material used.

Figure 3 shows the bending moment calculated without considering the load distribution. The location of the individual axes can be clearly seen in the figure. Significant positive bending moment peaks appear here. On the other hand, in Figure 4, where we took into account the distribution of the loads, these peaks disappear and the resulting positive values are significantly reduced. On the other hand, there is no significant difference in the magnitude of the negative values in the two figures.

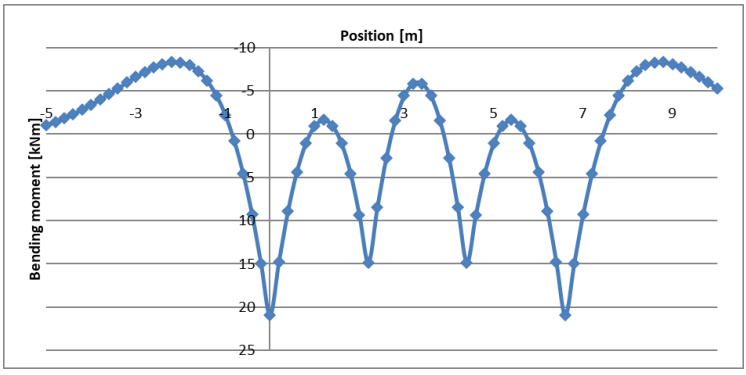

Figure 3: Bending moment in the beam without load distribution on the rail
Source: the result of our program

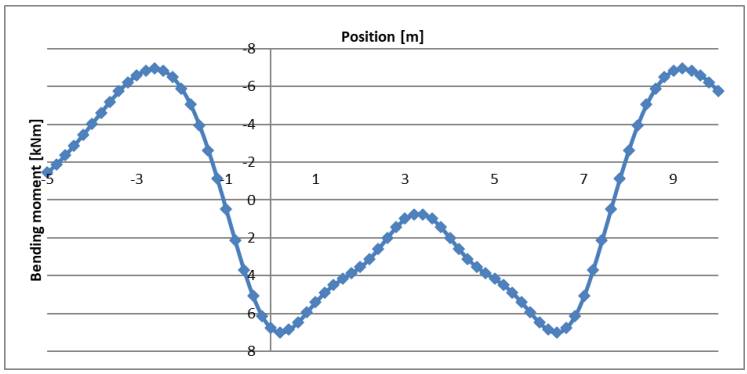

Figure 4: Bending moment in the beam with load distribution of the rail
Source: the result of our program

Based on the values in Table 2, it can be seen that with the correct choice of the calculation model, the positive bending moment values dropped to 33.3%. In this case, the positive and negative bending moment values are almost the same. Sizing for these internal forces results in a much smaller use of concrete and steel, which results in a significant cost reduction. In addition to these, the smaller use of materials also reduces the environmental impact.

Figure 5 shows the shear force calculated without considering the load distribution. The location of the individual axes can be clearly seen in the figure. Here, significant peaks appear on the shear force diagram. On the other hand, in Figure 6, where we took into account the distribution of the loads, these peaks disappear and the resulting values are significantly reduced.

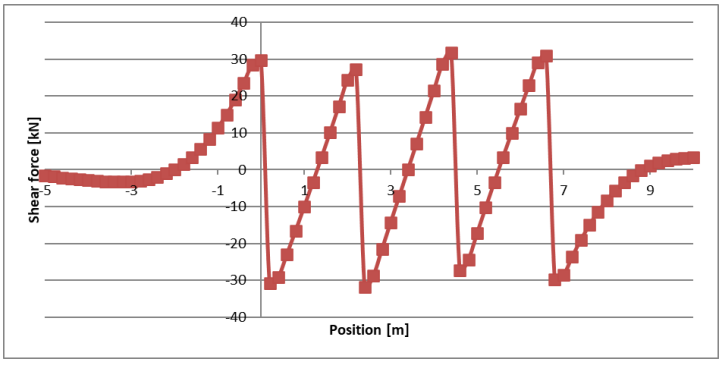

Figure 5: Shear force in the beam without load distribution of the rail
Source: the result of our program

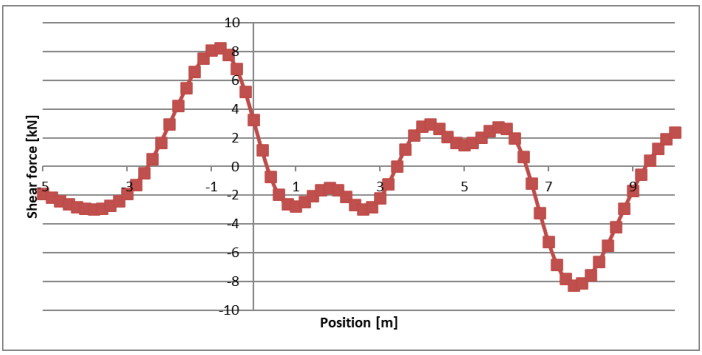

Figure 6: Shear force in the beam with load distribution of the rail
Source: the result of our program

Based on the values in Table 2, it can be seen that with the correct choice of the calculation model, the maximum value of the shear force dropped to 25.9%. Sizing for these internal forces results in a much smaller use of concrete and steel, which results in a significant cost reduction. In addition to these, the smaller use of materials also reduces the environmental impact.

5 Discussion

In our article, we only looked at the impact of the model on the demand and were able to draw conclusions on the expected material savings. In our further research, we want to get a more precise picture, so we want to obtain quantifiable values for both the concrete and reinforcing steel used by sizing the beams precisely, in order to create a kind of structural optimisation to reduce the environmental impact. This requires not only an analysis of the behaviour during the as-built phase, but also during the whole life cycle, the main aspects of which are detailed by Gáspár et al. (2011). The methodological development of this research would be facilitated by the use of the Intenscope method (Kocsis 2014).

6 Conclusions

In this paper, we present an adaptation of a calculation method in MS Excel environment that allows to calculate more accurate internal forces than the traditional practice, while taking into account the load-distributing effect of the rails. Based on the results calculated by us, it can be seen that a significant decrease can

be seen in the examined case both in the bending moment values and in the shear force values. In the case of the bending moment, the value is 66.7% lower, while in the case of the shear force, the value is 74.1% lower using the more accurate model. As a result, the amount of materials used can be effectively reduced, which results in a lower environmental impact (Major et al., 2023) and a reduction in construction costs.

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INTEGRATION OF THE SECAP METHOD IN SUSTAINABLE BROWNFIELD REHABILITATION PLANNING

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Brownfield rehabilitations provide a unique opportunity to contribute to local sustainable development, whereby the sustainability of those projects is also considered from the beginning of the planning process. This implies a specific focus on sustainable development throughout the project lifecycle, and it is crucial to rehabilitate these fields by proactively addressing climate challenges and contributing to the evolution of low or zero-emission districts. In the current paper, the European policy, legal framework, Hungarian legislation, and strategy documents define the sustainability aspects and requirements were analysed. Comprehensive terminology was developed, considering existing methodologies with a particular focus on the Social, Environmental and Climate Assessment Procedures (SECAP).

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1 Introduction

Sustainable development is a core principle of the European Union that merges economic, social and ecological aspects into one paradigm. Land use in a given geographic area is both the cause and the outcome of economic development and reflects the human impacts on the environment. For this reason, land use changes are critical for sustainable development, and the topic is crucial to the EU's policy agenda. The target of no net land taken by 2050 is part of the European Union's 7th Environmental Action Program (European Parliament and Council, 2013) and was also reinforced by the European Union's Soil Strategy for 2030 (European Commission, 2021). Encouraging the redevelopment of brownfields is particularly important to emphasize as an efficient approach to sustainable land use and land use planning, as well as a crucial mechanism for minimizing the loss of fertile land and mitigating land use. This requires a comprehensive approach involving various prerequisites, consisting of legal, financial, regulatory, and community-based considerations. The current article focuses on the legal and regulatory framework. It discusses how it creates a favourable environment for unlocking the potential of underutilized sites. It aims to propose a new model to fill the missing gap of integrating Sustainable Energy and Climate Action Plan (SECAP) and the Sustainable Urban Mobility Plan (SUMP) as essential tools for brownfield project planning.

2 Theoretical background / literature review

Originating in North America, the term "brownfield" quickly gained widespread recognition across the globe, particularly in Europe. The European Commission has explicitly stimulated the use of the term by organising a thematic conference in 2019 to promote brownfield redevelopment as a solution to limit urban sprawl, land take and soil sealing. Nonetheless, the EU needs a standard definition of brownfields and has a common general brownfield policy or strategy (Jacek et al., 2022). There is no single common methodology to define site-specific remediation standards or support the planning and implementation of brownfield rehabilitation (Morar et al., 2021). Thus, to understand the EU's ambitions concerning brownfield rehabilitation, EU policies that consider the direct and indirect impact of land use are to be examined. Regarding the Hungarian national legislative framework, the Building Act (Act LXIV of 2019) establishes the regulative framework for brownfield sites. The

most relevant articles are 2 § 43, which provides the definition of brownfield sites, and 8 § (7), which consigns the municipalities with the planning task concerning the rehabilitation projects. There are no standard tools for planning brownfield rehabilitation projects on the European or national level. Highlighting the sustainability aspects, the Sustainable Urban Mobility Plan (SUMP) and the Social, Environmental and Climate Assessment Procedures (SECAP) are relevant methodologies to be considered.

3 Methodology

The current study is based on a threefold analysis process. The relevant EU policy framework is identified as the first phase, and respective policy instruments are screened. In the second phase, Hungary's legislative implementation framework is discussed. In the third phase, selected available methodologies are examined and compared, and a systemic management structure is developed to illustrate how SECAP can be exploited during brownfield rehabilitation.

3.1 EU legislative framework

The EU policy framework analysis includes general and sectoral policy documents to screen for how well they steer and facilitate the redevelopment of the industrial landscape. In sum, 18 relevant EU policies have been identified (see Table 1).

3.2 Hungarian National Framework

The most relevant and actual legal document is the Building Act LXIV of 2019, an amendment of the original Building Act LXXVIII of 1997. It establishes the basic rules for brownfield sites. Also, it requires that, if there is a brownfield area in the administrative territory of a municipality, the local government is obliged to define the brownfield in the settlement planning tools (e.g., master plan, land use plan, and zoning plan) (Szakonyi & Makó, 2023).

3.3 Methods for sustainability planning

As no planning tools and methodologies concerning brownfield rehabilitation exist on a European level, the focus is set on planning instruments comprehensively serving sustainable development: the SUMP and the SECAP. These instruments are predefined by the European Union and implemented in the Member States on a local/national level, ensuring that development pathways in the European Community's different territories are similar to how SUMP and SECAP influence the brownfield rehabilitation planning and will put them into one systemic model with another planning document to ensure high efficiency of brownfield projects.

4 Results

Each research phase has generated its research outcomes that can be summarized as follows:

4.1 EU legislative framework

The text analysis of the 18 policy documents showed that only four explicitly mention brownfield rehabilitation. As summarized in Table 1, 11 further documents refer to connected terms like urban development, sustainable land use, reusing urban soil, and mitigating urban sprawl.

Research showed that the documents need to include criteria for sustainability or specific definitions of sustainable urban development and sustainable land use/management. The explanation might be that until now, sustainable development has been considered a general imperative in the European Community that has yet to require any further clarification or explanation.

Table 1: Categorization of reviewed policy documents

Observation	Policy documents
Mentions explicitly brownfield	– A new Circular Economy Action Plan (European Commission, 2020a) – EU Biodiversity Strategy for 2030 (European Commission, 2020d) – 7th EU Environment Action Programme (European Parliament, European Council, 2013) – Regulation on the Just Transition Fund (European Parliament, European Council, 2021a)
Has a clear reference to connected terminology (e.g. urban development, sustainable use of land, rehabilitation, restoration, regeneration, reusing urban soil)	– Roadmap to a Resource Efficient Europe (European Commission, 2011) – Reflection Paper - Towards a Sustainable Europe by 2030 (European Commission, 2019a) – The European Green Deal (European Commission, 2019b) – A Renovation Wave for Europe (European Commission, 2020c) – The New Leipzig Charter (2020) – EU Soil Strategy for 2030 (European Commission, 2021a) – New EU Strategy on Adaptation to Climate Change (European Commission, 2021b) – Regulation on the European Regional Development Fund and on the Cohesion Fund (European Parliament, European Council, 2021b) – Interreg Regulation (European Parliament, European Council, 2021c) – Territorial Agenda 2030 (2020) – Urban Agenda for the EU, Pact of Amsterdam (2016)
No relevant topic reference	– A New Industrial Strategy for Europe (European Commission, 2020b) – European Climate Law (European Parliament, European Council, 2021d)

4.2 Hungarian National Framework

The national legal framework has an apparent definition of brownfield. 2 § 43 of the Building Act defines a brownfield site as a parcel or parcels of land that has been abandoned, underutilized, or degraded, typically polluted, following primarily industrial commercial, transport or defence uses, but which can be converted into an area of value-added development through environmental and technical intervention. 8 § (7) consigns the municipalities the planning task concerning the rehabilitation projects, stating that the local government may delimit the brownfield areas in the settlement spatial plan and determine their reuse and development

possibilities while revising the settlement development plan. Thus, the national law defines that the local government must redevelop brownfield sites on its territory. In addition, the Building Act also names the local planning instruments that must deal with the brownfield development. The settlement management plan and the settlement development plan together create the settlement master plan, as defined by the Act XXXIX of 2021, and integrate the previously used tools like the settlement development concepts and strategies, settlement structure plans, local building regulations and the detailed zoning plans, in one joint land use planning instrument on local level (Jámbor et al., 2021). Brownfield areas are thus defined in this local settlement master plan, which includes analysis, recommendations, and proposals for the site's population, economy, housing, transportation, community facilities, and land use. It defines the brownfield redevelopment's construction concept and includes the zoning plan with detailed rules on how to use the brownfield area. The building code of the zoning plan specifies the standards for constructed objects, such as buildings on the brownfield, focusing on the building's physical features and characteristics that affect accessibility and safety (Szakonyi & Makó, 2023).

4.3 Methods for sustainability planning

SUMP and SECAP focus on a critical aspect of sustainable development (mobility and transport vs. energy and climate change mitigation, respectively) that directly impacts brownfield rehabilitation. SUMP is a strategic blueprint crafted to meet the transportation requirements of residents and businesses within urban areas and their adjacent regions, aiming to enhance overall quality of life. As Szakonyi and Makó (2023) highlighted, SUMP places people and their mobility at the heart of the planning efforts – contrary to traditional transport planning that has focused on providing space for the development of car traffic. Thus, SUMP supports public transport, walking, and cycling while reducing car use in this sense; it fosters, for example, car-free areas or zero-emission zones. The outcomes are of utmost importance for brownfield rehabilitation, as transport capacities directly impact the feasibility of such projects. SECAP focuses on energy security and climate change mitigation. It draws on the Baseline Emission Inventory (BEI) findings and the Climate Change Risk and Vulnerability Assessment (RVA). It defines concrete climate mitigation and adaptation measures with timeframes and assigned responsibilities, translating the long-term strategy into action (Bertoldi, 2018). A new

model for brownfield development planning was created in 2022 by Szakonyi and Makó (2023) to increase its sustainability outcomes by incorporating a transportation impact assessment as part of the settlement master plan. SUMP also appeared earlier in this new model, following the master plan and feasibility studies to improve the project evaluation process. Similarly, SECAP should also be integrated into the planning and evaluation process to consider renewable energy potentials in the brownfield planning mechanism. That can result in dedicated repurposing of the site, enabling the conversion of an area into a renewable energy valley or incorporating renewable energies into the brownfield project (Figure 1).

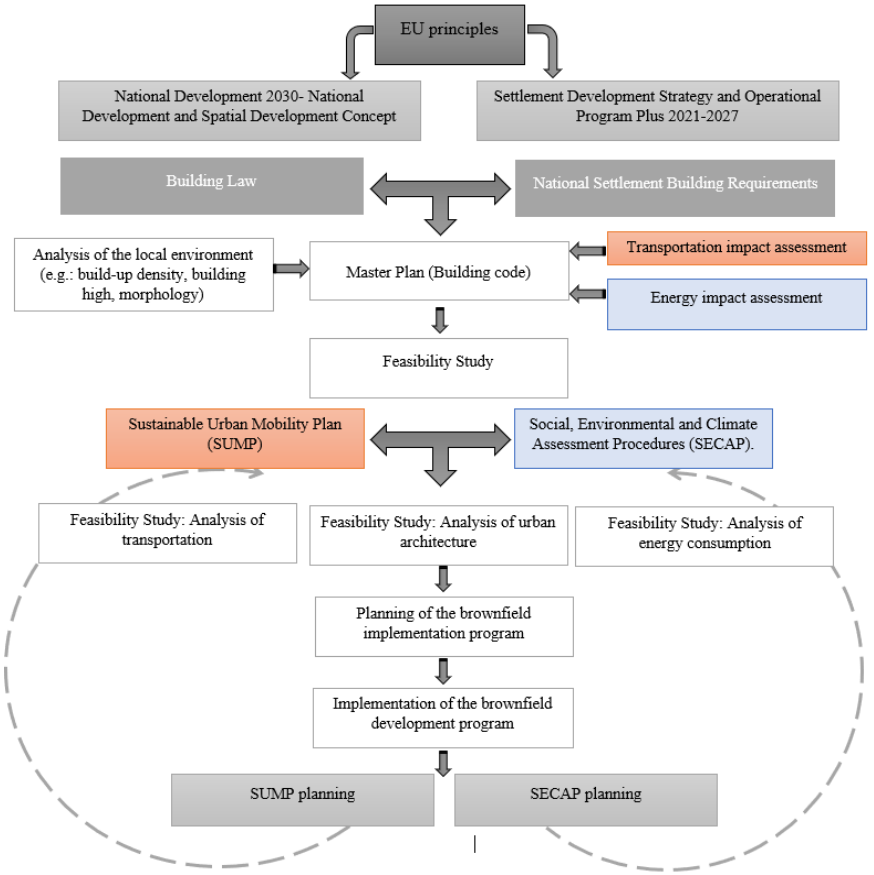

Figure 1: The proposed systemic model integrates the SECAP into the brownfield project evaluation process

5 Discussion

As summarized in Table 2, both SUMP and SECAP are planning instruments for cities that encourage joined-up decision-making across sectors and between stakeholders, focus on actual current and predictable future data (D, L, M) and emphasize the importance of vision and implementation (E, P, R). Both documents underline the importance of integrated approaches. SECAP explicitly strives for its integration into the municipality's everyday management processes (F, O). Further, SUMP highlights the relevance of quality management (G, H), while SECAP points to financial and human resources (K, Q). To develop a systemic management model, it is also essential to integrate not only the content-relevant inputs, thus the thematically relevant elements of SUMP and SECAP into the brownfield planning and implementation process but also the use the critical methodical elements of the two planning instruments in an integrative way.

Table 2: Methodical principles and elements of SUMP and SECAP

SUMP Driving principles	SECAP key elements
A. Plan for sustainable mobility in the "functional urban area"	I. Build support from stakeholders and citizen participation: if they support the SECAP, nothing should stop it!
B. Cooperate across institutional boundaries	J. Secure a long-term political commitment
C. Involve citizens and stakeholders	K. Ensure adequate financial resources
D. Assess current and future performance	L. Do a proper GHG emissions inventory as this is vital
E. Define a long-term vision and a clear implementation plan	M. Make a Climate Change RVA, based on an analysis of the local/regional trends of various climate variables and city socioeconomic and biophysical specificities
F. Develop all transport modes in an integrated manner	O. Integrate the SECAP into everyday management processes of the municipality: it should not be just another nice document, but part of the corporate culture!
G. Arrange for monitoring and evaluation	P. Ensure proper management during implementation
H. Assure quality	Q. Make sure that staff has adequate skills, and if necessary, offer training
	R. Learn to devise and implement projects over the long term

Based on Bertoldi (2018) and Rupprecht (2019)

Figure 2 illustrates the systemic management model for brownfield rehabilitation and leads to the following methodical recommendations to be considered:

- The social consultation and stakeholder engagement processes launched for SUMP and SECAP can create the base to ensure commitment and social acceptance for the envisaged brownfield project.
- A combination of classic project management tools and agile management techniques might ensure the focus on long-term vision while carrying out comprehensive operative implementation.
- An integrative approach should be used for thematic definition and for methodical implementation of the brownfield project to allow already established structures and frameworks to be built up and widened according to the specifics of the brownfield site.
- Quality management should focus on quality planning, assurance, and control, whereby the structures defined by SUMP can be reused and built upon.
- Adequate planning, allocation, and use of financial and human resources within SECAP can create an implementation framework that can also be utilized for the brownfield project.

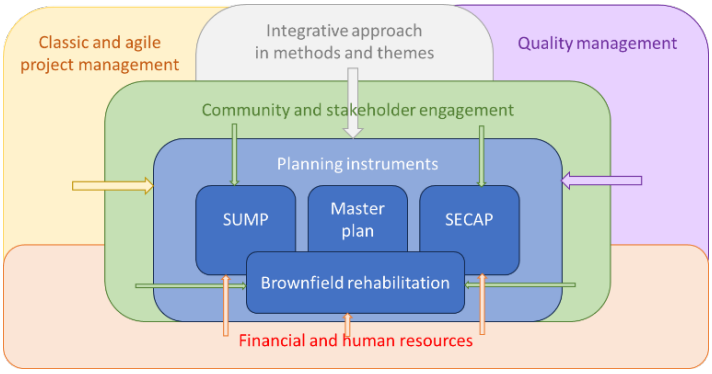

Figure 2: Systemic management model for brownfield rehabilitation Figure

6 Conclusions

Relevant policy documents on the EU level refer to brownfield rehabilitation indirectly or promise future strategy development. The terminology and implementation framework on a national level in Hungary do exist. However, neither the EU nor the Hungarian legal and policy framework indicates how the sustainability impacts of brownfield rehabilitation should be planned, measured or

exploited. SUMP and SECAP co-exist with the national land use planning instruments, but clear correlations could not be detected. The suggested new brownfield project development model, which integrates SUMP and SECAP into the process, seems promising. In contrast, the proposed systemic management model explores the methodical elements and structures used for SUMP and SECAP development, which can be explored for brownfield project planning and implementation.

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Business – NGO Partnerships in Hungary: A Longitudinal Study

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The purpose of this research was to examine eight business-NGO collaborations in Hungary, with the aim of evaluating their objectives, governance, and impact. In 2013, interviews were conducted with experts from the participating partners, and a thorough review of historical records, official documents, and media coverage was carried out. A follow-up evaluation of publicly accessible resources was conducted in 2023. The findings from 2013 revealed that these cross-sectoral partnerships primarily involved volunteering, with joint development and problem-solving in regional and educational sectors playing a lesser role. The partnerships varied in scope, ranging from smaller projects with short-term goals to more extensive collaborations. However, partner selection in these partnerships did not adhere to the features commonly observed in international literature and practices. By 2023, all but one of the original case study partnerships had been terminated, and there were no signs of sustained activities. Some of the NGOs involved in the partnerships underwent significant changes during this time. The termination of these partnerships was largely due to a lack of long-term strategic intent or commitment from the corporate partners. This study represents the first longitudinal research into cross-sectoral partnerships in Hungary.

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1 Introduction

The concept of cross-sector partnership gained prominence following the United Nations Conference on Environment and Development in 1992. Subsequent UN events reaffirmed the significance of collaborations between governmental, business, and non-profit sectors in contributing to global sustainability efforts, culminating in the adoption of a resolution on global partnerships in 2005. These partnerships are widely recognized as effective solutions in various fields, particularly in developing countries (Suryanto et al, 2023; Zaman, 2023). Cross-sector partnerships enhance the legitimacy of non-governmental organisations (hereinafter NGOs), promote social innovation, and enable the resolution of complex social problems (Joniškienė et al., 2020; Le Ber & Branzei, 2020). By pooling resources and addressing issues that cannot be tackled individually, collaboration between sectors allows organisations to achieve greater results. The private sector's increased emphasis on corporate social responsibility has encouraged businesses to work with NGOs to improve their reputation and take partial responsibility for social problems. In Hungary, the concepts of cross-sectoral partnership and collaboration between sectors are primarily referred to in public policy documents and political speeches. This study specifically examines partnerships between business and civil society, treating the terms "civil", "non-profit", "non-governmental", and "NGO" as synonymous.

2 Theoretical background

Definition of partnerships

Partnerships have been extensively discussed in academic literature, resulting in multiple definitions being proposed (see, for instance: Hutchinson, 1998; Nelson & Zadek, 2000; Wildridge et al., 2004; Seddon et al., 2005; Selsky, 2005; Geddes, 2017). Despite efforts to clarify the conceptual confusion, there is still disagreement among scholars. However, in practice, the use of different terminology does not necessarily lead to confusion as long as the participating parties understand and document their understanding of partnership within a specific context. According to influential literature, partnerships have the following characteristics: participants come from different sectors, partnerships share a common goal that goes beyond business benefits, partnerships have a formal institutional structure, and the partnership sets

out goals and activities that would not be achievable without collaboration (Pattberg, 2004, p 56).

Forms, benefits, and objectives of partnerships

Partnerships can take on various concrete forms, ranging from simple forms like financial donations to more complex collaborations (Tennyson et al., 2008). These partnerships often evolve from small-scale, quick successes to more strategic and complex collaborations. There are two major groups of benefits for partnerships: the goals jointly defined by the partnership and the individual goals of each participant. These goals can be achieved to varying degrees. The specific objectives of partnerships vary widely, and the benefits derived from partnerships can also be diverse, including local economic development, job creation, improvement in the quality and accessibility of services, advancement of health and education services, reduction in crime and violence, enhancement of diversity, and improvement in the overall quality of life (Nelson & Zadek, 2000).

The Hungarian social context

Factors such as the regulatory environment, government initiatives, social and organisational cultures, trust, and personal involvement all interact with the characteristics of the welcoming environment. These qualities can even manifest as national peculiarities that influence specific partnerships. The Hungarian social context plays a significant role in influencing cross-sectoral partnerships. International studies have found that Hungarians are generally less trusting, less tolerant, less open-minded, more individualistic, and more competitive compared to the European average (Neumann-Bódi et al., 2008; Keller, 2009; Tóth, 2009a and 2009b; Csepeli & Prazsák, 2010). They also tend to believe that individual actors can only succeed at the expense of others. Additionally, the majority of Hungarians expect the government, rather than themselves, to bring about positive changes in their lives (Kopp & Skrabski, 2008, p 147). These values and norms present a challenge for collaboration as they do not strongly support the formation and success of partnerships (Radácsi, 2011). However, it is possible for collaborations to develop and have an impact. By achieving their goals and providing a positive experience, collaborative projects can help reduce distrust and strengthen trust

between parties. Overall, cross-sectoral collaborations have the potential to contribute to the development of a trust infrastructure in Hungary.

3 Methodology

In 2013, a thorough research was conducted by an 11-member team on eight corporate-civil partnerships. The team conducted interviews with experts from the participating partners, gathered insights from historical records, official documents, and media coverage. The findings were documented and disseminated through various publications (Radácsi, 2015a; 2015b; 2021).

In 2023, a decade after the initial research, we conducted an investigation into the long-term impact of the projects and their influence on the activities, operations, and future collaborations among the partners. To achieve this, we conducted a comprehensive evaluation of publicly accessible resources, including the websites of the past projects and subsequent news coverage. We also examined sustainability reports issued by the involved companies to determine any disparities between current and past goals. In some instances, we communicated with representatives from the partnering organisations.

4 Results

Table 1 encompasses the collaborations highlighted in the case studies conducted in the year 2013. The table comprises the collaborating entities and the objectives pursued by the partnerships.

Table 1: The 8 partnerships in the 2013 round of the projects (Radácsi, 2015b)

Project name	**Revitalisation of the Liberty Island and its side-arm on the Danube**
Company – NGO	Coca-Cola Hungary – WWF Hungary
Objectives	WWF initiated a LIFE+ Nature project to undertake the restoration of Liberty Island and its adjacent side-arm, located near the city of Mohács. The principal objective of the project encompassed the establishment of thriving riverine channels around the island, which would become encompassed by a naturally occurring alluvial forest.
Project name	**Safety Net Programme**
Company – NGO	E.on Hungary – Foundation for Our Families, Hajdú-Bihar County Family Support Service

Objectives	The objective was to provide assistance to families burdened with excessive utility debts through a comprehensive initiative that facilitates breaking free from the cycle of debt, ensuring financial stability, and acquiring the necessary skills for proficient management of family budgets.
Project name	**H2O Programme[1]**
Company – NGO	Kürt – Digital Equality Foundation
Objectives	The objective was to diminish the segregation within schools and counteract the decline experienced by disadvantaged groups.
Project name	**Green Zone Programme**
Company – NGO	MOL Group – Ökotárs Foundation
Objectives	To provide support for the establishment, growth, or restoration of community-centred green spaces such as parks, public areas, and schoolyards that are accessible to all; to foster community development by actively engaging local civic organisations and stakeholders, including municipalities, businesses, and most importantly, the residents themselves.
Project name	**Supported Organisation of the Year**
Company – NGO	Tesco Hungary – Ability Park (AP)
Objectives	To guarantee the operation of AP, to implement and experiment with additional ideas, enhance their existing durable assets and mobile equipment; to extend the reach of AP's message to areas not previously accessible through their existing channels; to involv Tesco employees, supporting the integration of disabled workers in the workplace.
Project name	**Jövő/Menő[2]**
Company – NGO	Hungarian Telekom – Szívlapát Foundation, Environmental Social Science Research Group (ESSRG) at Szt. István University
Objectives	To demonstrate the potential for achieving the concept of sustainable development within a specific disadvantaged region, focusing on the Mezőcsáti Kistérség during the initial three-year period; to engage a diverse range of individuals from society, and implement numerous community programmes and events.
Project name	**Combating corruption in the SME sector**
Company	Telenor Hungary[3] – Transparency International Hungarian Chapter
Objectives	To jointly develop best practice solutions against corruption for the Hungarian SME sector; to establish electronic educational resources aimed to aid local SMEs in integrating the principles of ethical business practices into their day-to-day operations.
Project name	**Community of Volunteers**
Company	Vodafone Hungary – Volunteer Center Foundation
Objectives	To support employees who wanted to engage in volunteer work and encourage other employees to take on voluntary tasks.

[1] The name of the programme is derived from a Hungarian term, which refers to individuals facing disadvantages. This term consists of two words beginning with the letter 'H'. Additionally, the letter 'O' represents the Hungarian word for 'education'.
[2] A wordplay with the Hungarian words 'jövő' (future) and 'menő' (cool/trendy).
[3] Now Yettel.

The outcomes of the initial case study research highlighted several key points regarding cooperative efforts between business and community organisations in Hungary, as outlined by Radácsi (2015a).

Firstly, collaborative efforts in Hungary primarily involve volunteering, with joint development and problem-solving in regional and educational sectors playing a less significant role. Among the multinational corporations engaged in these efforts, only one had a deliberate international partnership strategy, while others participated in projects on their own initiative.

Corporate actors had diverse motivations for engaging in these collaborations, including media attention, altruistic intentions, and employee involvement. However, the common practice of service and market development motivation was largely absent. Civil organisations participating in collaborations tended to have a more consistent motivation system, with fundraising for projects related to their core activities being notably prominent.

The nature of collaborations varied, with some projects having the civil organisation as the primary owner and the business acting as a supporter, while others represented a genuine collaborative identity in both content and form. Additionally, collaborations varied in scope, ranging from smaller projects with short-term goals to more extensive partnerships. Collaborations generally started with simpler goals and progressed towards more complex goal systems as a risk management consideration.

Partner selection in collaborations did not adhere to the professional features commonly observed in international literature and practices. Instead, most collaborations were based on previous positive experiences, established personal trust, and respect. The interpersonal relationships between project managers representing partner organisations played a vital role in facilitating effective communication. The professional competence of project managers also had a significant impact, especially in situations requiring specialized skills. Respecting the values and core missions of each organisation is essential for establishing successful relationships.

Developing exceptional organisational and project communication skills can confer substantial benefits upon civil organisations, thereby warranting the utmost attention to their expert handling. Furthermore, it is imperative to evaluate and respond to local particularities in every collaboration, especially for multinational corporations and international non-governmental organisations. In cases where insufficient resources have been allocated for the duration of the project, it is essential to adopt a long-term perspective in decision-making. Moreover, the potential interest of partners or their resistance should be taken into account, as their acknowledgement and endorsement can greatly contribute to achieving the project's social objectives.

According to the results of the second round of research, the alliance between Coca-Cola Hungary and WWF Hungary stands as the only enduring collaboration among the original case study partnerships. This collaboration, grounded in a pre-existing strategic partnership, centres on the preservation of aquatic habitats and has eliminated the need for Coca-Cola Hungary to seek alternative partners. The extensive international network of WWF has provided additional advantages. Other companies, such as MOL and Vodafone, have also implemented similar programmes, but with varying degrees of success. MOL has maintained its programme independently since 2015, focusing on afforestation in urban areas, while Vodafone has transferred the coordination of its corporate volunteer programme to the Vodafone Hungary Foundation, allowing employees to engage in volunteer activities for four working days per year. Telenor, after experiencing a change in ownership, continued its programme until 2015 but has not actively supported the civil organisation since then. All other original case study partnerships have been terminated, with no signs of sustained activities. Some NGOs involved in the partnerships have also undergone significant transformations and have faced challenges due to insufficient funding. The integration of project insights into future programmes by some companies is seen as positive, but in other cases, the termination of the partnerships was due to a lack of enduring corporate strategic intention or commitment to the civil partner. Factors contributing to the termination of partnerships include changes in CSR and sustainability objectives, lack of support from stakeholders, and predetermined project durations and scopes. The short-term nature of these collaborations has made civil partners vulnerable to resource limitations and has hindered long-term competence development. Overall, the findings emphasize the importance of long-term commitment, stakeholder support, and strategic intention in sustaining successful partnerships.

5 Conclusions

Based on our research findings, it appears that even among the largest Hungarian companies, partnerships that were purported to be strategic have not proven to be long-lasting. An analysis of collaboration projects from 2013 reveals that, with the exception of one exception, these partnerships have not endured. Furthermore, it is noteworthy that only a few remnants of past thematic cooperation can be observed in some companies. This suggests that such partnerships have a limited lifespan in the business context.

The lack of sustained cooperation raises doubt about the realization of the expected benefits discussed earlier, particularly with regard to achieving synergistic effects through the collaboration between commercial enterprises and civil organisations.

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Note: Various company documents, websites, leaflets, e-mail communications with the partnering organisations.

MEASURING THE EMOTIONAL INTELLIGENCE OF ENTREPRENEURS

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This study aims to describe the existing tests for determining Emotional Intelligence (EI), identify problematic tasks, and determine ways to solve them. The article describes the most popular models of EI and their corresponding tools for measuring EI. Three main groups of questionnaires for measuring EI (ability-based model, trait-based model, mixed approach model) are described. Most of the tests for measuring EI are self-reported; therefore, the main disadvantage is their subjective evaluation. Also, the lack of EI assessment tools in the business environment is a promising area for EI application. Given the increasing interest in EI in business, management, and entrepreneurship, we suggested using the "EI in Business" questionnaire. According to the latest version of Goleman's mixed model, our test is based on four components, namely: Self-Awareness, Self-Management, Social-Awareness, and Relationship Management. The main disadvantage of subjective assessments of respondent's EI was proposed to be eliminated by interviewing colleagues on two components, which can be assessed from the outside (Self-Management and Relationship Management). Consequently, the final respondent's evaluation with the "EI in Business" questionnaire allowed to avoid the main problem of subjective assessment, and it became more reliable and accurate.

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1 Introduction

Emotional intelligence (EI) is defined by D. Goleman (1995) as the ability to identify our feelings and those of others, to motivate oneself, and to manage emotions in both one and others effectively. High EI is necessary for both problem-solving and effective communication. The fields of entrepreneurship, leadership, psychology, and business have all profited from EI study. Using the databases of Scopus and Web of Science, an analysis of the literature showed an increase in articles on EI in management. Essential soft talents found in EI include resilience, stress tolerance, adaptability, leadership, and social influence. EI increases the volume of excellent conversations, giving one a competitive advantage at work. High EI leaders can bring out the best in their peers, creating a talent pool that boosts commitment from staff members (Haricharan, 2022). The EI of project managers promotes collaboration and expedites achieving the desired results (Uzunbacak & Akcakanat, 2022; Zhang & Shengyue, 2022).

Given the impact of EI on enterprises' financial performance and management level, measuring EI concerning the competencies required for success in today's business environment is increasingly important. Therefore, this study investigates the problematic points in the assessment of EI and the possibility of applying existing tests to assess managers, economists, and entrepreneurs.

This study aims to describe the existing tests for determining EI, identify problematic tasks, and determine ways to solve them. The article describes the most popular models of EI and their corresponding tools for measuring EI.

We believe that the development of the EI of students allows for increasing the social and economic effects and aligns with two Sustainable Development Goals: quality education; good health and well-being.

2 Theoretical Background

The three primary theories underlying the development of EI are the mixed theory of emotional competence developed by Goleman, the non-cognitive theory of EI developed by Bar-On, and the theory of emotional and intellectual skills developed by Meyer and Salovey. The four branches of EI in the Mayer et al. (2000) model

explain how individuals identify and control their own emotions and how they might try to affect the emotions of others. The 16 talents in R. Bar-On's improved model are divided into components related to stress management, interpersonal, self-expression, self-perception, and decision-making (Bar-On, 2000). In 1995, D. Goleman categorized 25 emotional abilities into five clusters: motivation, self-management, empathy, self-awareness, and social skills (this version of his model is most often cited in scientific studies of EI). Afterwards, he condensed his model to just 18 competencies, which he then divided into four clusters: relationship management, social awareness, self-management, and self-awareness (Wolff, 2005).

The most popular and fundamental psychometric tests are the Trait Meta-Mood Scale (TMMS), Wong and Law's Emotional Intelligence Scale (WLEIS), Schutte Self Report-Inventory (SSRI), Mayer-Salovey-Caruso Emotional Intelligence Test (EQ-i, based on Goleman's work and Bar-On's measurements; ECI 2.0; EQ 360 2.0), and Trait Emotional Intelligence Questionnaire (TEIQue) (Ackley, 2016).

Bru-Luna et al. (2021) have divided the existing methods into three main groups of questionnaires for measuring EI: *Ability-Based Measures Instruments, Trait-Based Measures Instruments, and Mixed Model Measures Instruments.*

1. *Ability-Based Measures Instruments*. They are based on the ability-based model, primarily on Mayer and Salovey's. The most widely used tests are the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), the Wong and Law's Emotional Intelligence Scale (WLEIS), the Trait Meta-Mood Scale (TMMS), the Schutte Self-Report Inventory (SSRI), the Multidimensional Emotional Intelligence Assessment (MEIA), the Three Branch Emotional Intelligence Forced Choice Assessment (TEIFA), the Self-Rated Emotional Intelligence Scale (SREIS), the Emotional Intelligence Self Description Inventory (EISDI), the Multifactor Emotional Intelligence Scale (MEIS), and the Emotional Intelligence Scale (WLEIS). The advantage of these tests is that they include chores, riddles, and pictures, making them very attractive to respondents. The disadvantage of these tests is that it is possible to falsify results for social desirability purposes.
2. *Trait-Based Measures Instruments*. The Trait Emotional Intelligence Questionnaire (TEIQue) is the main instrument using this idea. This model's tools have severe limitations because they rely on self-evaluation. These

devices have several disadvantages, the two most commonly mentioned being their social acceptability and susceptibility to counterfeiting. Responding strategically and socially desirably can help the participant achieve a high EI profile, particularly when they are evaluated by supervisors or during job interviews. People often tend to overestimate or underestimate their EI, sometimes without realizing it.

3. *Mixed Model Measures Instruments.* The popular Bar-On and Goleman models are the foundation for the third category. The two most often used validated assessments are the Emotional Intelligence Questionnaire (EIQ) and the Emotional Competence Inventory 2.0 (ECI 2.0).

The majority of the tests were developed in the USA. The assessments most frequently include statements on a four- to five-point Likert scale.

Most of the tests for measuring EI are self-reported; therefore, the main disadvantage is their subjective evaluation. We also discovered *that the business environment lacked EI evaluation tools despite the abundance of instruments available.*

3 Methodology

In this study, we demonstrate the implementation of the "EI in Business" questionnaire to assess students' EI. According to the latest version of D. Goleman's mixed model (Wolff, 2005), the "EI in Business" questionnaire is based on four components, namely: Self-Awareness, Self-Management, Social Awareness, and Relationship Management. However, these components are based on competencies that are important for success in the business environment. The four key components of the instrumental model for developing EI (4EI Model), which forms the basis of this study, are Self-Awareness (SA), Self-Management (SM), Social Awareness (SocA), and Relationship Management (RM). The 4EI Model, which comprises 19 skills, is tailored to the business environment (Mikuš et al., 2022).

The "EI in Business" questionnaire shows the results graphically as an EI profile, an EI diagram with four quadrants. The demonstration and confirmation analysis of the questionnaire have been empirically validated, and MS Excel, SPSS, FACTOR, and R-Studio were utilized in the process. The hypothesis about the dependence of the EI value on the selected factors was confirmed using Confirmatory factor

analysis (CFA). CFA was performed using Cronbach's alpha coefficient; exploratory factor analysis was conducted using the principal components approach, polychoric correlation coefficients, rotation of the Oblimin Direct, and the hierarchical factor solution (Schmid-Leiman solution). The Kruskal-Wallis and Mann-Whitney U tests were used. A total of 158 respondents from Ukraine were surveyed. The "EI in Business" questionnaire has been validated and is reliable (Lutsenko et al., 2021).

The test contains 40 questions, ten questions for each competency. The test allows entrepreneurs to get an assessment of 4 components of EI: Self-Awareness (SA), Self-Management (SM), Social Awareness (SocA), and Relationship Management (RM) and build a graphical representation of the respondent's EI profile in business. The EI profile matches the 4EI Model; it consists of quadrants equal to the component's value obtained during the test (from 0 to 10). According to the stan scale, the results from 0 to 3 are a low level (LL), more than 3 to 7 is an average level (AL), and more than 7 to 10 is a high level (HL) of development of the particular components of the 4-component instrumental model of EI.

Figure 1 presents the interface of the chatbot created in the Smart Sender application and a fragment of the algorithm of the "EI in Business" questionnaire.

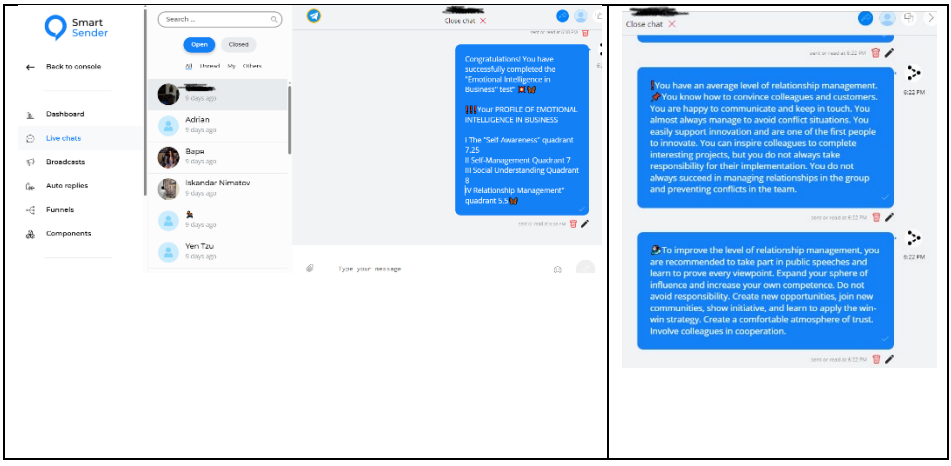

Figure 1: The interface of the chatbot created in the Smart Sender application and a Fragment of the algorithm of the "EI in Business" questionnaire
Source: own elaboration

The "EI in Business" questionnaire has become a basic tool and has been used to construct individual EI profiles (Mikuš et al., 2023) and group EI profiles (Fedorova et al., 2023), to track the dynamics of students' EI development (Fedorova et al., 2023) in European countries.

4 Results

Table 1: This three-step approach of the EI evaluation (source: own elaboration)

Stage of testing	Stage Description	Example EI profile
Stage 1 Respondent self-assessment	The respondent 1 answers 40 questions on the test (evaluation of SA, SM, SocA, RM)	{7,8^{SA}; 7,3^{SM}; 7,9^{SocA}; 6,1^{RM}} [1]
Stage 2. Respondent's external evaluation	The respondents evaluated several others by answering only 20 questions (evaluation of SM and RM)	{__; 7,5SM; __; 6,5RM} [2], {__; 7,1SM; __; 6,7RM} [3]
Stage 3. Calculation of the EI profile	EI profile of respondent 1 calculation is carried out, taking into account the assessments of other respondents	{7,8^{SA}; 7,3^{SM}; 7,9^{SocA}; **6,4^{RM}**}[1*]

The testing was voluntary and was conducted as part of an educational course "Emotional intelligence in youth and senior entrepreneurship" at Comenius University in Bratislava (Slovakia) and an educational course "Emotional intelligence

and leadership" at Ukrainian engineering pedagogics academy (Ukraine). Students were tested using a chatbot created in Smart Sender software. The testing was carried out in three stages, Table 1.

So, we conducted testing among the students as follows.

Stage 1. Student self-assessment

Student 1 assessed themselves by answering 40 questions. The test contained ten questions for each EI component: Self-Awareness (SA), Self-Management (SM), Social Awareness (SocA), and Relationship Management (RM).

For example, for Student 1, the EI profile can be described as follows:

EI profile 1 {$7,8^{SA}$; $7,3^{SM}$; $7,9^{SocA}$; $6,1^{RM}$}, {HL^{SA}; HL^{SM}; HL^{SocA}; AL^{RM}}.

This respondent has an average level (3-7 points) of Relationship Management (RM) and a high level (more than 7 points) of Self-Awareness (SA), Self-Management (SM), and Social Awareness (SocA).

Stage 2. Student's external evaluation

Students evaluated several of their fellow students by answering only 20 questions (10 questions for each component of EI: Self-Management (SM) and Relationship Management (RM). We believe that only these two components can be evaluated from the outside.

For example, for respondent 1, classmates' grades looked like this:

Student 2 {__; $7,5^{SM}$; __; $6,5^{RM}$},
Student 3 {__; $7,1^{SM}$; __; $6,7^{RM}$}

Stage 3. Calculation of the EI profile

EI profile of Student 1 calculation is carried out, taking into account the responses of his/her classmates. Then, the EI profile of respondent 1, taking into account the arithmetic mean of three respondents' answers by components Self-Management (SM) and Relationship Management (RM), will look as follows:

{7,8^{SA}; 7,3^{SM}; 7,9^{SocA}; **6,4^{RM}**},
{HL^{SA}; HL^{SM}; HL^{SocA}; AL^{RM}}.

Finally, the result for the component changed slightly, and we got more accurate data. In this example, Student 1's Relationship Management level has become higher. This three-step approach improves the objectivity of the EI evaluation.

5 Discussion and conclusion

Thus, the analyses of existing EI assessment methodologies have shown two weaknesses:

firstly, most tests are self-reported assessments and, therefore, are often subjective;
secondly, there is a gap in the assessment of EI in the business environment (which is gaining relevance as the importance of EI applications in management increases and the field of EI research expands beyond psychology).

Therefore, this study briefly describes our "EI in Business" questionnaire and demonstrates an example of applying the questionnaire to obtain a more accurate assessment of students' EI through an external supplementary EI assessment. The article shows the possibility of building an EI profile of a respondent considering his assessment of all EI components and taking into account an external assessment of his behaviour on the components of Self-Management and Relationship Management.

The study is not without limitations. In the future, we plan to expand the scope of the research and increase the number of respondents in European countries.

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PREDICTION OF RESIDENTIAL REAL ESTATE SELLING PRICES IN SERBIA USING ARTIFICAL NEURAL NETWORKS

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The increasing housing prices over the past decades have added complexity to the real estate appraisal process. Therefore, it is important to create a proper prediction model which can encapsulate complex dependence of the property price from variable inputs. But, the problem of predicting real estate prices is highly non-linear and depends on many parameters. This research explores the potential of utilizing artificial neural networks (ANNs) to forecast the selling prices of apartments in Belgrade, Serbia, based on various apartment parameters. The findings demonstrate high efficiency of the ANN models in property valuation and, if all the preconditions of property value modelling are met, the ANN technique stands as a reliable valuation approach that could be used by both real estate researchers and professionals.

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1 Introduction

The real estate market is a crucial part of the global economy, affecting macroeconomic stability and social welfare. Understanding its dynamics is essential for academics and industry professionals. Analyzing property values and forecasting market trends are complex tasks influenced by numerous variables. Artificial intelligence (AI) offers advanced models for assessment and analysis, providing rapid and accurate insights.

Clients value the expertise of real estate professionals, but manual analysis is time-consuming. AI can quickly process vast datasets, offering valuable predictions on market trends and future investments. A Recent research in the Republic of Serbia has highlighted AI's practical application in real estate analysis, using data from a reputable Serbian real estate website.

This introduction sets the stage for exploring how AI and artificial neural networks revolutionize real estate analysis, providing investors with timely, data-driven insights for informed decision-making.

2 Literature review

Neural networks have played a significant role in the field of real estate valuation, offering powerful tools for predicting property prices.

Research using artificial neural networks dates back to the 1990s and has shown varied results. Early studies, such as those by Borst (1991), Do and Grudnitski (1992), Tay and Ho (1992), Worzala et al. (1995), and McCluskey (1996), found ANNs to be useful for property valuation. These studies compared ANN models with traditional statistical models, and often found artificial neural networks to outperform the latter. For example, Do and Grudnitski (1992) in the United States concluded that the neural network model performed better than the multiple regression model in estimating the values of residential properties. They used eight independent variables and found that their neural network model resulted in almost twice the number of predicted values within 5% of the actual sale price, compared to the multiple regression model (40% versus 20%), on a test set of 105 houses. The mean absolute error of their neural network model was significantly lower than the

mean absolute error of their regression model (6.9% versus 11.3%). Similarly, studies by Nguyen and Cripps (2001) in the United States, Limsombunchai et al. (2004) in New Zealand, and Peterson and Flanagan (2009) in the United States supported earlier research claiming that neural networks provide better results than hedonic regression models. However, some studies have disagreed with these findings. Worzala et al. (1995) and McGreal et al. (1998) found that other models, such as additive regression (AR), M5P trees, and support vector machines (SVM), provided better results than neural networks. In mass appraisal, Lin and Mohan (2011) found that neural networks performed better than hedonic regression. Despite these differing results, artificial neural networks continue to be a valuable tool in real estate price prediction. Recent studies, such as those by Abidoye and Chan (2017), Aydemir et al. (2020), and Yılmazel et al. (2018), have shown promising results using neural networks for real estate price prediction.

In conclusion, while there is ongoing debate about the effectiveness of neural networks compared to the traditional methods and models in real estate valuation, they remain a widely used and promising tool in the field.

Further research and advancements in artificial neural network technology are likely to lead to even more accurate and reliable models for real estate value prediction in the future.

3 Methodology

Artificial neural networks are inspired by biological neural networks, representing their mathematical or computational model. Neurons are represented as processing elements and synapses as the weight of the connection. Dendrites are inputs and the axon is the output of the processing element. Processing elements are connected in a network such that the output of each is connected to the input of at least one other. The processing performed in the neuron's body is represented by input and transfer functions. The structure of the artificial neuron is shown in the Figure 1.

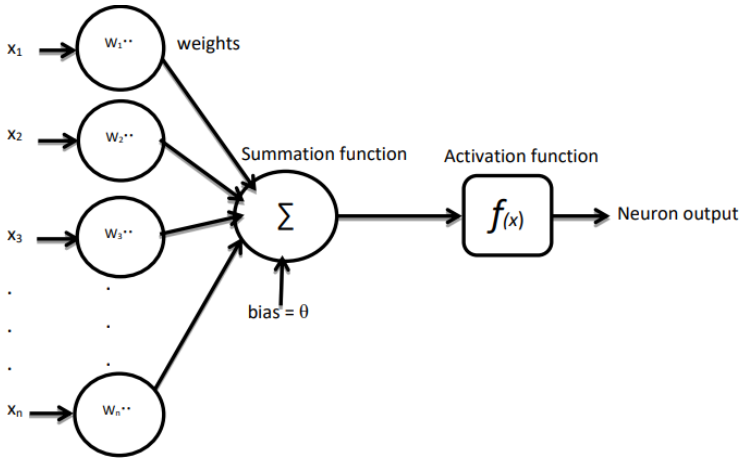

Figure 1: The structure of the artificial neuron

ANN models were proved to be very efficient in modelling complex, non-linear problems with many inputs. One drawback of this method is that it requires large datasets for training and testing of the model.

3.1 The data

The data was collected from one of the biggest and most significant online sales portals in Serbia, which deals, among other things, with real estate sales in the Republic of Serbia. Dataset was collected in period of December 2023-January 2024 and it consists of 8.358 active apartment sale listings in Belgrade, published in the previous four years. Table 1 lists all the collected parameters of each real estate unit i.e. apartment. The price parameter represents the asked selling price of the apartment. *Area r*epresents the total area of the apartment in square meters. *Rooms* is the total number of rooms in the apartment. *Bathrooms* is the total number of bathrooms in the apartment. *Floor* represents the floor at which the apartment is located and *Total Floors* is the total number of floors in the building. *Construction type* represents the physical condition of the apartment (Original condition, Renovated, Luxury, For renovation). *Date* is the year when the listing was posted, covering the period from 2020 to 2024. *Heating* is the type of heating in the apartment (Central, Electric heating, Heat pumps, Gas, Floor heating, Norwegian radiators, Marble radiators, A/C unit, Central heating with calorimeter, Tile stove, Solid fuel stove). *District* is the municipality where the apartment is located and *Settlement* is its micro-

location within the municipality. The district and settlement parameters are combined into a new parameter, *Address*.

Table 1: The real estate parameters

Parameter	Data type	Parameter	Data type
Price	Currency (in €)	Construction type	String
Area	Number (in m2)	Publishing year	Number
Rooms	Number	Heating	String
Bathrooms	Number	District	String
Floor	Nmber	Settlement	String
Total Floors	Number	Address	String

Considering that the initial dataset lacked sufficient information for certain neighborhoods/settlements in Belgrade, only the data for neighborhoods with a minimum of 50 occurrences (for the larger model) and at least 150 occurrences (for the smaller model) in the dataset were used in the further model creation process. All duplicates and missing values were removed. Textual data (address, heating, construction type) underwent label encoding. All data were normalized using Min-Max normalization.

4 Results

The primary measure of loss is the absolute percentage error of prediction, where 0% represents a perfect prediction. The first model architecture consists of six layers. The first and second layers have a learning rate of 0.005, they use ReLU activation functions, have batch sizes of 64 and nodes per layer of 1024 and 512, respectively. The dropout rates for these layers are 0.2 and 0.3, respectively. For the third and fourth layers, the learning rate is also 0.005, with ReLU activation functions, batch sizes of 64, and nodes per layer of 256 and 128, respectively. The dropout rates for these layers are 0.4 and 0.5, respectively. The fifth layer has a learning rate of 0.005, uses LeakyReLU as the activation function, a batch size of 64, 64 nodes per layer, and a dropout rate of 0.5. Finally, the sixth layer has a learning rate of 0.01, uses a linear activation function, a batch size of 64, 32 nodes per layer, and no dropout. With this architecture, a loss of 19.97% was achieved. The algorithm was then applied to a smaller dataset, resulting in a 6.63% lower error rate, amounting to 13.3%.

On a smaller dataset, the best results are obtained with the momentum, when the value of the parameter beta_1 is 0.5, so this was the value used in the further process. The error was reduced to 12.3%.

According to the model by Çılgın and Gökçen (2023), a different model was created. A neural network was modeled with one input, three hidden, and one output layer. The input layer has 8 neurons with a tanh activation function.

The following three hidden layers each have 720 neurons and a ReLU activation function. Between each pair of layers, a dropout layer with a rate of 20% is placed. The output layer has one neuron with a ReLU activation function. The model was compiled using the Adam optimizer with a learning rate of 0.0015 and a mean squared error is used as the loss function. Two beta parameters were experimented with, beta_1=0.9 and beta_2=0.999. The error of this model is about 3% lower than the first model on a larger dataset, amounting to 17.59%.

In general, our research has shown that predictive models based on artificial neural networks have a satisfactory level of accuracy. Specifically, the predictive model for estimating real estate prices in the Serbian market, developed for this study, has an average deviation of the actual price from the forecasted price of up to 12%.

5 Discussion

Compared to Abidoye and Chan's (2017) neural network with one hidden layer and a mean absolute error of 16%, our neural network performed better, with an error of 12%. However, our model performed worse than the one by Del Giudice et al. (2017) with a mean absolute error below 7%. One reason for our model's higher error could be the actual property prices, influenced by factors beyond our analysis. Neural networks may also be inadequately trained or have inappropriate hyper-parameter values. Predicting prices in models with more data was challenging, possibly due to the dataset containing apartments from different areas with a wide price range. While mean, median, and standard deviation were similar for both datasets, the minimum and maximum values differed significantly.

The Improvement was seen with a smaller dataset. There may be an issue with the number of hidden nodes relative to the available data for training. While certain rules govern this relationship, they were not strictly followed in our research, as the optimal architecture depends on the problem type and techniques used.

The results are acceptable, but further exploration is needed to minimize the maximum error. Predicting price ranges instead of exact prices could be a solution. Comparing the multilayer perceptron with other architectures could provide additional insights. Expanding the research to include sales data from other areas could also be beneficial. Using separate models for each area might improve performance when dealing with large datasets containing diverse addresses.

6 Conclusions

The study examined the potential of predicting real estate sales prices in Belgrade, Serbia, using artificial neural networks. Following the research of Abidoye and Chan (2017), Varma et al. (2018), Aydemir et al. (2020), among many others, a neural network model was created. Neural networks resulted in performance differences depending on the size of the dataset, where the smaller dataset had a lower error rate. The smallest model error obtained on the larger dataset was approximately 17%, while on the smaller dataset, it was approximately 12%. Compared to the results of Abidoye and Chan (2017) who achieved a mean absolute error of 16%, the neural network showed better performance, with an error of 12%. However, compared to the model created by Del Giudice et al. (2017), with a mean absolute error below 7%, our model performed worse. Overall, the models behaved as expected and achieved similar results to other studies on the same topic. In future research, it is possible to compare different and current approaches with the methods used in this study, as well as test hyper-parameters with wider intervals in the methods used in the study. Also, with slight modifications and different dataset, the same model can be used to predict the rental prices of the apartments.

The Presented research has several limitations, all of which are potential avenues for further research. First, the developed prediction model in current form is usable for apartments as just one of the forms of real estate. It would be necessary to modify set of inputs and the choice of hyper-parameters, in order to apply it to other types of the real estate, such as houses, land or commercial properties. Next, the presented

research was focused on Belgrade. It would be interesting to apply the same methodology and model on different cities/countries. One of the main limitations is the fact that the selling prices asked by owners in the listings were used as estimated values of the apartments, which could be biased, since owner's wishes are usually unrealistic and over-optimistic i.e. the real values of the apartments are usually lower than the asked prices in the listings. One way to resolve this issue is to use data for officially registered apartment sales by contracts from Tax Administration Office, but at this moment this kind of data is very hard to get, at least to the extent necessary for the application of ANN models. Finally, ANN models might not be the most appropriate technique for this problem, since there are many categorical model inputs. It would be interesting to apply some other machine learning techniques, such as Random Forest or XGBoost, and compare the obtained results.

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Sustainable Fashion Is "In" and Fast Fashion Is "Out" – A Corpus-Driven Analysis of Media Narrative Regarding the Fashion Industry's (Un-)Sustainability

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Being affordable and readily disposable, fast fashion has recently been perceived as a major cause of environmental pollution and unethical labour practices. To counter these pressing global issues, sustainable fashion has been gaining in importance. Mass media has a significant role in shaping public sentiment and influencing consumers" behaviour. This paper brings the results of a small-scale quantitative and qualitative linguistic analysis of three aspects of the fashion industry's (un-)sustainability. More specifically, we examined the media's vocabulary when addressing fast and sustainable fashion. Our study followed the principles of corpus analysis and discourse analysis. We analysed 1,000 randomly selected media reports focusing on fast fashion and sustainable fashion in English in the NOW corpus. Key results of our study show that the fast fashion-related media narrative is negative, whereas the sustainable fashion-related narrative is positive, with some criticism. This study aims to contribute to the knowledge about the terminology in mass media narrative used to address fashion industry-related sustainability issues. Further, we aim to advocate how such narrative can and should be used as a vehicle for changes in consumer behaviour and company practices and, consequently, how it can impact the attainment of relevant 2030 SDGs.

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1 Introduction

In recent years, the fashion industry has been subject to increased media attention, particularly as regards its impact on the environment, unethical labour practices and consumer behaviour. Mass media plays an important role in informing people about different topics as well as shaping their opinions and influencing their behaviour and actions when it comes to fashion-related purchasing decisions (Rinaldi & Semprini, 2017). Based on this, the study presented in this paper aims to highlight the key terminology and topics in media narrative on fast fashion and sustainable fashion by combining corpus analysis and discourse analysis. More specifically, we present the results of our small-scale study of selected frequently occurring terms and their collocates in texts on fast fashion and sustainable fashion as well as of the prevailing attitudes towards fast fashion and sustainable fashion as expressed in the media in English.

This paper continues as follows. First, we give a brief theoretical framework for the study, which is followed by the presentation of the research method adopted for our study. After that, we present and discuss the obtained results. We conclude the paper by summarizing our findings and indicating educational implications of the study, the relevance of the study in the context of the UN SDGs and by giving recommendations for further research.

2 Theoretical Framework for the Study

The theoretical framework for the study presented in this paper is divided into a brief overview of fast fashion and sustainable fashion as two concepts related to the sustainability of the fashion industry, and into the framework for the linguistic analysis underpinning our research.

2.1 The (Un-)Sustainability of the Fashion Industry

Today, academic and media narratives related to the fashion industry often revolve around fast fashion and sustainable fashion as the opposite environmental, social and economic aspects of the fashion industry. In general, the fashion industry is defined as one of the biggest global industries, and it has a far-reaching effect on our planet. It is also one of the most polluting global industries, with an enormous toll

on natural resources, an excessive carbon footprint and huge levels of waste (Bailey et al., 2022; Brewer, 2019; Rangel-Buitrago & Gracia C, 2024; Thorisdottir & Johannsdottir, 2020; Zhang et al., 2021).

The environmental crisis and the rising consumer awareness of pressing global climate changes and labour-related social injustices have resulted in the rise of sustainable fashion practices as the opposite trend to fast fashion. Fast fashion is characterised by inexpensively made trendy clothes which are readily available to meet consumer demands, and its production is placed in cheap-labour, low-income countries (Bick et al., 2018; Peters et al., 2021). On the other hand, sustainable fashion practices are focused on reducing environmental destruction by applying environmentally-friendly practices, good and fair working conditions for garment workers and more sustainable consumer purchasing behaviour (Gazzola et al., 2020; Henninger et al., 2016). Also, in light of the pressing environmental and social issues, consumers are becoming increasingly aware of the fashion industry's negative impacts and are turning towards sustainable fashion (Centobelli et al., 2022; Dangelico et al., 2022; Yang et al., 2024).

2.2 Corpus-Driven Analysis and Discourse Analysis of Fashion-Related Media Texts as Text Types

Fast fashion- and sustainable fashion-related mass media texts comprise, among others, newspaper articles, feature articles, editorials, opinion pieces, blogs, and interview transcripts. In line with the general text-type typology as proposed by Reiss, which focuses on the communicative function of texts (1977/89, cited in Munday (2001, p. 73)), these texts can be classified as the informative text type as their primary role is to give information or spread knowledge on a given topic. They can also be defined as descriptive, explanatory and/or argumentative texts since they encompass fashion-related reports and commentaries (including criticism) (De Beaugrande & Dressler, 1981; Hatim & Mason, 1993). In short, we can expect that the media narrative on the fashion industry includes facts about the topic as well as the attitudes and stance of the narrators towards the topic.

Texts can be analysed by using different methodologies, including corpus analysis and discourse analysis. By performing a corpus analysis of a large body of texts (i.e. a corpus), we can establish the key terms in a specific field (i.e. single words and

multi-word terms). In this way, we can shed light on the main points of the discourse, which also applies to newspaper language (Andersen, 2012; Bondi, 2010, pp. 3, 7; McEnery & Hardie, 2012). While corpus analysis gives quantitative results, discourse analysis can offer a qualitative perspective on the social implications of the narrative in which specific terminology occurs (Baker, 2009; Rusinek & Malec, 2015). In short, the combination of corpus analysis and discourse analysis of fashion-related media narrative tells us not only what is written about fast fashion and sustainable fashion but also shows how these texts add to the discourse on societal views on the plethora of issues related to the fashion industry.

Based on the above, the following research questions were formulated for our study: *Research question 1*: Which single words and multi-word terms frequently occur in the media narrative about fast fashion and sustainable fashion?

Research question 2: What are the prevailing attitudes expressed in the media narrative towards fast fashion and sustainable fashion in the context of the related frequently occurring themes?

3 Methodology

To answer our research questions, we analysed 1000 randomly selected extracts from online newspapers, fashion magazines, trade magazines, online blog posts, and other types of media news collected in the News on the Web (NOW) corpus which included the terms "fast fashion" and "sustainable fashion" (*English-Corpora: NOW*, n.d.). The random sampling was done automatically in the NOW corpus; we only set the sample selection to the publication dates within the timespan of 1st January, 2019 to 31st January, 2024. As the NOW corpus includes comprehensive global coverage of the news published in English, our study included media discourse on the topic in 20 English-speaking countries. Based on this selection, we built a small-scale corpus of texts comprising two sub-corpora: the fast fashion sub-corpus (i.e. FF sub-corpus) and the sustainable fashion sub-corpus (i.e. SF sub-corpus), each consisting of about 220,000 words.

The exploratory analysis of our sub-corpora was done in two stages. First, we performed a quantitative keyword analysis by using the corpus analysis software SketchEngine (Lexical Computing, 2023). This enabled us to determine key topics

addressed in the media concerning fast fashion and sustainable fashion. Second, we carried out an in-depth qualitative contextual (discourse) analysis of the immediate context (i.e. one paragraph extract in which the terms "fast fashion" and "sustainable fashion" occurred) to get an insight into the prevailing attitudes expressed in the media towards the two types of fashion. Due to the limitations of the research presented in this paper, we focused only on the environmental impact, labour practices and consumer behaviour of both types of fashion.

4 Results and Discussion

This section brings the results and the discussion of our quantitative and qualitative study in line with our research questions. At the lexical level of analysis, we show the collocates of selected terms frequently occurring in the media reports addressing fast fashion and sustainable fashion. At the discoursal level, we summarise the narrative on fast fashion and sustainable fashion and illustrate it with selected examples from our corpus.

Overall, our corpus analysis revealed the following list of multi-word terms which address various aspects of fast and sustainable fashion (see Table 1).

Table 1: The 100 most frequent multi-word terms related to fast fashion and sustainable fashion (in descending frequency of occurrence)

Multi-word terms related to fast fashion and sustainable fashion (combined corpus)	
sustainable fashion, fast fashion, fashion industry, environmental impact, organic cotton, charity shop, carbon footprint, slow fashion, fast fashion industry, carbon emission, textile waste, sustainable practice, sustainable fashion brand, fashion retailer, fashion trend, fast fashion brand, fast fashion retailer, recycled material, fashion choice, sustainable clothing, second hand, circular economy, circular fashion, ethical fashion, fashion designer	*fashion company, fashion item, new clothes, shopping habit, sustainable fashion industry, sustainable brand, polluting industry, sustainable material, textile industry, sustainable future, fashion product, global carbon emission, eco-friendly material, garment worker, clothing brand, green job, sustainable fashion choice, second-hand clothes, emission of greenhouse gases, toxic dye, fashion movement, fashion revolution, garment factory, impact of fast fashion, clothing production*

The above list of common phrases in both sub-corpora shows that the media narrative related to fast fashion and sustainable fashion primarily touches upon the environmental impact of the fashion industry and fashion-related waste management. Further, it addresses its economic aspects, the garment industry workers, as well as the behaviour of consumers. Notably, this vocabulary also

indicates the narrative regarding the efforts towards sustainable practices in the use of materials and, in a broader sense, the narrative on circular economy.

In line with the focus of this study, we now present and discuss the main findings for the selected terms and media narrative related to the environment, labour practices, and consumer behaviour.

4.1 Corpus Analysis of Selected Fast Fashion- and Sustainable Fashion-Related Issues –Key Terms

4.1.1 Environmental Issues

Since the environment is hugely affected by the fashion industry, we decided to focus on the collocates of the terms "environmental" and "waste" as they are strongly related to our topic (the latter being an enormous side effect of the fashion industry).

Table 2: Key noun collocates of the term "environmental" in the two sub-corpora (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
impact, footprint, catastrophe, benefit, crisis, harm, damage, activism, destruction, problem, cost, degradation, hazard, conservation, improvement, disaster, department, implication, consciousness, justice, front, organisation, claim, plan, movement, technique, consequence, standard, violation, expert, pollution, issue, practice	*impact, sustainability, degradation, footprint, issue, concern, awareness, toll, friendliness, protection, benefit, conservation, consciousness, health, effort, destruction, campaigner, service, problem, distress, awareness, objective, stewardship, implication, crusader, decline, activism, deterioration, education, damage, justice, ground, organisation, responsibility, pollution, action, standard, goal, cost, waste*

Table 2 shows a relative similarity of the collocates with the term "environmental" in both sub-corpora. This indicates that media narrative about the environment includes the same terminology in the context of both types of fashion. However, in the case of sustainable fashion, the context seems more comprehensive, and more emphasis is placed on environmental degradation and environmental protection education, responsibility, and environmental activism.

The comparison of the results from the two sub-corpora in the above table shows a moderate similarity of the groups of verbs associated with the noun "waste". However, the results in the SF sub-corpus point to a broader media narrative

regarding fashion-related waste since the terminology includes the aspects of waste management in terms of converting or transforming waste into usable materials and new resources.

Table 3: Key verb collocates of the term "waste" related to fashion in the two sub-corpora (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
collect, reduce, recycle, generate, trim, minimise, cut, produce, cause, include, create	*reduce, minimise, convert, generate, tackle, reuse, mitigate, repurpose, stop, eliminate, use, transform, discard, address, produce, bring, create*

4.1.2 Labour Practices

Concerning labour practices, we focused on the terms "labour" and "wage" as two frequently occurring terms used in fashion-related media narratives. In Table 4, we give the collocates of the term "labour"; in Table 5, we present the collocates of the term "wage".

Table 4: Noun collocates (adjectives and nouns) of the term "labour" (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
cheap, child, fair, human, forced, life-threatening, low-wage, migrant, physical	*cheap, slave, migrant, unskilled*
force, conditions, abuse, practice, exploitation, shortage, violation	*practice, force, standard, conditions, productivity, cost, mobility*

Table 5: Key collocates of the term "wage" in the two sub-corpora (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
minimum, low, fair, good, poverty, hourly, living, high	*fair, minimum, decent, living, liveable, hourly, poverty, poor, low, good*

The collocates in the above tables clearly show more criticism of the labour-related practices in the texts focusing on fast fashion than sustainable fashion, as unethical labour-related practices are emphasised (i.e. the exploitation and devaluation of workers and their skills in the textile industry). Namely, in the FF sub-corpus, more strong nouns associated with the exploitation and violation of workers' rights are present. On the other hand, the vocabulary related to the workers' pay (i.e. wages) is almost the same in both sub-corpora. This result points to the narrative related to

workers' economic well-being and social conditions stemming from deprivation and financial hardship.

4.1.3 Consumer Behaviour

In the context of consumer behaviour, we present the collocates of the terms "clothes" and "trend" as two terms closely associated with fashion.

Table 6: Key collocates (adjectives and verbs) of the term "clothes" (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
new, cheap, second-hand, vintage, unwanted, quality, season-free, stylish, pre-loved, old, good	*new, second-hand, unwanted, old, cheap, sustainable, high quality, organic, pre-loved, vintage, good*
(to)buy, make, sell, wear, swap, need, love, rent, have, use, create, discard, outgrow, recycle, design, dump, exchange, find, incinerate, produce, sew, source, throw away, wash	*(to) make, buy, wear, produce, sell, donate, recycle, design, upcycle, purchase, reuse, swap, throw away, collect, dispose of, find, love, manufacture, rent, repair, re-wear, source*

Notably, the frequent adjectives and verbs associated with the term "clothes" are almost identical in both sub-corpora. In principle, the verbs in both sub-corpora also address the same aspects, i.e., the manufacturing, the consumption, and the disposal of clothes. However, the SF sub-corpus also includes verbs related to sustainable practices such as upcycling, re-wearing and donating clothes.

Table 7: Key collocates of the term "trend" in the two sub-corpora (in the descending frequency of occurrence)

FF sub-corpus	SF sub-corpus
fashion, latest, next, new, fast, important, catwalk, seasonal, TikTok, runway, hot, consumer, brand, clothing, media-driven, pandemic-inspired, consumer-led, societal, workwear, ever-changing, conflicting, prevalent	*fashion, latest, sustainable, commercial, new, fleeting, current, big, major, memorable, repair-and-wear, DIY, seasonal, hot, fun, thrifting, top, key, recent, traditional, eco-friendly*

The comparison of the collocates in Table 7 shows a stark difference in the media focus (i.e. themes) regarding fast fashion and sustainable fashion trends. While the former focuses more on the trends being shaped by factors such as social media and fashion shows, the latter emphasises environmentally conscious choices and a more considerate approach to fashion.

4.2 Discourse Analysis of Media Narrative on Fast Fashion and Sustainable Fashion – Main Findings

This section brings the main findings of our discourse analysis of the media narrative on fast fashion and sustainable fashion. To align this part of our study with our corpus analysis, we focus on the narrative regarding the environment, labour practices, and consumer behaviour.

4.2.1 Media Narrative Regarding the Fast Fashion Industry – Main Topics

Table 8: Fast fashion-related media narrative – main topics

Topic	Example quotes
Fast fashion significantly contributes to environmental destruction (e.g. staggering amounts of waste, toxic dyes, carbon emissions, water source depletion, and water pollution).	"The reality is fast fashion is helping kill the planet. Its negative effects are seemingly endless, from the continuing human rights abuses in garment factories and excessive water use to high CO2 emissions from airfreighted clothing." (GB (19-04-11)) "This is a toxic system of overproduction and consumption that has made fashion one of the world's largest polluters, causing damage to the planet, exploiting workers, and harming animals." (CA (22-08-09))
The fast fashion industry extensively exploits cheap labour in third-world countries (e.g. low wages, exploitation and poor working conditions of garment workers).	"Not only that, with so many inexpensive garments being rolled out so quickly, many items usually aren't ethically made - so we're left with problems like unsafe working conditions, inadequate pay and forced labour." (IE (22-03-30)) "Labour in fast fashion is often exploitative and dangerous, sometimes involving child labour." (CA (21-03-21)) "There are the toxic chemicals, poor labour conditions and the health issues that affect the workers." (AU (19-08-10))
Fast fashion is associated with reckless consumer behaviour (e.g. overconsumption of cheap clothes, impulsive buying, quick disposal of clothes).	"Cheap prices and celebrity influencers have driven a "pick, click, wear and bin" mentality." (GB (19-09-24)) "Sadly though, one of the most enduring trends on TikTok are try-on "hauls", where creators receive packages full of clothing from a fast fashion retailer and then review each item on video. Often, this type of content is sponsored, so creators are paid to give positive endorsements of the (usually) cheap clothing." (AU (22-09-03)) "Americans buy a piece of clothing every five days, on average, and we pay so little for our garments that we've come to think of them as disposable." (US (21-02-06))

The main topics that emerged from our discourse analysis of the media narrative on the fashion industry are as follows. First and foremost, the fast fashion-related media narrative revolves around the unsustainable nature of fast fashion in general and the detrimental impact of fast fashion on the environment. The second most common theme is unethical and exploitative labour practices in sweatshops, including child labour and workplace safety issues. In addition, the media addresses the economic aspects, such as meagre wages, to keep production costs as low as possible. A large proportion of media narrative is devoted to consumer behaviour, especially when it comes to the consumers' need to follow and buy the latest fashion trends for little money, which propels the fast fashion industry. The latter is also highlighted in the narrative on Instagramers, TikTokers and fast fashion influencers/celebrities who perpetuate the (over)consumption of fast fashion. Our findings are summarised and illustrated with the examples from our corpus in Table 8.

4.2.2 Media Narrative Regarding the Sustainable Fashion Industry – Main Topics

Like the fast fashion-related media narrative, the sustainable fashion-related media narrative also addresses issues connected with the environment, labour practices, and consumer behaviour. However, in contrast to the former, this narrative focuses on lowering the carbon footprint and reducing or minimising other environmental impacts of the fashion industry. This is narrated by advocating environmentally friendly practices such as using recycled and organic materials, upcycling, circular industry chain, lesser use of toxic chemicals and, to a great extent, the reduction of waste. The latter is intertwined with the narrative about consumer behaviour where conscious consumption is highlighted (i.e. prioritising quality over quantity, making informed purchasing decisions, buying less, using clothes for longer periods of time, and supporting ethical brands). Lastly, the sustainable fashion-related narrative concerning labour practices revolves around safe and humane working conditions as well as fair wages for garment workers. These prevailing topics established with our discourse analysis of media narrative regarding the sustainable fashion industry are summarised and illustrated in Table 9.

Table 9: Sustainable fashion-related media narrative – main topics

Topic	Example quotes
Sustainable fashion emphasises lessening the fashion industry's negative impact on the environment (e.g. waste reduction via recycling and upcycling, the use of eco-friendly/organic materials, and minimising water and chemicals use).	"This is the reason cutting CO2 emissions, addressing overproduction, reducing pollution and waste, supporting biodiversity, and ensuring that garment workers are paid a fair wage and have safe working conditions, are all crucial to the scope of sustainability." (IN (22-06-08)) "This includes responsible fabric choices, the use of non-toxic dyes, upcycling, waste reduction and ethical labour practices. Sustainable fashion considers the future of the planet and the people making and wearing the clothes." (ZA (21-08-24))
Sustainable fashion advocates fair labour practices and supply chain transparency (e.g. safe working conditions, humane work environment, fair wages).	"Supporting sustainable fashion practices helps lessen the fashion industry's environmental effects while encouraging fair labour standards and ethical production processes. You can make a difference worldwide by shopping from businesses that promote sustainability." (NZ (23-04-19))
Consumers support sustainable fashion via conscious consumption, but this fashion tends to be expensive (e.g. choosing quality over quantity, second-hand shopping, buying less, buying clothes made of natural materials, supporting ethical brands).	"At the heart of sustainable fashion, we find consumers who are interested in extending the lifetime of their clothes. Clothing made from natural materials is generally far better when it comes to active life, let alone they are renewable resources not contributing to microplastic pollution." (GB (20-01-17)) "There's the idea that sustainable fashion is expensive, and rightly so in a way, because if you use the right materials and pay people properly, clothes are more expensive." (IE (19-08-25)) "Indian consumers are warming up to the concept of sustainable fashion, as they become increasingly conscious of the environmental impact of their shopping habits. Retail brands in India are riding the trend of eco-friendly shopping by introducing sustainable offerings." (IN (21-09-19)) "To cut down on textile waste, we all need to commit to buying less, and buying better." (IE (20-03-05))

5 Conclusions

This study was designed to explore the media narrative on fast fashion and sustainable fashion from two interrelated aspects. First, by undertaking a quantitative corpus-driven keyword analysis, we identified the prevailing terminology frequently used in the mass media concerning fast fashion and sustainable fashion. More specifically, we focused on selected terms related to the environmental impact, labour practices, and consumer behaviour in the context of these two types of fashion. Second, the qualitative discourse analysis of the textual context in which the

terms "fast fashion" and "sustainable fashion" occurred in our corpus showed two contrastive media narratives surrounding fast fashion and sustainable fashion. That is, fast fashion is shown in a negative light as it is associated with having a detrimental impact on the environment, with unsustainable consumer habits and with unethical labour practices. On the other hand, sustainable fashion is portrayed in the media as being responsible towards the environment and the garment workers, as well as being related to ethical consumer choices.

As our study was small-scale, it was limited to a small-sized corpus and a limited number of terms under analysis. Regardless of these limitations, the study shows the views on the two types of fashion presented in the mass media. In addition, the attitudes expressed towards the two types of fashion reflect the academic research on the fashion industry as given in our literature review.

This linguistic study adds to the understanding of current societal views on the fashion industry. By actively promoting sustainable fashion and its environmental and social benefits and criticising fast fashion for its negative impacts, mass media has a vital role in shaping societal attitudes towards the fashion industry at many levels. By doing so, it also contributes to the attainment of several UN SDGs (e.g. ensuring sustainable consumption and production patterns, taking urgent action to combat climate change and its impacts, ending poverty, ensuring healthy lives and sustainable management of water, ensuring decent work).

The findings of this study have important implications for practice and research. Regarding education, the topics highlighted in this paper could be addressed at all levels of education by focusing on general or more narrow aspects of the fashion industry as defined by the key terms and narratives presented here. As for future research, comparative analyses of fashion-related media narratives across different regions and languages are welcome.

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GREENHOUSE GAS EMISSIONS OF UNIVERSITIES: CHANCES AND CHALLENGES ON THE WAY TO GREENHOUSE GAS NEUTRALITY

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Universities contribute to the goal of climate neutrality with their research, but also emit greenhouse gas (GHG) emissions by means of their operations. The aim of this paper is to assess the GHG emissions of a university as an institution, identify the main sources of emissions and analyse chances and challenges on the way to become a climate neutral university. The analysis is based on the GHG balance of Esslingen University developed according to the standards of the GHG protocol. While many academic institutions in Europe issue climate reports, they often do not or only partly include scope 3 emissions and therefore underestimate the emissions. With its broad accounting approach, this paper extends the knowledge about the emission sources of a university, but also shows the limitations of areas such as procurement, which lack data for an exact quantification of the emissions. Three main sources of emissions can be identified: commuting, procurement and buildings (electricity and heating). The main obstacles to implement the changes on part of the university are budget limitations, limited influence on the part of the university as well as staff shortages.

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1 Introduction

Science plays a crucial role for the mitigation of climate change and the achievement of climate neutrality. Political decisions are based on the findings of climate research and science can provide important impetus for political planning and for the development of new products in the economy (Federal Ministry of Education and Research). Civil society organisations such as Fridays for Future explicitly refer to scientific findings and call for the use of those findings as a basis for decision-making (Posmek and Bastian 2023, p. 1). Furthermore, a more application-focused research can develop solutions for challenges on the ground, e.g. in municipalities (Marquardt 2019, pp. 108-110). Through their teaching, universities enable students to make sustainable decisions and train them in skills they need to mitigate climate change (Zürn et al. 2023, p. 47). However, universities as an organisation also emit greenhouse gases (GHG) within the scope of their activities and thus contribute to climate change (ALLEA 2022, p. 11). This paper analyses the GHG balance of Esslingen University in order to identify measures reducing GHG emissions and areas which need further research.

2 Theoretical Background / Literature review

While more and more academic institutions are starting to measure their GHG emissions and publish them in climate reports, there is no standardized approach regarding the creation of a GHG balance, in particular there is a great variety concerning the inclusion of scope 3 emissions. Many climate reports do not or only partly include scope 3 emissions and therefore underestimate the emissions (ALLEA 2022, pp. 7, 11, 25). While there is a lot of research regarding universities' emissions, it focuses on non-European countries with different university systems (e.g. Bailey and LaPoint 2015 (USA), Vásquez et al. 2015 (Chile), Wang 2019 (Taiwan)) or analyses a specific part of the GHG emissions (e.g. DeWeese et al. 2022 (commuting), Sippel et al. 2018 (student lifestyle), Thurston and Eckelman 2011 (procurement)).

Hence, the aim of this paper is to extend the knowledge about the emission sources of a university within the European context with a particular focus on scope 3 emissions by analysing the greenhouse gas balance of Esslingen University of the year 2022.

Esslingen University is located in the south of Germany, in one of Europe's strongest economic regions. 6,300 students study in 31 Bachelor's and 14 Master's degree programs in technical, economic and social fields. 219 professors, 438 employees and 466 lecturers are teaching, researching and working at the university (figures from winter semester 2022/23). The university is certified under the European Eco Management and Audit Scheme (EMAS) since 2012. It has two locations in the city of Esslingen am Neckar and one location in the city of Göppingen with a total of 25 buildings on a net floor area of over 93,000 m² (figures from 2023).

3 Methodology

Table 1: Emission sources included in the GHG balance and origin of data

	Emission source	*Origin of data*
Scope 1	Vehicle fleet	Consumption according to fuel bill
	Air conditioning systems	Refilling quantity according to maintenance report
	Heating (generated on site)	Meter reading
Scope 2	Purchased heating	Meter reading
	Purchased electricity	Meter reading
Scope 3	Waste	Amount according to the university's waste report
	Procurement	Extrapolation based on a sample of invoices
	Business trips	Business travel expense reports
	Canteen	Produced main meals by operator
	Commuter traffic	Survey on mobility
	External events (not on site)	Estimates based on press releases / consultation with organisers
	Up- and downstream chains (Scope 1 & 2)	
	Water / waste water	Meter reading

The GHG balance is compiled in accordance with the standards of the Greenhouse Gas Protocol (Smith et al. 2004) on the basis of the final energy-based polluter pays principle for all three university locations and includes the emission sources listed in table 1. The emission factors stem from widely used sources such as the German Environment Agency or the UK Department for Environment, Food and Rural Affairs and can be requested from the author. Emissions from electricity consumption were calculated on the basis of the general German electricity mix

(location based method), although Esslingen University uses green electricity. This is intended to visualise the effects of electricity savings (Huckestein 2020, p. 37).

Looking at the different origins of data, it can be seen that some have a higher accuracy than others. Whilst meter readings, maintenance reports etc. provide a high certainty that the numbers are correct, there is a lower probability in the areas of mobility and procurement.

Business trips are analysed on the basis of the employees' travel expense reports. This means that student travel, for example for semesters abroad, is not taken into account. Business trips that are not accounted for by employees, for example due to a lack of travel expenses or excessive expenditure, are also not included in the overview. The data for commuter traffic is derived from a survey on mobility that took place at the end of 2022, in which 500 students and 284 employees took part.

In order to determine the emissions from procurement, invoices were checked. Only cost types with physical goods were taken into account. A random sample was taken based on the quantity of procurements and the GHG emissions were extrapolated. For this purpose, the purchased goods were categorised and the GHG emissions were calculated based on those categories and the sums spent. Hence, there were no GHG emissions for a specific product available. Furthermore, the emission factors used are designed for the US market. Therefore, the numbers regarding procurement represent only a first approach to the emissions of procurement.

4 Results

In total, Esslingen University emitted 10,831 t CO_2e in 2022. This corresponds to 1.59 t CO_2e per university member and 0.12 t CO_2e per m^2 net floor area.

Figure 1 shows how the emissions are distributed among the three scopes. Scope 3 accounts for the largest share (approx. 70%), followed by Scope 2 (approx. 22%) and Scope 1 (approx. 8%).

Looking at the distribution of GHG emissions across the various emission sources (Fig. 2), three areas emerge that together account for almost 95% of Esslingen University's GHG emissions in both 2019 and 2022: Commuting, procurement and buildings (heat and electricity).

The GHG balance and further analyses will gradually be published on the website of Esslingen University[1].

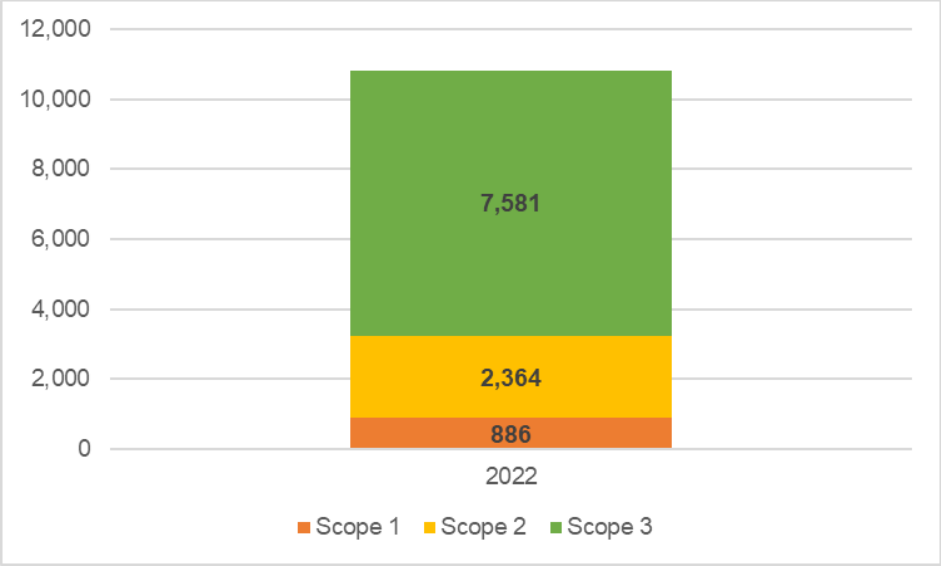

Figure 1: Emissions by scope

[1] https://www.hs-esslingen.de/hochschule/profil/nachhaltigkeit/klimaschutzmanagement/

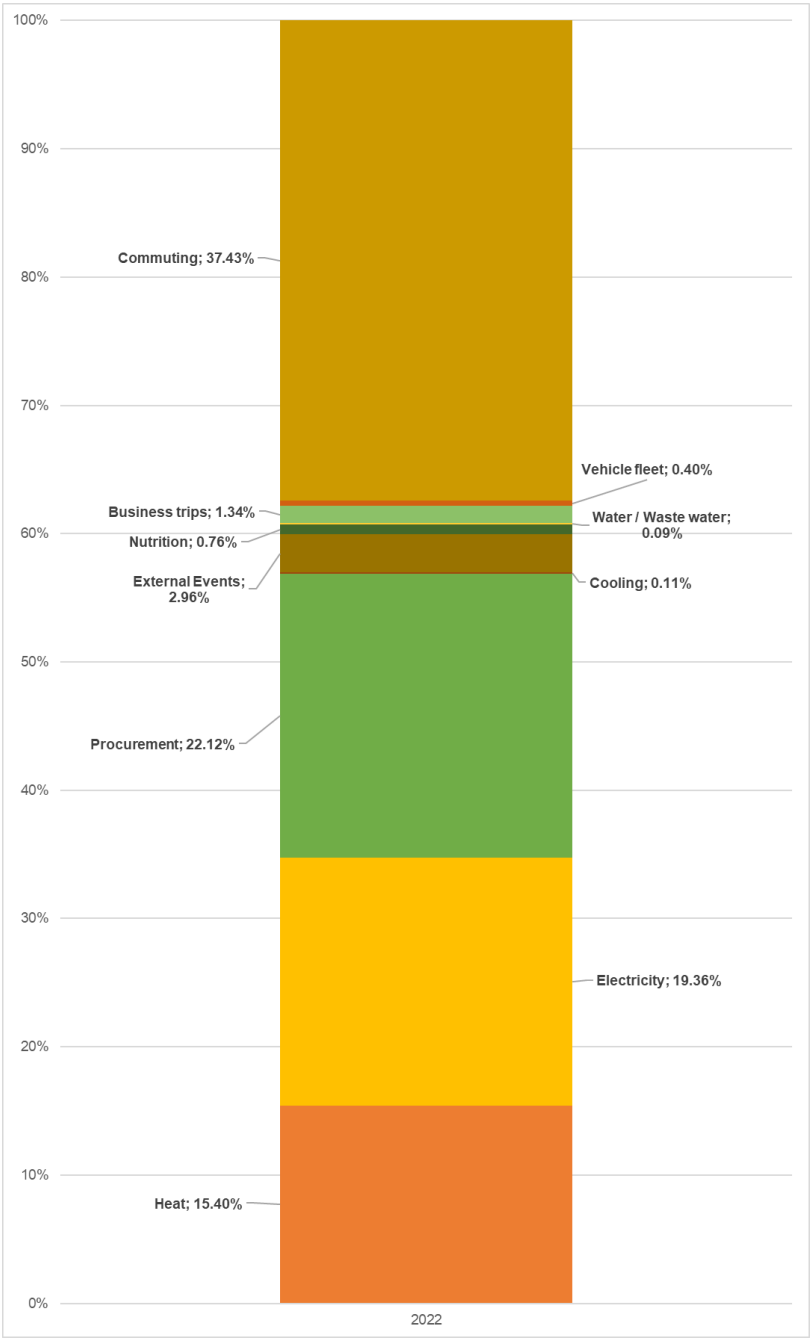

Figure 2: Emissions by source

5 Discussion

As commuting, procurement and buildings make out the major share of the Esslingen University's GHG balance, reducing emissions in those areas has a major effect and they should be the focus of the climate concept. However, it must also be noted that the results in the areas of commuting and procurement are only projections and the figures only represent an approximation of the actual situation and are subject to uncertainty. This is due to the fact that the figures for heat and electricity are based on meter readings, while the figures for commuting and procurement were estimated (see also the Methodology section) and may therefore be over- or underestimated. Nevertheless, they provide an initial approximation of the actual figures.

In terms of buildings, the measures to reduce GHG emissions are clear. Measures such as building refurbishment, automated building technology or efficient data centres can generate savings, whereby the GHG savings can be calculated with sufficient data. The main obstacles to implement these changes are budget limitations as well as shortage of staff in facility management or IT departments. In the case of the Esslingen University, there is also the specific situation that the buildings are owned by the state of Baden-Württemberg, not by the University itself, meaning that the latter cannot decide on the measures mentioned. Further measures regarding buildings include organisational changes such as the implementation of home office and desk sharing and information campaigns to change user behaviour.

In contrast, emission reductions in commuter traffic are only possible by changing user behaviour. The university can incentivise this through measures such as more bicycle parking spaces or charging facilities for electric vehicles, but whether this is accepted by university members is up to them. The fact that the university does not own the properties and therefore cannot make these decisions alone also comes into play here. Moreover, the university has little influence on important factors such as local public transport connections, their quality or the frequency of public transport services.

With regard to procurement, the data situation is difficult due to the large number of procurements from various departments at the university, particularly as no central database on procurements exists to date in the university administration.

There is also a lack of information on the carbon footprint of many products, meaning that emissions can only be estimated and products can hardly be assessed on the basis of their climate impact. In addition, there are also requirements from the state of Baden-Württemberg as well as budget constraints, meaning that the university's ability to exert influence is limited.

It is therefore advisable to look also at areas with lower emissions but greater scope for influence. The vehicle fleet and business trips are particularly worth mentioning here.

Looking at the ALLEA report (pp. 22-23), which compares the GHG emissions of 25 European universities, the emissions of Esslingen University of 1.59 t CO_2e per university member are above average. However, there is a vast variety as regards the emission sources which universities take into account. Many universities solely account scope 1 and scope 2 emissions. Others include only specific parts of scope 3 emissions such as business travel or commuting. Those universities that also account for scope 3 emissions have GHG emissions ranging from 1.04 CO_2e (Stockholm University) to 8.23 CO_2e (University College London) per university member. This huge range shows that it is necessary to develop a common mechanism for assessing the GHG emissions of universities.

6 Conclusions

Focusing on their operational GHG emissions represents a chance for universities to underpin the credibility of their teaching and research on sustainability.

Based on the GHG balance of Esslingen University, this paper has shown that the main emission sources of a university are commuting, procurement and buildings. Developing reduction measures in those areas can influence the GHG balance to a great amount. The main obstacles are budget limitations, limited influence on the part of the university as well as shortage of staff. Hence, also areas with lesser emissions should be looked at.

More research is needed regarding which emission sources should be part of the GHG balance and how emissions in areas such as procurement should be accounted for.

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COUNTRY-LEVEL SUSTAINABILITY INDICATORS IN CENTRAL AND EASTERN EUROPE: INTEGRATING UN SDGS AND ECOLOGICAL FOOTPRINT TO IDENTIFY MEANINGFUL CLUSTERS AND ASSESS REGIONAL PERFORMANCE

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The development of sustainability indicators at the national level emerged due to the limitations of using GDP as a measure of well-being, sustainability, and resilience. Over time, various indicators have been formulated, with a shift in focus from solely economic growth to a more encompassing perspective. The objective of this study was to integrate two methodologies, namely UN Sustainable Development Goals Index (SDGI), and the Global Footprint Network's Ecological Footprint (EF), in order to identify meaningful clusters of countries based on both measures. Our secondary aim was to reveal the similarities and differences between countries of the Central and Eastern European region. The clustering outcomes revealed that a three-cluster solution can be considered satisfactory. The results confirm the absence of decoupling at a macro level and provide evidence that the SDGs adequately address the intricate nature of sustainability. As for the countries in Central and Eastern Europe we found that this country group's SDGs is above average, but this group of countries is not homogeneous. Significant disparities are apparent in the variations observed in the SDG 9 scores.

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1 Introduction

The evolution of country-level sustainability indicators was necessitated by the flaws and limitations of GDP as an indicator of well-being, sustainability, and resilience (Stiglitz et al. 2009). Several different indicators have been developed over time to measure sustainability at the national level. The creation of these indicators has allowed better measuring of the well-being, social welfare, and ecological sustainability of societies. As sustainability goals continue to evolve, sustainability indicators will continue to develop, and new ones will be created to address emerging challenges. However, each country-level sustainability indicator has been subject to significant criticism based on their measurement methods and limitations.

We can conclude that while these alternative indicators are valuable in measuring progress towards sustainability goals, no indicator addresses all aspects of sustainability comprehensively and appropriately. These limitations and potential weaknesses highlight the need for a holistic approach in sustainable policy-making that acknowledges the complexity of sustainability, embraces new data sources and methods, and integrates the diverse perspectives of stakeholders across sectors and disciplines.

Our research aims to combine two of the aforementioned methodologies, the Ecological Footprint (EF) and the SDG Index (SDGI). While the main critique of EF from a wider sustainability perspective is its sole focus on environmental aspects, the SDGI has been often criticised due to its weak integration of these aspects. The goal of the research was to integrate the advantages of these methods, and to find meaningful clusters of countries according to the two measures.

2 Theoretical background

The SDG Index is an assessment of each country's overall performance on the UN 17 Sustainable Development Goals (SDGs), giving equal weight to each goal (Sachs et al., 2023). The score indicates a country's position between the worst possible outcome (a score of 0) and the target (a score of 100). The dashboard and trend arrows help identify priorities for further actions and indicate whether countries are on or off track to achieve their goals and targets by 2030, based on the latest trend

data. The 2023 SDG Index edition includes 97 global indicators. Two-thirds of the data come from official statistics (typically from United Nations custodian agencies), with one-third from non-traditional statistics, including research centres, universities, and non-governmental organizations.

Since 2015, the SDG Index and Dashboards have been peer-reviewed, and the global edition was statistically audited by the European Commission in 2019 (Schmidt-Traub et al. 2017; Papadimitriou et al., 2019). The SDG index scores serve as a valuable tool for monitoring a country's progress in achieving sustainable development. Analysing these data can help identify both areas of success and those that may require more attention or targeted interventions.

Ecological footprint is an indicator developed by the Global Footprint Network (GFN) to measure a country's ecological impact. It measures the amount of land required to support a country's consumption and waste disposal patterns (Wackernagel & Rees, 1995). The ecological footprint includes land used for food, timber, energy, and infrastructure. It also includes land required to absorb carbon emissions and other pollutants. It is a useful indicator of sustainability because it reflects how human activities impact the environment and how sustainable the current consumption patterns are. Additionally, the ecological footprint has been widely adopted by international organizations, such as the United Nations, as a measure of sustainability. The ecological footprint is versatile and provides many possibilities for analysis (Kocsis, 2014).

The ecological footprint for each country is expressed in terms of global hectares (gha) per person. The global average ecological footprint for the last available year (2018) is 2.8 gha per person, while biocapacity (the number of hectares available to each person) is 1.6 gha per person (GFN 2018). This means that the resources of the Earth are overused by 75%.

Szigeti and others investigated the decoupling state of GDP and ecological footprint of 131 countries. Among them, 40 countries experienced strong decoupling (absolute reduction in resource use), 77 countries experienced weak decoupling (relative decrease in resource use), and only 14 countries did not observe decoupling (relative increase in resource use) (Szigeti et al. 2017). Wang and others (2022)

investigated the decoupling trend in 166 countries from 1990 and 2015, and concluded that decoupling showed an improvement trend. Among them, upper-middle income countries improved the earliest (2003), and low-income countries improved the latest (2009). They also observed that the evidence of the inverted U-shaped nexus between economic growth and ecological footprint shows the validity of the Ecological Kuznets Curve globally, however, this nexus is not significant in low-income countries. Renewable energy consumption, population aging, financial development and trade openness all contribute to the reduction of the ecological footprint (Wang et al. 2022).

Based on a model of historical data and modelled projections Ward and others (2016) demonstrate that growth in GDP ultimately cannot be decoupled from growth in material and energy use, and argue that GDP is a poor proxy for societal wellbeing. Proponents of steady-state economy and degrowth therefore emphasise the goal of de-growing the economy within ecologically sustainable limits while at the same time increasing human wellbeing but defined in non-GDP terms (Latouche 2009; Daly 2014; Washington and Twomey 2016; Kallis et al. 2018). According to this view, the point of degrowth is not only downscaling in quantitative terms, but also a change in the objectives of the economy.

3 Methodology

For our study we used two databases, one is the National Footprint and Biocapacity Accounts (NFA) database and the other is the SDI Report (SDR) database.

NFA measure countries' ecological resource use and resource regeneration capacity. The accounts are based on around 15,000 data points per country per year, providing the baseline data for ecological footprint (EF) analysis for 184 countries in the latest data table for 2018, edited in 2022. Commissioned by the Footprint Data Foundation (FoDaDo), the National Footprint and Biocapacity Accounts 2022 Edition is produced by the Ecological Footprint Initiative of York University in collaboration with GFN (Lin et al., 2018). The 2022 SDG Index database includes data from previous years in addition to the most recent data, of which 2018 is used for comparability with the NFA. Data for 2018 were available for 177 countries

(Sachs et al., 2022). By merging the two databases, we found 159 countries that are included in both databases (hereinafter referred to as: "our database").

Central and Eastern European Countries (CEECs) is an OECD term for the group of countries comprising Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, and the three Baltic States: Estonia, Latvia and Lithuania (OECD 2001).

A key moment in clustering is how we measure the distances between countries. One possible subdivision of clustering procedures is the so-called hierarchical and non-hierarchical classifications. An important difference between the two methods is that the number of clusters in hierarchical methods is not predetermined, whereas in non-hierarchical classifications, cases are classified into a predefined number of clusters. To group the countries, cluster analysis was carried out using the hierarchical clustering method. The Nearest Neighbour method was used to filter outliers. The Ward method was used to determine the clusters. Clustering was performed using the SPSS software package.

Pearson's correlation coefficient was calculated between the 17 indicators and EF. The baseline calculations (hierarchical clustering and correlation matrix) resulted in further calculations with data for 157 countries and 18 indicators. We subtracted the EF data from 100 (which is the maximum value of the SDG Indices). Thus, a higher value indicates a more favourable, i.e. smaller ecological footprint. The table used for the calculation is presented (see Table 1). Our study investigated the positioning of CEE countries within the clusters.

Following the completion of our calculations, we obtained access to the 2019 ecological footprint data, prompting us to reassess our findings using this updated information. Through our analysis, we identified 155 countries with data available for comparison. Additionally, in order to better understand the significance of the ecological footprint, we conducted a supplementary analysis excluding this factor.

4 Results

The SDG Index has an average of 66. Universally replicable well-being requires an average ecological footprint smaller than the world average biocapacity. At current human population levels, there are 1.6 global hectares of biologically productive land on Earth per person. Given the growing population and the recognition of the need for biocapacity of wild species, the average global ecological footprint per capita needs to be reduced significantly below this threshold.

Based on the results of the correlation matrix there is no strong relationship between variables, so all variables can be left out of the analysis without significant bias.

Table 1: Cluster centres (2018)

SDG Scores	Clusters (Ward)		
	(2) Emerging countries	(1) Remainder of the Globe	(3) Developed countries
Goal 1	29.67	85.44	97.90
Goal 2	51.13	59.53	67.10
Goal 3	40.63	72.62	89.67
Goal 4	42.09	81.10	95.40
Goal 5	47.15	61.19	71.94
Goal 6	49.40	69.69	80.07
Goal 7	43.00	72.83	74.47
Goal 8	58.43	67.06	78.85
Goal 9	14.54	37.69	78.77
Goal 10	47.63	53.02	84.10
Goal 11	49.26	75.23	83.68
Goal 12	95.97	88.07	67.69
Goal 13	97.62	88.12	52.24
Goal 14	68.17	63.24	61.94
Goal 15	65.75	61.15	72.47
Goal 16	51.33	65.96	80.86
Goal 17	50.15	62.37	61.73
ef trans	98.74	97.30	94.03
average	55.59	70.09	77.38

The result of the clustering shows that the 3-cluster solution can be considered as acceptable. The cluster centres are shown in Table 1. A Nearest Neighbour clustering method resulted in the exclusion of two countries from the analysis, Bolivia and Haiti.

- Cluster 3: 'Developed countries' countries perform exceptionally well across SDG1, SDG3 and SDG4. In addition to EU member countries, this includes most of CEE countries: Croatia, the Czech Republic, Hungary, Poland, Slovak Republic, Slovenia, and the three Baltic States: Estonia, Latvia and Lithuania among others.
- Cluster 1: 'Remainder of the Globe' lags behind Cluster 3 by an average of 10% of the overall score. A very significant lag is observed for SDG 9 (above 50%), while SDG 12 and SDG 13 have significantly higher scores (around 30%). Among the CEECs, Albania, Bulgaria and Romania are in the 'Reminder of the Globe' cluster.
- In Cluster 2, referred as 'Emerging countries', there is an ongoing downward trend in the average score when compared to Cluster 1. Notably, there is a substantial decrease in scores for SDG1 and SDG 9, whereas scores for SDG12 and SDG13 exhibit continuous improvement.

Table 2: Selected data from the CEE countries

Country	Ecological Footprint [gha per capita]	Biocapacity [gha per capita]	Deficit	SDG Index Score	Goal 9 Score
Albania	**1,9**	**1,0**	**-0,9**	**72,2**	**29,3**
Bulgaria	**3,6**	**3,3**	**-0,3**	**73,3**	**54,3**
Lithuania	6,0	4,7	-1,3	74,6	65,5
Romania	**3,6**	**3,2**	**-0,4**	**77,1**	**55,8**
Slovakia	4,7	2,8	-1,9	77,8	65,7
Croatia	3,9	2,8	-1,0	78,1	65,9
Hungary	3,9	2,6	-1,3	78,3	69,3
Slovenia	5,4	2,2	-3,2	79,6	72,8
Latvia	6,4	8,2	1,8	79,6	66,5
Czech Republic	5,7	2,3	-3,4	79,9	78,2
Estonia	8,0	9,3	1,3	79,9	77,5
Poland	4,8	1,9	-2,9	80,2	73,2

The countries in Table 2 are arranged in ascending order based on their SDG Index scores. It is important to note that all countries have scores above the average SDGI score. The three Goals that display a decline in scores (SDG12, SDG13, SDG14) are primarily associated with the environmental pillar of sustainability. This suggests that when societies make progress in terms of their socio-economic conditions, they do so at the expense of the environment, thereby indicating the absence of

decoupling in this particular field. Re-running the calculation using data from the year 2019 yields a result that closely mirrors the original findings, with negligible variations observed in the decimal points. Even when the ecological footprint is omitted from the clustering analysis, the resultant outcomes remain consistent with the initial observations. This strongly indicates that countries categorized within clusters exhibiting higher scores are failing to fulfill the anticipated objectives within the environmental domain.

This statement confirms and reinforces two significant assumptions: first, that there is no decoupling phenomenon observed at the macro level, and second, that the SDGs adequately incorporate the essential environmental attributes necessary for comprehensively addressing the complex issue of sustainability.

5 Conclusions

Previous research has shown that good economic and social performance in developed countries comes at an environmental price. It has also been found that living with a low ecological footprint in countries with a low environmental impact is associated with severe socio-economic disadvantages. The 'Remainder of the Globe', while lagging slightly behind developed countries in terms of economic and social goals, performs significantly better in terms of environmental indicators. Addressing SDG9 can be a strategic issue of how to build resilient infrastructure, promote inclusive and sustainable industrialisation, and stimulate innovation without significant trade-offs in meeting environmental goals The contrast in SDG 9 values among CEE countries is notably pronounced compared to the overall SDG Index, where the greatest difference between the highest and lowest scores is merely 10%. In contrast, the variation in SDG9 values is significantly amplified, reaching two and a half times the magnitude of this difference, as illustrated in Table 2.

We believe the evidence supports the following conclusions:

- Despite the potential benefits of integrating ecological footprint indicators into the UN sustainability index, the combination of these two indices to address their shortcomings is considered superfluous in terms of methodological innovation.

- Data reliability is serious concern, and it has implications for monitoring progress and informing policy decisions.
- The environmental component of the SDGI is sufficient for the purposes of comparison.
- There is a significant trade-off involving in decoupling, as it entails a shift away from advanced development levels and raise cultural and consciousness-related issues, as well as potential risks in the form of perceived political self-harm.

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Life Cycle Analysis of Passenger Cars With Electric Drive (BEV)

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The life cycle analysis examines whether alternative drive technologies, such as electromobility, are actually more climate-friendly than vehicles with combustion engines. For a detailed assessment and thus a holistic presentation of the life cycle assessment, the entire life cycle of the vehicles must be mapped, starting with the extraction of raw materials and the manufacturing process of a vehicle. Frequently, there are divergent statements about the sustainability of alternative drive systems. This is often due to the fact that topics such as production or the disposal/recycling of the vehicles and, above all, the central component of the battery are often ignored. The question arises as to how and whether the current state of research provides sufficient information about these phases and their ecological assessment. The aim of the work is to present the life cycle of an electric vehicle based on the current state of research. To this end, 15 relevant studies/publications were selected for analysis and comparison. The assumptions made in the publications lead to some significantly divergent results. The energy-intensive manufacturing process for battery cells is largely responsible for the resulting emissions. Due to different assumptions, the CO_2 emissions for the battery are characterized by a wide variance.

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1 Introduction

The increasing use of alternative drive systems for vehicles offers the potential to improve the environmental impact of transportation. Life cycle analysis, also known as life cycle assessment, is used to investigate whether alternative drive technologies, e.g. electromobility, are actually more climate-friendly than vehicles with combustion engines. To this end, the environmental impact, e.g. greenhouse gas (GHG) emissions, is mapped over the entire life cycle of the vehicles, which includes the phases of manufacturing, use and disposal or recycling. A striking feature of the discussion about the "environmental friendliness" of vehicles is the discrepancy between the various assessments. Study results in which BEVs perform excellently contrast with results in which the gap in the CO_2 balance is very small or (depending on the parameters selected) the combustion engine performs even better (Buchal, 2019). The aim of the thesis is to define criteria for the assessment of the life cycle of electric vehicles based on the current state of research and to analyze the reasons for the different assessments of environmental friendliness. To this end, the question of the extent to which the current state of research provides any information at all about a comprehensive ecological assessment of electric vehicles will be investigated. This word focuses on individual transportation with electric vehicles.

2 Theoretical Background / Literature review

When comparing alternative drive systems, the focus is often on the vehicle use phase, the so-called tank-to-wheel (TtW) consideration. As electric vehicles do not emit any CO_2 while driving, the use phase has a clear advantage in the life cycle assessment. Vehicle manufacturers take advantage of this fact and have advertised some of their products as "zero-emission vehicles". However, this does not take into account the provision of energy, including the extraction of raw materials and fuel production, which is expressed in the so-called well-to-tank (WtT) approach. However, the life cycle assessment of an electric vehicle is influenced not only by the use phase but also by the emissions and energy consumption generated during the vehicle manufacturing and the disposal/recycling phase. The availability of data and emission values for the individual life cycle phases determine the possibilities for correctly evaluating the vehicle life cycle assessment. The partial consideration of individual phases, such as the use phase, is one of the main reasons for divergent statements on the sustainability of alternative drive systems. Topics such as the

manufacturing (including the extraction of raw materials) or disposal/recycling of vehicles are often ignored.

In principle, the product life cycle of vehicles can be divided into three main processes: the manufacturing phase including the extraction of raw materials, the use phase and finally the disposal phase including the recycling process (Broch, 2017). For a holistic view and the possibility of a comprehensive ecological assessment of vehicles, it is important that all phases of the vehicle's life are considered (Bothe & Steinfort, 2020). The consideration of a product over its entire life cycle is also referred to as cradle-to-grave (Herrmann, 2010). The manufacturing phase from the extraction of raw materials to the production of preliminary products and the completion of the end product is described as cradle-to-gate. A sub-process of the manufacturing phase, specifically the production of the end product in the manufacturing plant with the exception of raw material extraction, is described as gate-to-gate (Broch, 2017). In the use phase, a distinction is made between the provision of energy (well-to-tank, WtT) and the actual use of the vehicle (tank-to-wheel, TtW) (Bothe & Steinfort, 2020). Together, both emission values are referred to as well-to-wheel (WtW). The life cycle of a vehicle ends with its disposal after use (Volkswagen AG, 2019). With measures to recycle the vehicle, raw materials can be recovered and fed back into the production cycle (Bothe & Steinfort, 2020). The following figure (cf. figure 1) shows a simplified representation of an electric vehicle life cycle:

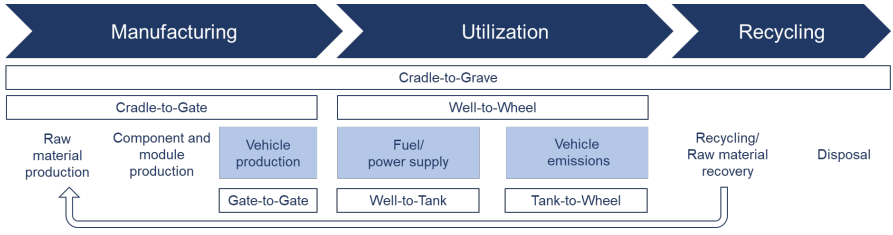

Figure 1: Simplified representation of the life cycle of an electric car
Source: author's compilation (Volkswagen AG, 2019; Broch, 2017)

For this work, 15 relevant studies and publications were selected. The title, abstract and structure were used to check whether the publication was suitable for the purposes of this work. Due to the constant technological progress in the automotive industry, topicality, i.e. the year of publication and the data collection period of the

studies, plays an important role. The period of the studies analyzed here is limited to the years from 2018 to the end of 2022. The selected studies were conducted by national and international research institutes or institutions. In some cases, car manufacturers themselves also publish carbon footprints for their electric vehicles. In References, the studies used are identified by an additional indication after the year of publication, e.g. Bieker, G. (2021) (study 09).

3 Methodology

The studies were analyzed with regard to the criteria relevant to this paper and the results were summarized in a structured manner. All data and research results from the selected sources were analyzed in accordance with the defined criteria. A distinction is made between main criteria and respective sub-criteria.

The first main criterion (A) is the various basic assumptions of the studies. Sub-criteria are, for example, the scope of the study and vehicle parameters. The other main criteria are based on the life cycle of an electric vehicle with the manufacturing (B), utilization (C) and disposal/recycling phase (D). Criterion B is further subdivided into B1 for the basic vehicle and B2 for the battery. Important sub-criteria include battery size, country of production, electricity mix, driving cycle and consideration of battery recycling.

4 Results

In order not to go beyond the scope of this paper, the following is limited to a selection of important criteria and also a selection of a few studies. Despite these limitations, it will become clear why the studies show such different results.

An initial indication of the different results can be seen in the number of vehicles considered (cf. table 1).

In the case of emissions for the manufacturing phase, there are either conversion factors or flat-rate values are assumed (cf. table 2).

Table 1: Ad A - Basic assumptions

sub criterion	study 01	study 02	study 07	study 08	study 11
Number of vehicles	790 vehicles; all vehicle classes; simple vehicle equipment	2 vehicles; the electric vehicle as a sports car with high engine power	30,000 different vehicles available on the European market	39 different vehicles and technology combinations	n.a.

Source: author's compilation

Table 2: Ad B1 - Manufacturing phase basic vehicle

sub criterion	study 01	study 02	study 07 (Kroher)	study 10	study 14
Calculation emissions for BEV	4.5 kg CO_2e * empty weight of vehicle in kg	8,000 kg	39.1 g/km	n.a.	7,270 kg

Source: author's compilation

There are very large deviations in the emission coefficients for the vehicle battery. The decisive factor here is the assumptions about the electricity mix in the country where the battery is manufactured (cf. table 3).

Table 3: Ad B2 - Manufacturing phase battery

sub criterion	study 01	study 05	study 09 (EU)	study 13 (China)	study 13 (EU)
kg CO_2 equivalent per kWh battery capacity	83.5	75	54	185	124

Source: author's compilation

The following figure (cf. figure 2) shows the bandwidths and calculation coefficients used for selected studies.

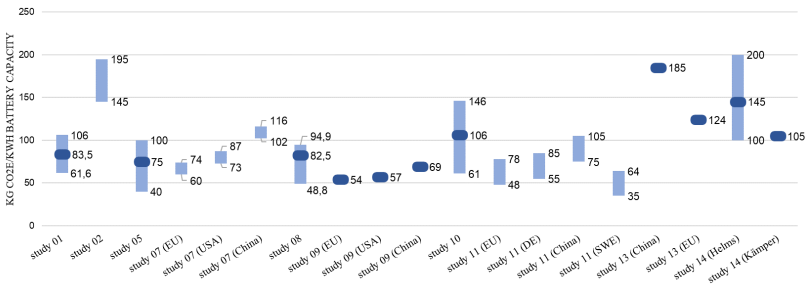

Figure 2: GHG emissions of battery production per study
Source: author's compilation

When operating a BEV, both the electricity mix of the country in question and the type of electricity used, i.e. conventional electricity vs. green electricity from renewable power generation by wind or solar plants, must be taken into account (cf. table 4).

Table 4: Ad C - Utilization phase

sub criterion	study 01	study 02	study 09	study 10	study 13
Power mix	– Conventional electricity: 0.401 kg CO_2-eq/kWh – Renewable electricity: 0.036 kg CO_2-eq/kWh	0.55 CO_2 emissions kg/kWh	– China: 509-622 g CO2-eq/kWh – Europe: 164-199 g CO2-eq/kWh – India: 561-746 g CO2-eq/kWh – USA: 239-357 g CO_2-eq/kWh	– Conventional electricity 2018: 530 g/kWh 2030: 347 g/kWh – Renewable electricity: 25 g/kWh	n.a.

Source: author's compilation

No uniform line can be seen in the consideration of CO_2 credits from battery recycling (cf. table 5).

Table 5: Ad D - Disposal/recycling phase

sub criterion	study 01	study 02	study 03	study 05	study 11
Credit through recycling/ second life strategy	Yes,credit through recycling	No	n.a.	No	CO_2- footprint reduction potential: 19% in 2020 and 22% in 2030

Source: author's compilation

5 Discussion

Numerous studies deal with the comprehensive ecological assessment of electric vehicles. In general, it can be stated that the assumption of different input parameters is the main reason for the divergence of results in the environmental assessment. The results of the studies must always be interpreted in relation to the

input parameters used in the study. A comparison of the studies is made more difficult due to the different assumptions and focuses of the authors.

Other aspects can also be included in the discussion. These include, for example, the approach or structure of the work, which on the one hand adheres to standards such as ISO standard 14040 (cf. study 13) or follows its own structure (cf. study 02). Furthermore, the selection and number of vehicle types considered plays a major role. The data basis used should also be mentioned, e.g. with regard to energy consumption in battery production. In a study by Wietschel from 2019 (cf. study 10), a CO_2-coefficient in the range of 150-200 kg CO_2/kWh is given, while the update from 2020 uses values in the range of 61-106 kg CO_2/kWh. Another important aspect is the consideration of the production location of the battery. The production of this vehicle component in a country with a poor electricity mix, such as China or India, significantly worsens the CO_2 balance.

In addition to the energy supply, the cell chemistry is also relevant for the environmental balance of an electric vehicle. There is an emerging trend towards a reduced cobalt content, which significantly improves the CO_2-balance. The measurement method for electricity consumption during the use phase plays another important role. Here, the outdated NEFZ method (cf. study 02) should be replaced by the extended measurement method, the WLTP cycle (cf. study 06). There is no uniform picture regarding credits for the reduction of emissions through battery recycling. Only in more recent publications (cf. study 1 or 11) this aspect is addressed under the keyword “second life". This refers to the continued use of batteries, which generally still have 70% to 80% of their original capacity, as stationary electricity storage units. A number of projects are already testing how "second use" can be deployed to store electricity from renewable energies and compensate fluctuations in the grid (Fuchs & Siegel, 2023). Finally, it should be noted that the focus of the studies examined is on GHG emissions. Other environmental impacts such as water pollution and scarcity, land consumption, noise pollution and particulate matter are largely excluded from the considerations.

6 Conclusions

In order to take account of the different results, it makes sense to make the results of this analysis available in a tool. The appropriate parameters can then be selected for specific vehicles in order to achieve the most correct results possible. However,

this requires the availability of the necessary information, e.g. the country of manufacture of the battery. Work is already underway to integrate this tool into the DIPO tool, which can be used to determine the economic efficiency and sustainability of vehicles with alternative drive systems (Bongard et al., 2022; Bongard & Main, 2023).

For further research, it should be noted that technological progress is developing rapidly, especially in battery production and recycling. These developments make a significant contribution to improving the carbon footprint of vehicles. The availability and analysis of current data therefore play an important role in research work. A carbon footprint must always be considered in its entirety and depends strongly on the assumptions and data basis made in each case. A precise analysis of the data basis and the assumptions made is therefore essential.

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Navigating the Automation Conundrum in the Modern Workplace

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This paper investigates the impact of automation in the modern workplace, focusing on the dual nature of its effects—both positive and negative. Utilizing a literature review and empirical research, including a survey with 81 participants, the study aims to provide a comprehensive understanding of the 'Automation Conundrum' and 'Automation Paradox.' The findings reveal that while automation enhances productivity and reduces routine tasks, it may also lead to job displacement, skill gaps, and increased technology dependence. A significant correlation was found between respondents' preparedness for automation and their optimism about new job opportunities, highlighting the importance of adaptability and continuous skill development. The study acknowledges limitations in its demographic scope and response variability. Implications for policymakers, businesses, and workers suggest a balanced approach to automation, emphasizing reskilling, policy innovation, and maintaining human elements in work.

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1 Introduction

The onset of the 21st century has brought about a shift in the workplace, primarily propelled by the rapid pace of technological advancements. Among these, automation and autonomy stand out as forces reshaping the nature of work, productivity, and the skill landscape required in modern economies. This transformation, while heralding increased efficiency and productivity gains, simultaneously unveils a complex array of challenges and unintended consequences. One of the negative consequences has been recognized as the 'Automation Conundrum and automation Paradox. These paradoxes encapsulate a scenario where automation, ostensibly a boon to productivity and efficiency, concurrently manifests challenges that undercut its potential benefits.

This paper draws upon a survey of literature and empirical research that sheds light on the nuances of the automation conundrum and paradox.

1.1 Defining the Automation Conundrum and Paradox

The terms 'automation conundrum' and 'automation paradox' serve as conceptual frameworks to understand the dual-edged impact of automation on the modern workplace. The automation conundrum is rooted in the dichotomy between automation's potential to streamline operations and its capacity to displace human workers, thereby creating a gap between technological capabilities and the readiness of the workforce to adapt to these changes. The paradox of automation, on the other hand, delves deeper into the implications of these challenges, revealing a complex interplay between technological advancement and socio-economic outcomes. This paradox lies in the realization that even as automation propels productivity and operational efficiency to new heights, it simultaneously engenders a set of adverse effects, such as the displacement of jobs, the widening of skill gaps, and an increased dependence on technology, thereby raising pressing ethical and socio-economic dilemmas.

Central to understanding the automation conundrum and paradox is the recognition of the nuanced impacts of these technological advancements. As Bainbridge (1983) eloquently articulated in the concept of the 'irony of automation,' the more advanced and autonomous systems become, the more critical the role of human oversight and

intervention, paradoxically, becomes. This irony underscores a fundamental challenge: as systems are designed to perform tasks with minimal human input, the skills, situational awareness, and engagement of human operators diminish, thereby exacerbating the risks associated with system failures or unforeseen scenarios. The automation paradox further complicates this landscape, as elucidated by researchers such as Endsley (2017) and Woods (2017), who highlight how increased automation can lead to a degradation of human operators' ability to maintain control over systems, particularly in situations not anticipated during the design phase.

1.2 Positive Aspects of Automation

The discourse on automation is not solely focused on its challenges but also highlights a range of positive impacts that have transformative potential for the workplace. At the forefront of these benefits is the significant enhancement of **Operational Efficiency**. This capability is not merely about the speed and accuracy with which tasks are performed but also encompasses the ability of automated systems to operate round-the-clock, thereby maximizing output and reducing the time required for various operations. Studies by Alberth and Mattern (2017), Anagnoste (2017), and Lacity and Willcocks (2015; 2016) provide empirical evidence supporting the assertion that automation can significantly enhance productivity across a diverse range of industries, from manufacturing to services.

Moreover, automation plays a crucial role in the **Reduction of Repetitive Tasks**, thereby freeing human workers from the monotony of routine, repetitive activities. The literature underscores this point, with studies by Lacity and Willcocks (2015) and Fersht (2012) highlighting how automation can foster job variety and enable employees to concentrate on higher-value work, thus enhancing the overall quality of work life. Furthermore, the **scalability and flexibility** of automation technologies, as noted by authors like Suri et al. (2017), provide businesses with the ability to adapt quickly to changing market demands and operational requirements, thereby offering a competitive edge in an increasingly dynamic and complex business environment.

If we consider AI as the current highest level of automation we can with Khanzode and Sarode (2020) add following advantages: finishing tasks faster than a human, stressful and complex work completed easily and quicker than a human, various

functions can be done at a time, success ratio is high, less errors, less space required, calculation of long term and complex situations, and discovery of unexplored things.

1.3 Negative Consequences of Automation

While the benefits of automation are significant, the technology's widespread adoption has also led to a series of negative consequences that cannot be overlooked. One of the most pressing issues is **Job Displacement**, a phenomenon where the introduction of automated systems results in the elimination of jobs that were previously performed by human workers. This displacement is not limited to manual or low-skill jobs but extends to roles that require complex cognitive skills, as automation and artificial intelligence technologies evolve to undertake tasks that involve decision-making and problem-solving. The literature, including works by Alberth and Mattern (2017) and Asatiani and Penttinen (2016), provides evidence of this trend, indicating that job displacement is a significant challenge that societies must address in the face of increasing automation.

Coupled with job displacement is the issue of **Widening Skill Gaps**. As automation technologies become more prevalent, the demand for skills shifts, emphasizing technical competencies and the ability to work alongside automated systems. This shift can create skill gaps, leaving segments of the workforce ill-prepared for the changing demands of the labor market. The research by authors such as Lacity and Willcocks (2015) and Suri et al. (2017) underscores the importance of addressing these skill gaps through education, training, and workforce development initiatives to ensure that workers are equipped with the skills needed in an automated world.

Another critical concern is the **Dependence on Technology**, where the reliance on automated systems can lead to a deterioration of human skills and decision-making capabilities. This dependence is particularly problematic in situations where automated systems fail or when unforeseen circumstances arise that require human intervention. The literature highlights the risks associated with over-reliance on technology, with studies by Endsley (2017) and Woods (2017) discussing how increased automation can degrade human operators' ability to maintain control over systems and make effective decisions in complex situations.

Khanzode and Sarode (2020) add some more disadvantages of AI: It can be misused, the results are not always reliable, lack of the human touch, users can become lazy, AI can be expensive.

1.4 Balancing Technological Advancement with Human Work

Navigating the complexities of automation in the modern workplace requires a multifaceted strategy that balances the benefits of technological advancements with the preservation of human-centric work. Key to this strategy is the **Reskilling of the Workforce**, an imperative that involves equipping employees with the skills and competencies required to thrive in an automated environment. The literature, including studies by Lacity and Willcocks (2015) and Suri et al. (2017), emphasizes the importance of continuous learning and adaptability, advocating for initiatives that facilitate the reskilling and upskilling of the workforce.

Policy Adaptations are another crucial element in the strategy to balance technological advancement with human work. This includes measures such as social safety nets, training programs, and incentives for businesses to invest in human capital. The research by authors like Lacity and Willcocks (2016) highlights the role of policy in mitigating the socio-economic challenges posed by automation, underscoring the need for proactive and innovative policy responses.

Furthermore, the **Embrace of New Roles** created by technological advancements offers a pathway to redefine job roles in the automated workplace. As automation takes over routine and repetitive tasks, new opportunities emerge for roles that leverage human strengths such as creativity, empathy, and strategic thinking. This evolution can lead to more varied and fulfilling career paths, aligning more closely with human capabilities and interests. The literature points to the importance of embracing these new roles, with studies by Anagnoste (2017) discussing how automation can foster job variety and enable employees to concentrate on higher-value work.

2 Methodlogy

We conducted research to uncover users' attitudes towards AI and its impacts. Our research question was how user perceive automation and its both positive and negative effects. Our questionnaire comprised five sections - Demographic Information, Benefits of Automation, Challenges of Automation, Adaptation to Automation, and the Future of Work under the Influence of Automation - and included 15 questions. See below for details.

Section 1: Demographic Information

- Age, gender, education.

Section 2: Benefits of Automation

- Automation leads to increased productivity and efficiency in the workplace. (Productivity)
- Thanks to automation, I can spend less time on routine tasks. (Routine)
- Automation brings greater flexibility and innovation to my work processes. (Flexibility)

Section 3: Challenges and Concerns about Automation

- I am concerned that automation will lead to job losses. (Job losses)
- Automation increases the risk of disadvantaging certain groups in the labor market. (Disadvantaging)
- I am worried about becoming dependent on technology due to automation. (Technology dependence)

Section 4: Adapting to Automation

- I feel prepared to adapt to changes caused by automation. (Preparedness)
- I believe it is necessary to continuously develop my skills to remain competitive in the era of automation. (Skills development)

- Institutions and organizations provide sufficient resources for retraining and skill development in relation to automation. (Support)

Section 5: The Future of Work

- I believe that automation will create more job opportunities than it will eliminate. (New jobs)
- I expect that automation will fundamentally change the nature of many professions in the future. (Change of profession)
- My optimism about the future of work outweighs my concerns about automation. (Optimism)

3 Results

We collected responses from 81 participants, with an average age of 41 years (standard deviation of 11 years). We employed a 5-point Likert scale, where 1 means "definitely yes" and 5 means "definitely no." The majority of participants were men (61%). Most respondents held a university degree (offered options were 1 for basic education, 2 for high school, and 3 for university). The questionnaire was distributed online, utilizing the snowball method for respondent recruitment and was also promoted across various forums and blogs. The questionnaire was in Czech.

Table 1: Descriptive statistics of the questions asked

		Mean	Std. Deviation
1	Productivity	2,32	1,10
2	Routine	2,46	1,23
3	Flexibility	3,33	1,18
4	Job losses	2,88	1,22
5	Disadvantaging	2,27	1,21
6	Technology dependence	3,23	1,45
7	Preparedness	2,68	1,28
8	Skills Development	2,37	1,24
9	Support	3,74	1,32
10	New Jobs	3,64	1,33
11	Change of profession	2,10	1,10
12	Optimism	2,88	1,46
13	Age	40,61	11,12
14	Education	2,56	0,63

From Table 1, it is evident that respondents believe automation enhances productivity and reduces routine tasks to some extent. However, they are sceptical about automation's contribution to greater flexibility and innovation, possibly because generative AI has not been widely introduced into many professions or is primarily used for routine tasks. Respondents are not particularly fearful of job losses but do anticipate that automation may pose challenges for specific groups in the labor market. They express concern over dependency on technology, feel underprepared for using automated technology, and perceive a lack of adequate support regarding automation. They anticipate that many professions will undergo changes and that continuous skill development will be essential due to automation. Respondents are slightly pessimistic, doubting that automation will lead to new job creation. Except for flexibility, technology dependence, lack of support, and the creation of new jobs, responses hovered around the midpoint value of 2,5, indicating no strong opinions.

In terms of correlations, we discovered a positive link significant at the 5% significance level between increased productivity, reduced routine tasks, and greater flexibility ($r_{s\ productivity\ -\ routine}$=0,47; $r_{s\ productivity\ -\ flexibility}$=0,26), aligning with expectations. Nonetheless, the correlation between reduced routine tasks and increased flexibility was not statistically significant at the 5% level. Those who feel prepared for automation are optimistic that it will generate new jobs ($r_{s\ preparedness\ -\ new\_jobs}$=0,26). Those feeling prepared for automation think it will bring them more flexibility ($r_{s\ preparedness\ -\ flexibility}$=0,41). Interestingly, older respondents exhibit more concern over job losses, changes in professions, challenges for certain groups in the labor market, and feel less prepared for automation ($r_{s\ age\ -\ job\_losses}$=0,24; ($r_{s\ age\ -\ change\_of\_profession}$=0,37; $r_{s\ age\ -\ preparedness}$= -0,23).

4 Discussion

The findings of this study contribute to the ongoing academic discourse on the impact of automation within the scientific context, particularly concerning human capital, skills, and the broader implications of technological change. By examining both the positive and negative facets of automation, this research aligns with the foundational insights of Bainbridge (1983) on the irony of automation and extends the contemporary analysis of Alberth and Mattern (2017), who delve into the productivity enhancements afforded by robotic process automation.

For stakeholders, the implications of this research are manifold. Policymakers are tasked with the challenge of devising strategies that mitigate the adverse effects of automation, such as job displacement and widening skill gaps, while also leveraging its benefits for economic and productivity gains. Businesses, on the other hand, must navigate the integration of automation technologies in a manner that preserves the human element of work, fostering an environment where technological advancements and human skills complement rather than replace one another. This necessitates a commitment to reskilling and upskilling initiatives, ensuring that the workforce remains adaptable and prepared for the evolving demands of the labor market.

Employees, as direct stakeholders, face the dual challenge of adapting to new technological realities while safeguarding their employability. The correlation found between preparedness for automation and optimism about future job opportunities underscores the importance of continuous learning and adaptability as key competencies in the age of automation.

Our research shows there are concerns about job security and technology dependence were moderate, with respondents feeling underprepared for automation's challenges and lacking sufficient support for adaptation. Interestingly, correlations indicated a positive relationship between perceived productivity benefits and optimism about new job creation, particularly among those who felt prepared for automation. However, concerns about job losses and the need for continuous skill development were more pronounced among older respondents. Overall, while recognizing automation's efficiency gains, the study highlighted mixed feelings about its broader implications, leaning towards a slightly pessimistic view of automation's role in future job creation and professional development.

5 Conclusion

In conclusion, this study underscores the complex landscape of automation in the modern workplace, presenting a nuanced view that balances the significant benefits of technological advancements against the challenges they pose to the workforce and society at large.

The 'Automation Conundrum' and 'Automation Paradox' encapsulate the dual-edged nature of automation, highlighting the importance of navigating these changes with a strategic approach that prioritizes human-centric work, continuous learning, and adaptability. The findings from the empirical research provide valuable insights into employee perspectives on automation, revealing a mixture of optimism and concern regarding the future of work, job security, and the necessity for skill development in an era characterized by rapid technological change.

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New Meaning of CSR in Business: Support for Ukraine's Societal Resilience in Wartime

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The military shocks caused by the Russian-Ukrainian war became the hardest test for Ukrainian businesses and its social functions. In the first year of hostilities alone, losses of Ukrainian business-assets are estimated at $11.3 billion, which significantly limited companies' opportunities for corporate social responsibility (CSR). The purpose of the article is to find out how the war changed the CSR model of Ukrainian businesses in the institutional and social dimension. The methodology of system analysis, sociology and institutionalism was used for the study. Primary limitations of our research are related to the objective impossibility in war conditions of obtaining actual statistical and corporate reporting data. Certain difficulties arise in finding publicly available information about relocated enterprises and companies. The key findings of our study lie in the substantiation of the connection between socially-oriented transformations in the Ukrainian CSR model under military shocks and the positive effect of these transformations on strengthening the Ukraine's economic and societal resilience in wartime. It is advisable to take this into account in the case of developing government policy and state anti-crisis management.

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1 Introduction

In the pre-war period, the regulatory framework for the incorporation of CSR into Ukrainian business was quite actively formed. Thus, in 2003, the Principles of Corporate Governance were officially approved in Ukraine, and since 2009, the National Standard has been in force, as official translation of ISO 26000 "Guidelines for Social Responsibility". In 2015, the "Honor Code for a Respectable Ukrainian Producers" was published (Petrenko, 2015). In 2017, Ukraine joined the OECD Declaration on International Investment and Multinational Enterprises, and the Guiding Principles for Responsible Business Conduct are an integral part of this document. However, large-scale practical implementation of CSR was not achieved, and to improve the situation, in 2020 the Cabinet of Ministers of Ukraine approved the "Concept for the state policy implementation in the field of support the development of socially responsible business in Ukraine for the period until 2030" (Order No. 66-r dated January 24, 2020).

The Russian full-scale invasion of Ukraine on February 24, 2022 became a hardest test for the sustainability, priorities and CSR of Ukrainian businesses. International estimates put the loss of business assets at $11.3 bln in the first year of hostilities, and at least 426 large and medium-sized public and private enterprises in Ukraine were damaged or destroyed, as were tens of thousands of small private businesses. Regionally, Donetsk region suffered the most, accounting for almost half of the total direct damage to businesses; there were also significant losses in Kharkiv, Luhansk and Kyiv regions (UNDP, October 2023, p. 18). The damage and losses suffered between February, 24, 2022 and December 31, 2023, by Ukrainian commerce and industry facilities are estimated at US$188.8 bln, agriculture – at US$80.1 bln, energy sector – respectively, at US$64.6 bln (World Bank, February 2024, p. 113, 129, 141).

However, in this shock situation, the usual CSR model was not only not rejected by Ukrainian business, but also received a new interpretation in the context of military turbulence (Lazorenko, 2023; CSR Ukraine, 2023, April 13). The purpose of the article is to find out how the military shocks changed the CSR model of Ukrainian businesses, and to substantiate what institutional and societal consequences caused these transformations. This study's hypothesis is that on the great solidarity wake of Ukrainian society under the Russian Federation full-scale military invasion, Ukraine's business war-contextually strengthened its social responsibility and thereby

supported the economic and societal resilience of its country. These types of resilience accordingly characterize the ability of the national economy and society to prepare for shocks, resist them, adapt and quickly recover from them, maintaining a long-term perspective.

2 Literature review

The key stages of theoretical thinking and expanding the thematic framework of the "corporate social responsibility" phenomenon are discussed by Kolot (2013). This author emphasizes that, in its essence, corporate social responsibility is a certain type of social obligations (mostly voluntary) implemented in corporate management to employees, partners, the state, civil society institutions, and society as a whole (p. 6). Barauskaite & Streimikiene (2020) characterized the basic concepts and methods of evaluating companies' CSR indicators. Petrenko (2015) reviewed the chronology of the international standardization system' development in the corporate responsibility field, as well as the implementation in Ukraine of the standard IC CSR–08260008000 "Social responsibility. Requirement". Zlatanović et al. (2023) proposed a holistic approach to the typical CSR-performance relations.

Taliouris (2018) identified the foundations and specifics of modern European policies for corporate social responsibility in the context of achieving the Sustainable Development Goals.

Contemporary EU business practices in the CSR sphere are analyzed by Heremans & Verhavert (2022, August 22). The authors also assess the potential impact of the European Green Deal initiative, which is expected to significantly shape the economic activity dynamics over the coming decades, and introduces a number of new rules for CSR, including corporate governance and operations, and also the contractualization of social and environmental obligations. Vargas (2013) researched the corporate social responsibility in contexts of conflict and insecurity, and proposed a normative, analytical and instrumental framework for identifying various challenges to corporate social responsibility. The role and strategies of national governments in overcoming these challenges for CSR are justified by Wirba (2023).

Yevtushenko (2013) described the main stages of the institutionalization of social responsibility in Ukraine, right up to the outbreak of the armed conflict in Donbass. Amosha et al. (2017) recognized opportunities and barriers for fulfilling social obligations of Ukrainian industrial enterprises under the ongoing military conflict in Donbass since 2014. Experts from UNDP in Ukraine (October 2023) presented research on Ukrainian businesses' CSR in the first year of the war, conducted in the implementation context of the OECD Due Diligence Guidance for Responsible Business Conduct, namely Enhanced Human Rights Due Diligence in Conflict Affected and High-Risk Areas. Ukrainian enterprises that are most socially responsible in wartime and provide various assistance for society, the state, individual citizens and the Ukraine's armed forces were identified by Lazorenko (2023).

Issues of resilience at the level of the economy, different social groups and society as a whole, which are under deep military conflicts, are studied in detail by Eisenberg et al. (2014), as well as, but for peacetime conditions – in Haavik's (2020) study.

3 Methodology

In the research, we apply the methodologies of system analysis, institutionalism, sociology, and partially use official wartime statistics. Primary restrictions in this case are associated with the objective impossibility, under war conditions, of obtaining factual and complete statistical and corporate reporting data, and mainly data from sociological surveys and only in unoccupied territories. Certain difficulties arise in finding publicly available information about relocated enterprises and companies, since some of them partially changed their production profile, taking into account wartime needs.

Official data from the State Statistics Service of Ukraine (https://www.ukrstat.gov.ua/) for 2014–21 do not include the temporarily occupied territories of Crimea and part of the temporarily occupied territories in the Donetsk and Luhansk regions; data for 2022 does not include temporarily occupied territories and part of the territories where hostilities are ongoing. The statistical information for 2021–22 has been compiled on the basis of reports actually submitted by enterprises and additional estimates of indicators.

Important sources of our study are monthly surveys of enterprises of Ukraine conducted by the National Bank of Ukraine (https://bank.gov.ua/ua/statistic/nbusurvey), as well as other sociological research results provided by international and national structures. Institutional assessments of the national business environment are presented in the article based on data from the Transparency International Ukraine, UNDP in Ukraine, as well as relevant data from the European Commission and the European Council regarding Ukrainian institutional reforms and implementation of the EU–Ukraine Association Agreement.

4 Results

Since the beginning of the war, Ukrainian business has continued to suffer the devastating impact of military shocks, including significant damages and losses. Data on this for the first year of the war (February 2022 – February 2023), as well as for 2022 as a whole, are given above in the article. According to the results of sociological surveys, for Ukrainian companies (mainly micro, small and medium-sized businesses), the past year 2023 was better than the previous one, but also very difficult: only 62% of surveyed businesses worked at full capacity; 41% of firms worked only within their region; 43% of businesses increased expenses by 20–50%; revenues decreased in 46% of firms, and profit – in 48%; and 30% of companies reduced their staff (Ukrainian Sociological Portal, 2024, January 19). During the martial law in Ukraine, the number of active enterprises of all forms of ownership, non-profit organizations, institutions operating primarily in the real sector, decreased significantly – as of November 1, 2023, by more than 55 thousand units, compared to the same date in pre-war 2021 (Table).

Under the ongoing war, the plans of Ukrainian businesses for the current year are not very optimistic. Sociological polls in January 2024 showed a deterioration in business activity estimates of enterprises in almost all sectors of the national economy, their leaders expect an acceleration in the growth rate of purchase prices, a further decrease in new orders for their own products, as well as a reduction in employees, most significantly in construction (32% of firms), industry (15%) and the services sector (15%) (National Bank of Ukraine, January 2024).

Table 1: Number of active enterprises of all forms of ownership, non-profit organizations, institutions in Ukraine as of November 1, 2021 – November 1, 2023

According to Ukrainian Classification of organisational and legal forms	Total number of active enterprises, non-profit organizations and institutions, units as of			Difference between 2023 and 2021 indicators
	November 1, 2021	November 1, 2022	November 1, 2023	
Total in Ukraine, *including*:	698771	659755	643602	–55169
Farming	30242	28544	25383	–4859
Private enterprise	50028	41306	36241	–13787
State Enterprise	1558	1312	1128	–430
Municipal enterprise	8679	7848	7662	–1017
Joint-stock company	4785	4408	4203	–582
Limited liability company	261894	232777	223744	–38150
Non-profit organisation, including Volunteer's	89183	92104	94603	+5420

Source: Authors' research based on SSSU (2024).

An institutional and societal feature of the martial law in Ukraine was that, under the extremely negative influence of military shocks, the overwhelming number of businesses operating in the country (on the Ukrainian Government controlled territories and where hostilities are not taking place) did not abandon social responsibility, but retained it and introduced new aspects. In particular, Ukrainian businesses used: relocation of enterprises and personnel (according to the Ukrainian Ministry of Economy, during the first year of the war, 800 enterprises were relocated to safer country's regions under the Government Business Relocation Program, that provides free assistance for relocants from National Railway and Postal operators); non-standard employment to preserve jobs; retraining of personnel for wartime needs; employed of internally displaced Ukrainians and war veterans; financed the creation/equipment of "Energy Hubs" for people (rooms with electric generator and Wi-Fi in case of blackouts due to military destruction of energy infrastructure);construction or repair of air-raid shelters in schools and residential buildings; purchase of technical equipment and digital devices for distance learning for schools, colleges and universities; provided humanitarian and/or financial support to Ukraine's armed forces and civilians, etc.

In addition, as stated in the UNDP report, during the martial law, Ukrainian companies intuitively applied tools corresponding to the Heightened Human Rights Due Diligence, although most companies did not know about it before the war. Among such tools, it is possible to single out: preparation of Business Continuity Plans with an emphasis on the safety of employees and customers; provision of instructions for employees regarding various situations at workplaces (for example, the action algorithm when announcing an air alarm) and possible support in these situations; implementation of Employee Assistance Programme for medical and mental health support for employees and their families; provision of financial assistance in case of the enterprise/business and personnel relocation, etc. For example, Oshadbank, which provides the largest share of social payments for Ukrainian citizens, primarily pensioners, has had a Business Continuity Plan since 2014, which has been 90% implemented since February 24, 2022 (UNDP, October 2023, p. 43, 49).

But objectively, under martial law some Ukrainian businesses failed to fulfil their social obligations and also violated the labor rights of their employees. Among the common human rights abuses are health and safety in the workplace, illegal dismissal, unpaid leave, decrease or increase in workload with or without remuneration (in critical sectors), and non-payment of salary, salary in "envelope", or delays in payment (UNDP, October 2023, p. 35). The decisive reason for these violations was the shocking deterioration of Ukrainian companies' finances.

Based on the Ukraine case, experts developed a five-component Ukrainian CSR model during wartime, that includes the following elements (CSR Ukraine, 2023, April 13):

(i) business continuity,
(ii) human safety,
(iii) army assistance,
(iv) partnerships and
(v) local communities.

We propose to include an institutional component in this model, which allows the formation of a societal context and corresponds with the definition of CSR as "the responsibility of enterprises for their impacts on society" contained in the EU

strategy 2011–14 for Corporate Social Responsibility. Application of such an approach in a full-scale war context will allow us to link together the CSR actions of Ukrainian business with the economic and societal resilience of the country. During wartime, economic and societal resilience is vital for Ukraine and maintaining its subjectivity.

The particular importance of the institutional component of the Ukrainian CSR model is confirmed by arguments regarding increasing the social sustainability of Ukraine in wartime. By this institutional component we understand the socially-oriented strengthening of the institutional capacity of domestic large and medium-sized businesses, whose interests are represented by the Ukrainian League of Industrialists and Entrepreneurs (ULIE, https://uspp.ua/en/) and Association of Organizations of Employers of Ukraine (AOEU, https://ooru.org.ua/en/). Given the Ukrainian martial law practices, we consider that the above institutional capacity strengthening occurs in two ways.

First, through *socially-oriented measures implemented directly by business structures themselves*. For example, already at the beginning of the Russian invasion, ULIE and AOEU created a permanent Anti-Crisis Headquarters for business assistance, the work of which involves the heads of specialized parliamentary committees, government ministries, banks, more than 100 leading business associations, large and medium-sized companies. The Headquarters' activities significantly strengthened the social dialogue institution, defending not only the interests of domestic business under wartimes, but also its opportunities for social responsibility. In particular, by lobbying the draft law "On State Industrial Policy", the effective implementation of which can ensure the creation of 600 ths new jobs in the post-war period (Burlay, February 2024); legal support in the Supreme Court of Ukraine against economically unacceptable wartime attempts to abolish the Economic Code and the Labor Code of Ukraine; supporting the demands of all-Ukrainian trade union to the Government not to introduce regressive labor legislation, etc (Grytsenko et al., 2023, p. 22–23).

In fact, for almost two years during the war, the business Anti-Crisis Headquarters performed the institutional functions of the Council for Entrepreneurship Support in the Conditions of Martial Law, which was created by the Decree of the President of Ukraine dated January 26, 2024 No. 30/2024, among the Council functions is the

support of social responsibility opportunities for domestic businesses in war- and postwar times.

Second, through *socially-oriented institutional interaction with other institutional actors*. For example, ULIE contributes to solving the problem of unemployment in Ukraine, its level, according to expert estimates, reached 20.9% in February 2024. Simultaneously, Ukrainian enterprises have a deficit of qualified and unqualified employees. This is connected with the migration of many specialists abroad as refugees from the war; mobilization tasks for the Ukrainian Defense, as well as the high need for a program for reskilling and retraining of employees. During the war, the ULIE and the Anti-Crisis Headquarters will closely cooperate with the State Labor Service of Ukraine and the National Qualifications Agency on the implementation of such programs (ULIE, March 20, 2024).

5 Conclusion

To summarize all mentioned above, the following conclusions can be reached:

- under the military shocks, the socio-practical and institutional steps taken by Ukrainian business provided a new reading of the CSR model and demonstrated a serious positive CSR impact on economic and societal resilience of Ukraine;
- given the Ukraine's martial law practices, it is advisable to add an institutional component to the five-component model of Ukrainian CSR during the war, developed by the "CSR Development" Center;
- this institutional component represents the strengthening of the institutional capacity of Ukrainian business, which can occur in two ways: (1) through socially-oriented measures implemented directly by business structures themselves, and (2) through socially-oriented institutional interaction with other institutional actors;
- the identified CSR impact on economic and societal resilience (based on the Ukrainian case) is important to consider in government policy-making and anti-crisis governance;
- further research may be devoted to possible transformations of the CSR model during the post-war reconstructive recovery of Ukraine.

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The Emergence and Relevance of Different CSR Motivational Factors Among Hungarian SMEs

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The paper aims to observe Corporate Social Responsibility (CSR) related motivations in the Hungarian small- and medium-sized enterprise (SME) sector. Literature on CSR distinguishes SMEs from large companies. Being closer to stakeholders, they have special motivational patterns and different possibilities. These features result in special mindset, vocabulary, and activities related to CSR. Based on the literature, we differentiate three types of motivational factors: the Friedmannian view, business case, and moral case. Within all three types, we separately handle incentives and disincentives of CSR. In our comprehensive research on sustainability implications (e.g., stakeholders, motivations, supporting and hindering factors, topics, and activities) among Hungarian SMEs, we used mixed methodology. In the exploratory phase, the qualitative method covered three focus group sessions. Based on the qualitative results, we designed a structured and systematic questionnaire that was surveyed on a representative sample of 300 SME leaders in 2023. Within the 3 types, a total of 9 motivational statements have been selected for the current study to highlight the most dominant motivational characteristics among Hungarian SMEs. Although the business case exists, the moral responsibility of SME leaders is highlighted, and it is tangible that we have gone beyond Friedman's idea about the priority of profitmaking.

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1 Introduction

The motivations for taking responsibility for sustainability can be linked to the fundamental question 'What is the purpose of business activity?' Mainstream economics claims that the primary purpose, responsibility is to enable economic growth by profit-making. One of the best-known manifestations of this profit-oriented view of firms is Friedman, who argued that firms are merely responsible for increasing their profits (Friedman, 1970). According to the shareholder value approach, companies aim at increasing shareholder value in the long run, but in practice, this approach was often associated with short-term profit maximization and had many negative consequences. Among other consequences, this approach has led to economic instability and crisis (Porter, 1992), self-interest, corporate scandals, and other kinds of irresponsible corporate behaviour (Clarke, 2015).

Although the mainstream economics ignores it butethical norms necessarily exist in business. Business ethics encompasses the concept, principles, issues and need for CSR, which stems from general ethical theories and principles of sustainability. One of the most important theories of business ethics is the stakeholder theory (Freeman, 2016), which states that, since all stakeholder groups contribute to the value creation of the company, to different degrees and with different means and resources (e.g. money, labour, raw materials, infrastructure, purchase of products and services) , the company should operate with attention to their legitimate needs, expectations and the impacts on them. Dealing with the interests of stakeholders is a moral obligation (moral case), additionally, it is the basis of the expectation that stakeholders will reward the company with their loyalty (business case, Frank, 2010).

The contribution of different stakeholder groups to value creation is multidimensional. This is how the understanding of micro-level responsibility is linked to sustainability as a global goal aiming for development in social and environmental dimensions – besides economic one.

In this article, we investigate the three types of motivational factors: the Friedmannian view, business case, and moral case among the Hungarian SMEs. Within all three types, we separately handle incentives and disincentives of CSR.

2 Literature review

The literature on CSR distinguishes between SMEs and large companies (Málovics, 2009, Jansson et al., 2017, Bikefe et al. 2020, Metzker &s Streimikis, 2020, IIRC, 2021, GRI, 2022). First, SMEs have different motivations concerning their responsibility, because they are closer to their stakeholders, whose expectations are perceived differently consequently better understood.

Second, their capacity to take responsibility is limited because they have fewer organisational, human (Radácsi, 2021), and financial resources (Mahmood et al., 2021). These characteristics result in specific mindsets, vocabularies and activities for CSR and sustainability efforts, but it is undeniable that they must also address responsibility, as defined by the UN (2015) in the Agenda 2030, which includes the Sustainable Development Goals.

Given the prominent role of SMEs, and thanks to their unique characteristics and capabilities in CSR, the study of their practices has led to a new field of research on CSR and corporate sustainability (Magrizos et al., 2021).

In this article, as predicted in the Introduction section, we specifically focus on the CSR motivations of SMEs, which can be classified into three broad types according to the literature. The first type is the Friedmannian view, regarding that a company should only care about the interests of stakeholders if and only if it has a positive profit effect in the short term in the sense of direct, monetary return (Friedman, 1970). As a disincentive, this type of motivation argues that anything the company does, but it does not increase profits, is a misuse of shareholders' money.

Business case, as opposed to this narrow economic approach, refers to the economic advantage that a company can achieve by meeting the sustainability needs and expectations of its stakeholders. CSR activities and their appropriate communication will improve the reputation of the company (Porter & Kramer, 2002, Kotler & Lee, 2005, Economist, 2008, Fenwick et al. 2022), increase consumers' and employees' loyalty (Gannon & Hieker, 2022, Berniak-Woźny et al., 2023), and enable better financial conditions (Doane, 2005, Boze et al. 2019, Gjergji et al., 2020), so those lead to cost savings and innovation ideas (Zastempowski & Cyfert, 2021, Csutora et al., 2022), finally contribute to compliance with law (Shalhoob & Hussainey, 2023).

The third type, explicitly business ethical motivation or moral case, arises from the fact that the company's management recognises and acknowledges the company's impacts on its stakeholders because the management is willing to take responsibility for these impacts (Győri, 2012, Boda et al., 2013, Zsolnai, 2022, Rockström & Sukhdev, 2016, Carroll, 2021, Gillian et al., 2021).

3 Methodology

This paper is a part of a broader research (Kolnhofer-Derecskei et al., 2022, Győri et al., 2023), and aims to observe sustainability-related attitudes, activities and motivations in the Hungarian SME sector.

In our comprehensive research on sustainability implications (e.g., stakeholders, supporting and hindering factors, issues, and behaviours), mixed methodology was used. In the exploratory phase, the qualitative method covered three focus group sessions. Based on the qualitative results, we formalized a structured and systematic questionnaire that was surveyed on a representative sample of 300 SME leaders in 2023.

The stratified random sample was taken from identifiable groups (strata) that are homogeneous for three desired characteristics, namely (1) company size based on the number of employees; (2) region; and (3) economic activity classification.

In this paper, the three types of motivation are represented by 3-3 statements about the role and responsibility of companies. Each statement measured the respondents' beliefs, attitudes and understanding on a 7-point ordinal scale, some of them from 0 to 7, though several statements applied a bipolar scale; we indicate the different scales in the results. We investigated with the use of ANOVA whether the characteristics of the SMEs (size, gender of the leader, sector) have an impact on their motivational viewpoints.

Statements related to the Friedmannian view:

F1. Companies should only address environmental and social problems that they have caused themselves.

F2. Many business leaders only make excuses when they fail to act to protect the environment because of a lack of financial resources.
F3. The public receives excessive information on the responsible behaviour of companies.

Statements related to the business case:

B1. Companies only engage in corporate social responsibility because stakeholders expect them to.
B2. There is a strong expectation from local communities to assume responsibility for environmental issues.
B3. The expectations of market actors, such as our partners or competitors, only extend to compliance with legal requirements.

Statements related to the moral case:

M1. I wouldn't be able to look in my children's eyes if we were only seeking profit and did not respect the rules of social coexistence.
M2. Every individual has a responsibility to avoid reducing the life quality of humanity's future generations.
M3. It is the responsibility of every individual to do all that is reasonably possible to protect the natural environment.

4 Results

Based on the descriptive statistical results (shown in Table 1), the respondents tend to disagree with the statements advocating the Friedmannian view (F1 and F3), while they seem to agree with the statement denying it (F2), in this motivation type, so it can be interpreted as a disincentive. These results suggest that the fully mainstream, profit-oriented position is not typical or just weakly exists among Hungarian entrepreneurs.

Related to the business case as motivation, respondents are generally neutral (B1) and found stakeholders' expectations to be only moderate (B2), with a wide standard deviation. Moreover, the Hungarian market stakeholders (e.g. partners and

competitors) do not go beyond expecting compliance with legislation (B3). As a results of this, all of these results can be interpreted to be disincentives.

Table 1: Descriptive statistics of the statements (source: own elaboration)

Statements	Scale	Mean	Std. Deviation
F1. Companies should only address environmental and social problems that they have caused themselves.	[-3;3]	-0.94	1.961
F2. Many business leaders only make excuses when they fail to act to protect the environment because of a lack of financial resources.	[-3;3]	0.89	1.711
F3. The public receives excessive information on the responsible behaviour of companies.	[-3;3]	-0.47	1.637
B1. Companies only engage in corporate social responsibility because stakeholders expect them to.	[-3;3]	0.11	1.770
B2. There is a strong expectation from local communities to assume responsibility for environmental issues.	[0;7]	3.77	2.028
B3. The expectations of market actors, such as our partners or competitors, only extend to compliance with legal requirements.	[0;7]	5.40	1.733
M1. I wouldn't be able to look in my children's eyes if we were only seeking profit and did not respect the rules of social coexistence.	[0;7]	6.16	1.311
M2. Every individual has a responsibility to avoid reducing the life quality of humanity's future generations.	[-3;3]	2.65	0.851
M3. It is the responsibility of every individual to do all that is reasonably possible to protect the natural environment.	[-3;3]	2.47	1.366

On the contrary, the third motivation type, the moral case seems to be determind, the responsibility for future generations (manifested by own children of the entrepreneurs, M1) score is 6.16 on the [0;7] scale and gots in general 2.65 on the [-3;3] scale (M2). Similarly, the responsibility for the natural environment tends to be crucial, as well (M3). It means that moral case motivations are mainly incentives for taking responsibility.

5 Discussion

With ANOVA as a tool for inferential statistical analysis, we investigated the relationship between motivation types and SMEs' characteristics, like size of the firm, gender of the leader and sector where the company is registered. In the case of the statements related to the Friedmannian view, we found significant differences in the following points.

Female leaders (121 persons in the sample) more strongly deny statement F1 (F=4.673, p=0.010), and statement F3 (F=4.103, p=0.017). In the case of F3, we found significant differences based on sectors (F=2.463, p=0.018), the most responsible sectors are 'Professional, scientific and technical activities' with score -1.27, and 'Other services (administration, education, arts, finance, communication, real estate)' with score -0.71. Company size did not have a significant impact on this motivation type.

Related to the business case, medium-sized enterprises (42 in the sample) feel stronger expectations from stakeholders (F=3.812, p=0.052), and it features in the case of female leaders (F=2.875, p=0.058).

In the moral case, as described above, there is broad agreement on the existence of responsibility, with generally significant results, but for female leaders, we found significantly stronger motivation levels (F=7.620, p=0.001).

6 Conclusions

Based on our results, CSR and corporate sustainability exist among Hungarian SME leaders, the moral case is a strong motivating factor, reinforced to a small extent by the business case - but in fact, the expectations of Hungarian stakeholders are not high -, while the Friedmannian, just profit-oriented viewpoint is largely denied. This shows that Hungarian SME leaders recognise their responsibility for sustainability. Within the overall strong motivational level, female managers also stand out, similar to previous findings in the literature (Gilligan, 2014, Lu et al., 2020, Wei et al., 2021).

In the next phase of our research, we will go further in investigating the different types of motivation in order to bear a complete picture of the present situation and further directions of CSR among Hungarian SMEs. Having thus explored the CSR motivations of Hungarian SMEs in more depth, the next stage of the research will be to compare them with global trends in order to improve the relevance and applicability of our research.

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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON CONSUMER BEHAVIOR MANAGEMENT

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The trends in the digitalization of marketing require the expansion of marketing management tools, which is primarily associated with the capabilities of artificial intelligence. The purpose of the paper is to study the modern capabilities of artificial intelligence tools for managing consumer behaviour. The methodological basis of the research is general (such as generalization, analysis and synthesis) and special (system and structural analysis) methods. System analysis identifies the features of artificial intelligence tools for consumer behaviour management, and structural analysis summarizes the functions of artificial intelligence tools for consumer behaviour management. In the paper, the artificial intelligence tools are structured according to the possibilities of their use in the process of consumer analysis, promotion, development and implementation of consumer behaviour management strategies. The result of the study is a grouping of artificial intelligence tools for managing consumer behaviour and the formation of models of interaction between objects and subjects of consumer behaviour management. The originality and value of the study lies in providing recommendations for the use of artificial intelligence tools to manage consumer behaviour, which will allow businesses to increase profits.

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1 Introduction

Today, marketing tools for processing information about consumer behaviour are dynamically developing. According to surveys by McKinsey Global Institute (McKinsey Report, 2023), the use of AI in management of customer behaviour will lead to an increase in productivity by 38%, in promotion by 10%, in sales by 4%, in product development of trade mark by 12%, in trade by 2%. According to The AI Marketing Benchmark Report (2023), 61.4% of marketers used AI in their marketing activities, 44.4% used it for content creation, and 19.2% spent more than 40% of their budget on AI research of market.

Considering the artificial intelligence as a marketing tool, it should be emphasized the positive sense of using this technology to make management decisions that are based on the collected data, which are analysed and interpreted together with market trends and the opportunity to develop a marketing strategy that predicts the next step of the consumer. There are a lot of AI tools, so there is a need to structure and systematize them, which will help practicing marketers choose the most effective one for a particular marketing function. The choice of an artificial intelligence tool depends on the goals and objectives set by the company to manage consumer behavior, namely the influence of pricing policy, promotion strategy, content quality, etc. and increasing sales volumes.

The artificial intelligence technologies allow automatically respond to changes in consumer behaviour and adapt to it in real-time. With the help of artificial intelligence algorithms, it becomes possible to improve the analysis and evaluation of large databases of unstructured data to divide consumers by groups or psycho types, which will allow the application of individualized marketing. The relevance of the research is confirmed by the fact that the tools of artificial intelligence in the management of consumer behaviour are useful technologies, as they allow the analysis of large volumes of customer data, provide insights to support marketing strategies, minimize time for marketing research and other operations related to the company's marketing policy.

2 Literature review

In the process of research, works on the digitalization of marketing in general, as well as digital tools for managing consumer behaviour, as a separate component of marketing functions, were studied. In general, there are many marketing tools, but recently artificial intelligence technologies have been rapidly developing in various fields, including marketing. In the period of brand competition and digitization of all spheres, research focuses on the issue of integrating artificial intelligence technologies into the process of developing marketing strategies and identifying the skills that marketers need to gain competitive advantages (Ibrahim et al., 2023).

The study of consumer behaviour with AI tools was carried out by Longoni and Cian (2022), who analyse how consumers respond to decisions of AI result when they focus on the functional and practical aspects of a product. That is, in the decision-making process, people prefer or resist the recommendations of AI. Garvey et al. (2023) considered consumer reaction and satisfaction consequences of using artificial intelligence agents compared to human agents. The implementation of artificial intelligence tools in the system of marketing decisions has its advantages and disadvantages were highlighted by Bruyn et al. (2020). According to Cannella (2023), the artificial intelligence tools make the process of data collection and analysis seamless, reduce costs, and provide the opportunity to make marketing and management decisions in real-time. Ultimately, artificial intelligence applied to enterprise marketing strategies paves the way for profitable and effective sales (Kotler et al, 2017). Currently, not enough research has been conducted on the justification of the choice of consumer behaviour management tools, which would be convenient and easy to use. Therefore, it remains relevant to compare artificial intelligence tools for this purpose, classify them and provide practical recommendations for using one of them.

A lot of time is spent developing chat bot services and AI programs to capture consumer interest, increase returns, and provide a personalized customer experience. Companies that have the opportunity to better understand their customers have the opportunity to effectively develop brands by developing products that meet customer expectations. The tools of AI in marketing allow to model the portrait of the target consumer, analyse consumer loyalty through automated content analysis of social networks, cluster consumers by groups, influence consumer behaviour

through personalized communication content, set up personalized advertising appeals, forecast the costs of creating new products, maintain the target the audience. The main direction of the application of AI in the process of managing consumers is to focus on an individualized approach in marketing.

Consumer behaviour management tasks that can be solved using AI tools are focused on social media analysis, sales and consumer behaviour analysis, demand forecasting, personalization of offers for consumers, lead generation, automated content creation, chat bots, pattern recognition, improving advertising messages, augmented reality and electronic marketing. First, artificial intelligence can collect and analyse large amounts of social media data about products, brands, competitors, etc. that cannot be done manually to determine the sentiments of target audiences. Second, artificial intelligence technologies can identify trends and relationships between various factors, such as advertising, prices, promotions, user reviews, etc., to identify factors influencing consumer behaviour and product choices. Thirdly, artificial intelligence tools in the process of collecting data from networks can optimize information to forecast the demand for goods, taking into account such factors as seasonality, weather, number of competitors, etc., as well as in the process of planning production and stocks, to ensure competitive advantages. An important advantage of using artificial intelligence in marketing is the ability to personalize offers for consumers when analysing data about consumers, their interests, previous purchases, etc. Additionally, chat bots are an effective way to deliver personalized customer service at scale.

The artificial intelligence processes a huge amount of data to find ideal customers, performed lead generation, accordingly, for B2B purposes, it will minimize the time at the basic search stage. AI can be used to automate content creation and improve advertising to create personalized emails for each of a company's subscribers based on their previous interactions with the brand, reducing time and cost. Augmented reality can allow the customer to see and feel the products before making an online purchase, which can drive a faster customer response.

3 Classification of AI tools for consumer behavior management

The methodological basis of the research is general (such as generalization, analysis and synthesis) and special (system and structural analysis) methods. The system analysis identifies the features of artificial intelligence tools for consumer behaviour management, and the structural analysis summarizes the functions of artificial intelligence tools for consumer behaviour management. In the process of research, the main artificial intelligence tools that can be used by companies to manage consumer behaviour were collected and structured. The tools are structured according to the main functions of consumer behaviour management, namely consumer analysis, promotion, development and implementation of a consumer behaviour management strategy. The results of structuring are summarized and recommendations are provided for effective management of consumer behaviour using artificial intelligence tools.

Table 1: Artificial intelligence tools those are appropriate to use in the process of consumer analysis

AI tool	Features	Advantages	Disadvantages
Unmetric Analyze Xia	Analyses the content of social networks, providing information about their content, advertising publications and their effectiveness	Consumer analysis and strategy adjustment	Other marketing components are not taken into account, high cost
NetBase Quid	Identifying changes in consumer behaviour and market trends	Collection of information about consumer preferences	Does not take into account consumers who are not in the database
Pathmatics	Analysis of advertising effectiveness of competitors based on sites	Taking into account the experience of competitors	Cost
Crayon Market IQ	Finding potential business clients that match a given "customer profile"	Selection of the target audience in the market	Cost, focus on the B2B market
Albert	Analysis of large volumes of data about site visitors and identification of potential buyers	Selection of the target audience in the market	Not suitable for local business

Source: Influencer Marketing Hub, 2024

In Tables 1-4, artificial intelligence tools are structured according to the possibilities of their application in the process of consumer analysis, promotion, development and implementation of consumer behaviour management strategy. The results of

the structuring made it possible to single out the features, advantages and disadvantages of the specified artificial intelligence tools.

Table 2: Artificial intelligence tools those are appropriate to use in the promotion process

AI tool	Features	Advantages	Disadvantages
Jasper.ai	Automated creation of advertising content, optimization of marketing content (blogs, social networks, emails)	High-quality content, internationality (25 languages), Jasper Chat (personalization)	Cost, fact checking required
Beacon AI Outreach Tool	Creation of persuasive and professional advertising letters	Email personalization, quality content, interface	There is no analytics function
Flick's AI Social Marketing Assistant	Creating social media content	Interesting content ideas	Beta testing is in progress
EBI.AI	Creation of chat bots	Personalized interaction with customers, language processing, data analysis	Not integrated with other platforms
Chatfuel	Creation of chat bots, automation of responses, identification of potential customers	Personalized interaction with customers, data analysis	Not all areas of promotion are covered
Customers.ai	Creation of a multi-platform chat bot	Marketing chat content management	Not all areas of promotion are covered
Manychat	Creation of chat bots	Ease of use	Focused on Facebook Messenger, but have support for Instagram Direct
DeepBrain AI	Combining avatars with chat bots	Video creation, internationality (200 languages), diversity of use	Limiting videos to 10 minutes of time
Rapidely	Creating content in social networks	Interesting ideas for social networks, versatility for different industries	No calendar sharing available
ChatGPT	Content creation	Word processing, accuracy	Cost, ethical issues
Copy.ai	Content creation	Speed, simplicity	Limited customization options, subscription required
HeyOrca	Automatic creation of signatures for	Simplicity, great collaboration and approval system,	No re-sharing, limited paid tracking of posts

AI tool	Features	Advantages	Disadvantages
	publications in social networks	integration with Canva for post design	
Persado Motivation AI	Analysing the content of advertising, creating ads	Increasing the effectiveness of work with the target audience	Cost, social media coverage only
Nosto	Identify user-generated visual content from the target audience and convert it into advertising content	Increasing the effectiveness of work with the target audience, cost	Covers visual content only
Facebook Ads Google Ads	Launching programmatic advertising, automatic selection of advertising placement options, obtaining results of optimization of advertising campaigns	Optimization of advertising campaigns, partially free	There are no recommendations for optimizing the created ads
Market Brew	Optimization in terms of site evaluation by search engines, recommendations for improving the site's rating	Ability to increase the position of the site in the search network, cost	Does not affect consumer behaviour
SEO Surfer	Evaluation of the site by keywords and in comparison with competitors, optimization of blog posts	Ability to increase the position of the site in the search network, cost	Does not affect consumer behaviour
Frase.io MarketMuse	Collection of data from sites by keyword, evaluation of texts, creation of a convenient site structure, creation of content by keywords	Ability to increase the position of the site in the search network, cost	Does not affect consumer behaviour
GrowthBar	Evaluation of site content	The ability to increase the position of the site in the search network, cost, ease of use, complexity	Does not affect consumer behaviour, limited customization
Seventh Sense	Creation of a profile of each client and its analysis in order to increase the opening of advertising letters	Personalization of letters increases the interest of the client and increases the number of users, cost	It only affects the effectiveness of email marketing
LivePerson	Automated messaging, voice communication that helps manage communication with customers	Increases the speed of processing requests, customer loyalty	Cost

AI tool	Features	Advantages	Disadvantages
Smartwriter.ai	Creation of personalized letters, with a unique name, product description, links to the site, generation of backlinks	Increasing the interest of potential customers through personalization, value	It only affects the effectiveness of email marketing
Cogito	Real-time analysis of managers' conversations with customers, detection of signals in customer speech	The ability to control the behaviour of managers to obtain the effectiveness of conversations	Cost
Phrasee	Optimizing the language of links, creating copies	Increasing consumer interest	It only affects the effectiveness of email marketing
Acrolinx	Improving the quality of content	Increasing consumer interest	Does not cover all promotion components
InstaText Grammarly	Checking the grammar and spelling of the content	Content quality	Does not cover all promotion components
DeepL	Content translation	Content quality	Does not cover all promotion components
Socialfaim	Marketing of influencers, technologies for brands	Content quality	Cost

Source: Influencer Marketing Hub, 2024

Table 3: Artificial intelligence tools those are appropriate to use in the process of developing a strategy for managing consumer behaviour

AI tool	Features	Advantages	Disadvantages
Optimove	Collecting data about customer actions from various platforms for the purpose of modelling behaviour and forming a marketing strategy	Ability to adjust the marketing plan	Cost
Sens.ai	Analysis of the effectiveness of publications in social networks and providing recommendations for creating strategies	Ability to adjust the marketing plan	Analysis of information from mobile applications only
Evolv	Analysis of the client's behaviour on the site and providing recommendations for changing the strategy	Ability to identify site flaws	Only the client's behaviour on the site is taken into account in the recommendations
Brand24	Social media monitoring and analytics	The breadth of coverage of various media	Data overload, navigation
Uberflip	Analysis of individual customer experience on the	Improving the content strategy	Recommendations only on content, cost

AI tool	Features	Advantages	Disadvantages
Content Camel	site, provision of content strategy recommendations		
Cortex	Analysis of company and competitor content, creation of recommendations for content improvement	Opportunities to improve the content strategy, availability of a free trial version	Applies to content strategy only
GumGum	Analysis of images and page content, providing content recommendations	Opportunities for improving the content strategy	Narrow possibilities
Smartly.io	Planning, testing and running only the most effective ads	Integrates with various platforms	Difficulty of use
Emplifi.io	Management of social networks, tracking the effectiveness of promotion	Management of all profiles in social networks on one panel	Difficulty of use
GRIN	Affiliate Marketing, Consumer Protection, Public Relations, Communications, Influencer Marketing, Brand Content, Branded Content Creation	Content library integration, sales tracking	Lack of transparency of pricing
Brandwatch	Influencer marketing, consumer intelligence, social media marketing, market research, brand management	CRM for influencer management, integration with existing platforms for social media planning and customer analysis	Focused on corporations, individual pricing
Upfluence	Campaign analytics, e-commerce integration, CRM integration	Ease of use	No audience analysis
IndaHash	Development of dynamic marketing strategies, integration of e-commerce	Accurate search results, brand safety	Big size
NeoReach	Scanning major social media platforms, influencer marketing	Accurate search results	Lack of micro-influencers
HypeAuditor	Analytics and influencer identification, campaign management, market analysis	Determining the quality of the audience	Missing Facebook data
Linqia	Data-driven campaign strategy, creative direction, influencer management	Accurate search results	Cost
Trellis	Check prices for different products	Dynamic pricing, advertising targeting	Difficulty of use

Source: Influencer Marketing Hub, 2024

Table 4: Artificial intelligence tools those are appropriate to use in the process of implementing a consumer behaviour management strategy

AI tool	Features	Advantages	Disadvantages
Terminus Emarsys Socialbakers	Tracking the effectiveness of the strategy on the platforms where the promotion is carried out, providing predictive analytics	Opportunities for strategy optimization	Analysis of the current strategy without prevention of incurred losses

Source: Influencer Marketing Hub, 2024

Therefore, the existing tools of artificial intelligence help to change the decision-making result of the marketing specialist and the potential client at all stages of consumer behaviour management: from consumer analysis to the implementation of the consumer behaviour management strategy. The use of artificial intelligence tools by the marketer allows for reducing the time and costs of marketing activities, improving the quality of consumer marketing research and promoting the product as effectively as possible. The main disadvantage of most tools is their high cost or narrow functionality.

4 Discussion and conclusions

Among the main advantages that can be obtained thanks to the use of artificial intelligence is the formation of a portrait of each client. Specialists in the management of consumer behaviour receive a benefit in the form of saved time. In the process of analysing a large amount of data, it is possible to create personalized content and adjust it to manage the behaviour of the consumer according to his psych type. Information about a potential consumer in social networks, comments, online purchases, and reviews about a purchase can influence the formation of a consumer's portrait. This data, combined with specialized software for the analytical processing of information by artificial intelligence, makes it possible to understand the customer.

Summing up, it should be noted that consumer behaviour management tools based on artificial intelligence allow a better understanding of visual images and text. Replacing routine work with a machine algorithm of artificial intelligence allows the use of unstructured data to improve marketing analytics in the context of personalizing content for each consumer, influencing purchases and, in general, the formation and implementation of a marketing strategy. AI tools improve demand

forecasting and inventory management, increase company profitability, and forecast changes in customer behaviour.

Systems can analyse data about consumers, and their buying habits and predict how they will respond to certain marketing measures. Also, AI tools make it possible to analyse the effectiveness of marketing campaigns, identify new potential sales markets, and analyse competitors. The use of artificial intelligence makes it possible to understand and satisfy the needs of consumers, which will increase the effectiveness of marketing campaigns. Prospects for further scientific research are to identify the relationship between cognitive marketing and the use of artificial intelligence.

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Artificial Intelligence in Retail Stores: Evaluation of Readiness to Adopt AI Technologies Among Consumers

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This research aims to explore consumer attitudes toward the incorporation of Artificial Intelligence (AI) in physical retail settings, specifically examining how prior AI experiences, perceived risks, consumer self-efficacy in AI usage, and gender differences influence their readiness to embrace AI technologies in retail environments. Employing a quantitative cross-sectional survey methodology, the study gathered data from 243 consumers knowledgeable about AI who have engaged in shopping activities within physical stores over the past year. Through descriptive statistics, Pearson's correlation, and t-tests, the analysis reveals a direct positive correlation between consumers' previous AI interactions and their openness to AI in retail. Conversely, perceived risks are found to affect their willingness to engage with AI technologies negatively. The research is geographically limited to Slovenia, which may restrict the applicability of its findings to other contexts. The study emphasizes the potential for increasing consumer acceptance of AI in retail through the introduction of strategic technology and the emphasis on security features. Contributing original insights into the dynamics of consumer perceptions of AI within the physical retail sector, this work offers valuable implications for retailers aiming to optimize AI integration strategies to mitigate consumer apprehensions and accommodate diverse demographic preferences.

Keywords:
artificial intelligence, consumer attitudes, physical retail, technology acceptance, perceived risks

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1 Introduction

Artificial intelligence (AI) is reshaping marketing, enhancing customer engagement through personalized experiences, and increasing efficiency (Xu et al., 2021; Sterne, 2017). It supports the marketing evolution towards automated, data-driven value creation (American Marketing Association, 2017) and streamlines operations by automating tasks, improving customer service, and enabling precise marketing strategies (Martinez-Lopez & Casillas, 2013). AI's growth, driven by machine learning and natural language processing, offers transformative potential for marketing (Bornet et al., 2021). However, ethical and privacy issues associated with AI use necessitate careful consumer trust management (Crittenden, 2019; Hansen, D., 2010). The understanding of consumer attitudes towards AI is crucial, especially considering privacy concerns and the desire for human interaction (Moore et al., 2022; Chen & Chang, 2023). Studies indicate that prior AI experiences and factors like gender and self-efficacy significantly influence consumer openness to AI in retail (Chen & Chang, 2023; Sohn, 2024; Abed, 2024; Joshi et al., 2024), underscoring the need to align AI integration with consumer expectations to ensure growth and satisfaction.

2 Concepts and theoretical background

Use of Artificial Intelligence in Marketing

In the rapidly evolving field of digital marketing, artificial intelligence (AI) plays a pivotal role, enabling tailored customer interactions and efficient marketing strategies through data-driven insights (American Marketing Association, 2017; Xu et al., 2021). Machine learning and natural language processing are instrumental in understanding and predicting consumer behavior, enriching the marketing toolkit with capabilities previously requiring human intelligence (Martinez-Lopez & Casillas, 2013).

Augmented Reality, Blockchain, drones, and the Internet of Things drive forward marketing personalization and efficiency, marking a shift towards more interactive and data-centric marketing approaches (Crittenden, 2019; Azuma, 1997). However, the integration of AI in marketing also surfaces concerns regarding privacy, trust, and the ethical use of technology (Grewal, 2021). Moreover, consumer attitudes

towards AI, influenced by previous technological experiences and demographic factors, play a crucial role in accepting AI applications in retail settings (Joshi et al., 2024; Chen & Chang, 2023).

Utilization of Artificial Intelligence in Physical Retail Stores

AI technology in the retail sector, as outlined by Lin (2023), employs algorithms to analyze customer data for personalized marketing, efficient inventory management, and secure transactions, contributing to retail growth. Chen and Chang (2023) detail AI's role in enhancing physical store experiences through smart technologies, facilitating autonomous shopping, and reducing staff interaction. While Anica-Popa et al. (2021) emphasize AI's advantages in improving customer service and operational efficiency, Mahmoud et al. (2020) caution against potential negatives, such as job displacement, skill shortages, privacy concerns, and societal impacts. Balancing AI's benefits with its challenges is essential for a progressive retail environment (Donepudi et al., 2020; Mahmoud et al., 2020).

Existing Research on Customer Attitudes towards Artificial Intelligence in Physical Retail Stores

Studies indicate diverse consumer reactions to artificial intelligence (AI) in retail settings. Moore et al. (2022) found that while some consumers appreciate the innovation of AI assistants, others prefer traditional human interaction, emphasizing the social implications of AI in retail. Chen et al. (2022) examined consumers' perceptions of AI in marketing communications. When interpreting AI, consumers ussualy focuse on functionality, emotions, and comparisons with humans. Overall, they accepted AI in marketing communications without significantly affecting their product evaluations. In Gursoy et al.'s (2019) study, they explored the factors influencing the acceptance of AI devices in the services context. Factors such as social influence, motivation, anthropomorphism, and emotions were identified as significant in the acceptance process. Pillai et al. (2020) predicted customers' purchase intentions in stores using AI. Customers perceived these stores positively, and their enjoyment and adaptability were key predictors of purchase intentions.

3 Conceptual framework and research hypotheses

Our study investigates four hypotheses within the context of consumer readiness for AI in physical retail. These hypotheses are grounded in the literature, aiming to enrich the discourse on smart retail and AI adoption. To explore the dynamics of consumer behavior towards artificial intelligence (AI) technologies in the retail sector, we investigate various factors that may influence their readiness to adopt such innovations in physical stores. These factors range from prior experience with AI, perceived risks regarding confidentiality, self-assessment of the ability to manage AI technologies, to demographic differences, particularly gender. The formulation of our hypotheses is grounded in the review of recent literature, which provides insights into how these factors potentially affect consumer attitudes and behaviors towards adopting AI technologies in retail environments.

Firstly, drawing on the works of Chen and Chang (2023), Sohn (2024), Abed (2024), and Liu et al. (2024), we recognize the potential impact of consumers' prior experience with AI technologies on their readiness to embrace upcoming AI innovations in physical retail settings. These studies collectively suggest that familiarity with AI and related technologies could enhance consumers' openness and readiness for future AI applications in retail contexts. The underlying assumption is that prior experience with AI can reduce uncertainties and increase the comfort level with technology, thereby fostering a positive attitude towards new AI deployments. Therefore, we propose our first hypothesis *H1: There is a statistically significant positive correlation between consumers' prior experience with AI technologies and their readiness to adopt potential AI technologies in physical stores.*

Secondly, the relationship between consumers' perceived risks, especially concerning data confidentiality, and their readiness to adopt AI technologies in retail settings is of interest. Citing Schepman and Rodway (2020) and Abed (2024), we note that concerns over data privacy and security are significant factors that could hinder the willingness of consumers to adopt AI technologies. The apprehension about how personal information is handled and the potential for breaches could deter consumers from engaging with AI-based services. Consequently, we introduce our second hypothesis *H2: There is a statistically significant negative correlation between consumers' expressed perceived risk regarding confidentiality and their readiness to adopt AI in physical stores.*

Thirdly, we consider the role of self-efficacy in technology adoption, particularly how consumers' self-assessment of their ability to manage AI technologies influences their interest in adopting these technologies. Wang & Zhao (2024) emphasize the importance of self-efficacy in mitigating perceived risks and enhancing engagement with technology. The belief in one's ability to effectively use and manage AI technologies can make consumers more inclined to adopt them. Thus, we propose our third hypothesis *H3: There is a statistically significant positive correlation between the self-assessment of consumers' ability to manage AI technologies and their interest in adopting these technologies in physical stores.*

Lastly, the examination of demographic differences, specifically between male and female consumers, in their readiness to adopt AI technologies in physical stores is crucial. Joshi et al. (2024) provide a basis for considering how demographic factors may play a role in shaping consumer attitudes towards AI in retail. Gender differences, in particular, may influence perceptions, expectations, and readiness to engage with AI technologies. Therefore, we propose our fourth hypothesis *H4: There is a statistically significant difference between male and female consumers in their readiness to adopt AI technologies in physical stores.*

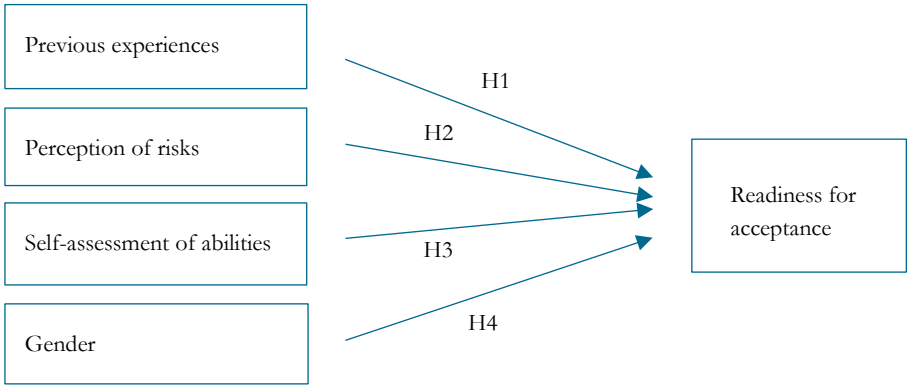

Figure 1: Conceptual Research Model

In Figure 1, we present the conceptual research model illustrating the relationships between hypotheses and the examined constructs. The model is grounded in four hypotheses focusing on constructs: customers' prior experiences with AI technologies, perceived risk in using AI in physical stores, self-assessed capability in

managing AI technologies, and gender as a sexual identity. These constructs collectively influence the willingness to adopt AI technologies in physical stores.

4 Methodology

In this study, we conducted a quantitative research on customers' perceptions of AI in physical retail stores. We designed a questionnaire with 7-point and 5-point Likert scale questions. This questionnaire was adapted by Meuter et al. (2005), and was administered online to a sample of customers who had shopped in physical stores in the past year and were familiar with AI.

For sample acquisition, we employed a combination of a purposive approach, engaging participants from the author's network and social circles, and chain sampling, encouraging participants to share the questionnaire with their acquaintances, friends, and relatives. The sample includes 243 respondents. Respondents provided insights into their experiences with AI, associated risks, self-efficacy in managing AI, and demographic details via the 1KA platform. Data analysis, encompassing descriptive statistics, Pearson's correlation, and t-tests, was conducted using SPSS, with results presented through visual aids. Informed consent was obtained from all respondents, and their data were treated confidentially.

5 Results

Our analysis reveals a significant positive correlation, indicating that consumers with more extensive experience with AI technologies are more inclined to use them in stores. This is evidenced by positive Pearson coefficients between statements of AI technology use in everyday life (T1) and willingness to try such technologies in physical stores (T4, T5, T6), with coefficients ranging from 0.368 to 0.411 ($p < 0.001$).

Table 1: Pearson's Correlation for Hypothesis H1

Correlations

		T1	T2	T3	T4	T5	T6
T1	Pearson Correlation	1	-.550**	.741**	.383**	.411**	.368**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215
T2	Pearson Correlation	-.550**	1	-.557**	-.276**	-.255**	-.227**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215
T3	Pearson Correlation	.741**	-.557**	1	.438**	.472**	.428**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001
	N	215	215	215	215	215	215
T4	Pearson Correlation	.383**	-.276**	.438**	1	.843**	.760**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001
	N	215	215	215	215	215	215
T5	Pearson Correlation	.411**	-.255**	.472**	.843**	1	.848**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001
	N	215	215	215	215	215	215
T6	Pearson Correlation	.368**	-.227**	.428**	.760**	.848**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	215	215	215	215	215	215

**. Correlation is significant at the 0.01 level (2-tailed).

The analysis for H1 (Table 1) demonstrates a significant positive correlation between consumers' frequent use of AI technologies in daily life (T1) and their willingness to try such technologies in physical stores (T4, T5, T6), evidenced by Pearson coefficients of 0.383, 0.411, and 0.368 ($p < 0.001$). It is noteworthy that statement T2 is formulated in the opposite direction, explaining the negative correlation with statements about willingness. However, it still supports the basic assumption of H1, as higher experiences with the use of technologies correspond to a greater willingness to use them in stores. Based on these findings, we can confirm Hypothesis H1 and conclude that consumers' previous experience with artificial intelligence technologies significantly influences their willingness to adopt these technologies in physical stores.

Using one-way Pearson's correlation coefficient, we reanalyzed the relationship between statements about risk and privacy perception (T7, T8, T9, T10) and statements about willingness to use these technologies in physical stores (T4, T5, T6).

Table 2: Pearson's Correlation for Hypothesis H2

Correlations

		T7	T8	T9	T10	T11	T4	T5	T6
T7	Pearson Correlation	1	.345**	.683**	.632**	-.207**	-.344**	-.376**	-.292**
	Sig. (2-tailed)		<.001	<.001	<.001	.002	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215
T8	Pearson Correlation	.345**	1	.479**	.381**	-.472**	-.450**	-.496**	-.453**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215
T9	Pearson Correlation	.683**	.479**	1	.706**	-.320**	-.383**	-.439**	-.346**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215
T10	Pearson Correlation	.632**	.381**	.706**	1	-.347**	-.447**	-.458**	-.373**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215
T11	Pearson Correlation	-.207**	-.472**	-.320**	-.347**	1	.575**	.643**	.653**
	Sig. (2-tailed)	.002	<.001	<.001	<.001		<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215
T4	Pearson Correlation	-.344**	-.450**	-.383**	-.447**	.575**	1	.843**	.760**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	215	215	215	215	215	215	215	215
T5	Pearson Correlation	-.376**	-.496**	-.439**	-.458**	.643**	.843**	1	.848**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	215	215	215	215	215	215	215	215
T6	Pearson Correlation	-.292**	-.453**	-.346**	-.373**	.653**	.760**	.848**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	215	215	215	215	215	215	215	215

**. Correlation is significant at the 0.01 level (2-tailed).

Analysis for H2 (Table 2) revealed a significant negative correlation between consumers' data confidentiality concerns and their willingness to use AI technologies in physical stores, evidenced by Pearson coefficients ranging from -0.344 to -0.458 ($p < 0.001$). Conversely, positive views on technology effectiveness correlated positively with willingness to use AI, with coefficients between 0.575 and 0.653. Based on these findings, we can confirm Hypothesis H2 and conclude that consumers' perception of risk and privacy in connection with the use of artificial intelligence technologies has a statistically significant impact on their willingness to adopt these technologies in physical stores.

To explore the connection between consumers' confidence in using AI technologies (T12, T14, T16, T17) and their openness to adopting such technologies in physical retail settings (T4, T5, T6) we utilized Pearson's correlation coefficient (Table 3)

Table 3: Pearson's Correlation for Hypothesis H3

Correlations

		T12	T13	T14	T15	T16	T17	T4	T5	T6
T12	Pearson Correlation	1	-.380**	.744**	-.563**	.477**	.651**	.380**	.381**	.326**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215	215
T13	Pearson Correlation	-.380**	1	-.396**	.348**	-.124	-.349**	-.046	-.095	-.131
	Sig. (2-tailed)	<.001		<.001	<.001	.069	<.001	.502	.167	.056
	N	215	215	215	215	215	215	215	215	215
T14	Pearson Correlation	.744**	-.396**	1	-.617**	.496**	.698**	.381**	.357**	.320**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215	215
T15	Pearson Correlation	-.563**	.348**	-.617**	1	-.383**	-.567**	-.258**	-.223**	-.200**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	.003
	N	215	215	215	215	215	215	215	215	215
T16	Pearson Correlation	.477**	-.124	.496**	-.383**	1	.534**	.431**	.402**	.369**
	Sig. (2-tailed)	<.001	.069	<.001	<.001		<.001	<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215	215
T17	Pearson Correlation	.651**	-.349**	.698**	-.567**	.534**	1	.333**	.325**	.308**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	215	215	215	215	215	215	215	215	215
T4	Pearson Correlation	.380**	-.046	.381**	-.258**	.431**	.333**	1	.843**	.760**
	Sig. (2-tailed)	<.001	.502	<.001	<.001	<.001	<.001		<.001	<.001
	N	215	215	215	215	215	215	215	215	215
T5	Pearson Correlation	.381**	-.095	.357**	-.223**	.402**	.325**	.843**	1	.848**
	Sig. (2-tailed)	<.001	.167	<.001	<.001	<.001	<.001	<.001		<.001
	N	215	215	215	215	215	215	215	215	215
T6	Pearson Correlation	.326**	-.131	.320**	-.200**	.369**	.308**	.760**	.848**	1
	Sig. (2-tailed)	<.001	.056	<.001	.003	<.001	<.001	<.001	<.001	
	N	215	215	215	215	215	215	215	215	215

**. Correlation is significant at the 0.01 level (2-tailed).

The analysis revealed statistically significant positive correlations, notably between T14 and T4 ($r = 0.381$, $p < 0.001$), affirming that greater self-confidence in managing AI technologies correlates with increased willingness to engage with these technologies in-store. Based on these findings, we can confirm H3, concluding that consumers' self-assessment of their ability to use AI technologies statistically significantly influences their willingness to accept these technologies in physical stores.

Finally, differences between men and women were analyzed with an independent samples t-test. Group 1, representing female consumers, and Group 2, representing male consumers, were compared across three statements regarding their readiness to use AI technologies.

Table 4: Independent Samples T-Test for Hypothesis H4

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
T4	Equal variances assumed	3.024	.084	-1.538	212	.063	.125	-.297	.193	-.677	.084
	Equal variances not assumed			-1.660	89.163	.050	.100	-.297	.179	-.652	.058
T5	Equal variances assumed	.936	.334	-2.162	212	.016	.032	-.443	.205	-.847	-.039
	Equal variances not assumed			-2.262	84.570	.013	.026	-.443	.196	-.832	-.054
T6	Equal variances assumed	.203	.653	-2.865	212	.002	.005	-.605	.211	-1.021	-.189
	Equal variances not assumed			-2.898	80.089	.002	.005	-.605	.209	-1.020	-.190

The results of the analysis for Hypothesis H4 indicate (Table 16) that:

- For statement T4 ("I am willing to try artificial intelligence technologies in physical stores"), there was no statistically significant difference between men and women ($t(212) = -1.538$, $p = 0.125$).
- For statement T5 ("I am willing to accept the use of artificial intelligence technologies in physical stores"), there was a statistically significant difference between men and women ($t(212) = -2.162$, $p = 0.032$), indicating a difference in their readiness.
- Similarly, for statement T6 ("I would like to see more use of artificial intelligence technologies in physical stores"), the difference between men and women was statistically significant ($t(212) = -2.865$, $p = 0.005$).

Based on these findings and the relevance of statement T5, we can conclude that there are statistically significant differences between men and women in their readiness to accept artificial intelligence technologies in physical stores.

6 Discussion

The study validates the hypothesis that consumers with prior experience with AI are more inclined to adopt such technologies in physical stores, underscoring the significance of familiarity and comfort with AI in shaping consumer readiness. The findings also underscore the critical role of perceived risk in consumer acceptance of AI, where concerns over privacy and data security emerge as significant barriers. Interestingly, our analysis revealed that consumer confidence in using AI technologies and gender differences also play pivotal roles in the adoption of AI in retail settings, with males generally more open to embracing these technologies.

For retailers, these insights offer actionable strategies to enhance AI adoption among consumers. Gradual technology implementation, prioritizing security, and transparency, and providing educational support emerge as key recommendations. Additionally, tailoring marketing and product offerings to address gender-specific preferences could further refine consumer targeting and increase technology acceptance. Future research directions should explore the impact of AI across different retail sectors, demographic factors on AI acceptance, strategies to mitigate perceived risks, and the effectiveness of different educational approaches. The nuanced understanding of these areas can significantly contribute to the strategic deployment of AI in retail, maximizing both consumer satisfaction and business efficiency.

In conclusion, our study provides valuable insights into consumer attitudes towards AI in the retail sector, highlighting the importance of experience, risk perception, confidence, and gender differences in shaping these attitudes. The confirmation of all proposed hypotheses not only enriches the academic discourse on AI in retail but also offers practical guidelines for retailers aiming to navigate the complexities of AI integration. Future research, while addressing the limitations of this study, holds the potential to further unravel the multifaceted dynamics of AI adoption in the retail landscape, offering a roadmap for the successful integration of technology in enhancing consumer experiences.

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Beyond Financials: Understanding the Implications of NFRD and CSRD on Non-financial Reporting

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In an area where transparency and accountability are two crucial corporate governance factors, the Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD) present key legislative acts to foster these principles. Both directives determine that selected companies must include and publish non-financial information in their annual business reports (such as environmental and social matters, human rights, etc.) alongside financial ones. NFRD and CSRD have been implemented for companies to report more comprehensive information about their operations, informing all interested individuals and groups about the information they need for their decision-making, thereby reducing risk, extending the scope of information, and providing a comprehensive view of the company's management. Both directives determine how companies report on their social and environmental impact and signal a shift towards sustainable CSR business practices. This paper aims to determine the methodology and develop a research model to evaluate the effect of NFRD and CSRD on non-financial information reporting in practice.

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1 Introduction

Companies are composed of numerous interests and processes that intertwine with each other. Their operations are thus interwoven and connected with numerous interests. Likewise, the operation of a company affects many stakeholders who are directly or indirectly associated with the company (such as shareholders, employees, suppliers, customers, etc.) (Cinquini & De Luca; 2022; Čufar & Primec, 2021). To increase transparency in business operations, financial reporting by companies has emerged in the past. That has gradually become standardized and comparable. Financial data have provided stakeholders with information about the operation of the company and its performance. However, from the perspective of data comprehensiveness, such information only represented the performance of the company from an economic/financial viewpoint (Ellili, 2022). The incompleteness of such reporting was demonstrated by the future performance of companies. Specifically, within the context of financial crises under which companies found themselves in crisis and, in some cases, even failed. It was discovered that companies had excessively relied on generating revenue and profit while simultaneously taking on excessive risks that were unsustainable for them (Al Hawaj & Buallay, 2022; Cinquini & De Luca, 2022). Based on these shortcomings, the need for more comprehensive reporting of information emerged. Primarily, a need emerged for reporting that would reveal additional risks associated with the operation of the company, which would inform key stakeholders about factors and risks not related to the financial operations itself (Buallay, 2022). For this purpose, the EU implemented the NFRD and later, the CSRD. Both directives are part of the EU's efforts to enhance transparency and accountability in the business sector, particularly regarding environmental, social, and governance matters (Christensen et al. 2022; Greiling & Bauer, 2023; Turzo et al., 2022). In recent years, the EU has increased its interests and adopted legislation supporting the sustainability and resilience of companies. Alongside the NFRD and CSRD, it has implemented the Directive on corporate sustainability due diligence (CSDDDD) and the Taxonomy Regulation. Despite established legislation and the EU's commitment to promoting sustainability, questions remain about whether legislation (such as the NFRD and CSRD) impacts non-financial reporting in practice. This paper will develop a methodology based on NFRD, CSRD, and ESRS criteria to define and measure how NFRD and CSRD impact non-financial reporting in practice (Primec & Belak, 2022).

2 Literature review

Past research suggests that there are several criticisms and skepticism toward the sustainability reporting of information (Cho, 2015, Turzo et al. 2022). Critics accuse sustainability reporting of lacking comparability of reported data, credibility, and relevance, which would contribute to informed financial reporting. Critics of sustainability reporting also argue that sustainability reporting is a facade that companies use to gain media attention. Sustainability information often lacks clarity and comparability. Instead of ensuring the legitimacy of the company, it undermines it (Abhayawansa et al., 2018; Cho, 2015). On the other hand, there are advocates for sustainability reporting who argue that when companies do not disclose sustainability information transparently and when they ignore sustainability risks, they face increasing skepticism from key stakeholders and incur higher capital costs. In addition, sustainability reporting provides essential assistance to companies for the constantly changing climate environment (Bebbington, 2018). A study from 1995 showed that the implementation of sustainable reporting can improve a company's legitimacy (Suchman,1995). From a sustainability perspective, there is a significant connection between ESG and the actual performance of a company. Past research also demonstrates that the introduction of mandatory sustainability reporting improves company performance in certain circumstances (Buallay, 2022; Ellili, 2022). Disclosing sustainability information has a favorable impact on investment efficiency factors. Companies should improve the disclosure of sustainability information, enhance the quality of their financial reports, and adhere to existing sustainability reporting standards to improve their operations. Despite the existing question of appropriateness between voluntary and mandatory reporting of sustainability information, there is a demand among investors, financial analysts, and other key stakeholders for greater disclosure of sustainability information (Al Hawaj & Buallay, 2022; Buallay, 2022; Krasodomska, 2017).

Sustainability reporting is closely related to Corporate social responsibility (CSR). Upon reviewing the literature, numerous definitions of CSR can be found. Among others, in its Green Papers from 2001, the European Commission defines CSR as "*a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders"* (Commission of the European Communities, 2001). World Business Council on Sustainable Development (WBCSD) defines CSR as: "*Corporate social responsibility is the commitment of business to*

contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve the quality of life." (WBCSD, 2000).

Over time, the term has expanded into larger and more extensive dimensions (Benn S. et al., 2016; Carroll, 1979). In the economy, it is possible to observe an increasing number of companies that report sustainability information to their stakeholders and emphasize the importance of CSR. Through the introduction of new terms, social responsibility has expanded to a point where it has become too broad to foster the promotion of CSR management (Bohinc, 2016; Maignan & Ferrell, 2004). Additionally, the number of CSR data disclosures has increased in recent years. It is important to highlight that the majority of these disclosures were made voluntarily and were not mandatory (Christensen et al., 2021). At this level, companies primarily used sustainability reporting as a means of communicating their expected financial performance, reducing capital costs, and decreasing information asymmetry. Numerous measures and initiatives have been implemented in recent years to promote sustainability and non-financial reporting. Consequently, non-financial reporting has been utilized on a global scale. Despite the increasing efforts to report such information, a review of the information revealed a need for greater comparability among different non-financial reporting frameworks (Cinquini & De Luca, 2022). In addition to the need for comparison, increasing demands and pressures have also begun to emerge from investors and other stakeholders. A larger set of information reduces risk to investors and improves the credibility of companies. Thus, it encourages sustainable corporate governance and increases trust in capital markets (Dobija et al., 2023). Therefore, the EU has adopted the NFRD which mandates certain companies (entities of public interest with more than 500 employees on their balance sheet day) to report non-financial information. The NFRD consists of two parts. The first part represents the diversity policy where the company discloses information on the composition of its management or supervisory board in terms of gender, education, and age (Belak & Primec, 2020). The second part of the reporting covers non-financial information from the perspective of environmental, social, employee-related, human rights, and anti-corruption and bribery aspects. NFRD was adopted in 2014, and companies had to report their first non-financial information in 2018 for the fiscal year 2017 (Primec & Belak, 2017).

For each of the above-stated matters, companies have to report (European Commission, 2019): 1) *"a brief description of the company's business model,* 2) *a description of the policies pursued by the company concerning those matters, including due diligence processes implemented,* 3) *the outcome of those policies,* 4) *the principal risks related to those matters linked to the company's operations, including, where relevant and proportionate, its business relationships, products or services which are likely to cause adverse impacts in those areas, and how the company manages those risks, as well as* 5) *non-financial key performance indicators relevant to the particular business.*

The companies report the data mentioned above based on the "comply or explain" principle which requires them to either disclose the specified data or explain any omissions. In 2020, the European Commission published findings from the review of the NFRD, highlighting that, based on the NFRD, companies have improved their governance towards sustainability by incorporating sustainable components into their governance. However, the NFRD research showed certain deficiencies, mainly related to the limited scope and clarity of reporting requirements, comparability of data, and the credibility and usefulness of reported non-financial information. These deficiencies were identified as obstacles and shortcomings in achieving the EU's sustainability goals (Parguel et al., 2011; Primec & Belak, 2022; Reddy, 2019).

To address the identified deficiencies of NFRD, the EU introduced the CSRD. Compared to the NFRD, the CSRD introduced several changes, such as increasing the scope of companies that are obliged to report sustainability information, more detailed and standardized reporting under ESRS standards, publishing information in machine-readable format, as well as digitally tagged, and penalties for non-reporting and reporting following the principle of double materiality. On the 5th of January, 2023, CSRD entered into force. Selected companies will be obliged to report following the CSRD starting from the year 2025 for the fiscal year 2024. It is expected that due to the new CSRD requirements, and especially due to standardized reporting based on the ESRS standards, the current level of information reporting will improve and address the above-mentioned shortcomings of the NFRD (Greiling & Bauer, 2023; Primec & Belak, 2022).

3 Discussion

A research model for researching the impact of NFRD and the CSRD on non-financial reporting was established, incorporating the criteria of NFRD, CSRD, and ESRS requirements. The research model identifies whether the aforementioned legislation requirements of NFRD and the CSRD impact the non-financial information reporting of companies in practice. In the research model, 3 ESG categories with 15 sub-categories were established for the following information groups:

- C1: Environmental group of information (comprised of 5 sub-categories),
- C2: Social group of information (comprised of 4 sub-categories), and
- C3: Governance group of information (comprised of 6 sub-categories).

The first group (C1) includes environmental information related to climate change, pollution, water and marine resources, biodiversity and ecosystems, and circular economy. The second group (C2) includes social information which defines whether companies reported information related to social factors which include the company's workforce, employees in the supply chain, other groups and local communities, and customers and end users. The third (C3) group explores information related to governance factors. In particular, it explores whether companies reported information related to the company's business model and strategies, management and quality of relations with business partners, corporate governance and supervisory board, products and services of the company, risk management and internal control, and responsible business practices. For each of the categories mentioned above, the following will be examined: 1) status of reported data (reported/not-reported), 2) comparability of reported data (companies' comparison with previous years' results), 3) forecast for future years (forecast of companies results for future years), 4) linkage of the non-financial data reported by the companies to companies financial reporting data, 5) integration of key stakeholders interests with sustainability topic, 6) definition of how risks, opportunities, or materiality of the sustainability topic may affect key stakeholders, 7) identification of main risks and opportunities in the sustainability area under review, and 8) indication double-materiality (considering financial materiality and impact materiality).

For the execution of the research, the most suitable companies will be those that are currently already obligated to report non-financial information following NFRD and will also be required to report non-financial information following CSRD in the coming years. Consequently, the research model will be most useful for fiscal years 2017 onward when companies were already required to report information following NFRD. More evident results, however, can be expected in 2025 (with the fiscal year 2024) when the first companies will begin to report following CSRD. The research will be conducted in two parts. The first part of the research involves the use of the research model, based on which the information reported by selected companies will be evaluated. Information will be obtained from companies' annual reports or sustainability reports. The multiple case studies method will be used, enabling the examination of specific cases or phenomena. This allows the researcher to gain detailed insights and understanding of the phenomenon. The method was chosen because it provides a thorough understanding of the circumstances and the situation under study (Primec & Belak, 2022; Yin, 2016). Based on the obtained results, categories will be formed and evaluated. Each category will be assessed within two time frames. In particular, it will be examined whether companies report information from the defined groups and sub-groups of the research model and whether the information is consistent with the requirements of the NFRD and CSRD. Based on the results obtained, a comparative analysis will be conducted in the second part of the research. In this part of the research, the results from both timeframes will be compared with each other. The level of reported information will indicate whether there has been an improvement in non-financial information reporting. Content analysis enables replicable and valid inferences to be drawn from the text. In addition, content analysis has been also used for similar research in the past (Nicolo et al., 2020). Based on the research results, it will be evident whether companies report the required information of the above-mentioned groups and sub-groups as set by the research model (Cinquini et al., 2022; Čufar et al. 2023, Nicolo et al., 2020).

Based on the conducted research, we expect to be able to answer the following questions about whether and how the NFRD and the CSRD legislation influence non-financial reporting in practice:

- evaluation of NFRD and the CSRD impact on the environmental group, particularly concerning content related to climate change, pollution, water and marine resources, biodiversity and ecosystems, and circular economy,

- evaluation of NFRD and CSRD on the social group, particularly concerning content related to the company's workforce, employees in the supply chain, other groups and local communities, and customers and end users, and
- evaluation of NFRD and the CSRD on the governance group, particularly concerning content related to the business model and strategies, risk management and internal control, products and services of the company, management and quality of relations with business partners, corporate governance and supervisory board, and responsible business practices.

Based on the results of the research using the mentioned methodology and research model, it will be apparent whether the requirements of NFRD and CSRD influence the level of non-financial reporting in practice. In particular, the results of the results will present whether non-financial information has improved since the adoption of NFRD and whether the upcoming requirements of CSRD had any impact on the level of non-financial reporting in practice. Based on the results of the research model, it will also be evident to what extent companies are already prepared for standardized reporting under ESRS standards and in which areas companies currently report the most information. The research model will allow a comparison of multiple non-financial reporting practices and their effect on sustainable corporate governance.

4 Conclusion

The paper brings additional insights into the field of non-financial reporting and sustainable corporate governance with the development of a research model that has been prepared based on the requirements of NFRD, CSRD, and ESRS. In particular, the research model measures how NFRD and CSRD impact non-financial reporting in practice. Additionally, the study aimed to showcase the importance and anticipated findings of employing the research model in future empirical surveys. For achieving companies' long-term success, sustainability and CSR must be implemented within the governance structures of corporations. Due to upcoming legislation changes, the research model will show the extent to which legislation currently affects non-financial reporting and the extent to which it is expected that reporting will change in the future. As a secondary method, interviews may be conducted with selected companies to get further insights.

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A Survey of Sustainable Mental Health Among Students at Higher Education Institutions of Economics in Budapest

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In recent years, there has been a lot of research on the sustainability of our environment and economy. The results of the aforementioned research are widely available. However, less is said about social sustainability and, in particular, about the managers and employees of the future farming organisations, who are still at school or university at the moment. Yet, today's students will be tomorrow's leaders and employees. But what are the characteristics of these young people? What are their expectations and ideas for the future? How anxious are they? How happy are they? What stable network of relationships do they have? How many of them can see themselves running a business and what are they doing about it? How conscious are they of their actions or do they just go with the tide? Our research questions will be answered by using the results of a survey – which has been running since 2019, and which is based on the second semester of 2022/23 including 609 subjects – regarding students studying at higher education institutions of economics in Budapest. We are hopeful that our results can contribute to the field of sustainable mental health by focusing on global well-being, resilience, self-regulation and peer efficacy.

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1 Introduction

Contrary to popular belief, sustainability attitudes and behaviour only slightly reduce the subjective well-being derived from material goods. However, they greatly increase positive mental health and the resulting subjective well-being. This state is called sustainable positive mental health. (Fajzi – Erdei, 2015).

Countries committed to sustainable development see education as a catalyst and driver for achieving the SDGs (Benavot et al., 2023). This is why we felt it important to study university students in this area. Students, during their years in higher education, spend nearly half of his or her waking hours on campus. During this time, they attend lectures, work individually and in groups. The years spent in higher education have a significant impact not only on students' knowledge, but also on their self-esteem, happiness and self-image, which affects their mental health and coping skills. In our study we wish to explore this.

2 Theoretical Background / Literature Review

Sustainability, as a complex set of objectives, can be interpreted in many ways. In our study, we focus on a small slice of social sustainability and one of its main actors: the managers and employees of future farming organisations who are currently at school or university. Today's students will be tomorrow's managers and employees, facing a number of challenges. One such challenge is to reduce inequalities (Szigeti et al., 2023), creating the conditions for green human resource management (Szabó et al., 2023, Joshi et al., 2023, Amrutha and Greetha, 2020) or operating social responsibility at a high level. (Szczuka, 2015).

To ensure that future generations can adapt to the many challenges they face, it is vital that they enjoy good mental health. We talk more and more about mental health, but what does it really mean? "Mental health is an integral part of health. It is a state of well-being in which individuals realise their own abilities and can cope with the stresses of life and contribute to community life. Mental health is a precondition for a productive economy and inclusive society and better mental health is both a social and an economic imperative." (EC, 2023, WHO, 2022).

It may be affected by emotions, thoughts, behaviour or the ability to manage interactions with others. It can also be influenced by social, cultural, economic, political and environmental factors such as national policies, social network, living standards, working conditions and community social support (Livingstone et al., 2022).

Good mental health is essential for living a fulfilled life, for realising our full potential and participating more effectively in our communities, and for building resilience to stress and adversity. But what is resilience? Resilience is a popular term these days: it is used in a wide range of fields from child psychology to social sciences, from ecology to security studies, from political science to government strategy (Szokolszky – V. Komlósy, 2015).

The reason for linking ecological and psychological approaches is that the interrelationships between the fields are becoming clearer.

There are several definitions of resilience. In relation to individuals, one of the most common definitions is that resilience is a dynamic process over the course of life in which an individual accesses internal and external resources that lead to positive adaptation in the face of adversity. (Connor and Davidson 2003)

Today, extremely rapid technological changes, climate change, wars, economic crises and environmental disasters, or the lingering effects of COVID-19, pose extraordinary challenges to human beings (UN, 2023). For this reason alone, the psychological aspect of the concept of resilience is an important factor.

In our study, we will present the partial results of an ongoing study using a validated questionnaire from the field of positive psychology.

3 Methodology

In our study, we present the partial results of a research project that has been running since 2019. The focus of the research is on students studying at three higher education institutions of economics in Budapest.

We investigate the students' mental health, future goals and competences to be developed. The research is based on a questionnaire consisting of nearly 80 questions. The sample is always selected from first-year students, as they are the ones who undergo the biggest change: they start a new phase in their lives after high school and not only change schools, but also go through a life stage transition.

In this paper, we present the results for the second semester of 2022/23, based on a validated psychological questionnaire (EPOCH questionnaire).

The questionnaire was completed between February and April 2023.

The founder of positive psychology, Martin Seligman, defined 5 pillars of wellbeing, PERMA (positive emotion, engagement, relationships, meaning, accomplishment), which were adapted by Margaret L. Kern and colleagues (2016) into the EPOCH (engagement, perseverance, optimism, connectedness, and happiness) model.

The Hungarian adaptation is by Láng (2019). His research supports that the adapted (EPOCH-H) questionnaire offers an age-appropriate measure, well aligned with international mainstream theoretical models for researchers who wish to investigate adolescents' well-being using a self-report instrument and along multiple dimensions.

Number of respondents: 609. In presenting the results, we use the contexts defined by the researchers of the EPOCH questionnaire (the meaning of each category is presented in Table1).

4 Results

For first-year university students a door gets opened to a new world: for many of them, successfully applying and starting university is one of the defining moments of their lives.

After leaving secondary school, young people enter a new phase in their lives. It is also an important stage during the journey to adulthood, which is not experienced in the same way by all young people.

Table 1: Results of the EPOCH questionnaire based on the responses of students studying at higher education institutions of economics in Budapest in spring 2023 (sample size: 609 students)

	Average	Median	Std. Deviation
Engagement: *being absorbed, interested, and involved in an activity or the world itself. Very high levels of engagement are known as a state called "flow"*	**3,92**	-	-
When I do an activity, I enjoy it so much that I lose track of time.	3,89	4	0,949
I get completely absorbed in what I am doing.	4,27	4	0,817
I get so involved in activities that I forget about everything else.	3,64	4	1,031
When I am learning something new, I lose track of how much time has passed.	3,89	4	0,949
Perseverance: *having the tenacity to stick with things and pursue a goal, despite any challenges that occur*	**3,96**	-	-
I finish whatever I start.	4,05	4	0,822
I keep to my schoolwork until I am done with it.	3,86	4	1,033
Once I make a plan to get something done, I stick to it.	3,82	4	0,975
I am a hard worker.	4,11	4	0,888
Optimism: *having a sense of hope and confidence about the future.*	**4,09**	-	-
I am optimistic about my future.	4,13	4	0,911
In uncertain times, I expect the best.	3,70	4	1,061
I think good things are going to happen to me.	4,30	**5**	0,837
I believe that things will work out, no matter how difficult they seem.	4,21	4	0,894
Connectedness: *feeling loved, supported, and valued by others.*	**4,49**	-	-
When something good happens to me, I have people who I like to share the good news with.	4,68	4	0,654
When I have a problem, I have someone who will be there for me.	4,10	4	1,043
There are people in my life who really care about me.	4,63	**5**	0,747
I have friends that I really care about.	4,54	**5**	0,860
Happiness: *a general feeling of happiness, cheer, and contentment with life*	**4,09**	-	-
I feel happy.	3,86	4	0,932
I have a lot of fun.	4,12	4	0,913
I love life.	4,28	4	0,879
I am a cheerful person.	4,12	4	0,924

Source: own research

As with all life transitions, the period after leaving secondary school can be a time of crisis (quarter-life crisis). In general, the process of becoming independent from the family is accelerated and an independent self-image is developed. The familiar friends and peers from secondary school no longer offer security: new relationships and alliances are formed in the new, unfamiliar environment, and a new way of life

becomes dominant (Leist Balogh - Jámbor, 2016, Bonnie et al., 2019, Vágány – Erdeiné Késmárki-Gally, 2022).

Riggs and Han (2009) found that a period of worrying in early adulthood can lead to a decline in mental health, but can also strengthen the individual when coping successfully.

More resilient students find it easier to overcome obstacles both on and off campus, adapting better to changing situations. A social supportive environment can be of considerable help in this.

Fostering students' social emotional development, skills and competences at universities also develops students' coping skills both on and off campus (Alderby et al, 2023).

Students were asked to rate 20 statements on a 5-point Likert scale (almost never/ not at all like me = 1; almost always/ very much like me = 5), as in the original questionnaire. Scores are computed for each domain as the average of the four items, and results can be presented as a profile across domains. After receiving the responses, responses were assessed using SPSS 25. The descriptive statistics, which are most relevant to our topic, are presented below (Table1).

5 Discussion

When analysing the results of the survey, we can see that the students who responded to the survey gave relatively high scores in all five aspects.

In terms of category averages, the lowest scores were given to Engagement (3.92), although the median for all responses was 4. (The standard deviation is around 1 for almost all categories.)

The highest score was for Connectedness (4.49), which was outstanding. It should be noted here that two statements in this range ("There are people in my life who really care about me." and "I have friends that I really care about.") also have a median of 5, which is encouraging because it means that the students in the sample have a social network that helps them cope with their everyday difficulties.

The situation is somewhat nuanced by the results of our focus group research following the questionnaire survey, which involved students who completed the questionnaire and volunteered to participate in groups of 6. Here, several of them indicated that their response to the questionnaire was significantly influenced by the proximity of their high school.

A recurring response from focus group participants was that, in many cases, they had not yet developed the close relationship with their cohort mates that they would have liked to have once they had entered university. Many also noted that they hardly knew their peers, which made them feel lonely. This is certainly something that needs to be addressed by the university's mental health advisers and student organisations.

6 Conclusions

In our study, we looked at a small slice of social sustainability and two of its main actors: the managers and employees of future farming organisations, many of whom are still at school or university. Our study involved students from three business schools in Budapest and conducted a questionnaire survey on their mental health.

The results of the survey (EPOCH-H questionnaire) are encouraging, as the responses indicate that the students surveyed gave relatively high scores to the statements in the questionnaire, which suggests a favourable level of resilience and a healthy mental state.

In all cases, however, it is important to look beyond the averages and also to explore the situation of students with extremely low scores, so that universities do not lose, but indeed support these students by activating their external and internal resources to successfully adapt to uncertain situations.

We must not sit back seeing the results. New areas need to be included in the research that goes beyond the focus of the EPOCH-H questionnaire and looks more broadly at the situation, mental well-being and coping skills of the next generation. In addition, methods need to be developed or existing good practices adopted to help a mentally healthy generation carry the torch from us, and be capable of coping with the difficulties they face.

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THE ROLE OF BIOGAS IN ENERGY SUPPLY - FOCUS ON AFFORDABILITY, SUSTAINABILITY AND SECURITY OF SUPPLY

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In the recent past we considered energy supply as a centrally managed, inexhaustible, cheep source of power, gas, water, heat. Nowadays, in the era of economic crises, growing number of warlike conflicts, vulnerable global supply chains, climate change - this is not that obvious anymore. As an aftermath of all recent changes, it common to talk about decentralised generation, energy communities, microgrids, demand management. The energy industry is still one of the biggest emitters in its never-ending contest to cope with steadily growing energy hunger of the world. In this context energy industry does its best to behave on a responsible manner and exploits all possible non-fossil, non or reduced emitting, renewable primer energy resources to decrease – or keep the level at least – of the emission of greenhouse gases. In this study our aim is to demonstrate the possible positive impact of an energy source, not yet utilised to its full potential, the biogas. We analyse under what economic, social, regulatory environment can grow up to its potential and what are the preconditions of feasibility.

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1 Introduction

A sustainable energy transition will transform the energy sector (De-León Almaraz et al. 2023). Today, companies, including energy companies, are facing major challenges: global crises such as pandemic COVID-19 and the Russian invasion of Ukraine have highlighted the need for affordable, secure and local energy supplies (Csiba – Szigeti, 2023). At the same time, climate change mitigation requires a rethink. While the challenges may seem daunting, energy companies can draw on the experience of others in the sector and beyond who are finding solutions and scanning the horizon for new opportunities (Fantaguzzi et al., 2022).

It is the shared responsibility of all institutions, businesses and consumers to share best practices, knowledge and experience on how to reduce and rationalise their energy consumption.

One way to do this is to use industrial, agricultural or municipal waste for energy production, in line with European Union (EU) waste management principles.

Rapid demographic growth is putting great pressure on the consumption of biological resources, and is forcing governments, organisations and society to work on the reproduction of these resources. The Circular Economy Business Model (CEBM) is described and defined as such an organisational ecosystem that creates and fixes value by extending the lifetime of products, remanufacturing, repairing or simply designing products with a long lifetime from the outset (Hina et al., 2022).

The basic difference between Circular Economy (CE) and CEBM can be formulated as CE is an economic model and CBM is a way of creating value.

CE focuses on the remanufacture and reuse of materials, as well as refurbishment, maintenance and repair to keep products in use for a long time. CEBM, on the other hand, is an approach whereby organisations create value by adhering to CE principles (Csiba – Szigeti, 2023).

The theoretical background of the study is based on the guidelines of Webster and Watson (2002) and Brocke et al. (2009).

In addition to the literature search, 12 interviews were conducted with company executives/senior managers who play an important role as decision makers and market players in the energy and financial sector.

The results of the qualitative research are presented along three main themes, highlighting the most important findings due to space limitations:

a) Renewables versus conventional energy, business models
b) Economic and environmental impact
c) Future perspectives and strategies

Our research suggests that technological progress and the evolution of the regulatory environment need to be in harmony. The production of biogas, biomethane (also a non-electric renewable energy) in a supportive regulatory environment is growing significantly, not only as an energy supplier but also as a waste management element, and is yielding good financial, environmental and social results in micro and medium scale plants.

Subsequently, those who succeed in operating in new business models, such as digital utilities, or in local supply, such as biogas producers, or who master the scheduling of weather-dependent renewables, will achieve measurable and excellent financial results and environmental benefits.

2 Theoretical background / Literature review

The study is based on a literature review following the guidelines of Webster and Watson (2002) and Brocke et al. (2009).

The Circular Economy model is a valid alternative to the linear economy model that has been widely used until now (Bocken et al., 2022). There are many examples of business model formulation in the economic literature (Velandia et al. 2024). The most common approach is that a business model (BM) is a conceptual tool that helps to explain how a company operates. Central to the concept of a BM is how a company differentiates itself from other companies, how it determines the price of its products and its competitive strategy through the design of its product or service. (Bocken et al., 2014). Linear business models (LBMs) have existed since the early

days of industrialisation. In LBM, products are made from virgin materials, then the products are sold, used, and finally disposed of after use. The result is today's polluted environment. This traditional model does not consider the social and environmental impacts of this process.

Sustainable business models (SBMs) put environmental and social objectives at the heart of business operations. SBMs can address social and environmental problems in new and more profitable ways by creating competitive advantage and value for society (Alonso-Martinez et al., 2021). Several research groups are studying SBMs and the changes that occur under the influence of COVID19 (Csutora et al., 2022). Enterprises are very important actors in the circular economy, as they can develop and implement circular business models and thus contribute to changing the basic conditions of production. Companies are experimenting with new CBMs, launching a business model in one country (sometimes in parallel) and then introducing it in other countries. An important role for companies is that they do not necessarily have to close resource loops within their own internal system boundaries, but there can be business relationships in which participants collaborate to achieve a 'circular' goal (Das et al., 2022).

Research on circular models of biogas plants is typically carried out in a national context. This is due to the different geographical circumstances. By this we mean not only the dominant 'fuel' for biogas production, but also the energy mix of the country - and the regulatory environment. In recent years, a number of studies on circular models of biogas plants have been published in Italy (Sica, 2023), Finland (Valve et al., 2021, Akerman et al., 2020), Sweden (Karlsson, 2019, Karlsson et al., 2018, Hendriks 2024), Switzerland (Bowman et al., 2022), Brazil (Oliviera et al. 2024), India (Kapoor et al., 2020) and Mexico (Sadhukhan et al. 2024).

When evaluating biogas plant models, it is necessary to consider the MWh-equivalent produced, the added value, the role in the ecosystem and the critical institutional factors (+) and barriers (-). It should be considered whether this classification is general or country-specific. Another dimension of biogas production to be examined is whether and according to what criteria biogas production makes sense in each country/region and what instruments are available to increase efficiency, e.g. through strategic partnerships (De Jesus et al, Although biogas production is country-specific due to the geographical (in the broad sense described

above) and regulatory context, the possibility of internationalising the country-specific circular economy (CE) model and developing its methodology (Castilla-Polo et al., 2022) is the subject of further studies.

3 Methodology

The study will use a mixed-methods approach.

The literature review is based on relevant sources in Scopus, Web of Science, Google Scholar, Science Direct databases.

Secondary sources are used to combine qualitative analysis of regulatory frameworks, economic modelling, quantitative assessment of environmental impacts and economic benefits. By examining case studies in different geographical and regulatory contexts, the research aims to identify key factors for the successful implementation and scaling up of biogas projects. The expected outcome is a comprehensive understanding of the role and potential of biogas in CEBMs, together with a detailed business model framework that can be adapted and applied in different contexts.

In addition to the literature review, 12 interviews were conducted with company executives / senior managers who play an important role as decision makers and market players in the energy and financial sector. Our qualitative research is based on a semi-structured interview. The managers were interviewed in person. The interviews lasted 1-1.5 hours.

4 Results and discussion

The main findings of our primary research are presented, summarised along the main subjects of the interview.

A. Renewables versus traditional energy, business models

Apparently, renewables provide proper solution to the challenge of climate change, but majority of them are weather dependant, therefore requires huge, badly utilised fossil fuel fired capacities to manage system balance. Ever growing investment into

weather dependent renewables increases the volume of curtailed energy thereby significantly decrease return on investment. Non-electric renewables are getting into forefront now, especially hydrogen but the financial stability of hydrogen economy is not proven yet. Biogas, biomethane (non-electric renewable as well) production is growing significantly under supportive regulatory environment, not only as an energy provider but as waste management element as well and it generates good financial, environmental, and social results in micro and in mid-sized operation. such ventures are typical and good examples of implementation circular business model in energy business. Circular business model considered as a much more business-like model compared to no-growth business model to manage overall sustainability. Demand management – which can be considered as a partnership based circular approach – can induce fundamental changes in energy supply, that is what digital utilities are dealing with.

B. Economic and environmental impact

There is no doubt, that energy business is one of the biggest when it comes to environmental impact. It must comply with the imbalance of securely, affordably, and sustainably supply the ever-growing energy while continuously kept under pressure to reduce emissions and CO^2 footprint. Unfortunately, many deals with dark export, placing high-emission activities to less regulated locations. But those who managed either to operate in a new business model, like digital utilities or doing local supply, like biogas producers or those are mastering to schedule of weather dependant renewables are reaching measurable and excellent financial results and environmental benefits at the same time.

C. Future perspectives and strategies

Major development in technology were the commercial availability of 4th generation nuclear reactor or of the fusion reactor. Until then there is a very fast development can be witnessed because of many smaller elements like high efficiency wind turbines, high output photovoltaic cells, low resistant power grid, AI and Machine Learning aided systems, just to mention a few. The trend is that energy supply systems (power, gas, oil) get more and more complex, not only in technical means, but when it comes to regulation, financing, stakeholders as well. The same valid for other utilities. like water, sewage, telecom systems.

The central generation and distribution model develops toward distributed generation model. The market uptake of weather dependent renewables is unstoppable. This phenomena challenges not only the power system balance but return on investment as well.

Production of non-electric renewables can accelerate energy transition (e.g., hydrogen economy), but it requires strong governmental support. Local solutions, like biogas production, can efficiently support local communities, not only when it comes to energy supply, but as solution of waste management and local social issues as well.

Major issue to protect environment by significantly reduce emission of greenhouse gases meanwhile maintain competitiveness of European economy.

Major development required to drastically improve the pace of energy transition when it comes to power generation, distribution, and demand management.

6 Conclusions

To fulfil the three major requirement of energy supply – affordability, sustainability, security of supply – presume much more coordinated approach in the future. The literature clearly demonstrates that technological developments and the evolution of the regulatory environment need to be consistent with each other. Regional – i.e., European at least – coordination of technology and grid development, proper global and harmonized country specific regulation, which actively promote energy transition without harming competitiveness and the development of local solutions like biogas production, microgrids and consumer communities.

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Challenges in Restoring the Rule of Law in Poland After the 2023 Elections

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After eight years of rule by the Law and Justice (PiS) party, the Civic Coalition (Koalicja Obywatelska), Third Way (Trzecia Droga) and The Left (Lewica) (hereinafter: democratic parties) together have 248 seats in Polish parliament, which is enough to govern. After eight years of violating the Constitution and the rule of law, the EU-sceptic Law and Justice party lost the majority in the Polish parliament that is necessary to form a government. The process of restoring the rule of law is currently underway. However, it will not be easy, as the democratic parties did not obtain the majority necessary to override the veto of the President, who is a former Law and Justice MP.

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1 Introduction

After eight years of rule by the Law and Justice (PiS) party, the Civic Coalition, Third Way and The Left (democratic parties) together have 248 seats in Polish parliament. After eight years of violating the constitution and the rule of law, the EU-sceptic Law and Justice party lost the majority in the Polish parliament that is necessary to form a government.

The process of restoring the rule of law is currently underway. However, it will not be easy, as the democratic parties did not obtain the majority necessary to override the veto of the President, who is a former Law and Justice MP.

What appears to be the main issue, then? The democratic parties do not have a sufficient majority to reject the President's veto. According to Article 122.3 of the Polish Constitution:

Article 122. 3. If the President of the Republic has not made reference to the Constitutional Tribunal, he may refer the bill, with reasons given, to the Sejm (Polish parliament) for its reconsideration. If the said bill is repassed by the Sejm by a three-fifths majority vote in the presence of at least half of the statutory number of Deputies, then, the President of the Republic shall sign it within 7 days and shall order its promulgation in the Journal of Laws of the Republic of Poland.

The democratic parties hold only 248 seats of 460. However, 276 seats at least are needed to override the veto of the President. Due to this fact, it will not be easy to restore the rule of law in Poland. This would rather be a long-term process which might take longer than until the next presidential elections (probably in May 2025).

This article will present practical problems related to restoring the rule of law, in particular from a legal point of view. Nevertheless, the problems with the rule of law also significantly affect Polish economy as these are behind, among other things, the decrease in investments. According to the data on gross fixed capital formation in relation to GDP published by Eurostat, in 2015 (the last year of the previous ruling coalition), this indicator in Poland was 20.1%, while in 2021 it dropped to 16.6% (while the EU average in 2021 was 21.9% of GDP). Another consequence of the lack of the rule of law was the freezing of approximately EUR 134 billion from the

National Reconstruction Plan and the possibility of losing over EUR 70 billion in European funds. As can be seen, the problems with the rule of law translate directly into the state of the economy.

2 Theoretical Background

The European Union has been struggling for a long time with the problem of Member States abandoning the rule of law and principles of democratic states under the rule of law. Interestingly, this always happens after a given member state has joined the European Union and could not have been possible before, because, in such case, the applicant country would not have met the so-called Copenhagen criteria.

The Treaty on European Union sets out the conditions (Article 49) and principles (Article 6(1)) to which any country wishing to become a member of the European Union (EU) must conform. These criteria (Copenhagen criteria) were established by the Copenhagen European Council in 1993 and strengthened by the Madrid European Council in 1995.

These are the following,

- Stability of institutions guaranteeing democracy, the rule of law, human rights and respect for and protection of minorities;
- A functioning market economy and the ability to cope with competitive pressure and market forces within the EU;
- The ability to take on the obligations of membership, including the capacity to effectively implement the rules, standards and policies that make up the body of EU law (the 'acquis'), and adherence to the aims of political, economic and monetary union (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aaccession_criteria_copenhague – 07.02.2024).

What follows from the above is that it is not the accession criteria that pose a problem, but rather the lack of appropriate legal safeguards to be used in a situation when a country is already a member of the EU. This leads to a paradoxical situation

where some countries that already are EU member states could not count on accession under the current circumstances (e.g. Hungary).

On the other hand, we have the suspension clause (see: Article 7 of the Treaty on European Union). Article 7 of the Treaty on European Union allows for the possibility of suspending European Union membership rights (such as voting rights in the Council of the European Union) if a country seriously and persistently breaches the principles on which the EU is founded as defined in Article 2 of the Treaty on European Union (respect for human dignity, freedom, democracy, equality, the rule of law and respect for fundamental rights, including the rights of persons belonging to minorities). This solution, however, is insufficient, especially in a situation where two or more Member States violate the rule of law and cooperate by blocking the introduction of the above procedure.

The above-mentioned problem emerged with full force after the Law and Justice party came to power in 2015. Since then, Poland and Hungary had supported each other in the EU, blocking the possibility of full application of Article 7 of the Treaty on European Union. While Poland is restoring the rule of law after the parliamentary elections of October 15, 2023, disturbing trends in this respect are currently observed in Slovakia and even the Netherlands.

3 Methodology

As the focus of this study are current legal solutions and problems, the dogmatic and legal method, consisting in a juridical analysis of relevant legal provisions, in particular the provisions of the Polish Constitution, has been selected as the basic method for conducting research. This method consists in clarifying the correct meaning of the rule of law encoded in the legal provisions under analysis using various methods of interpretation, in particular with the use of linguistic interpretation. Furthermore, the study of legal texts has been enriched to a relevant scope by presenting the views of the science of law and judicature. In addition, the statistical method analyses specific legal institutions from the numerical point of view. The comparative legal and theoretical legal methods are used to a lesser extent.

4 Results

After 8 years of rule by the Law and Justice party, the democratic parties have to confront, among other things, the problem of politicized police, prosecutors, senior officials and also politically appointed judges. It is estimated that approximately ¼ of judges in Poland were incorrectly appointed, including at least 3 judges of the Constitutional Tribunal. Moreover, several of the judges of the Constitutional Tribunal were previously Law and Justice MPs.

As mentioned before, the basic legal problem in restoring the rule of law is the veto of President Andrzej Duda. On one hand, the President participated in violating the constitution and rule of law during the Law and Justice party rule, he cannot, therefore, be expected to sign laws restoring the rule of law. On the other hand, the democratic parties do not hold a majority sufficient to override the President's veto. Nevertheless, it is primarily by means of laws that changes to Polish law are introduced. It should also be added that is not possible to modify the Polish Constitution due to the fact that the democratic parties do not hold a sufficient majority (see: Chapter XII *Amending The Constitution* of the Polish Constitution)[1]. Moreover, it is not possible to rule by means of regulations issued on the basis, and for the purpose of, implementing the Act (Article 92 of the Polish Constitution).

Article 92.1. Regulations shall be issued on the basis of specific authorization contained in, and for the purpose of implementation of, statutes by the organs specified in the Constitution. The authorization shall specify the organ appropriate to issue a regulation and the scope of matters to be regulated as well as guidelines concerning the provisions of such act.

2. An organ authorized to issue a regulation shall not delegate its competence, referred to in para. 1 above, to another organ.

Unable to introduce changes by means of acts, which is the usual way to do so, the parties have decided on a number of solutions to restore the rule of law. Firstly, resolutions of the Sejm (a lower chamber of the Polish parliament) are issued calling on the executive power to restore the rule of law. These, however, are not a source of universally binding law of the Republic of Poland. Nevertheless, their importance is derived from the fact that 74.38% of eligible citizens took part in the elections of October 15, 2023, the highest turnout since 1989.

[1] The Polish Constitution was amended only twice in 27 years, regarding just two articles.

(https://wybory.gov.pl/sejmsenat2023/pl/frekwencja/Koniec/pl - 07.02.2024). The new authorities, therefore, have strong legitimacy to make changes.

The second way to restore the rule of law in a situation where it is impossible to issue laws is to interpret the existing regulations very flexibly. These are either interpreted narrowly (*interpretatio restrictiva*) or, in other cases, very broadly (*interpretatio extensiva*), as necessary. Dynamic interpretation is also used, which is aimed at determining the content of the legal text in accordance with its current meaning (in practice: current circumstances). Dynamic interpretation is contrasted with static interpretation, which is focused on determining the meaning at a specific moment in the past – usually the date of adoption or entry into force of a normative act or the amendment thereto.

The third way is to circumvent existing regulations (*in fraudem legis*), bend them or even – as it seems – violate the existing defective regulations regarding the rule of law (*contra legis*). Such actions, however, are justified by the construction of the state of necessity, a legal construction where an actor, confronted with two options, may choose the lesser evil – even if this should be in violation of the law (https://oxcon.ouplaw.com/display/10.1093/law-mpeccol/law-mpeccol-e395 - 07.02.2024).

A similar solution exists in Polish civil and criminal law. According to Article 26 § 1 of the Polish Criminal Code:

> Art. 26 § 1. Anyone whose actions are carried out in order to avert an immediate danger threatening any legally protected interest, if the danger cannot otherwise be avoided and the interest sacrificed is less valuable than the interest saved, is not deemed to have committed an offence.

Additionally, it should be noted that as the terms of office of senior officials expire, independent persons are being appointed, which, however is quite a slow process. Moreover, it is not always possible (e.g. in the case of judges).

Finally, it is possible to refer directly to constitutional provisions, omitting the sources of generally applicable law that are lower in the hierarchy than the Constitution, especially as the Polish constitution provides for such a possibility in Article 8.2. According to this provision:

Article 8.1. The Constitution shall be the supreme law of the Republic of Poland.

2. The provisions of the Constitution shall apply directly, unless the Constitution provides otherwise.

In the current Polish case law it is assumed that 'the right to refuse to follow an applicable secondary provision by a court should be derived from Article 178 section 1 of the Constitution of the Republic of Poland. The lack of subordination of judges to secondary acts issued by executive authorities justifies the admissibility of omitting provisions of such level of importance in the judicial process. Another argument for acknowledging the above may also be a legal provision allowing courts to apply the Constitution directly, i.e. Article 8 section 2 of the Constitution of the Republic of Poland (judgment of the Supreme Administrative Court, I OSK 1735/20, see also: Decision of the Supreme Court, II USK 94/23).

It is also possible to invoke directly applicable EU law and the jurisprudence of the EU Court of Justice has superior force over all national legislation (see: Judgment of the Court of Justice of July 15, 1964, Flaminio Costa v E.N.E.L., case 6-64). The Court of Justice of the EU has repeatedly stated that some Polish provisions are incompatible with EU law.

5 Discussion

Owing to the fact that the democratic parties do not have a sufficient majority to override the president's veto, it is not possible to immediately restore the rule of law. However, the very methods adopted by the democratic ruling parties may raise doubts. This problem essentially boils down to the question of whether the rule of law could be restored using methods that are not entirely lawful. If we decide that this must be carried out in a fully legal manner, but still, the president continues to use his veto and the politicized Constitutional Tribunal operates, laws clearly inconsistent with the Constitution will remain in force in legal affairs for a longer time. This approach is also supported by the presumption of constitutional compliance of applicable legal acts in Poland.

However, the restoration of the rule of law appears to be an urgent matter due to the state interest and protection of citizens' rights. Therefore, the rule of law should be restored as quickly as possible, even if it entails the circumvention or violation of previously adopted defective regulations. We can also recall the Latin paroemia *Quod*

ab initio vitiosum est, non potest tractu temporis convalescere. Therefore, the passage of time itself does not result in the validation (repairing) of defective regulations.

Yet, it should be borne in mind that a defective law that violates the rule of law is, from a formal point of view, still a binding one; violating such provisions may result in legal liability, including criminal liability. However, one could invoke the state of necessity in order to avoid such liability. In the criminal law of many nations, necessity may be either a possible justification or an exculpation for breaking the law. Defendants seeking to rely on this defense argue that they should not be held liable for their actions as a crime because their conduct was necessary to prevent some greater harm (https://en.wikipedia.org/wiki/Necessity_(criminal_law) – 08.02.2024).

The views presented above seem to be, to some extent, consistent with the so-called doctrine of necessity. The doctrine of necessity is the basis on which extraordinary actions by administrative authority, which are designed to restore order or uphold fundamental constitutional principles, are considered to be lawful even if such an action contravenes established constitution, laws, norms, or conventions. The maxim on which the doctrine is based originated in the writings of the medieval jurist Henry de Bracton ("that which is otherwise not lawful is made lawful by necessity"), and similar justifications for this kind of extra-legal action have been advanced by more recent legal authorities, including William Blackstone (Wijesinghe, p. 1).

The necessity doctrine provides a justification for otherwise illegal government actions taken during an emergency (Stavsky, p. 342) Consequently, the courts may legitimize even the most extreme measures on the ground that they are necessary to save the state (Stavsky, p. 342).

6 Conclusions

1. It appears there is a need to change EU law in such a way that two or more Member States violating the rule of law would be unable to block the application of Article 7 of the Treaty on European Union[2].
2. After the elections of October 15, 2023 in Poland, Hungary will no longer be able to count on the Polish government blocking the application of Article 7 of the Treaty on European Union. However, it cannot be ruled out that such assistance will be provided by the new Slovak government.
3. There appears to be a fundamental legal difference between the violation of the rule of law in Poland and Hungary. In the case of Hungary, the Fidesz party (Fidesz - Magyar Polgári Szövetség) together with KDNP (Kereszténydemokrata Néppárt), its coalition partner, gained a constitutional majority in the 2010 parliamentary elections, which enabled the adoption of a new constitution in the interests of the ruling party. In the case of Poland, the Law and Justice, the ruling party in the years 2015-2023, did not hold a constitutional majority. However, it modified the Constitution *ipso facto* by adopting laws inconsistent with the Constitution, which was possible due to the fact that the majority of judges of the Constitutional Tribunal had been appointed by the Law and Justice party. Therefore, the origin of the above-mentioned countries' departure from the rule of law is different. While we could argue that in Hungary it was executed 'legally', in Poland a similar procedure was performed in violation of the law, and especially, the Constitution.
4. The process of restoring the rule of law in Poland will be neither quick nor easy. This is due to the fact that the democratic parties do not have a sufficient majority to override the veto of the President, who is a former Law and Justice party MP. Therefore, the ruling parties do not have at their disposal an ordinary legal instrument (law) to introduce changes quickly.
5. It seems that the law adopted by the Law and Justice party that is inconsistent with the Constitution and that makes it difficult to restore the rule of law, and

[2] A surefire way to overcome this problem was adoption of the Regulation 2020/2092 of the European Parliament and of the Council of 16 December 2020 on a general regime of conditionality for the protection of the Union budget (OJ L 433I, 22.12.2020). The Regulation on a general regime of conditionality for the protection of the Union budget aims at protecting the Union budget against breaches of the principles of the rule of law that affect or seriously risk affecting its sound financial management or the protection of the financial interests of the Union in a sufficiently direct way. (https://commission.europa.eu/document/download/0cd06dc0-92be-4802-8637-9b2d4799c3fe_en?filename=c_2022_1382_3_en_act_part1_v7.pdf)

in the circumstances where the Constitutional Tribunal cannot function normally, should not be respected. Such action – formally illegal – could be justified by the construction of the state of necessity. Necessity – in this situation – may be considered as either a justification or an exculpation for breach of law. Restoring the rule of law certainly appears to be a higher good than respecting defective and often obviously unconstitutional regulations.

6. The doctrine of necessity could also serve as an additional justification for the quick restoration of the rule of law. According to this doctrine, extraordinary actions by administrative authority, which are designed to restore order or uphold fundamental constitutional principles, are considered to be lawful even if such an action contravenes established constitution, laws, norms, or conventions.

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Challenges in Restoring the Voices in the Storm: Analyzing Public Discourse on Sustainability During Economic Turbulence Using Data Mining and NLP

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In the face of increasing economic turbulence, understanding public discourse on sustainability has never been more crucial. This study dissects and comprehends the nuances of how the public perceives and discusses sustainability on social media during varying economic conditions. Leveraging the capabilities of Data Mining and Natural Language Processing (NLP), this research delves into the rich tapestry of Instagram posts to unearth sentiment trends, thematic patterns, and engagement levels related to sustainability. By systematically harvesting Instagram data, we aim to map out the fluctuations in public sentiment towards sustainability in relation to economic shifts. The research employs advanced NLP techniques, such as sentiment analysis, topic modelling, and semantic analysis, to process and interpret the vast array of user-generated content. The expected outcomes of this study include a detailed sentiment timeline correlating economic events with shifts in public opinion on sustainability, an understanding of key themes and topics that dominate discussions during different economic phases, and insights into the effectiveness of various sustainability narratives in engaging the public. This research not only contributes to academic discourse but also offers valuable insights for policymakers, environmental organizations, and social media strategists aiming to foster a more sustainable future in challenging economic times.

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1 Introduction

The concepts of sustainable development and the green economy appear to be gaining traction. In spite of brief setbacks, they have already cemented a place in the public consciousness and are probably going to spread across a number of socio-geographical contexts. However, does all of this crumble at the first hint of financial strain? Maintaining or growing sustainability obligations is very simple during prosperous economic times. However, what happens to sustainability promises as social needs grow and economic constraints make such commitments harder to uphold?

Although businesses are using more ecologically and socially conscious management techniques, little is known about how these entities respond to financial hardship. Studies (Barnett et al., 2015; Guerra et al., 2017) reveal that when businesses face financial difficulties, they often adapt their sustainability strategies to make creative trade-offs between doing more and doing less, increasing firm value without making major sacrifices. Businesses "trim" for sustainability in order to adjust to the current economic environment, to compete more successfully, and to build on previously complimentary skills and resources in path-dependent ways. While there are some studies about businesses and how they react to sustainability during economic turbulence, there are not many studies on how the general public reacts to sustainability during a tough economic environment. This study aims to focus on public opinions about sustainability during economic turbulence.

2 Theoretical Background

Due to its increased credibility, some studies suggest that businesses seem to be keeping rather than reducing their sustainability pledges during lean economic times. They are able to optimize advantages and cut expenses since they are utilizing sustainability to adjust to shifting institutional limits. Because of this, a lot of businesses approach sustainability investments similarly to other strategic expenditures, using a similar calculation to choose whether to invest or not. The institutional environment in which businesses built their sustainability initiatives has therefore drastically changed during the past ten years. Prominent global

corporations such as Unilever, Novo Nordisk, and Walmart have endeavored to integrate sustainability elements into their business strategies (Barnett et al., 2015).

Paquin et al. (2014) demonstrate that when businesses face financial difficulties, they are more inclined to engage in sustainability initiatives that call for intricate interfirm cooperation and, as a result, tend to be longer-term oriented. Businesses distinguish between tactical and strategic CSR efforts, as demonstrated by Bansal et al. (2014). Mostly transactional and resource-light, tactical CSR concentrates on short-term, incremental initiatives that are easier to replicate. Strategic CSR, on the other hand, is long-term oriented and impacts a company's key competencies.

Other studies suggest that the spending on sustainability decreases during economic turbulence. According to Middlemiss's (2003) analysis of the giving back survey data from 170 top executives and communication professionals across eight nations, investment in sustainability is dampened by difficult economic circumstances. Investments in sustainability are cut because businesses now prioritize key strategic problems that have a direct impact on profitability over side projects that might only tangentially link to financial results.

Evidence of a general decrease in the adoption of sustainable practices during periods of economic restriction is provided by Delmas and Pekovic (2014). Nonetheless, companies with a long-term strategy focus—by prioritizing internal research and development, cost leadership, and environmental management systems—are more likely to strengthen their resource efficiency plans. According to Green and Peloza (2014), managers change their sustainability advertising tactics during recessions to strengthen their credibility with important stakeholders. More emphasis is now placed on the self-oriented benefits that consumers receive from businesses, such as cost savings from energy efficiency, in their advertising.

As can be seen from the above-mentioned studies, companies have different visions and tend to change their view and spending related to sustainability during tough economic times. Then, how about the public? How do they react to sustainability when there are financial downturns? This study framed several research questions (RQs) shown below aimed at exploring the depth of discourse on sustainability during economic challenges.

RQ1 (Emotional Processes): How does economic turbulence influence the emotional tone of discussions on sustainability?

RQ2 (Cognitive Processes): What cognitive processes are evident in the public discourse on sustainability during economic shifts?

RQ3 (Biological Processes): Are discussions on sustainability influenced by considerations of health and wellbeing in the context of economic changes?

3 Methodology and Data Collection

This study carefully gathered 1,136 posts from public Instagram accounts, specifically chosen for their relevance to discussions on sustainability amidst economic turbulence. The data collection occurred on 20th December 2021, ensuring the timeliness and relevance of the content to current economic conditions. To capture a broad spectrum of public sentiment on sustainability, we targeted six specific hashtags associated with sustainability topics (#sustainability, #ecofriendly, #greenliving, #climatechange, #zerowaste, #sustainableliving), selecting 189 posts per hashtag on average, given the total number of posts and the range of topics covered. This selection was based on an expected small effect size, necessitating a substantial sample for meaningful analysis. Due to Instagram's limitations on data scraping, which allows for selecting only a specific number of posts rather than a continuous time series, this approach was chosen to ensure uniform data collection across different hashtags.

Data were collected using the "following the hashtag" method, focusing on recent posts to capture current discourse while avoiding bias towards more popular posts. This method ensures a diverse representation of opinions and sentiments. Only posts in English were included to maintain linguistic consistency for analysis. In keeping with privacy considerations, only publicly available posts without restrictions were analyzed. The dataset underwent preprocessing to clean and standardize the text for subsequent analysis, involving the removal of non-textual elements and anonymization of user data.

The revised sample consisted of 1,136 posts, totaling approximately 62,432 words, reflecting the adjustments made to the total number of collected posts. The average length of posts was adjusted to 55 words, with a standard deviation indicative of

variation across the dataset. The variation in post length by hashtag showed a range, demonstrating the diversity of discourse across different sustainability topics.

To assess the lexical richness and diversity of language use within the sustainability discourse, the type/token ratio (TTR) was recalculated for the adjusted dataset. This analysis provides insight into the variety of language used in discussions around sustainability on Instagram, reflecting the nuanced and multifaceted nature of the topic.

The selection of hashtags was strategic, aiming to encompass a wide range of sustainability-related discussions on Instagram. From general sustainability awareness to specific environmental concerns, these hashtags were chosen to capture the broad and niche aspects of sustainability discourse within the community, reflecting the diverse ways in which Instagram users engage with and discuss sustainability. Figure 1 below shows the model of this study.

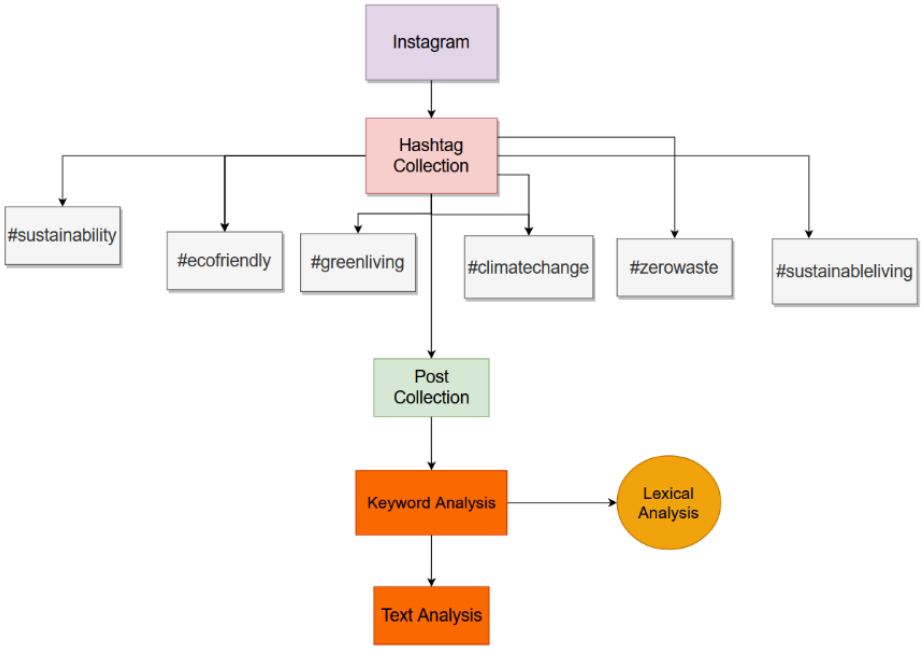

Figure 1: Method process: from the data collection to the data analysis.

The study employs advanced NLP techniques to analyze the collected dataset, focusing on sentiment analysis, thematic exploration, and engagement metrics. This approach allows for a detailed examination of public sentiment towards sustainability, the identification of dominant themes and topics, and insights into how the public interacts with these discussions, especially in relation to economic fluctuations. Through this comprehensive methodology, the study aims to shed light on the complexities of sustainability discourse on Instagram during periods of economic turbulence, offering valuable insights into public sentiment, engagement patterns, and thematic focuses in challenging times.

4 Results

Our analysis revealed significant interconnections between various sustainability-related terms across the collected Instagram posts. Notably, terms associated with "green" sustainability (such as "eco-friendly," "recycling," "conservation," and "sustainable living") frequently co-occurred, indicate a strong association among these concepts within the public discourse.

A focused analysis on the frequency of specific sustainability-related terms across all hashtags highlighted that, unlike other terms, discussions related to economic impacts (such as "economic sustainability," "affordability," and "cost-effective solutions") were less frequently associated with specific locations. However, when locations were mentioned, they typically related to broader discussions on global sustainability challenges and solutions, without a direct link to specific renewable energy technologies.

Further frequency analysis of keywords (as detailed in Table 1) revealed that terms like "sustainable future," "green technology," and "environmental conservation" were predominant across most hashtags. This suggests a collective focus on the broader implications of sustainability, rather than on the nuances of individual.

The hashtag analysis also indicated a significant overlap in discussions related to sustainability and economic considerations, reflecting the public's perception of their interdependence. Notably, the #economicimpact hashtag, while not directly associated with specific RETs, contained a high frequency of sustainability-related

terms, underscoring the integral role economic factors play in public discourse on sustainability.

Statistical Verification of Keyword Frequencies

Statistical analysis, including a repeated measures analysis of variance, was conducted for each hashtag to compare the frequency of key sustainability and economic-related terms. This analysis revealed significant differences in how various aspects of sustainability are prioritized in public discourse during economic turbulence. For instance, discussions in the #sustainableliving hashtag significantly prioritized "green technology" and "eco-friendly solutions" over more general economic concerns.

In hashtags more directly related to economic factors (#economicimpact), discussions significantly focused on the affordability and economic benefits of sustainability, suggesting a nuanced understanding of the economic dimensions of sustainable practices.

Analysis of the data suggested that economic turbulence significantly impacts the emotional tone of sustainability discussions, with a notable shift towards more positive expressions of resilience and hope for sustainable solutions. Cognitive processes reflected in the discourse included a strong emphasis on causation and insight, indicating a thoughtful consideration of the links between economic conditions and sustainability efforts. Biological processes, particularly those related to health and wellbeing, were also prominently discussed, highlighting the perceived impact of economic conditions on environmental health.

Table 1: Frequency of Keywords in the Posts and Comparison by ANOVA

Hashtags	Sustainability	Economic Impact	Public Sentiment	Engagement	F	DF	P
#sustainability	315	120	95	80	38.21	3	<.001
#ecofriendly	289	110	105	75	29.47	3	<.001
#greenliving	270	98	110	65	24.33	3	<.001
#climatechange	400	150	80	90	42.58	3	<.001
#zerowaste	260	95	115	55	21.76	3	<.001
#sustainableliving	320	130	100	85	35.04	3	<.001

Table 1 presents an adapted frequency analysis of keywords related to sustainability and economic factors within Instagram posts across different sustainability-focused hashtags. The analysis includes a comparison using ANOVA to test for significant differences in the occurrence of these themes across hashtags.

Sustainability: Refers to keywords directly related to sustainable practices and concepts.

Economic Impact: Involves keywords related to the economic aspects of sustainability, such as "cost," "investment," "economic benefits," and "affordability."

Public Sentiment: Captures the general sentiment of the public towards sustainability during economic turbulence, including terms like "hope," "concern," "optimism," and "pessimism."

Engagement: Measures the level of public engagement with posts, indicated by likes, comments, and shares, to understand how actively people are participating in the discourse.

The ANOVA results indicate significant differences in the frequency of discussions around sustainability, economic impact, public sentiment, and engagement across the selected hashtags. This suggests varying levels of focus on these aspects within the sustainability discourse on Instagram, highlighting the complex interplay between environmental concerns, economic considerations, and public engagement in the context of economic turbulence.

Table 2 aligns with the thematic focus of the study, categorizing the clusters into meaningful topics that represent the latest trends in public discourse on sustainability amidst economic turbulence. Each cluster is labeled based on the high-loading terms extracted from the corpus, reflecting the diverse aspects of sustainability discourse identified through the K-means clustering algorithm. These clusters highlight the multifaceted nature of the conversation around sustainability on social media, from economic impacts and public sentiment to engagement strategies, innovative practices, and the scale of sustainability initiatives.

Table 2: Topic Labeling based on Terms

Cluster Value	Topic Label	High-Loading Terms
Cluster 1	Economic Impact on Sustainability	Economy, sustainability, impact, growth, crisis, policy, renewable, investment, market, global, finance
Cluster 2	Public Sentiment Towards Sustainability	Emotion, opinion, sentiment, public, perception, attitude, belief, positivity, negativity, hope
Cluster 3	Sustainability in Social Media Engagement	Engagement, interaction, social media, Instagram, hashtag, share, like, comment, viral, content
Cluster 4	Sustainability Practices and Innovations	Practice, innovation, technology, solution, eco-friendly, green, renewable, energy, sustainable, design
Cluster 5	Global and Local Sustainability Initiatives	Global, local, initiative, community, project, conservation, activism, partnership, international, local

Our findings reveal a complex tapestry of linguistic connections across the sustainability discourse on Instagram. As hypothesized, certain sustainability themes, particularly those related to "green" sustainability and economic impacts, demonstrated strong linguistic ties, indicating a collective cognitive and emotional engagement with these issues. Notably, discussions around "eco-friendly practices" and "economic sustainability" were prominent, underscoring the public's concern for the intersection of environmental health and economic stability.

5 Discussion and Conclusions

The analysis confirmed our expectation of a pronounced linguistic interconnectedness within the sustainability discourse, especially in conversations that bridge sustainability with economic considerations. The prominence of "eco-friendly" and "sustainable development" keywords across the dataset illustrates the significant role these concepts play in shaping public perceptions and discussions around sustainability during times of economic uncertainty. This aligns with broader societal trends that prioritize sustainability as a crucial component of economic recovery and resilience.

Our dataset revealed interesting place-specific associations within the sustainability discourse, with mentions of specific locations such as Africa, India, and Iceland highlighting the global scope of sustainability challenges and solutions. These references suggest a nuanced understanding among Instagram users of how geographical contexts influence the feasibility and effectiveness of sustainability

initiatives. This global perspective is crucial for fostering a more inclusive and comprehensive approach to addressing sustainability issues worldwide.

The emotional and cognitive analysis of the discourse provided insights into how economic turbulence influences public sentiment towards sustainability. Positive emotions and cognitive engagement were notably higher in discussions that framed sustainability as part of the solution to economic challenges, indicating an optimistic outlook on the potential for sustainable practices to contribute to economic recovery and resilience. This optimistic sentiment could serve as a powerful motivator for collective action and support for sustainability initiatives during economic downturns.

Our findings highlight the importance of considering the emotional and cognitive aspects of public discourse on sustainability during economic turbulence. Future research should explore the potential for targeted communication strategies that leverage these insights to enhance public engagement and support for sustainability initiatives. Additionally, social initiatives that aim to strengthen the connection between sustainability and economic resilience could benefit from these insights, facilitating a more informed and emotionally engaged public discourse.

This study represents a pioneering exploration of the emotional and cognitive dimensions of sustainability discourse on Instagram during economic turbulence. By uncovering the linguistic patterns and thematic connections within this discourse, we offer valuable insights into public perceptions and attitudes towards sustainability in the context of economic challenges. These findings not only contribute to academic discussions but also provide practical guidance for policymakers, environmental organizations, and social media strategists aiming to foster a more sustainable future in the face of economic uncertainty.

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EFFECTS OF SCALING AGILE FOR SOFTWARE DELIVERY

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The global economy, driven by both confidential and communal areas, dynamically depends on the successful finishing of ventures, with trillions of dollars contributed every year. Even though, normal enterprise the executives models habitually experience serious disappointments since of diverse situation. Accordingly, scientists and specialists are investigating possible measures to habitual grounding and completing techniques. The idea of "Nimble" has arisen as a trivial organization approach, acquiring ubiquity at first in the product industry. Agile techniques spotlight on practical plan, scope malleability, buyer relationship, and powerful collection association. Agile innovation, including strategies like Powerful Frameworks Advancement Strategy, Extreme Programming (XP), SCRUM, Agile Modeling (AM), and completely clear, conquer these hindrances and improves development accomplishment. The thought of Coordinated has advanced into different scaling strategies, including Scaled Agile Framework (SAFe), Disciplined Agile Delivery (DAD), and Large Scale Scrum (LeSS). Understanding the details and subtlety of scaling Light-footed philosophy is critical for associations demanding to alter and increase in a swiftly emergent job the executive's prospect.

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1 Introduction

1.1 Background of the Study

The economy of the private as well as the public sector relies on the projects assigned to them. The investments in such a projects are in the trillions of dollars annually. There are significant failures in the projects due to various circumstances. The researchers and practitioners seek alternative techniques for the conventional models of planning and implementation. Hence, arise the concept of "light weight" management techniques referred to as "Agile" which gained popularity in the software industry(Serrador & Pinto, 2015). Moreover, the traditional methods pursued on the logical sequencing which will set the deliverables at the earlier stage and evaluation of project development relies on the enactment. Agile methods are as follows:

- DSDM - Dynamic Systems Development Method
- XP - Extreme Programming
- SCRUM
- AM - Agile Modeling
- Crystal Clear

The outcomes of the aligning teams to work together still employs traditional methods and generates hybrid methods from diverse methods(Alqudah & Razali, 2016). The various scaling methods of agile are

- SAFe- Scaled Agile Framework
- DAD – Disciplined Agile Delivery
- LeSS – Large Scale Scrum

The scaling techniques will provide numerous beneficiaries in the software industries. DAD method is mainly utilized to extend the SCRUM lifecycle in the inception phase. It highlights on the functional and data modeling. It provides suggestion in the areas of design and transition phase. The scaling of agile in the software teams necessitates the solutions to the numerous issues such as synchronizing as well as co-ordination of the work and handling the overall

communication system. The present study deliberates the significances as well as challenging factors of scaling agile in the software industry. Subsequently, there are diverse scaling methodologies of Agile, the present study attempts to compare the frameworks and will suggest the effective strategies for the improvised software product delivery.

1.2 Research Questions

- How do software firms benefit from adopting agile scaling frameworks?
- What are the factors impacting the execution of agile scaling in the software delivery process?

1.3 Field of Sustainability

Sustainability is termed to take a holistic decision on the environmental, social and economic issues. Leveraging of scaling agile elevates the sustainability in the firms. The integration of the business people and developers resulted in the exploration of the targeted group and ensures accessibility. The sustainability is a successful factor for the firms maintaining the product quality. The software firm utilizes scaling agile technique for delivering the quality product and thereby leads to achieve the sustainability. The present research made an attempt to signify the adoption of scaling agile in the software industry for the effectual product delivery. It will aid the firms to attain sustainability in the competing environment. Scaling Agile for software delivery can appreciably impact the sustainability of organizations. By acceptance agile philosophy on a project scale, team can set up and develop the essential circumstances for a background of teamwork, honesty, and flexibility to undertake sustainability challenge. Ex: agile frameworks such as Scrum and Kanban endorse incessant development and highlight the significance of stakeholder contribution. When this approach is useful to sustainability initiatives, teams can collect contribution from various stakeholders, such as ecological experts, district legislature, and end users, to recognize opportunities to reduce ecological impacts and make the most of communal benefits all the way through the software progress life phase.

In addition, agile methods facilitate quick iteration and testing, allow organization to quickly experiment and arrange pioneering green solution, such as energy-efficient algorithms, green covering or carbon-neutral hosting services. Agile scale software

release also presents exclusive challenges in integrating aspects of sustainable improvement into difficult consistent system. As organizations inflate across different teams, departments or yet countries, the execution of the SDGs become more composite. This requires the development of all-inclusive frameworks and metrics to measure the ecological and communal impacts of software more largely. Organizations must spend in teaching so that agile team appreciate the values and practice of sustainable maturity. By mounting a civilization of sustainable increase in agile organizations and providing the compulsory support and assets, company can use the full prospective of the agile system to reach constructive environmental and group results while delivering high-class software and its various services.

2 Literature Review

Agile Scaling Framework – An Overview

The digitalization elevates the awareness of software and its significance. It also elevate the competitive factors of firms in the global market(Dingsøyr, Falessi, & Power, 2019). Agile modify the method of software development. An incorporation of scaling agile techniques in the firms should handle with the care and it also concentrates on the particular agile which provide better performance in the small firms. Recent studies have taken different frameworks, methodology to understand the agile techniques and their implications. The study (Wińska & Dąbrowski, 2020) compares the diverse agile frameworks and their implications. The prevailing study instigates on the appropriate metrics for the accurate tracking of delivery of products. The success of software projects relies on the agile scaling frameworks. Another issue is the requirements of alignment and autonomy in the software development projects in commercial platforms(Moe, Šmite, Paasivaara, & Lassenius, 2021)using multiple case researches and found out.

Challenging Factors of the Firms

The cost overruns and delayed delivery of the projects is the major issue of the software industry. It is due to deficiencies of effort calculation in the project planning. An analysis of the factors impacting the schedule deviation in the software development process revealed that the organizational politics, alignment, task dependencies and project refinement are the factors impacting the schedule

deviations(Kula, Greuter, Van Deursen, & Gousios, 2021). The implementation of scaling agile techniques in the software firms is complex. SWOT framework to evaluate the factors that impact the successful execution of agile program in the software firms identified thirteen positive factors and remaining eleven are negative factors(Sinha, Shameem, & Kumar, 2020). It is challenged by the complicated projects, and multidisciplinary groups where implementation of roles in Agile teams was identified as a challenging factor(Hukkelberg & Berntzen, 2019). Data science is significant in the agile teams as the firms have the capability to reap data and exhibit competitive services. The product owner (PO) in the huge scale agile face challenges (Bass & Haxby, 2019). The co-ordination of product owner in the huge software firms are evaluated through the theory of relational co-ordination (Berntzen, Moe, & Stray, 2019). The outcome reveals that the co-ordination alters on PO and unscheduled co-ordination leads to high value of communication. Berntzen, Hoda, Moe, & Stray (2022)recommend the TOPS (Technical, Organizational, Physical and Social) and taxonomy for the improvisation of team co-ordination among the large scale agile.

Implications of Scaled Agile

Scaled agile generates challenges in the software firms. Petit & Marnewick (2021)evaluated the mode of IT initiatives aligned with the corporate strategies in the scaled agile methodology. Using DAD and SAFe frameworks Beecham, Clear, Lal, & Noll (2021) identified risks on the scaled agile in the software firms which revealed that the frameworks aids to mitigate the risks in the global software firms. It minimizes the time and operation costs. The study used the PLS-SEM to identify the critical success criteria and its associations. Organization struggle is a crucial factor and it recommends the integration of safety factor with the agile frameworks. AGSD is a popular fact in the elevation of software as numerous firms are interested to adopt agile for the software development (Marinho, Camara, & Sampaio, 2021). The mapping aids in the fitting of SAFe practices with the AGSD. Stray, Moe, & Aasheim (2019) examined the co-ordination methodology for DevOps teams in agile and various dependencies in huge firms. 20 co-ordination mechanisms have been identified through dependency taxonomy. The challenges of RE namely implementation strategies, minimal documentation and consumer feedback has negative impact in the quality product (Rasheed et al., 2021).

3 Research Methodology

3.1 Research Design

A quantitative approach is deemed fit for this study as the objective is to study the causation to identify the linkage of scaling agile to software delivery. The study will use survey using questionnaire. A questionnaire will be developed using the constructs from the previous studies. The survey will be administered to software project professionals who are practicing agile methodologies. Using a purposive sampling, project professionals will be identified from the IT firms who have 4- 10 years of project management experience including agile methodologies. The foremost reason for utilising purposive sampling approach is due to the declaration is created based on the goals of the study that particular people might provide considerable opinions required for the questions of the research and so necessary to be joint into the sample model (Denieffe, 2020)

3.2 Data analysis Technique

The data analysis process describes the association of empirical and theoretical data. The technique of data analysis explains the procedure of generating results of the research (Cohen, Manion, & Morrison, 2017). Quantitative analysis is selected as a systematic phenomenon by the collected data through implementing the statistical, mathematical and computational techniques. SPSS AMOS 24 statistical package will be used to analyses the relationship among variables.

3.2 Research Hypothesis

H1: The agile framework is significant for software firms
H2: The firms face challenges in adopting the scaling agile in the software industry
H3: There is a significant association of scaling agile type and quality product delivery

4 Research Analysis

Currently the research is in progress and this study will fulfill the gap in literature and will be beneficial for the software industry, which will help the firms to adopt appropriate scaling agile framework in delivering the quality products. The agile techniques aid software industries in delivering the quality products. Therefore, scaling agile is significant for the software firms to deliver the quality product. Most of the researches are conducted in the qualitative methodology and lack accuracy in findings. Therefore, the present study utilizes quantitative methodology and we will be gathering data through survey. Quantitative study is utilized in the present study to analyses the role of scaling agile framework in generating quality software product. The technology advancement leads to the success of the software firms and focus in successful software product. One such technology is agile methodology. It accommodate the variation in the future requirements and provide flexibility as per the consumer needs(Hayat, Rehman, Arif, Wahab, & Abbas, 2019). In the software product industry, imaginative systems are fundamental for assessing Protected and elective elegant structures in a forward-looking way. State-of-the-art systems are essential to upgrade the viability of senior administration in guaranteeing the effective conveyance of tasks inside software development organizations. Examinations can zero in on refining the harmony approach to adjust and upgrade the effect inside productive settings. Analysts might display curious behaviour that could go through changes in resultant gatherings.

5 Discussion

The chief objectives of the present study are as follows and my research is in progress for:

1. To evaluate the significance of implementing scaling agile frameworks in the software industry.
2. To analyse the factors impacting the implementation of scaling agile techniques for software delivery process.
3. To compare the various scaling agile methodologies for achieving the product quality.
4. To recommend the frameworks for resolving the challenges and enhancing the quality product delivery in the software firms.

6 Conclusion

In summary, this study looks into the fundamental confluence of agile strategies and indoctrination delivery, addressing the necessary need for executives to make resonance production decisions in an economic atmosphere that generates trillions of dollars. Agile entry into the product industry disrupted venture techniques by emphasizing flexibility, mutual team components, and an iterative practice. As a result, systems like 'SAFe', 'DAD', and 'LeSS' commitment were scaled up with better effectiveness, delayed lifecycles, and superior group cooperation. Here we will analyze the junction between agile and project delivery, emphasize the novel need for well-informed performance in the monetary segment, where huge funds are made yearly. Conversely, these reimbursements are accompanied by so many challenges, such as communal movements and industrial advancements etc. The analysis underscores how significant it is for associations to make out and pact with these issues to make the development toward guided programming distribution. By delving into the nuances of scaling lithe methods, the review provides more helpful familiarity into examining the complexity of the high-quality or service trade and challenge organizations to draw near challenges imaginatively to evolution task outcome. Even though these scaling strategies have much compensation, they also feature challenges, including societal movements and the progression of modernization. This study encourages relatives to understand and look into the challenges for supported achievement by providing imminent into the nuances of rising harmonized in the software product IT sector. This study also offers essential acquaintance into the particulars of nimble scaling, emphasizing the call for of businesses to deal with these challenges to advance encoding delivering outcomes artistically.

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CYCLICALITY INFLUENCE ON THE GLOBAL TREND OF TURBULENCE FOR BUSINESS

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The purpose of this article is to investigate, in the context of global military-economic cyclicality, the impact of cyclical processes of societal development on the global trend of turbulence that determines the current business environment. The study is based on the combination of logical and historical methods, as well as on the dialectical ascent from the abstract to the concrete. The main results of the study: the essence of military-economic cycles is defined, the role of their crisis-militaristic phases in the formation of business conditions, in particular in the resolution of contradictions of competing societal organisms, and thus - reducing turbulence is substantiated; the actualization of militarization of the economy, industrialization of war and economic policy of military Keynesianism in the conditions of local-global conflict in Ukraine is shown. The value of the study lies in the forecast of the modern world-system approaching the beginning of crisis-militaristic phases in the deployment of global military-economic cycles. This process lays the foundation for the reduction of global turbulence, and thus for the transition to an upward economic environment and more favorable conditions for business.

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1 Introduction

Nowadays, business is developing in the trend of global turbulence, which is formed under the influence of a variety of socio-economic cycles - industrial, Kondratiev, hegemony cycles, long cycles of world politics, systemic cycles of capital accumulation, etc. In the modern capitalist world-system deep contradictions (inter-class, inter-country, inter-civilizational) have become more acute, which require an early resolution, which will reduce geopolitical, and hence geo-economic turbulence and move to an upward wave of the 6th Kondratiev cycle. The sustainability of the macro-environment for doing business in the context of globalization is largely determined by the cyclical dynamics of geopolitical processes. In turn, the sustainability of development at the micro-level (business) directly depends on the sustainability of the macro-level (national economy). In general, the sustainability of the modern world-system is determined by the effectiveness of overcoming its cyclical crises. Today, the world-system is experiencing increasing turbulence of cyclical geopolitical and geo-economic processes, in the development of which crisis-militaristic phases are coming, which actualizes this study. The necessity of this study is due to the fact that it forms a theoretical basis that expands the possibilities of assessing the prospects of business activities and making appropriate decisions based on the objective conditions of cyclicality of the capitalist economy, primarily military-economic cyclicality.

The methodological basis of the study consists mainly of general scientific methods. To study the influence of cyclicality on the global trend of business turbulence, first of all, logical and historical methods were used, as well as a dialectical ascent from the abstract to the concrete, including general scientific methods of analysis and synthesis, induction and deduction.

2 Literature review

The study of the influence of cyclicality on the global trend of turbulence, which determines the conditions for conducting business activities, is carried out in this article through the prism of theories of cyclicality of global political-economic and military-economic processes. This study is based on the theory of long cycles of world politics by G. Modelski and W. Thompson (Modelski, 1995), the theoretical provisions of G. Friedman (Friedman, 2021) on the influence of US institutional

cycles on the rest of the world. The increasing role of the militarization of the economy, the industrialization of war and the economic policy of Keynesianism is justified based on the scientific publications of G. Arrighi (Arrighi, 2007), P. Custers (Custers, 2010), W. McNeill (McNeill, 1982), J. Toporowski (Toporowski, 2023).

The justification of the role of crisis-militarist phases of military-economic cycles in the cyclical dynamics of the world-system and, consequently, in the changing conditions for business activities, as well as the forecast regarding their deployment in the coming years are based on the theory of long cycles of world politics by J. Modelski and W. Thompson (Modelski, 1995) and the world-system analysis by I. Wallerstein (Wallerstein, 1983; 2004).

The special role of internal cyclical processes of the modern leader of the world-system in its cyclical dynamics is characterised based mainly on the theoretical provisions of J. Friedman (Friedman, 2021) on the influence of US institutional cycles on the rest of the world.

3 Results

The specific phenomenon of geopolitical and geo-economic cyclicality, and thus turbulent conditions for business, is formed by the unity of the diversity of global socio-economic cycles. One of the most relevant forms of socio-economic cycles for all historical epochs are military-economic cycles, since it is wars (an integral component of civilizational development) - a way of redistribution of resources necessary for the process of societal reproduction. Military-economic cycles should be understood as a form of socio-economic cyclicality, which is generated by the struggle for resources that allow societal units or complex societal organisms - winners in the struggle for economic and military-political leadership - to dominate in the long term and develop successfully for some time. Each historical form of political-economic system of domination, which was established as a result of war, contained in itself the preconditions of the next war - deep socio-economic, political, civilizational contradictions. At each of the already passed stages of the historical process and today the most important phase of military-economic cycles, which performs a cycle-forming function, is the crisis-militarist phase.

The crisis-militaristic phase of the military-economic cycle should be understood as a phase of manifestation of extreme aggravation of contradictions in the system of interactions of certain competing societal organisms (states, their associations, military-political blocs, civilizations). The aggravation of such contradictions leads to a military-political conflict, the outcome of which determines the balance of power in a particular regional or global geopolitical system and creates the grounds for overcoming the systemic crisis.

During the crisis-militaristic phases of global military-economic cycles, the geopolitical system of global capitalism is plunged into the strongest instability, at the same time it is tested for strength. The unfolding of the crisis-militaristic phases of global military-economic cycles leads to the transformation of the global geopolitical system. As a result of this transformation, either a new leader of the global geopolitical system emerges, or the geopolitical strategy of the old leader, who has retained its dominance, changes. In any case, the leader of the global geopolitical system further determines the technical-technological, socio-economic, military-political, environmental and cultural guidelines of development for the whole world. In the global capitalist system, it is the sustainability of development of the hegemon state, its value orientations that determines the sustainability of all other states, in other words, the sustainability of national economies, and thus the successful development of business at the macro- and micro-level.

The unfolding of such forms of military-economic cycles as long cycles of world politics, substantiated by G. Modelski and W. Thompson, cycles of hegemony, proved by I. Wallerstein, are cyclical processes of struggle of the leading actors of geopolitics for the status of hegemon. The unfolding of the crisis-militaristic phases of the mentioned military-economic cycles culminates in the establishment of hegemony of a certain world power. In the historical retrospective of capitalism development, these were the United Provinces (Holland), the United Kingdom (Great Britain) and the United States of America.

In each case, hegemony was achieved through the Thirty Years of World War, a land war that involved (not necessarily constantly) almost all the major military powers of the era in large-scale conflicts that were extremely devastating to the land and population. These were the Thirty Years' War of 1618-1648; cycle of the Napoleonic wars 1792-1815; Euro-Asian Wars 1914-1945 (Wallerstein, 1983).

A hegemon country sets the rules of the game for the entire interstate system, dominates the world economy, it is a leader in production, trade and finance, achieves political decisions that are convenient for it, minimizes the use of military force while being militarily strong, and forms the cultural vocabulary used by the whole world (Wallerstein, 2004). In historical retrospect, it was the countries that achieved hegemonic status during their period of dominance that determined the socio-economic conditions and institutional norms of doing business internationally for the long term. This ensured a relatively stable business environment on a global scale, and hence on the macro and micro levels. Although the conditions were unequal.

Thirty-year world wars play the role of crisis-militaristic phases in the unfolding of global military-economic cycles. After the end of the next Thirty Years' World War 1914-1945, the resolution of global geopolitical contradictions was redirected to local armed conflicts. The US nuclear strike on Hiroshima and Nagasaki in 1945 and the arms race became the basis for the introduction of this approach.

4 Discussion

The latest characteristic examples of localization of geopolitical confrontation and concentration of turbulence in a certain region are the local-global conflict in Ukraine that started in February 2022 and the Israeli-Palestinian conflict that resumed in October 2023, which had a shock effect on business in Europe and other regions of the world.

In the cyclical development of global military-economic processes, according to the theory of long cycles of world politics, in 2026 will come the phase of "macro decision", which in the previous few cycles unfolded as a 30-year period of global confrontation that led to world wars (Modelski, 1995). The local-global conflict in Ukraine and the renewed Israeli-Palestinian conflict set the stage for crisis-militaristic phases of global military-economic cycles, namely: "intermediate war" that stimulates the economy at the beginning of the upswing phase of the 6th Kondratiev cycle; the " macro decision" phase of the modern long cycle of world politics; the "Thirty Years World War" phase of the modern hegemony cycle, and the territorialism (material expansion) phase of the systemic capital accumulation cycle.

The onset of crisis-militaristic phases in the unfolding of global cycles increases the instability of the business environment, which negatively affects business activity during the crisis. To achieve their geopolitical goals, the leading actors of geopolitics carry out controlled chaos of the world-system, thus destabilizing the political and economic systems of their competitors. That is, they create artificial entropy, generating contradictions that unbalance the world-system and disrupt the established global value chains, which has an extremely negative impact on doing business at the global, macro- and micro-levels. However, it is during the unfolding of crisis-military phases that the ways of resolving the contradictions of the world-system are determined, which lays the foundation for upward trends in the economy. In addition, the military-industrial complex becomes a growth driver, and military Keynesianism is applied to overcome the socio-economic crisis.

The industrialization of war was largely responsible for the successful development of capitalism in Europe and the United States. W. McNeil (1982), referring to the century and a half before the Industrial Revolution, believed that Europe entered a self-evolving cycle, when its military structures supported economic and political expansion at the expense of other peoples and states, and the military structures themselves were supported by this expansion. It was the industrialization of war that gave a powerful new impetus to the self-evolving cycle (Arrighi, 2007). In the first half of the twentieth century, as a result of two world wars, which caused significant damage to the European economy, Western Europe lost its leading role in the geopolitical system, the unfolding of the above-mentioned self-evolving cycle was slowed down and took a hybrid form.

As part of the economic policy of military Keynesianism, the government has been spending heavily on the military to stimulate economic growth, as well as using a variety of measures to encourage other countries to buy weapons from domestic manufacturers (Custers, 2010). The war in Ukraine has been the reason for the increased supply of military equipment, ammunition and military related products to Ukraine by Western countries. Western governments committed themselves to increasing defense spending. It has become necessary to invest in new capacities of the military-industrial complex. Arms manufacturers are demanding that the government guarantee the profitability of their investments. It is the alliance between industry and the state that lies at the heart of military Keynesianism. At the same time, intensified sanctions policies disrupt international free trade, interfere with

international payments, and accelerate food and energy price inflation (Toporowski, 2023). In the current conditions of aggravation of confrontation between the leading actors of geopolitics and their allies, the capitalist world-system has become on the path of militarization. That is, a new cycle of militarization of the global economy is open, which means the intensification of the application of the economic policy of military Keynesianism.

The leader of the modern capitalist world-system is the USA. Therefore, the political cycles of this superpower, in particular the foreign policy cycles of F. Klingberg, as well as the institutional and socio-economic cycles identified by G. Friedman, affect the deployment of cyclical geopolitical and geo-economic processes, and thus the business environment.

Institutional cycles in the U.S. were triggered by wars: American War of Independence, the Civil War, and World War II. In total, three such cycles have unfolded. The fourth institutional cycle will begin around 2025. These cycles have inevitably affected and continue to affect the rest of the world (Friedman, 2021). Therefore, the nature of cyclical military-economic processes, and thus the global economic environment, in the near future largely depends on whether and what kind of institutional cycle will continue to exist in the United States. The current socio-political crisis in the U.S. is so large that it is quite capable of leading to an internal societal catastrophe with a military component, or to a world war in hybrid form, which will initiate the deployment of another 80-year institutional cycle. The turbulence of the political and economic system of the hegemon of the modern world-system causes unstable and high-risk conditions of doing business, leads to the redistribution of spheres of influence, and thus to the possibilities of surplus value production.

5 Conclusions

It has been established that under any of the possible variants of transformation of the global geopolitical system in the future, military-economic processes will proceed in cyclical form, as internal antagonistic contradictions of societal development exist as long as there is class, inter-country, inter-civilizational inequality. This means that cyclical processes will have an impact on business development, periodically plunging it into severe turbulence. The unfolding of crisis-militaristic phases of

modern military-economic cycles will probably result in a choice between two forms of global geopolitical system: (1) a world-system dominated by one hegemon country; or (2) a world-system led by a collective leader.

The transformation of the global geopolitical system into a system in which the antagonism between social classes, antagonism between the actors of geopolitics is smoothed, will significantly increase its sustainability, which will ensure sustainable development of individuals, organizations, business units and the entire global civilization. To mitigate antagonism at the global, national and micro levels, it is necessary to consolidate the efforts of the social class that possesses economic and political power sufficient to set the guidelines of socio-economic development, political life, ideology and manage societal development, not allowing it to deviate significantly from these guidelines. In the capitalist world-system such social class has an international character, its basis is formed by representatives of big business. Today, the contradictions between big business, oriented to use the opportunities provided by military Keynesianism, and big business in civilian sectors of the economy have become more acute. For the former, the period of turbulence generated by the crisis-militaristic phases of military-economic cycles provides growth opportunities, while for the latter, it disrupts the established global and local value chains and threatens ruin. Therefore, consensus within the backbone of the ruling class - big business - is inevitable, the only question is its form.

The theoretical provisions outlined in this article are particularly important in the context of making business decisions in the conditions of transition to the crisis-militaristic stage of societal development.

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Strategic Insights: How Environmental, Social, And Governance Factors Shape Portfolio Investments

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This study aims to explore the intricate effects of environmental, social, and governance (ESG) factors on investment portfolios using a meta-analysis and meta-regression methodology. The objective is to gain insights into how ESG factors impact both investors and companies, contributing to a nuanced understanding of the relationship between financial performance and responsible business practices. Utilizing meta-analysis and meta-regression techniques, the study systematically analyzes a wide array of literature on the impact of ESG factors on investment portfolios, aggregating empirical studies, case analyses, and theoretical frameworks from academic journals and industry reports to identify patterns and trends through rigorous meta-regression analysis. The findings of this study provide compelling evidence in support of a sustainable performance premium associated with companies prioritizing robust ESG practices. Companies with higher ESG ratings consistently demonstrate sustainability, effective risk management, and strong financial performance. The meta-analysis highlights the significant influence of institutional investors, regulatory developments on ESG disclosures, and sector-specific nuances, enabling investors to capitalize on the advantages of sustainable performance and risk mitigation linked to ESG factors. The study suggests that aligning with robust ESG practices can help corporations attract institutional capital, navigate regulations, and inform policymakers about frameworks promoting responsible investments and sustainable practices.

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1 Introduction

In today's financial environment, the integration of Environmental, Social, and Governance (ESG) aspects into investment decisions signifies more than just a transitional phase it reflects a fundamental shift in how investors assess risk, return, and overall impact. The "E" in ESG evaluates a company's environmental impact, including efforts beyond compliance to address climate change, resource conservation, and ecological footprint. Governance ("G") assesses internal directives and structures, including decision-making transparency, board autonomy, and executive compensation alignment with long-term performance. Incorporating ESG into investments extends beyond ethical considerations; it strategically enhances long-term outcomes and risk management. Companies with strong ESG practices are perceived as resilient to environmental challenges, adept at managing social complexities, and committed to ethical governance. This trend is reshaping the investment landscape as capital flows into ESG-focused funds, offering companies with high ESG ratings improved access to capital and a competitive edge. This shift represents a fusion of financial expertise and responsibility, compelling investors to consider broader implications beyond profit margins. As the financial sphere embraces this paradigm, exploring the impact of ESG on investment portfolios prompts us to align investments not only with financial objectives but also with a vision for a more sustainable and equitable future.

2 Literature review and meta-analysis

Previous research (Wan et al., 2023), (Parikh et al., 2023), (Park & Oh, 2022), (Bermejo Climent et al., 2021), (De Souza Barbosa et al., 2023), (Naffa & Fain, 2022), (Iazzolino et al., 2023) and (Keeley et al., 2022) consistently demonstrates a positive correlation between companies with strong Environmental, Social, and Governance (ESG) practices and financial performance. Numerous studies, including those by MSCI and Harvard Business Review, indicate that companies with high ESG ratings frequently outperform their lower-rated competitors over the long term. This sustainable performance is attributed to factors such as risk mitigation, operational efficiency, and enhanced stakeholder trust. Empirical findings from meta-analyses on ESG highlight its profound impact on financial markets, emphasizing the constructive role of governance and the complex consequences of environmental factors. Socially conscious funds demonstrate merit despite associated costs, and

global ESG integration enhances resilience and financial sustainability during times of turmoil. Recommendations include prioritizing governance and environmental aspects while acknowledging the complexity of the international landscape. However, limitations arise due to the imperative demand for standardized ESG assessments and potential biases that may compromise the evaluation of environmental and social characteristics. In this table, we present some works related to the impact of ESG factors on portfolio investments. Throughout this table, we elaborate on the author, year, variables, methods, and findings used by the authors in their scholarly papers.

Table 1: Meta-Analysis of existing studies related to the How Environmental, Social, and Governance Factors Shape Portfolio Investments

Authors	Year	Variables	Methods	Empirical Findings
(Wan et al., 2023)	2023	Philosophy of the ESG system, factors affecting ESG, the financial outcomes of ESG, the association between ESG and corporate social responsibility (CSR), and ESG investing	Bibliometric analysis	Many studies are increasingly focusing on the influence of ESG behavior on a firm's risk, capital cost, performance, and value
(Parikh et al., 2023)	2023	MarketCap, ROI, E-factor, S-factor, G-factor	Multiple linear regression analysis	The G factor is the sole factor that contributes to positive returns for shareholders. The insignificance of the S factor for the creation of equity returns, especially in the short run. The E factor leads to negative returns due to additional investments by a company that may not help in the creation of any revenue.
(Becchetti et al., 2015)	2015	Investment Area, Investment Size, socially the performance of responsible funds (SRFs), the performance of conventional funds (CFs)	Matching approach, recursive analysis	There is no clear-cut dominance over the entire period and in all segments of one investment style over the other. All the considered approaches seem to indicate that SRFs generally do better than CFs in the period following the global financial crisis.
(Park & Oh, 2022)	2022	Risk Management View, Information	The Unified Theory of Acceptance	Individual investors might not look resourceful as individuals, but their influence on the financial market

Authors	Year	Variables	Methods	Empirical Findings
		that Individual Investors Use, Integration of ESG Information in Investment Decisions	and Use of Technology (UTAUT) model	can be significant. ESG management is no longer a matter of choice, but an innovative process for investors' investment decisions.
(Bermejo Climent et al., 2021)	2021	Rb,t MKTval, BTM, PER, EVEBIT, EVEBITDA, GPA, ROC, ROCD, MOM, Global Disclosure, Environmental Disclosure, Social Disclosure, Governance Disclosure	Model approach with Mac-Beth regressions	The results show that the impact of governance and environmental disclosure on portfolio returns is predominantly positive, but the effect on volatility changes over time. The positive effect of the social pillar on portfolio volatility is not robust when later subsamples are considered.
(Zehir & Aybars, 2020)	2020	ESG data and Stock Market data, which covers the period between 2004 and 2018,	Capital asset pricing model (CAPM) and Fama-French three-factor model	The results strongly suggest that using ESG based scores, two portfolios underperform the market index. The results of the three-factor model indicate that the performances of ESG and GOV portfolios outperform the market excess return by 0.57% and 0.53%, respectively.
(De Souza Barbosa et al., 2023)	2023	Environmental, Social, and Governance (ESG) criteria	Preferred Report Items for Systematic Reviews and Meta-analysis (PRISMA), and a critical analysis.	The integration of ESG criteria, observed from different perspectives, strengthens corporate sustainability performance. The present study concludes that companies, regardless of nationality, follow the guidelines of ESG criteria integration, and such a procedure brings several benefits.
(Whelan et al., 2015)	2025	ESG issues, ESG data shortcomings, and confusion regarding different ESG investing strategies.	Meta-analysis	This study found positive correlations between ESG performance and operational efficiencies, stock performance, and lower cost of capital.
(Naffa & Fain, 2022)	2022	Beta, Value, Momentum Size, Volatility, Liquidity Profitability, Growth, Investment,	Fama-French (FF) spanning regressions, GMM-IV estimator	ESG leader portfolios realized significant negative risk-adjusted returns, though the results are not robust. The environmental follower portfolio showed positive risk-adjusted performance, as results were significant for four model

Authors	Year	Variables	Methods	Empirical Findings
		Leverage, Earnings variability Environment (E), Social (S), Governance (G)		specifications, yet the model failed in the robustness checks.
(Iazzolino et al., 2023)	2023	Total Assets, Total Equity, Earnings Before Interest Tax Depreciation Amortization (EBITDA), Revenues, ESG scores.	Multi-sectoral analysis	The study finds that that ESGs impact on firm efficiency differently over sectors: some of them are more sensitive than others to ESG factors.
(Keeley et al., 2022)	2022	ESG scores of invested companies, total market prices of invested companies, and investor history portfolio reports.	The ultimate ESG ownership analysis	The results show that developed nations need policies to support the consequences of the pandemic, while the pandemic has caused many threats to social life in developing countries.

Source: Data processing by authors (2024)

Numerous research studies examining the impact of environmental, social, and governance (ESG) factors on investments confirm their importance, standardize the behavior of publicly listed companies, and offer valuable insights for financial markets. Specific factors, such as corporate governance, have a positive impact on capital returns, while the environment has a detrimental effect, and social factors demonstrate limited importance. The ESG results have a significant impact on stock returns, with governance yielding the highest results and the environment averaging lower. By effectively integrating ESG into risk management, alongside transparent disclosure and sustainable practices, investors can reduce costs associated with information processing. Governance characteristics strongly influence investment portfolio performance, while environmental and social attributes may be subject to bias, highlighting the need for standardized ESG assessments. Interestingly, socially responsible investing (SRI) does not show a clear correlation with portfolio performance. However, over long time periods, ESG investments have proven to be effective in performance and offer protection during crises. Although ESG portfolios may not generate significant returns, they serve as indicators for capturing sustainability risk drivers. ESG factors impact firms' efficiency differently across sectors, providing guidance for creating efficient investment portfolios. Investors prioritize environmental and governance factors when making investment decisions.

The international model for ESG investment reveals strong regional links and variations in investment models.

3 Scientific research methodology

This paper applied the qualitative and quantitative methods of scientific research. The meta-analysis method was applied using the qualitative approach, while the meta-regression method was applied through the quantitative approach. The process of gathering and evaluating data for a meta-analysis is of critical importance, as it is one of the most significant factors that can contribute to analytical success. In general, a total of 20 journals were selected, in addition to online libraries and publishing platforms, namely Elsevier, ResearchGate, and Springer, etc. There were 20 papers with 28 studies selected from the year 2015 to the year 2023, from which the data ranged from 2015 to 2023. Finally, many of the same authors frequently use statistically significant results in various ways in works like working papers and journal articles. At the end of the review process, the final data for the meta-analysis officially consisted of 14 papers, of which 20 studies served as observations for this meta-analysis. The time period also remained unchanged, as it now covers research from 2015 to 2023.

4 Results of meta – regression analysis

During a comprehensive exploration of Environmental, Social, and Governance (ESG) elements across five research papers, a consistent theme emerges: ESG is crucial for sustainable corporate growth. Studies conducted on Chinese listed companies from 2015 to 2021 collectively affirm the positive impact of ESG performance on corporate financial well-being, firm value, and profitability. Digital transformation is recognized as a moderating factor contributing to sustainability expansion. Aligned with stakeholder theory, the first paper emphasizes positive links between ESG, firm value, and profitability. Recommendations include the need to support ESG policies, mobilize resources, and conduct thorough examinations of causal factors affecting the ESG effect on financial performance. The research acknowledges several limitations, such as focusing on specific industries and data collection constraints, directing attention towards future research priorities, and underscoring the importance of expanding the field to include unlisted and small-medium enterprises (Wu, 2023). The second paper delves into the impact of ESG

performance on firm value and profitability, revealing a strong and comprehensive relationship, except for the environmental aspect. Possible explanations for the lack of correlation with the environment are explored, such as longer-term horizons required for results and high investment costs. The study also addresses ESG implications during economic crises, suggesting potential protection against negative risks. Recommendations echo the need for policy support, resource mobilization, and further exploration of causal factors affecting the role of ESG in financial performance (Fu & Li, 2023) In the third study, the positive influence of ESG practices on strong accountability and stakeholder relations is highlighted, supporting stakeholder theory. Practical implications underscore advantages for managers and their impact on trading processes for investors seeking returns from ESG-focused businesses (Siwei & Chalermkiat, 2023). The fourth research paper, using regression analysis, demonstrates that improving ESG performance leads to reduced borrowing costs and increased market value, with borrowing costs mediating the market value effect. Policy focus, proactive ESG management by corporations, and institutional exploration of ESG-based investment strategies are considered fundamental (Habib & Mourad, 2023). In the fifth study, which focuses on publicly listed companies, the beneficial effects of ESG on lowering borrowing costs and increasing market value are identified, with state and non-state capital mediating these intermediary effects. The paper concludes by urging policymakers, corporations, and investors to consider ESG when making decisions and developing investment strategies (Aydoğmuş et al., 2022).

Table 2: Meta-Regression of existing studies related to the effects of the COVID-19 pandemic on financial markets

Authors	Variables*	No. of observations	Regression Coefficients	Std. Error	P-Value	R^2
(Wu, 2023)	Receivable Turnover Ratio (C.V)	100	(.120)	.036	.001	.248
	Inventory Turnover (C.V)	100	(.022)	.010	.030	.248
	EPS (I.V)	100	.189	.086	.032	.248
	ESG Score (C.V)	100	(.389)	.193	.048	.248
(Fu & Li, 2023)	Financial performance ROA (D.V)	15710	(- 0.543)	6.589	0.034	0.819
	ESG (I.V)	15710	0.894	1.113	0.047	0.138
	Firm size	15710	1.047	1.302	0.045	0.138
	Debt level (C.V)	15710	(3.998)	0.561	0.100	0.138

Authors	Variables*	No. of observations	Regression Coefficients	Std. Error	P-Value	R^2
	Operating leverage (C.V)	15710	0.130	1.193	0.041	0.138
	Firm age (C.V)	15710	(0.565)	0.245	0.205	0.138
	Cash flow (C.V)	15710	(1.199)	0.107	0.463	0.138
	Equity restriction ratio (C.V)	15710	0.113	0.788	0.062	0.138
	Executive compensation (C.V)	15710	(0.203)	0.699	0.071	0.138
	Regional development level (C.V)	15710	(0.000)	30726	0.000	0.138
(Siwei & Chalermkiat, 2023)	Tobin's Q (D.V)	325	-	2.078	-	0.424
	ESG (I.V)	326	0.153	0.905	0.0498	0.424
	Reputation (C.V)	326	(0.166)	2.421	0.0313	0.424
	Size (C.V)	326	(0.274)	1.802	0.0495	0.424
	Revenue growth (C.V)	357	0.00162	48.64	0.000717	0.424
	BTMV (C.V)	326	0.0000	0	-	0.424
	Covid-19 (C.V)	376	0.0498	0.434	-	0.424
	Ownership (C.V)	310	(0.233)	0.491	0.0854	0.424
	Cost of debt (C.V)	326	(2.285)	0.0300	-	0.424
(Habib & Mourad, 2023)	Market Value (D.V)	1612	(0.034)	1.007	0.040	0.154
	Total enterprise values (D.V)	1612	0.023	0.721	0.044	0.254
	Tobin's Q ratio (D.V)	1612	(0.022)	1.278	0.053	0.451
	ESG (I.V)	1612	0.516	0.622	0.055	0.451
	ENV (I.V)	1612	0.022	1.630	0.015	0.451
	SOC (I.V)	1612	0.130	1.035	0.022	0.451
	GOV (I.V)	1612	0.334		0.074	0.451
	SIZE (C.V)	1612	(0.736)	1.388	0.097	0.451
	AGE (C.V)	1612	(1.472)	1.346	0.456	0.451
	LEV (C.V)	1612	(0.085)	1.031	0.048	0.451
(Aydoğmuş et al., 2022)	Tobin's Q (D.V)	14043	-	2.963	<0.001	-
	Return on Assets -ROA (D.V)	14018	-	11.413	<0.001	-
	ESG Combined Score-ESG_CS (I.V)	14043	0.008	25.855	0.002	-
	Environment score-ENV (I.V)	14043	0.002	31.715	0.002	-
	Social score-SOC (I.V)	14043	0.008	29.756	0.002	-

Authors	Variables*	No. of observations	Regression Coefficients	Std. Error	P-Value	R^2
	Governance score- GOV (I.V)	14043	0.004	29.035	0.002	-
	Logarithm of Total Assets – Size, Log_TASST (C.V)	14043	(0.498)	2.626	0.064	-
	Leverage Total – TDTA (C.V)	14043	(0.920)	0.203	0.443	-

Source: Data processing by authors (2024)
*Explanation: (D.V) - Dependent Variable, (I.V) - Independent Variable

Based on the results from the meta-regression analysis, we can conclude that five academic studies collectively underscore the crucial role of Environmental, Social, and Governance (ESG) elements in advancing corporate sustainability. Covering research conducted on publicly traded Chinese firms from 2015 to 2021, the studies consistently demonstrate a favorable impact of ESG performance on financial well-being, firm value, and profitability. The influence of digital transformation emerges as a moderating factor affecting the relationship between ESG and financial performance, contributing to sustainable growth. The research provides support for stakeholder theory, which highlights positive links between ESG, firm value, and profitability. Recommendations include the implementation of policy measures, mobilization of resources, and further exploration of causal factors influencing the impact of ESG on financial performance. Despite limitations such as focusing on specific industries and constraints in data collection, these areas suggest opportunities for future research. The collective studies emphasize the importance of analyzing specific industries and considering unlisted and small-medium enterprises. The research also shows that different ESG factors have different effects. For example, the environmental factor has complex relationships because it has longer-term effects and high investment costs. Findings also extend to the implications of ESG during economic crises, indicating potential protection against downturns. As a whole, the research supports putting in place policies, getting resources together, and continuing to look into how to better understand and use ESG practices in different situations. It stresses how important these practices are in both theory and practice for improving financial performance, firm value, and profitability.

5 Discussion

Research on the relationship between Environmental, Social, and Governance (ESG) performance and corporate and financial outcomes offers profound insights into contemporary business practices. The consistent findings across studies confirm that robust ESG performance has a positive impact on various aspects of firm performance, including but not limited to firm value, profitability, and financial efficiency. These results resonate strongly with stakeholder theory, which posits that businesses should consider the interests of all stakeholders, not just shareholders, in decision-making processes. These findings have implications that extend beyond individual firms and into the broader corporate landscape. They underscore the significance of ESG integration in corporate strategies, emphasizing its role in fostering sustainable development and enhancing long-term value creation. However, the realization of these benefits hinges on effective policy measures and resource allocation. Policymakers play a pivotal role in creating an enabling environment for ESG practices by implementing regulations, incentivizing responsible behaviors, and fostering collaboration between stakeholders.

Moreover, the research sheds light on the potential advantages of incorporating ESG criteria into investment decision-making processes. Investors are increasingly recognizing the importance of ESG factors in assessing risk and identifying opportunities. By considering ESG considerations, investors can not only improve financial performance but also contribute to positive social and environmental outcomes. Nonetheless, challenges persist in this domain, including the lack of standardized methodologies for ESG assessment and reporting. Addressing these challenges requires concerted efforts from both the public and private sectors. Furthermore, the sector-specific nuances highlighted in the research underscore the need for tailored approaches to ESG integration. Different industries face distinct challenges and opportunities concerning ESG factors, necessitating customized strategies and metrics. Future research endeavors should thus prioritize sector-specific analyses to provide targeted insights and recommendations for companies and investors.

6 Conclusion and recommendations

In conclusion, the empirical evidence from research on ESG performance underscores its critical role in shaping corporate and financial outcomes. The positive correlation between ESG practices and financial performance reaffirms the importance of responsible business practices in value creation. Stakeholder theory finds robust support, emphasizing the broader societal benefits of ESG integration beyond financial returns. To harness the full potential of ESG practices, stakeholders must collaborate to address existing challenges and limitations. Policymakers should prioritize the development of transparent and standardized reporting frameworks to facilitate informed decision-making. Additionally, ongoing dialogue between academia, industry, and regulatory bodies is essential to refine ESG assessment methodologies and address emerging issues effectively.

For companies and investors, the findings offer practical implications for integrating ESG considerations into decision-making processes. By prioritizing ESG performance, companies can enhance their competitiveness, attract investment, and contribute to sustainable development. Similarly, investors can leverage ESG criteria to build resilient portfolios that align with their values and long-term objectives. In essence, the insights garnered from research on ESG performance underscore its pivotal role in shaping the future of business and finance. By embracing ESG principles, stakeholders can pave the way for a more sustainable and inclusive global economy.

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THE ROLE OF PSYCHOLOGICAL MENTAL HEALTH OF STUDENTS INFLUENCES SUSTAINABLE ENVIRONMENT (CASE: HUNGARIAN ECONOMIC UNIVERSITIES)

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Young students start new phase of their lives at university after finishing secondary school. Like any transition in life, the period after leaving high school can be a shock and a crisis. The many changes, the many places to fit in and the start of independent life all coincide, and this can cause considerable anxiety for young people, as most of them are starting their independent lives at this time. These students will be workers in the future carrying these effects with them. The aim of this study is to understand the mental health status and problems of first-year students currently enrolled for three undergraduate business courses in Budapest, in Hungary. This research used the EPOCH model and the validated EPOCH-H questionnaire. According to the results, the mental health of students needs to be strengthened in typical teaching processes, and the preservation and improvement of students' mental health should be in the major focus of attention for all higher education institutions in the future. The results of the study show that mental health has a significant impact on student well-being and consequently influences sustainability. The results of the study will be continuously updated as the survey is conducted every semester.

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1 Introduction

For first-year students, university opens door to a new world, successfully applying and starting university is one of the most decisive moments of their lives. Young students, after having left secondary school, start a new phase in their lives. It is also an important step in the journey to adulthood, which is not experienced in the same way by all the young people. As with all life transitions, the period after leaving secondary school can be a crisis. It means quarterlife crisis (Agarwal et al., 2020; Robinson et al., 2021). In general, the process of becoming independent from the family is being accelerated and an independent self-image is formed. Friends from the secondary school no longer provide security: new relationships are formed in the new, unfamiliar environment, and a new life way becomes dominant (Nagyné Kricsfalussy, 2017; Leist Balogh & Jámbori, 2016). Some students become anxious in unfamiliar surroundings and cannot cope with the seemingly limitless freedom. They feel lost in the big university organisation. The transparent and manageable classroom community is replaced by hundreds of students at the lectures. University lecturers no longer know students personally, as in a semester a lecturer meets hundreds, sometimes thousands of students, minimising the time spent on one student. In addition to the above problems, a significant proportion of students also need to generate the financial resources to support themselves while studying. Consequently, they are new students at universities and new entrants to the labour market at the same time, and they have to respond to both factors simultaneously. This can again create a serious crisis situation for young people. Therefore, the quarterlife crisis can start at this stage of life and cause a serious crisis for the students. All the changes, the need to fit in many places and the start of independent life coincide, and it can cause considerable anxiety for young people, as most of them are starting their independent lives at this time.

A further mental strain is that for some young people, university life is associated with a sense of boundless freedom, for example, there are no strict obligations during the academic year, no constant and ad-hoc exams, no compulsory attendance at lectures, which can be amazing for the students concerned in the first period. It is the period of parental relaxation control and huge parties. In this case, a new problem may appear in their lives, the question of harmful addictions and dependencies may arise: alcohol and drugs to relax, then pills to get through the day or prepare for exams.

Sustainable development encompasses three key areas: economic, environmental and social. Social sustainability involves a focus on the well-being of people and communities. This paper explores the mental health of first-year students in Budapest. The research question is the following: What is the psychological well-being of first-year students at economic universities in Hungary?

The rest of the study is structured as follows. Section 2 provides shortly the major national and international literatures. Section 3 covers the data sources as well as the method of analysis. Section 4 presents the statistical analysis and results, while Section 5 discusses the opportunities in international context. Finally, Section 6 concludes.

2 Theoretical Background

The transition from secondary school to university is in itself a major life change and source of stress, which can be associated with adjustment problems (Fisher & Hood, 1987). One of the fundamental reasons for this is that there are important differences between the educational approaches of secondary schools and universities. While secondary education tends to take a top-down approach, which means that students have little control and limited influence over decisions about curriculum, courses or the timing of their school work. In contrast, university programs give students greater freedom to make personal decisions about subjects, exam timetables or joining student groups (Jagodics & Szabó, 2023).

To look at the secondary sources, it can be seen that there is a growing body of academic literature on mental health problems and psychiatric morbidity among university students.

The results of many authors (Andrade et al., 2023; Bhama, 2022; Bogdan & Lomakovych, 2021; Hukom & Lubis, 2023; Joshipura & Lamba, 2023; Kim et al., 2023; Kitukutha et al., 2021; Storonyanska et al., 2021; Volosovych et al., 2021) show the negative impact of COVID-19 on society and the economy. Similar findings are obtained by Ginevičius et al. (2022), Mishchuk et al. (2023), Streimikiene, (2022) and Aguayo-Estremera et al. (2023).

Initially, symptoms of burnout were observed in health and social workers, members of self-help groups and crisis intervention centre staff. Later researches have also identified burnout in other professions that actively interact with people, such as teachers, lawyers and police officers. Most studies on burnout are related to these fields (Heinemann & Heinemann, 2017; Fontes, 2020). According to Jagodics and Szabó (2023) burnout research extended beyond different professions to educational contexts as well. The study of factors contributing to undesirable student outcomes in higher education is becoming increasingly important. According to research by Schaufeli et al. (2002), student burnout can be described along three main symptoms: exhaustion caused by academic demands, cynical attitudes towards learning and academic goals, and feelings of incompetence and reduced performance.

Based on their descriptive analysis and bivariate linear regression calculations, Khan et al. (2020) found that among college and university students in Bangladesh, 28.5% of respondents had stress, 33.3% had anxiety, and 46.9% had depression ranging from mild to extremely severe. Husky et al. (2020) researched the mental health of French university students during the pandemic. Their research involved students from social sciences, health sciences, engineering, law and economics. They found increased anxiety and moderate to severe stress.

In their study, Muaddi et al. (2023) assessed the burnout among medical students during the COVID-19 pandemic. They found that the prevalence of burnout was high among medical students at Jazan University. Szigeti et al. (2023) surveyed 410 university human resources students and their research results can be used in educational development.

3 Methodology

This study presents the partial results of a complex, multiannual research series. This publication is a continuation of a study conducted in February 2020, whose results have already been published by Vágány (2021a). Our quantitative questionnaire research method has focused on the data collection of students enrolled in the undergraduate business education in Budapest. The questionnaire was filled in by first-year full-time students (1,170 students), bachelor of economics studies, at three universities.

The authors used a questionnaire that has been validated both abroad and in Hungary (they used different methods to check that the questionnaire really measures what it was designed to measure). The overall questionnaire consisted of mostly closed and two open questions. Responses were voluntary and anonymous. Data collection was self-completed via an online interface use by Google Form, which included instructions for completion. The questionnaire consisted of 80 questions in four main sections.

1. EPOCH questionnaire (Hungarian validated version: EPOCH-H): Psychological well-being is one of the most important research areas in positive psychology, but adolescents are not expected to have fully developed the components of psychological well-being at an early age. This challenge is addressed by the EPOCH questionnaire (Láng, 2019). The dimensions represented in the EPOCH model describe the adolescent who will be able to soar as an adult, taking into account the age-specific characteristics of adolescence.
2. Attachment Style Questionnaire (ASQ) (Feeney et al., 1994), Hungarian validated version: ASQ-H (Hámori et al., 2016).
3. Assessment of students' competences.
4. Examination of positive and negative factors of the coronavirus pandemic.

This article focuses on the 1st and 4th topic. Data collection took place between 1 September 2022 and 30 November 2022. Based on the evaluable feedback of 1,170 students, a total of 8 main groups of factors were affected by the negative impact of the coronavirus pandemic (marked with N), therefore what it took away from students (A-H). Subgroups (1-6) have been identified within each main groups.

These indicate that the pandemic has taken away some things from the students (Table 1).

Table 1: The main groups and subgroups of what the pandemic has taken away from the students

A. Personal characteristics					
1. Freedom, sense of freedom, spontaneity,	2. Sense of safety, stability, comfort,	3. Positive outlook, optimism, enthusiasm,	4. Calmness, patience, tolerance, faith in the	5. Motivation, momentum, energy, perseverance,	6. Mental health, love of life, physical and mental

informality, liberation, unrestraint	confidence, self-assurance, predictability, planning	cheerfulness, happiness, openness	world, view of people	diligence, helpfulness	balance, hope, common sense, plans, vision, possibilities, dreams
B. Programmes that are precious to the student					
1. Opportunities and memories of 'once in a lifetime' (e.g. big wedding, graduation, serenade, freshman camp, childhood, young years, tradition high school graduation)	2. Parties, fun, leisure, experiences, recreation, events, festivals, games, hobbies	3. Travel, holidays, excursions	4. Sports, exercise, training, professional competition, careers in sport		
C. Social environment					
1. Personal contact (with family, friends, partner, child, colleagues), social life, physical touching of people, hugging, personal contact with classmates, personal education, oral exams	2. Love, partner (break-up, divorce)	3. Love, partner, family member (loss, death)	4. Possibility of relationship and future love		
D. Work environment					
1. Job, workplace, income (lost, reduced), standard of living, existence, financial security, financial well-being, lifestyle, savings		2. New job and employment opportunities, higher income opportunities, business and career opportunities, professional development, internships abroad, exchange programmes, scholarships (e.g. Erasmus)			
E. University environment					
1. University life, experiences, atmosphere, daily school attendance					
F. Normal daily life					
1. Habitual system, regularity, routine, way of life, smooth running of the world, comfort, home, independence, privacy, previous life (e.g. rent, dormitory), normal, comfortable and orderly everyday life, balance, hustle and bustle, activity, rhythm of life, dynamism, spin, rush, stress, tension, anxiety, difficulties, time					
G. Other factors					
1. Health, sense of smell, sense of taste, fresh air, life without a mask, need to conform, dependence on family and others, child self, health care, shape, healthy lifestyle, make-up, everything					
H. Nothing					

In total, seven major groups of factors were defined by the positive effect (P) of the coronavirus pandemic, i.e. what it has given to students. Within each major group (A-G), the paper identified several subgroups (1-5). The pandemic has provided students with the following positive factors (Table 2).

Table 2: The main groups and subgroups of what the pandemic has given to the students

A. Changes in self and environment				
1. Being at home more, having more free time, rest, sleep, more time for themselves (health, weight loss, studying, hiking, hobbies, sports, reading, crafts, computer games)	2. Self-time, reflection, peace of mind, recharging, self-awareness, found self, physical-mental change, harmonious sense of life, personality development, change of attitude, new values, appreciation of what is important in life and small pleasures, redefined perception of life, rethinking life, better appreciation of human relationships, touch, better attention to the environment (home, hygiene, safety), the world and people have changed (caution, sticking together), better air, nature has regenerated	3. Awareness, perseverance, diligence, self-reliance, focus, confidence, determination, stronger, more mature, calmer and less stressful life, patience, slowed down, adapting, calming down, quieting down, experience, discipline, balance, hope	4. Previous goals have changed: new goals, plans, life, tasks, opportunities, having children, normal life, new living place	5. Completed and achieved plans, studies in university
B. Work environment				
1. New job, income, internship, fellowship, better performance at work, more space, success at work, new position		2. Better work (home office, home school), work-family balance, better time management, flexibility	3. Better money management, savings	
C. Social environment				
1. Spend more time with family and friends (even online), more time with his/her pets		2. Improved and closer relationships with family, friends, people, who are real friends, living together with partner	3. New love, meet new people and new friends, new pets, car	
D. Educational environment				
1. Better grades, easier and successful semester, successful high-school graduation		2. Online education, changed exams, less travel and commuting, better use of technology and online space		

E. Other factors				
1. Many things, health care changes, free parking, vaccination certificate, wearing a mask				
F. He/she sees only negative things instead of positive ones				
1. Worse job, disadvantage at work	2. Broken family and relationship, less time together, bad friendships	3. Boredom, loneliness, isolation, being alone	4. Strange situation, confusion, chaos, disappointment, uncertainty, fear, dread, bad mood, hating the mask and people, instability, lost youth, unable to make friends, difficulties, hardship, stress, tension, anxiety	5. Illness, giving up, harmful addiction (smoking, alcohol), obesity, suffering, mental breakdown, depression, insanity, nervous panic attack
G. Nothing				

4 Results

The questionnaire was completed by 792 women (67.7%) and 378 (32.3%) men. 84% of respondents are aged 18-24 and 7% are aged 25-30. The two oldest age groups have the lowest number of respondents. Three respondents are in the 45-50 age group and two respondents are in the 50+ age group. Nearly half of the respondents live in Budapest (47%), while the rest live in a county town (8,5%), rural town (30,8%) or village (13.8%). The questionnaire consisted of 80 questions in four main sections.

The open responses given by students from the above groups of factors were as follows:

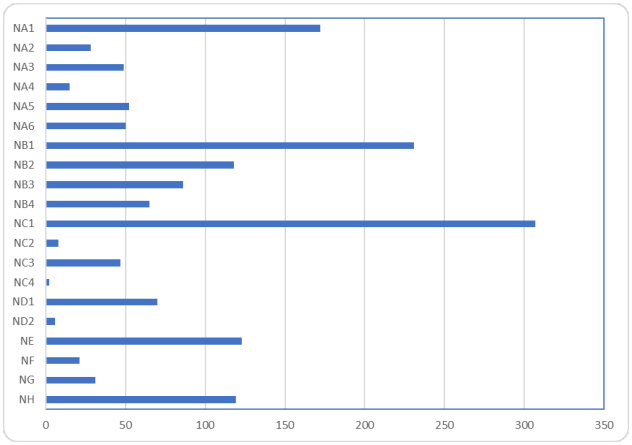

Figure 1: The main groups and subgroups of what the pandemic has taken away from the students

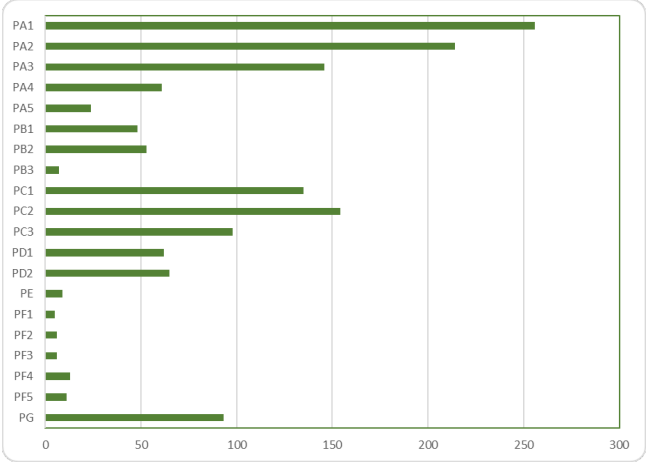

Figure 2: Main groups and subgroups of positive factors

Based on the above, the following top three factors were taken away from first-year students by coronavirus (1. most mentioned):

- NC1: Personal contact (with family, friends, partner, child, colleagues), social life, physical touching of people, hugging, personal contact with classmates, personal education, oral exams.

- NB1: "Once in a lifetime" opportunities, memories (e.g. big wedding, graduation, serenade, freshman camp, childhood, young years, high school/university graduation), traditional oral graduation.
- NA1: Freedom, a sense of freedom, spontaneity, informality, liberation, autonomy, unrestraint.

The following top three factors were given by the pandemic to first year students:

- PA1: Being at home more, having more free time, rest, sleep, more time for themselves (health, weight loss, studying, hiking, hobbies, sports, reading, crafts, computer games).
- PA2: Self-time, reflection, peace of mind, recharging, self-awareness, changed, found self, physical-mental change, harmonious sense of life, personality development, change of attitude, appreciation of what is important in life and small pleasures, redefined perception of life, new values, rethinking life, better appreciation of human relationships, touch, better attention to the environment, the world and people have changed, better air, nature has regenerated.
- PC2: Improved and closer relationships with family, friends, people, who are real friends, moving in with boyfriend/girlfriend.

However, from a psychological point of view, it is of great importance and, as described in the introduction, it is important to deal with the PF1-PF5 factors separately, with the 'critical' responses, because in this case, the students, when asked what they attributed to the coronavirus pandemic, gave negative factor(s) instead of some positive factor(s) (i.e. stress, tension, anxiety, etc.). This is a total of 41 students, which is 3.5% of the total database, or 35 students out of 1000!

Of 41 students, 5 students' owe it to the pandemic that they have a worse job and have been disadvantaged at work (PF1), 6 students have a broken family, a broken relationship, less time with their family and unfortunately a worse relationship with friends (PF2). Six students experienced boredom, loneliness, isolation, loneliness (PF3) during the quarantine. Thirteen respondents received strange situations, confusion, chaos, disappointment, uncertainty, fear, dread, bad mood, hatred of masks and people, instability, lost their youth, no friends, difficulties, hardships,

stress, tension, anxiety as positive aspects of the pandemic (PF4). Eleven students received illness, harmful addiction (smoking, alcohol), obesity, suffering, mental breakdown, depression, mental illness, nervous breakdown, panic attack or giving up from the pandemic situation (PF5).

If we analyse only the PF4 and PF5 factors, we see that 19 women and 5 men are affected. The vast majority of respondents (83.3%) belonged to the youngest age group (18-24 years). Ten of the respondents (41.6%) live in the capital city and nine (37.5%) in a rural town.

5 Discussion

As it can be seen previous studies have shown that university students in particular face various environmental and mental health struggles due to COVID-19. The issue of mental health is particularly exciting at universities in business studies, where competitive spirit is very strong. Vágány (2021b) explored the life coaching, mental health or psychological counselling activities of 17 business higher education institutions by examining their websites. The results of her research show that universities have very different mental health and life skills counselling networks and different levels of importance for the mental health of students and staff.

From a psychological point of view, it is of great importance to deal separately with the 'critical' (PF1-PF5 factors) responses. In this case, the students interviewed indicated negative factor(s) (e.g. stress, tension, anxiety, etc.) instead of positive factor(s).

They perceive their situation as so bad that they could not mention any positive factor, nor even the 'nothing' factor. These students are in such a state of mind when they are at university, at the courses. On the statistical side, it could be said that 'only' 3,5% of the total sample is affected by this poor mental health, it does not give us the possibility to draw any definitive statistical conclusions, but from an educational and psychological point of view, this number is a lot. These students see their situation as so desperate, negative, bad, and dark, under so much pressure from the pandemic that their mental health and psychological well-being need to be addressed.

6 Conclusions

This study researched the mental health of university students in economic studies in Hungary during the pandemic, for which no research has been done in previous years.

In our view, improving the psychological well-being of students should be a priority for any higher education institution that wants to attract high achieving students and maintain a high position in national and international rankings of higher education.

Universities have a role to play in maintaining the mental health and well-being of students. Increasing competition in higher education and the changing environment make it clear to more and more higher education institutions that protecting the mental health and psychological well-being of their students, staff and faculty will be essential to ensure long-term student and faculty satisfaction. As our research results demonstrate high performance and significant results can be achieved by people of high psychological well-being and mental strength, whether they are students at a university, high performers at a workplace or the best in a sport.

The questionnaire was repeated in the period following the completion of the research presented in this study. The results are still being evaluated.

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Unraveling Air Pollution Dynamics Under the Influence of Fossil Fuel Subsidies: The Cases of Slovenia and North Macedonia

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Purpose – Addressing the imperative of sustainable development and environmental conservation, this study investigates the intricate relationship between carbon dioxide emissions and annual fossil fuel subsidies in Slovenia and North Macedonia. Methodology/Approach – Utilizing regression analysis aligned with the indicators of the twelfth Sustainable Development Goal (SDG), we discern trends in sulfur dioxide, carbon monoxide, nitrogen monoxide, and total suspended particulate matter emissions. Findings – For every billion dollars in subsidies, North Macedonia experiences an average annual reduction of 40.073 kilotons in carbon dioxide emissions, while Slovenia sees an increase of 6.999.431 kilotons per year. The results point out the negative impact fossil fuel subsidies have on the environment by making fossil fuels more affordable, thus warranting further regulation by lowering or eliminating this type of subsidy. Implications – The implications address the need for research advancement and enhanced SDG reporting in North Macedonia, coupled with a demand for improved environmental indicators in Slovenia. Policymakers can leverage these findings for air pollution regulation, and managers can champion socially responsible practices for a green economy. Originality/Value – This study fills a critical gap in the literature regarding cross-country comparisons in this area, identified through a Scopus database search.

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1 Introduction

It has been a decades-long challenge for policymakers and societies to control and reduce carbon dioxide emissions to curb the effects of climate change and protect the environment (Osobajo et al., 2020). This challenge garners increasing interest with the rising emphasis on sustainable development, environmental conservation, and corporate social responsibility practices. Illustratively, the quality of the air in North Macedonia represents one of the most serious concerns in the country (Meisner et al., 2015).

When it comes to this scientific topic, organizational and economic sciences tend to connect air pollution restrictions with monetary stimulants or punishments. One of the pillar instruments in this regard is fossil fuel subsidies (Arzaghi & Squalli, 2023). Fossil fuel subsidies, along with the associated external costs, are expected to steadily rise in the following decade. Implementing fuel pricing reforms worldwide could result in a decrease in carbon dioxide (CO_2) emissions, potentially helping to limit global warming to acceptable thresholds (Black et al., 2023). On the other hand, researchers have pointed out that environmentally harmful subsidies, such as fossil fuel subsidy reforms alone, would not suffice to eliminate energy inefficiencies (Kicia & Rosenstock, 2015). This highlights the importance of further exploration in this research niche and provides additional motivation for conducting the research.

Furthermore, research in the field of air pollution is becoming increasingly important in the Balkans as Europe's most polluted area (Belis et al., 2023). While most scholars so far have primarily analyzed the impact of fossil fuel subsidies on carbon dioxide emissions in global terms, others have focused on air pollution or subsidies within separate countries (Verkuijl et al., 2018). The underexplored research context of Slovenia and North Macedonia, as demonstrated through a detailed search in the Scopus database, reaffirms the existence of a critical research gap regarding cross-country comparisons in this area.

As a result, the objective of this research is to address this gap and investigate the intricate relationship between carbon dioxide emissions and annual fossil fuel subsidies in Slovenia and North Macedonia. Using regression analysis aligned with the indicators of the twelfth Sustainable Development Goal (SDG), we aim to identify trends in sulfur dioxide, carbon monoxide, nitrogen monoxide, and total

suspended particulate matter emissions, and analyze the impact of fossil fuel subsidies on the environment. The structure of this paper is organized as follows: Section two presents the literature review, followed by an explanation of the methodology and the key findings in sections three and four, respectively. We will then conclude with a discussion of the findings in section five and present a set of conclusions and recommendations in the final segment.

2 Literature Review

One of the aspects of our analysis focuses on carbon dioxide emissions, which can be defined as stemming from the burning of fossil fuels and machinery-based productions (Solomon et al., 2009). These emissions are recognized for their role in causing irreversible climate changes and negative disruptions to well-being (Solomon et al., 2009). In this sense, researchers offer perspectives on the rationalization of inefficient fossil fuel subsidies, a pivotal objective in attaining SDG 12 (Van de Graaf & van Asselt, 2017).

The term 'fossil fuel subsidies' refers to government support for consumers and producers of fossil fuels (Van de Graaf & van Asselt, 2017). Fossil fuel subsidies can be considered as part of a broader classification of environmentally harmful subsidies (Kicia & Rosenstock, 2015), encompassing consumer subsidies, which reduce the price of fossil fuels for consumers and are generally used in developing countries, and producer subsidies, which are used to lower costs of production (Zatti, 2020). Subsidies have sizable fiscal consequences, can encourage pollution, and promote inefficient resource allocation that particularly affects individuals with lower incomes (Black et al., 2023). Consequently, there has been growing concern regarding the need for fossil fuel subsidy reform recently (Chepeliev & van der Mensbrugghe, 2020).

Changes in fossil fuel subsidy policies would show great improvements regarding climate change (Zatti, 2020) The current research landscape indicates that linking fossil fuel subsidies to pollution and climate change, enacting proper reforms on a national and international level, as well as keeping close track of as many indicators for sustainable development as possible is imperative to reaching SDG 12 and achieving sustainable development globally (Coxhead & Grainger, 2018). Based on this, we develop four distinct hypotheses:

H1: There is a positive relationship between fossil fuel subsidies and CO2 emissions in North Macedonia.

H2: There is a positive relationship between fossil fuel subsidies and CO2 emissions in Slovenia.

H3: Sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NOx), and the total amount of suspended particles (TSP) emissions in North Macedonia have a defined trend.

H4: Slovenia has demonstrated measurable improvements in achieving the targets outlined in SDG 12 in comparison to North Macedonia over time.

3 Methodology

For this article, we opted for a secondary data collection method spanning from December 2023 to January 2024. We gathered data from global datasets of the World Bank and the International Monetary Fund, as well as governmental portals in Slovenia and North Macedonia (State Statistical Office of the Republic of North Macedonia, n.d.; Statistical Office of the Republic of Slovenia, n.d.). Our focus was on utilizing regression analysis to investigate the relationship between variables and predict the value of the dependent variable (y) in relation to the independent variable(s) (x). The dependent variable is also known as the response variable, while the independent variable is known as the predictor or explanatory variable. Simple regression is used when there is one dependent and one independent variable, while multiple regression is employed in the case of one dependent and two or more independent variables.

The linear regression includes multiple independent variables and can be represented by the following equation:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots. + \beta_n + \varepsilon \quad (1)$$

where:
y is the dependent variable; x is the independent variable; β_0 is a constant; βn is the slope coefficient for x_n; ε is the residual.

To fulfill the objective of comparing air pollution levels between North Macedonia and Slovenia, we considered carbon dioxide emissions, expressed in kilotons. To examine how the subsidies issued in each country affected carbon emission, we

conducted a regression analysis. During the data collection process, we observed that there is significantly more available data for the indicators of SDG 12 for Slovenia compared to North Macedonia (United Nations Department of Economic and Social Affairs, 2023). This discrepancy necessitated including a larger number of indicators in the comparative analysis, given the relatively small number of indicators included in the general report for North Macedonia (United Nations in North Macedonia, 2023)

Most of the information presented in the profiles of both countries in terms of SDG reports is based on measurements from 2018 and 2019. Despite the quantitative presentation of the indicators, there is a lack of information on trend movements in North Macedonia for most indicators within SDG 12. However, alternative sources provide more recent information regarding the indicators of the goal for responsible consumption and production (World Bank, 2024; International Monetary Fund, 2022).

Through the developed model and the explained methodology, our aim was to gather and compare indicator data for the given countries that have not been sufficiently explored. Additionally, we sought to examine the impact of subsidies for fossil fuels on the quantity of emissions of key greenhouse gases, namely CO_2 equivalents. The data encompassed total CO_2 emissions, excluding the burning of biomass with a short-term impact, while including other forms of biomass burning (such as forest fires, decay after logging, fires on drained peatlands, and decay of drained peatlands), and all anthropogenic sources of CH_4, sources of N_2O, and F-gases.

4 Results

4.1 Analyzing the Impact of Carbon Dioxide Emissions on Fossil Fuel Subsidies in North Macedonia and Slovenia

The carbon dioxide emissions in kilotons for North Macedonia and Slovenia represent the dependent variables for the period 2010-2020. In the regression analysis for both countries, the independent variable is the square value (North Macedonia) and quadratic and cubed value (Slovenia) of the nominal amounts of

subsidies for fossil fuels in U.S. dollars, along with the assessment of the slope of the movement of emissions in relation to subsidies (see Picture 1).

The regression's confidence level is 96.6%, which is statistically significant in relation to the usual significance level of 0.05 (Chatterjee & Hadi, 2013). Additionally, the independent variables show statistical significance, as confirmed by the t-statistic. From the results, it can be concluded that 57% of the variations of the dependent component are explained by the variations of the independent components, which is satisfactory enough to explain that there is some connection between these components (Seber & Lee, 2012). From here on, we observe that the carbon dioxide emissions for the given period average around 11,198 kilotons, without the influence of subsidies. On average, with each addition of a billion dollars of subsidies in North Macedonia, emissions decrease by an average of 40,073 kilotons per year.

In North Macedonia, the data exhibits more scattered patterns, with periods of slight decline and growth in the trend. Conversely, in the Slovenian case, the data shows significant oscillations in terms of how subsidies affect carbon dioxide emissions. The significance confidence of the regression is at a level of 92%, which can be considered as a high percentage of significance (Chatterjee & Hadi, 2013). The independent variables and the residual value also show statistical significance in addition to the t-statistic. Evidently, 59% of the variations of the dependent component can be attributed to the variation of the independent variables, which further justifies the connection between these variables (Seber & Lee, 2012).

Dependent Variable: MAK_CO2_KTONI
Method: Least Squares
Date: 12/22/23 Time: 14:26
Sample: 2010 2020
Included observations: 11

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11198.02	234.6905	47.71401	0.0000
(MAK_NOM_IZNOSI_SU_BIL_$)^2	231781.7	82966.80	2.793669	0.0234
MAK_NOM_IZNOSI_SU_BIL_$	-40073.60	13046.31	-3.071642	0.0153

R-squared	0.572385	Mean dependent var	10697.89
Adjusted R-squared	0.465481	S.D. dependent var	749.6633
S.E. of regression	548.0848	Akaike info criterion	15.67774
Sum squared resid	2403176.	Schwarz criterion	15.78625
Log likelihood	-83.22756	Hannan-Quinn criter.	15.60933
F-statistic	5.354208	Durbin-Watson stat	1.394653
Prob(F-statistic)	0.033436		

Dependent Variable: SLO_CO2_K_TONI
Method: Least Squares
Date: 12/22/23 Time: 14:30
Sample (adjusted): 2010 2020
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-347164.0	127315.8	-2.726795	0.0295
(SLO__NOM__IZ_NOSI_SU_BIL$)^3	93166257	33864475	2.751150	0.0285
(SLO__NOM__IZ_NOSI_SU_BIL$)^2	-44419194	15954439	-2.784128	0.0271
SLO__NOM__IZ_NOSI_SU_BIL$	6999431.	2481407.	2.820751	0.0257

R-squared	0.597713	Mean dependent var	17101.02
Adjusted R-squared	0.425305	S.D. dependent var	1127.273
S.E. of regression	854.5707	Akaike info criterion	16.61436
Sum squared resid	5112038.	Schwarz criterion	16.75905
Log likelihood	-87.37900	Hannan-Quinn criter.	16.52316
F-statistic	3.466841	Durbin-Watson stat	1.645820
Prob(F-statistic)	0.079588		

Figure 1: Results of the regression analysis for North Macedonia (left) and Slovenia (right)
Source: Authors' analysis

On average, each addition of a billion dollars of subsidies in Slovenia results in an increase of emissions by an average of 6,999,431 kilotons per year. This indicates that Slovenian subsidies have a positive effect on the amount of CO_2 emissions, suggesting that they are effectively used to boost the use of fossil fuels. In North Macedonia, conversely, subsidies hinder the amount of CO_2 emissions, suggesting that they are either not being effectively used or that their effect on the environment is detectable after more than a year. This result may also suggest insufficient reporting and data collection. Subsequently, H1 is rejected, and H2 is accepted, due to the negative and positive relationships between the analyzed variables, respectively.

Dependent Variable: LOG(TOTAL GHG MKD)
Method: Least Squares
Date: 12/24/23 Time: 17:45
Sample: 2002 2019
Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.48719	17.15840	5.273639	0.0001
YEAR	-0.038837	0.008534	-4.550608	0.0003

R-squared	0.564128	Mean dependent var	12.40631
Adjusted R-squared	0.536886	S.D. dependent var	0.276041
S.E. of regression	0.187853	Akaike info criterion	-0.401875
Sum squared resid	0.564620	Schwarz criterion	-0.302945
Log likelihood	5.616874	Hannan-Quinn criter.	-0.388234
F-statistic	20.70803	Durbin-Watson stat	1.106806
Prob(F-statistic)	0.000327		

Figure 2: Regression results of logarithmic emissions of SO_2, CO, NOx, and TSP
Source: Authors' analysis

An additional regression analysis was conducted on the annual sums of emitted gases SO_2, CO, NOx, and TSP, estimating the percentage movement of the emission of these gases annually in North Macedonia for the period from 2002 to 2019. The statistically significant model (see Picture 3) indicates that 56% of the variations are explained by the variations of the independent components, which satisfactorily explains the connections between the variables. On average, the level of these gases decreases by 3.88% per year. This trend of reducing emissions of the above-mentioned gases, with SO2 being the most prominent, confirms H3 and serves as an important indicator of the SDG 12 progress in North Macedonia.

4.2 Comparison of Indicators Between North Macedonia and Slovenia

The quantity of SO_2 from 2002 showed an intensive upward trend over the next 3 years, reaching approximately 160,000 kilotons, followed by a steep downward trend, only to experience a significant increase again in 2019. Similar patterns can be observed with NOx, and CO, which reached about 50,000 tons in recent years, as did TSP. On the other hand, total non-CO_2 gases noted an upward trend, which continued until 2019 when available data ended. The data shows that the level of CO_2 emissions in kilotons ranged from 16,000 to 20,000 over the past two decades in Slovenia, contrasting with North Macedonia, where this figure ranged from about 10,000 to 12,000 during the same period. No significant oscillations causing drastic changes were observed.

Regarding subsidies presented as a percentage of the gross domestic product (GDP), the observations in Slovenia predate those in North Macedonia. In the former, there was an increase in the percentage share of subsidies in GDP from 2008 to 2010, followed by stagnation and a slight decrease in 2020/1. However, in North Macedonia, the indicator remained at zero until 2014, then increased to 1.5% in 2020. Additionally, the lowest number of subsidies per capita in Slovenia is approximately equal to the highest in North Macedonia. Similarly, North Macedonia, experienced a significant increase in subsidies in the period 2017-2019, whereas the data for Slovenia demonstrates a constant subsidy level between 350-450 million until 2018, after which it decreased.

From the findings of a simple comparative analysis of select time series data from the targets (Figure 1), it becomes apparent that Slovenia has not shown improvements over time across all targets when compared to the progress seen in North Macedonia. This is particularly evident in the areas of plastic exports and nitrogen emissions. Although Slovenia ranks thirteenth and North Macedonia ranks sixtieth according to their SDG index scores, both countries exhibit a combination of advancements and setbacks concerning SDG 12. Consequently, H4 is subject to rejection.

Figure 4: Comparative analysis of Slovenian and Macedonian indicators
Source: Authors' analysis

5 Discussion

Fossil fuel subsidies are positively correlated with greenhouse gas emissions in Slovenia, which is consistent with most contemporary research heavily pointing to the connection between fossil fuel subsidies and air pollution globally (Couharde & Mouhoud, 2020). According to the data on the Macedonian fossil fuel subsidies, they appear negatively correlated to the CO_2 emissions in the country, contrasting the common view of the positive correlation between the two variables. It is noteworthy that SO2, CO, TSP, and NOx are more prevalent pollutants in Macedonia, and their data is subject to closer monitoring. This data reveals a negative trend. The scarcity of reliable data on fossil fuel subsidies and overall pollution indicators leads to inaccurate or erroneous conclusions, such as the estimation of air pollution costs in the Macedonian capital Skopje, ranging between 0.5 and 1.5 billion euros (Niranjan, 2023). Slovenia, on the other hand, demonstrates a better track

record in implementing sustainable development measures in the context of responsible consumption and production (Hojnik et al., 2020). However, challenges persist in areas such as plastic exports, where recycling is lacking, and nitrogen emissions (Lavtizar et al., 2021). While Macedonia shows promise in reducing greenhouse gas emissions, it falls behind in other aspects (Ćosić et al., 2011).

In this sense, researchers are adamant that adequate monitoring and data collection can boost future research of SDG 12-related targets and make prospective reforms in inefficient subsidies considerably better informed and more precise (Black et al., 2023). Furthermore, including alternative solutions to fossil fuel subsidy reforms, such as carbon pricing models, to the targets for achieving SDG 12 would further improve the discussion regarding the efficiency of fossil fuel subsidy reforms and carbon pricing models.

6 Conclusions

The objective of our research endeavor was to investigate the intricate relationship between carbon dioxide emissions and annual fossil fuel subsidies and compare the indicators related to SDG 12 in Slovenia and North Macedonia. We found that there is a positive relationship between fossil fuel subsidies and CO_2 emissions in Slovenia and a negative one in North Macedonia. Furthermore, the results indicated that SO_2, CO, NOx, and TSP emissions in North Macedonia have a defined trend, yet a space for improvement regarding the achievement of the targets outline in SDG 12 in the cases of both countries was noted. For every billion dollars in subsidies, North Macedonia experiences an average annual reduction of 40.073 kilotons in carbon dioxide emissions, while Slovenia sees an increase of 6.999.431 kilotons per year. This underscores the need for regulatory measures to lower or eliminate such subsidies. There are also several implications from the analysis where, compared to Slovenia, North Macedonia has a greater need for monitoring strategies to achieve sustainable development. Despite Slovenia's implementation of numerous measures and higher sustainability rankings, challenges remain in areas such as plastic exports rather than recycling, as well as nitrogen emissions. The connection between fossil fuel subsidies and air pollution remains insufficiently explored across most countries. Further research on this connection would greatly assist in the financing of environmentally and economically sustainable projects and in the gradual elimination of unsustainable fossil fuel subsidies.

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Patient Perceptions and Sustainable Healthcare: Understanding Digital Anxiety in Turbulent Economic Environment

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In the healthcare sector, organizations are actively preparing for the challenges and changes associated with a turbulent economic environment. Technological revolutions such as Industry 4.0 and Industry 5.0 are expected to bring trends that will fundamentally change the way healthcare works, like the use of communication tools for patients and medical teams. Many studies show that developments in healthcare are influenced by digital transformation. Innovations are primarily focusing on prevention, early diagnosis, and improvement of quality of life and health. Technologies, such as the use of artificial intelligence, telemedicine, smart devices, and robotics, will simplify and speed up processes and services in healthcare. In the context of evolving healthcare landscapes and the increasing integration of digital technologies, our research investigates patient perceptions and concerns. Through a comprehensive study, we discovered a noteworthy trend: patients exhibit a statistically significant fear of digital healthcare, surpassing levels of distrust or perceived ineffectiveness. This finding prompts a critical inquiry into the underlying reasons behind this fear and seeks to understand how healthcare organizations can effectively address these concerns for sustainable adoption amid a turbulent economic environment. To collect the data, we used a questionnaire survey, that was performed on 437 patients from Slovak Republic.

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1 Introduction

In the current turbulent economic environment, a series of disruptive forces propelled by advancements in science and technology are reshaping not only business dynamics, cultural norms, and societal structures but also influencing our biological frameworks and ethical considerations (Leonhard, 2016).

In this paper, we focus on the healthcare sector, specifically examining the impact of emerging digital technologies on healthcare delivery and exploring the perceptions of clients towards these transformative changes. Several authors (Javaid et al. 2020, Aceto et al. 2020, Cassettari et al. 2019) posit that the future trajectory of the healthcare industry will be profoundly shaped by digital transformation. Advanced technologies are poised to play a pivotal role in preventive care and early diagnosis while fostering closer collaboration among stakeholders and innovative service amalgamations within healthcare delivery. These trends underscore the apprehensions of clients regarding digital healthcare. Consequently, this article aims to explore prospective trends and technologies associated with Industry 4.0 and 5.0, elucidating their potential impacts on client perceptions and concerns within the healthcare sector. Drawing from our research findings, we offer insights into how healthcare clients in the Slovak Republic currently perceive emerging trends and technologies.

2 Theoretical Background

Industry 4.0 epitomizes the pervasive integration of the internet and digitization across virtually every facet of human endeavour. It stands as a prominent fixture within the contemporary landscape, representing a formidable challenge and serving as a principal catalyst for technological advancement poised to propel successive waves of innovation in the ensuing decades (Leonhard, 2016).

The core tenets underpinning Industry 4.0, including interoperability and the seamless integration of systems both horizontally and vertically through novel technologies and information and communication technology (ICT) solutions, are perceived as strategic responses to the turbulent economic environment. These challenges encompass the imperatives of maintaining competitiveness amidst globalization, coping with market volatility, navigating shortened product and

service life cycles, and managing the escalating complexity inherent in products and processes (Kagermann, 2013).

The healthcare sector has a significant opportunity to benefit from Industry 4.0. The use of new technologies can bring many benefits and advantages to healthcare organizations and stakeholders. The COVID-19 pandemic has changed our way of life, work, and education significantly. With the shift to remote learning and work, digital healthcare has become more critical (Taamneh et al., 2022). Digital healthcare use is affected by both psychological and technological factors, such as fear and uncertainty avoidance. During the pandemic, the use of technology has become more crucial than ever. Remote learning, working, and digital healthcare have become vital (Alturki & Aldraiweesh, 2021). Artificial intelligence is being used to assist product and support teams in performing more accurate analyses in various business contexts (Elrehail, 2023; Kar & Kushwaha, 2021). Planning for the future of work requires considering the challenges of obsolescence and the need for ongoing reskilling (Kar et al., 2021). However, the COVID-19 pandemic has also created fear and uncertainty that may influence the acceptance and use of digital healthcare (Raza, Qazi, Khan, & Salam, 2021). A study by Kee (2021) found that the COVID-19 pandemic had a negative impact on the usage of learning management systems, suggesting that fear and uncertainty may have a more significant impact on technology use during a crisis.

3 Methodology

The research methodology is based on the analysis of theoretical knowledge and starting points in the field of the fourth industrial revolution, developments in healthcare and individual trends connected to Industry 4.0 and Industry 5.0. We used data from the questionnaire survey. Our sample consisted of 437 patients from the Slovak Republic. We used stratified random sampling and respondents were selected by the following criteria: gender, workplace demographics (Western Slovakia / Central Slovakia / Eastern Slovakia), and age.

Distribution of the sample by gender of patients:

Table 1: Gender of the patients

	Number	Percent
Men	202	46,2
Women	235	53,8
Other	0	0
Together	437	100,0

4 Results

For the descriptive statistics of individual hypotheses, it is necessary to sketch the variables that are in the hypothesis. In this case, they are the "Score of perception of concern" and "Score of perception of distrust and ineffectiveness".

Table 2: The level of fear of digital healthcare

Score 2 - 10	
N	437
Average	6,57
Median	7,00
Sd. deviation	2,284
Skewness	-,125
Kurtosis	-1,183
Range	8
Minimum	2
Maximum	10

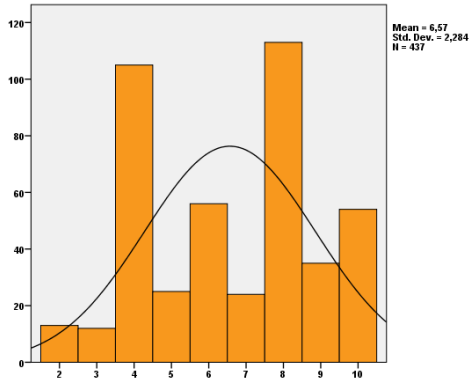

Figure 1: The level of fear of digital healthcare

Table 3: The level of perceived ineffectiveness and distrust towards digital healthcare

Score 2 - 10	
N	437
Average	4,84
Median	4,00
Sd. deviation	1,860
Skewness	,557
Kurtosis	-,037
Range	8
Minimum	2
Maximum	10

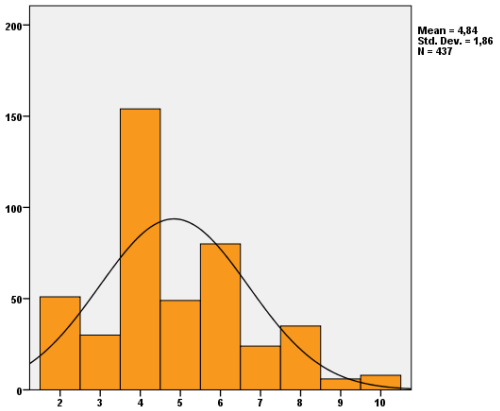

Figure 2: The level of perceived ineffectiveness and distrust towards digital healthcare

To ensure that we selected the appropriate test to verify our hypothesis, we needed to check if the variables in our sample followed a normal distribution, meaning that they followed a Gaussian curve. We used the Kolmogorov-Smirnov normality test to determine whether the data was normal or not, which was essential for us to move forward with verifying our hypothesis, based on the sample size.

Table 4: Normality test

		Kolmogorov-Smirnov		
		Statistic	df	Sig.
	The level of fear of digital healthcare	,197	437	,000
	The level of perceived ineffectiveness and distrust towards digital healthcare	,212	437	,000

We have observed that the average score of the level of fear regarding digital healthcare on a scale from 2 to 12 points is at the level of 6.57 points, based on the results shown in **Table 2.** and **Table 3.** and **Figure 1.** and **Figure 2.** On the other hand, the average score of the level of perception of ineffectiveness and distrust towards digital healthcare on a scale from 2 to 12 points is at the level of 4.84 points. While interpreting the results, we looked at the Sig. column of **Table 4.** We found

that the measured group does not have a normal distribution since there is a value less than 0.05. Therefore, we used non-parametric tests to calculate the hypothesis if at least one of the pairs of groups does not have a normal distribution. As neither group had a normal distribution, we had to use a non-parametric test. We formulated a hypothesis to find out if there is a statistically significant difference between the level of perception of fear about digital healthcare and the level of perception of ineffectiveness and distrust in digital healthcare. For the analysis of the hypothesis, we used the non-parametric Wilcoxon paired test after considering the nature of the variables.

Table 5: and Table 6: Wilcoxon paired test
The level of fear of digital healthcare * The level of perceived ineffectiveness and distrust towards digital healthcare

Z	-11,243
Asymp. Sig. (2-tailed)	,000

Ranks				
		N	Mean Rank	Sum of Ranks
The level of perceived ineffectiveness and distrust towards digital healthcare – The level of fear of digital healthcare	Negative Ranks	288	199,09	57338,00
	Positive Ranks	82	137,77	11297,00
	Ties	67		
	Together	437		

The Wilcoxon paired test is interpreted by **Table 5.** and the line Asymp sig. If there is a value less than 0.05, then we know that there is a statistically significant difference between the variables being compared. In our case, the value is 0.000, which means there is a statistically significant difference between the two variables. **Table 6**. determines the direction of the difference, where we can see the results of the comparison for each variable. The *Negative Ranks* row shows the number of times the first variable (digital healthcare inefficiency and distrust rate score) scored lower than the second variable (digital healthcare concern rate score). The *Positive Ranks* row shows the number of times the first variable scored higher than the second variable. The *Ties* row shows how many times these values matched.

From **Table 6**. we can see that the score of the measure of inefficiency and distrust in digital healthcare was lower than the score of the measure of concern about digital healthcare in 288 cases, higher in 82 cases, and the same in 67 cases. Therefore, we found that **clients are statistically significantly more afraid of digital healthcare than they would distrust it or consider it ineffective.**

5 Discussion

Industry 4.0 and the emerging concepts of Industry 5.0 are pivotal trends shaping modern environments, profoundly impacting dynamics and fostering transformative innovations. The healthcare sector, amidst turbulent economic conditions, stands as a prime example where the integration of digitalization and advanced technologies associated with Industry 4.0 and beyond is conspicuously evident.

The contemporary landscape is marked by an unprecedented level of dynamism driven by rapid technological advancements. In this context, Industry 4.0 emerges as a paramount trend profoundly shaping the trajectory of various industries worldwide. This phenomenon is a direct result of the rapid evolution of technologies with the capacity to revolutionize organizational management paradigms and daily life. Managers are confronted with the imperative to cultivate keen discernment in recognizing the multifaceted opportunities and challenges inherent in the advent of Industry 4.0. The transformative potential of this paradigm shift extends across diverse domains, necessitating proactive engagement and strategic foresight to harness its benefits while mitigating potential pitfalls (Mohiuddin et al., 2022).

In alignment with anticipated shifts, businesses are exhibiting heightened interest in leveraging emerging technologies to drive innovation, sustain long-term competitiveness, and facilitate agile adaptation to evolving market dynamics. A central challenge posed by the advent of Industry 4.0 revolves around achieving heightened levels of digitization. Traditionally, digitization has been construed as the integration of computer and internet technologies aimed at enhancing the efficiency and efficacy of processes involved in value creation within the economic sphere (Reddy and Reinartz, 2017). The evolution of Industry 4.0 is catalyzing pervasive digitization across all sectors, leading to a paradigm shift wherein conventional products or services are either supplanted by digital equivalents or augmented with innovative digital functionalities (Prem, 2015).

6 Conclusion

Based on the results of the Wilcoxon paired test shown in **Table 5.** and **Table 6.** we can conclude that **clients perceive fear of digital healthcare statistically significantly more than distrust or ineffectiveness of digital healthcare**. Our hypothesis was confirmed, and our research highlights a prevalent fear among clients regarding the adoption of digital healthcare, a sentiment surpassing distrust or concerns about its efficacy. This fear underscores the need for proactive measures to educate and reassure the public, fostering a conducive environment for the widespread acceptance of digital health solutions. Slovakia exhibits a notable adoption of eHealth solutions, particularly through electronic prescriptions, indicating an initial foothold in digital healthcare practices. Despite the current dominance of ePrescriptions, other transformative technologies such as auto-diagnostic systems, remote patient monitoring, artificial intelligence, digital data sharing, and 3D printing hold immense potential. Moreover, fostering a culture of innovation and addressing client apprehensions about digital healthcare is imperative for driving further digitization in healthcare. Overcoming fear through education and building trust can facilitate the necessary knowledge exchange and partnerships essential for successful technology implementation. Consequently, embracing these advancements will empower both clients and healthcare providers, enabling personalized medicine, greater autonomy, and ultimately, enhanced healthcare outcomes for all.

Acknowledgments

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CHALLANGES AND OPPORTUNITIES NATURE-BASED SOLUTIONS FOR URBAN ADAPTATION IN THE ECONOMIC ENVIRONMENT

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In an increasingly urbanised economic environment, with more and more cities, there is a strong incentive for people to seek innovative local solutions to reduce their exposure to the risks of climate change. Accelerating urbanisation affects people in different ways, increasing exposure to the impacts of climate change. Air and surface temperatures in urban built-up areas are higher than in surrounding rural areas, leading to increasing urban heat islands. The more favourable economic environment has led people to move from rural to urban areas, and urbanisation has resulted in a mix of agricultural land, commercial and transport centres, industrial estates, industrial parks, transport hubs and coherent residential communities, housing estates, health and education facilities. The need to develop urban living space and its feasibility within a framework of sustainability requires a systemic, historical approach. In this article, we present the results of our survey in the parks of residential areas in Debrecen and the impact of contiguous green space on the microclimate. Through our computational methodology, we illustrate the influence of green space rehabilitation and innovative park developments adaptable to the urban environment on property value growth in a booming economic environment.

Keywords:
environment, urbanisation, green space, urban areas, sustainability

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1 Introduction

Due to the urbanisation trend of the 21st century, the level of built-up areas is constantly increasing, so the qualitative and quantitative analysis and sustainable development of the urban environment is a priority. The role of green spaces in the functioning of the urban ecosystem is nowadays the focus of attention (Dzifa, 2021). In our country, urbanised areas suffer from a serious deficit in green space - water management, and it can be noted that the proportion of urban green space is much lower in many municipalities compared to the built-up areas. In an increasingly urbanised and booming economic environment, the urban population is gradually increasing in proportion to the size of the cities. The process of urbanisation can thus be understood as a global and multidimensional process, which is manifested in rapid changes in the population density and environmental quality of urban populations (Elmqvist, 2008). The exposure of populations to climate change risks (Hashem, 2016) can be mitigated through innovative solutions at local level, through ecologically oriented green space development. The aim of this study was to investigate the relationship between housing prices and green space characteristics. The value of urban green spaces is not only known to reduce the urban heat island effect (Park, 1999; Zhang et al. 2017), improve air quality (De Ridder et al.2004; Smith & Huang, 1995), promote people's mental health (Beyer et al. 2014; Chen &Jones 2019; Nutsford et al. 2013), well-being (Groenewegen et al. 2012), but also increase property values (Jim & Chen, 2006; Chen et al. 2023).

2 Theoretical Background / Literature review

The evolution of temperature extremes and humidity in urban environments is related to the degree of built-up area (Elmqvist et al. 2015), the proportion of paved surfaces and the per capita availability of biologically active green areas. In February 2021, the European Commission adopted a new strategy for adapting to the impacts of climate change (COM(2021) 82 final), which highlights the need for immediate action to tackle the consequences of a changing climate. The adaptation measures will be implemented together with the measures published in the framework of the European Green Deal (COM(2019) 640 final). The new strategy sets out three main objectives: smarter adaptation, more systematic adaptation and faster adaptation. Sustainable ecological urban greening can be implemented in urban environments in a number of ways, such as mown lawns/hedgerows, annual green spaces, tree-

lined streets, perennial beds, biodiverse green spaces. Knowledge of environmental information is essential for effective climate adaptation. We measured the impact of green spaces on microclimate in a sample area of a housing estate in Debrecen, and the potential and ways of adaptation in an urbanised environment, which expresses the preparation for current or near future changes.

3 Methodology

Based on statistical data (ingatlan.com/debrecen), we compared the average apartment and house prices per square metre for non-new build properties in Debrecen over the past five years. We also looked at the popularity of each neighbourhood in terms of home sales. Debrecen is the second largest city in Hungary. The most popular districts of the city are the Belváros, the Nagyerdő area. The younger age group is more attracted to the Belváros, where properties are also an excellent rental option. Families tend to prefer neighbourhoods with a quieter environment and an excellent infrastructure, such as condominiums and housing estates. Looking at the five years from February 2019 to February 2024, the average price per square metre of non-new housing is up 172% and the average price per square metre of non-new housing is up nearly 202%. Given the fact that Debrecen is an industrial and university city, the increase in property values has been boosted by industrial development (international companies, pharmaceuticals, logistics services, car parts, IT, telecommunications, etc.) and the development of the city's infrastructure (motorway, airport). The available statistics show that more and more people are moving to the agglomeration from Debrecen, despite the steady increase in the price of real estate in the county capital. Within the city, low-residential, energy-efficient properties are popular, as well as stand-alone properties or those with green space in the immediate vicinity of the property. The location of the study was chosen to be an urban residential park in Debrecen where condominium/apartment buildings are popular and valuable due to the green space available and usable for recreational/leisure purposes. The "Újkert" housing estate was built in the mid-1970s in the north-east of Debrecen on an area of 810700 m^2 , with a green area coverage of 47.92% and a built-up area of 52.08% (Figure 1). The green area coverage per inhabitant in the area is 26.85 m^2 /person. The residential area is characterised by 4-14 storey buildings, with several large green spaces.

Figure 1: Presentation of the sample area
Source: Fülöp 2020

The measuring instruments used in the chosen sample area were the following: temperature and humidity meter TESTO 610 (With this instrument we are able to determine dew point, relative humidity, humid air temperature in addition to air temperature. The accuracy of the instrument is in tenths of km/h), Windtronic 2 - wind speed meter (The instrument is able to determine the maximum average and instantaneous wind speed. The instrument is compact and accurate to tenths of km/h).

Maxwell MT 25 901 infrared thermometer (The instrument obtains information on the surface temperature from the reflection of infrared light rays between 800 and 1400 nm with an accuracy of 4 digits). Eight sampling points were selected across the cross-section of the sample area (park), and temperature and humidity were measured at each point between June and September.

4 Results

The variation of temperature across the park cross-section for eight sampling points from 17.06.2019 to 02.09.2019 is shown in Figure 2. The graphs show the temperature results from sampling points 1 to 8 from left to right.

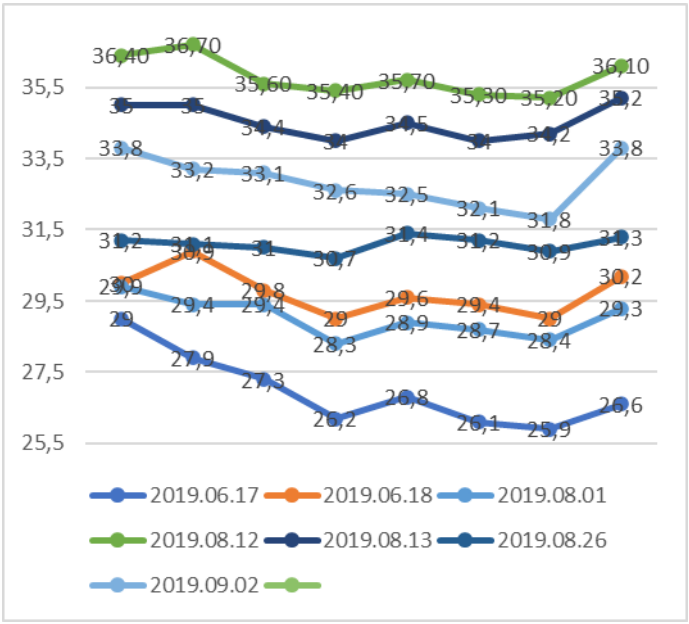

Figure 2: Temperature measurements in the sample area
Source: Fülöp 2020, Czédli et al. 2021

Measurement points 3, 4, 6 are located in the heart of the park, measurement points 2, 5, and 7 are located on the border of green areas, while points 1 and 8 are located in built-up areas. Our results confirm that the temperature decreases as one moves inwards in the green area. The average temperature difference between the edge of the park (measurement point 1) and the centre of the park (measurement point 3) was found to be 14.32° C. Moving across the cross-section of the park, the average surface temperatures ranged from 30.51 to 44.83 C. The lowest average temperature, at measurement point 3, was 30.51 °C in the interior of the park, and the highest average temperature, 44.83 °C, was measured in the built-up area. The intensity of the humidity variation in the sample area is illustrated in Figure 3.

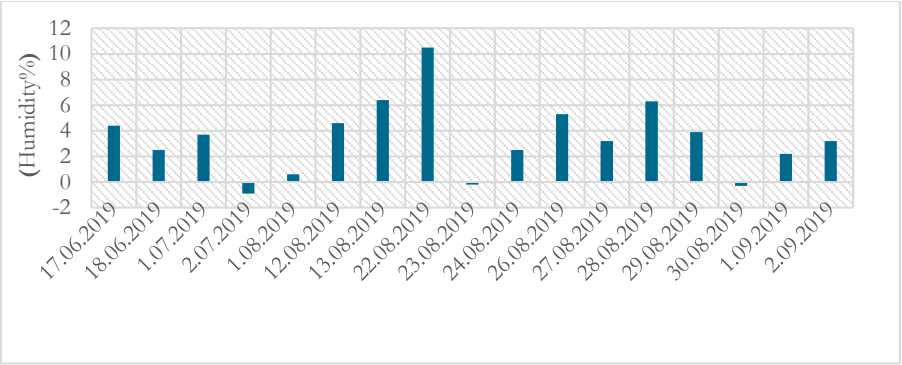

Figure 3: Intensity of change of the cushion column in the sample area
Source: Fülöp 2020, Czédli et al. 2021

5 Discussion

In order to compare the value and the conditioning effect of different urban green spaces for the urban population, we need indicators that allow us to carry out monitoring on a regular basis, since by carrying out the same studies several times, we can identify positive or negative trends by including quantitative and qualitative indicators. Rapid urbanisation is leading to the loss and fragmentation of urban green spaces, due to the rapid expansion of built-up areas at the expense of green spaces (Nazombe& Nambazo 2023). The marginal value of parks in terms of property prices depends on the type of green space, its protected status and its distance from the park (Lutzenhiser & Netusil 2001). Statistical results show that the impact of semi-natural green areas (Debrecen Nagyerdő zone) on property values is always higher than that of areas created by green space development (residential green areas).

6 Conclusions

Nature-based solutions offer a long-term opportunity for urban adaptation in a vibrant economic environment: they provide a cost-effective solution to modern urban challenges and contribute to making cities more sustainable and liveable with a range of positive environmental, social and economic impacts. The design and implementation of green infrastructure projects that provide ecological services and nature-based solutions with lower long-term maintenance costs are good for

municipal budgets. The development of green spaces in urban neighbourhoods contributes to improving the mental and physical health of the population, supports recreation, cools urban surfaces in summer, and supports the improvement of local social relations and community development. The need to develop urban living space and its feasibility within a framework of sustainability requires a systems approach and a historical approach. Green space development has a direct impact on the development of the city, influencing the quality and typology of the built environment.

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Sustainability Trends in Fine Dining Restaurants: A Complex Systems Approach

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Changing societal attitudes and increasing governmental requirements towards environmental protection and maintaining a holistic approach to all participants in production and consumption areas encourage the catering sector to develop and implement sustainability practices. In the case of fine dining restaurants, such realia encourage the search for solutions or their variations to maintain both sustainability and business resilience. Taking into account the scarcity of scientific literature regarding sustainability development and its complexity in fine dining restaurant practices, this paper aims to analyze and to define sustainability trends in the case of fine dining restaurants through the lenses of complexity theory. A Lithuanian context was chosen as a small market and it revealed the following primary trends: to find various ways to decrease the production costs and product prices; efforts and expectations to have stronger connections with local farmers in the future; a wish to educate the customers more about sustainability and ecological products; to increase the application of the zero waste strategy; to increase the balance of workflow to the employees; to work on a systematic development and implementation of sustainability strategy.

Keywords:
fine dining restaurants, sustainability, trends, sustainability managerial solutions, complexity theory

JEL:
D21, L21, M21

University of Maribor Press

1 Introduction

The enterprises of the catering sector are experiencing even growing requirements to be managed in a sustainable way in order to contribute to environmental protection (Huang, Hall & Chen, 2023). Thus, so called green restaurants, which make efforts to reduce their negative impact on the environment by implementing green practices, such as recycling, utilizing renewable energy, implementing responsible waste management strategy and serving organic foods, become more common (Joshua, Jin, Ogunmokun & Ikhide, 2023). In the case of fine dining restaurants, implementing sustainability practices in coherence with "unique theme, high-quality expensive food, exceptional service, and a formal ambience" (Ma & Hsiao, 2020, p. 113) and at the same time to be profitable and successful would meet even more challenges. These challenges emerge from current contemporary economical, political and other major phenomena, including COVID-19 pandemic, post-pandemic challenges and war conflicts in Europe and outside it. There are quite many examples of worldly famous fine dining restaurants, which had to announce their closing, including "Noma" restaurant (Denmark), which is about to close in 2024 (Crispin, 2023). The main challenges for such restaurants include growing costs and customer demands and at the same time to maintain a particular level of sustainability including a sustainable human resource management in the face of exhausting work processes and a necessity to attract and retain high level specialists.

Even more challenges occur in the case of fine dining restaurants that operate in relatively small markets. These challenges naturally create various obstacles to maintain a holistic approach to all the organizational aspects - at the same time to be sustainable and meet customer needs.

In the scientific literature on fine dining restaurants and their sustainable practices, still more emphasis is put on the context of economically developed countries or countries that have more potential for sustainable practices (USA, United Kingdom, France, China, Australia, etc.). Thus, ***a problematic question*** could be formulated as follows: what are sustainability trends in fine dining restaurants in small markets? One should emphasize that the scientific solution in order to answer this question requires *a complex system's approach* in order to reveal the overall picture regarding the main challenges towards the implementation of sustainable practices and their solutions based on a particular context.

Thus, **the aim** of this paper is to define sustainability trends in the case of fine dining restaurants through a complex system's approach.

In the theoretical part of the paper the concept of fine dining restaurant and its sustainable management is presented through the lenses of a complex systems approach.

In the methodology part, the research methods are revealed.

Finally, in the Results and Discussion part, the realia and main challenges in order to reveal sustainability trends of fine dining restaurants in the context of a small market.

2 Theoretical Background / Literature Review

A fine dining restaurant as a complex adaptive system. Complexity theory, which emerged at the Santa Fe Institute in USA in the eight decade of XX century (Schneider & Somers, 2006) primarily from biological and physical sciences, such as math, physics and chemistry, was adapted to social sciences too, thus it allows all social systems and various social phenomena to be viewed as complex adaptive systems too (Johnson, 2009). *The complex adaptive system* can be defined as a network of interacting agents-actors, whose bottom-up based interactions without centralized control create a new order (Anderson, 1999). Complex adaptive systems are fluctuating from *the edge of chaos* (Lewin, 1999) through positive feedback and to the stabilization stage through negative feedback (Uhl-Bien, 2021). Such a system has particular simple rules, values and behavioral norms, which act as so called *attractors* – the spheres, to which the system returns after experiencing some fluctuation (Cîndea, 2006). Being as close as possible to the edge of chaos, the system reaches the highest level of creativity and innovativeness (Boal & Schultz, 2007).

While employing these features, a complex adaptive system - a fine dining restaurant as well - is able to co-evolve internally and externally and adapt to the external environment; to develop its identity, viability and responsible behavior (Anderson, 1999; Mason, 2007; Parsons, 2007; Uhl-Bien, Marion & McKelvey, 2007). In other words, during individual and organizational learning while performing their activities and interacting with other actors in a localized space, fine dining restaurants change

their internal and external environment to increase the adaptation through continuous development of human and social capital, and emergence of innovations. In addition, fine dining restaurants as complex adaptive systems are characterized by particular values and behavioral norms through which they are recognized in an external environment. Taking into account the significance of sustainability, system's members act as a community without breaking defined behavioral standards and thus solving challenges in meeting those standards. However, especially in the case of various external perturbations, the fine dining restaurants need to find a way to solve the dilemma between exploration (creativity, innovation) and exploitation (planning, control) (Uhl-Bien & Arena, 2018). This dilemma quite often is very vivid in the case of employing sustainable practices in the restaurants.

The complexity of the concept of sustainable management. Today's restaurant industry is rapidly evolving and is increasingly seeking to integrate sustainability principles into its operations, especially in fine dining restaurants where customers are more willing to pay for the high-quality experience that sustainable management provides.

In the case of catering sector, including fine dining restaurants, a significant area of sustainable management practices covers practices supporting food sustainability, such as usage of local and organic products, developing sustainable menus, reducing, recycling and using food waste, and implementing energy and water saving practices as well (Pinard, Byker, Serrano & Harmon, 2014; Huang, Hall & Chen, 2023).

In general, the food producing processes in the restaurants should be analyzed by adapting system thinking, seeing these processes as *the food systems* consisting of different interacting actors, processes and institutions, which shape how the "food is grown, produced, processed, transported, and consumed" (Zanella, 2020).

Moreover, the scientific literature emphasizes the importance of sustainable management processes that are directed to human resource management and community outreach, by encouraging sustainable behavior in the local community (Gössling & Hall, 2022). For example, as Kim & Hall (2020) stated, it is important not only to implement sustainable practices in the restaurant but also encourage restaurant customers to participate in the restaurant's sustainable activities and learn more about sustainability.

The same would be applicable to the restaurant employees too. For example, scientists present the concept of *green psychological climate*, which describes the perception of employees regarding organizational attributes and behavioral norms, related to environmental sustainability (Joshua, Jin, Ogunmokun & Ikhide, 2023). Bhutto, Farooq, Talwar, Awan & Dhir (2021) stated that there is a mediation effect of green psychological climate and green work engagement between green inclusive leadership and green creativity in the organizations. In other words, such inclusive leaders in the organization show their accessibility to the employees, share creative and innovative ideas, provide the necessary resources, promote the emergence and implementation of creative ideas in the area of sustainability, thus initiating the sustainable behavior in the employees. One should emphasize that a sustainable management in general should provide adequate working conditions and satisfactory salaries, continuous learning and development.

In overall, sustainability should cover all the areas of fine dining restaurant processes - financial, social and environmental performance (Higgins-Desbiolles & Wijesinghe, 2019). For example, in the case of financial performance, it means not only seeking for profit but for responsible financial management, which includes ethical behavior, transparency and accountability towards all stakeholders, including employees, customers, suppliers and the community.

However, in reality finding the balance between different organizational areas is not an easy task, especially in small markets, which additionally are being affected by various external negative phenomena.

3 Methodology

The aim of the empirical exploratory research was to define the trends behind the sustainable fine dining restaurant management in a small market.

The objectives were as follows:

- To reveal sustainable management practices in the case of usage of local and seasonal products;
- To reveal waste reducing management practices in fine dining restaurants;

- To define sustainable human resource management practices;
- To reveal the cohesion between financial matters and the implementation of sustainability practices.

The *multiple qualitative case study research strategy* was applied (Stake, 1995).

Three Lithuanian fine dining restaurants were chosen as case studies. Lithuanian catering sector is growing steadily by year, however, with less than three million inhabitants in Lithuania, tourist flows, affected by various negative phenomena (COVID-19 pandemic, war of Ukraine, etc.), growing prices, increasing the value added tax (VAT) since 2024, this sector yearly experiences various turbulence and challenges related to both business resilience and the implementation of sustainable practices.

All these restaurants operate in the two biggest Lithuanian cities - Vilnius and Kaunas. In this research study, these restaurants are simply called Restaurant A, Restaurant B and Restaurant C.

Restaurant A was established in 2018 in Vilnius. It was established with a purpose to offer more sustainably grown food to the customers and to develop Lithuanian food traditions.The restaurant has its own farm, from where local seasonal products were used to prepare the dishes. In 2019 this restaurant was the first time selected among the best 30 Lithuanian restaurants.

Restaurant B was established in 2017 in Kaunas and implements the vision of Nordic food. This restaurant is increasingly seeking to implement sustainable practices, including using local and seasonal products and avoiding chemical ingredients in food production and preparation. The restaurant was selected among the best 30 Lithuanian restaurants three times.

Restaurant C, which is based on European kitchen traditions, was established in 2014 in Vilnius. This restaurant was also selected among the best 30 Lithuanian restaurants three times.

The head chefs of the restaurants were interviewed in order to get the overall view of sustainable restaurant practices in each restaurant.

The interview questions were divided in different sections, as follows:

- *General questions about sustainability.* How is your vision and mission related to sustainability? What sustainability practices are you implementing at your restaurant?
- *Using local products that are grown organically or based on sustainable agricultural practices.* How do you create a menu, taking into account local products, seasonal products, traditions and customer expectations? To what extent do you use organic / ecological products in your restaurant? Are there any challenges you face in going more organic?
- *Waste management strategies.* What methods do you use to reduce food waste? What do you think it takes for a restaurant to adopt a zero-waste strategy? Does your restaurant use special techniques and measures to save energy and water? If so, what kind?
- *Sustainability and finances.* How does your restaurant deal with rising food prices and how does it affect your menu creation? How does your restaurant adapt to rising energy prices? How does your restaurant deal with logistics and transport costs? How do sustainability activities affect a restaurant's finances? How do you combine financial management with implementing sustainability practices? Are there any challenges? If so, how do you address them?
- *Sustainable human resource management (especially in the case of training towards sustainability and providing appropriate work conditions).* How do you help ensure good working conditions (working environment, workload) for your employees? Are you facing any challenges? If so, how do you address them? How often is your restaurant staff trained in sustainability issues? If such training takes place, what sustainability topics are used? How does this help employees run the restaurant more sustainably? How does your restaurant encourage its employees to apply sustainability principles, such as reducing waste?

4 Results

General attitudes towards sustainability. In general, all restaurants more or less adopt sustainability practices. Restaurant A emphasized sustainability as "the foundation of a modern restaurant management". The restaurants B and C stated that

sustainable practices help to reduce waste and costs, and to regulate the flows of goods properly. As Restaurant A stated, "Without a sustainable approach to this business, it is impossible to create something lasting and bringing not only profit, but also added value to the market.".

Using local products that are grown organically. Usage of seasonal products is applied but not at the full extent. For example, Restaurant C stated that although the seasonality has a big impact towards creating the menu, however, it is hard to maintain the seasonality in 100 percent, especially if there is an insufficient supply of local products: "Growers/producers of seasonal products are rarely able to offer a constant supply, a constant desired quality, so seasonal products usually occupy about 60% percent of all menu choices". In general, the usage of seasonal products depends on particular periods of time: "If local products appear in the market like vegetables, fish or meat when the season starts, we choose local products" (Restaurant B). Restaurant A even mentions a particular season: "In the months of May-October, we use the products that are growing at that time". However, in general the main attitude regarding seasonal products is reflected in the statement of Restaurant B: "If we were to stick with a seasonal menu, we would be pushing ourselves too hard".

The restaurants also preserve particular products for another season: "In the spring-summer months <…> we preserve products for the cold months when nothing will grow. In those months we use all kinds of beets and what is saved from the warmer seasons" (Restaurant A).

The restaurants cooperate with local farmers and local markets, especially in the case of Restaurant A because they have their local farm. This restaurant emphasizes that product providers should fit the following requirements: seasonal, Lithuanian, qualitative products. However, as Restaurant B mentioned, if the particular products meet the requirements of the restaurant, they get it locally, otherwise – they get it from other countries. The restrictions for a wide range usage of local products emerge, first of all, because of the size of the market - this market is small and thus expensive with a questionable quality – "a farmer putting the "organic" label forgets about the quality". However, Restaurant A expects that "that cooperation between farms and restaurants will soon become much smoother".

Restaurant C stated that the priority is to use local products, but to use ecological products "is still a dream that is hard to achieve". The main reason behind it is the high price: "Eco-friendliness greatly affects the price". Thus, the restaurants in general choose the products, if there is a balance of price and quality (Restaurants B and C).

Waste management. As the Restaurant A stated, a smooth organization of work also decreases waste, for example, by balancing work flows and guest numbers. In the case of Restaurant C, the LEAN system is adapted in order to decrease waste. However, it was said that to "reach 100% zero waste in the restaurant is the biggest obstacle because of the constant turnover of employees, because LEAN practical skills are not something that can be mastered quickly, and until all employees apply LEAN principles, it is still not possible to reduce food waste to zero".

Especially Restaurant A and Restaurant B emphasized that food that does not reach the dinner plate is consumed by the staff for lunch".

The formation of menus can also be a tool for waste management. One of the ways - to shorten the menu options: "6 appetizers, 5 main dishes and 2 desserts - thus increasing the possibility that our guests will choose almost all dishes." (Restaurant A). The same restaurant also avoids geometrical forms of dishes in the plates, while using various molds that give space to food waste.

The restaurants also reuse left-overs: "we try in one or another format to give those products another form, such as to squeeze juice from them, make broths, make chips, etc., if that is not possible, then - to use it for compost" (Restaurant A).

Training employees about sustainability. Such training still isn't organized in the analyzed restaurants. Only the Restaurant A mentioned that they seek to employ sustainably-conscious employees and talk about it. As Restaurant A stated, that the strategy of sustainability is still about to be implemented: "A lot of effort needs to be put in this direction, but as a young company we are moving step by step towards an increasingly sustainable organism". However, as it is visible from the answers, the restaurants are making efforts to create the environment for their employees:

- Nurturing new employees through knowledge sharing: "The master and apprenticeship program has been implemented in the kitchen for almost five years, where young people with no experience but who are eager and ambitious are hired, and they work all their time together with the most experienced chefs in the kitchen. If the desire and ambitions do not fade, such employees can start their career as a professional chef after 6-8 months" (Restaurant C).
- Regular communication and mutual feedback: "regular communication and listening" (Restaurant A), "We talk, communicate and try to find out the expectations from the employee, but we also emphasize what we expect from him" (Restaurant B), "Every employee's opinion is important. Even a new employee who just started working yesterday can express his observations or opinion on one or another work issue, and the managers never follow the principle of the restaurant's natural hierarchy when making decisions or giving tasks, but take the time to explain to the employee, why exactly it is done this way, and why it is not done differently." (Restaurant C).
- Maintaining work balance. Mostly it is implemented through the division of work: "the workload is not distributed to individual cooks or waiters, but to the whole team evenly, in this way the stronger ones help the weaker ones, the weaker ones learn and improve, the stronger ones gain management skills" (Restaurant C). Another aspect is creating a shorter menu, so it is easier to manage the work (Restaurant B). Finally, the reservations are managed: "We are paying attention to the number of reservations for the month ahead. We don't take all the bookings that come up, so we avoid overloading the reservation system" (Restaurant A).

Talking about *finance and sustainability management*, the respondents were quite positive regarding the finance management and the implementation of sustainability practices, and they emphasized the ability to adapt to various circumstances: "It's not the strongest that survive - it's those that adapt" (Restaurant C).

5 Discussion

Empirical research was concentrated on the cases of fine dining restaurants that operate in a small market (Lithuania). The cases revealed particular **sustainability trends** that are adapted in these restaurants:

- To find various ways to decrease the production costs and product prices (a qualitative product is understood not always as equal to local /seasonal/ecological product). The term "high price" is emphasized in various aspects, talking about finding a balance between price and quality. It is related to the scientific research results, which reveal that restaurant managers aren't very eager to implement sustainable practices because of financial pressures and obscurity of how sustainable practice could create value to the customers (Raab, Baloglu & Chen, 2018).
- Efforts and expectations to have stronger connections with local farmers in the future (some restaurants have their own farms already).
- To not get limited to local products because of limited scope to get these products and seasonality. However, the restaurants do all the best to use local and seasonal opportunities, including the preparation for the next one (for example, fermenting the products).
- A wish to educate the customers more about sustainability and ecological products, and how sustainable practices increase the value to the customers (Raab, Baloglu & Chen, 2018) (because the customers don't ask much for ecological products and thus don't create the necessity to offer more ecological options).
- To increase the application of the zero waste strategy.
- To increase the balance of workflow to the employees.
- At the moment, sustainability in fine dining restaurants seems as quite a natural thing or "work principle, like adding salt to soup or wishing a guest "enjoy your meal" (Restaurant C), however, a systematic sustainability strategy is needed to be implemented, including the training of employees because the restaurants confirm that sustainability is an important dimension in the management of contemporary fine dining restaurants.

Research limitations. Since the research was performed in a Lithuanian context while analysing three cases of fine dining restaurants, it provides only the primary insights regarding the sustainability trends in fine dining restaurants in a small market with its limitations. Thus, the following **implications for future research** can be defined:

- to perform a comprehensive empirical research, involving a variety of fine dining restaurants in order to define different types of strategic approaches depending on the region in a particular country and different countries with similar market characteristics;
- to cover different organizational functional spheres (marketing, finance, human resource management, operations) to reveal sustainability practices and their improvement areas (for example, the scope for employee training programs, supply chain management, cultural preservation, customer education, sustainable physical environment etc.);
- to perform empirical research by combining the scientific knowledge of sociology, management and economics in analyzing the behavior of different agents in the restaurants as complex adaptive systems and their interconnections. It is important to state that the research could be performed through the lenses of different actors (customers, employees, not only the ones who have head positions in particular organizations);
- qualitative and quantitative research methods could be combined in future research;
- to perform longitudinal surveys in order to reveal the different stages behind the sustainability trends in fine dining restaurants.

6 Conclusions

- From the perspective of complexity theory, a fine dining restaurant, which has a strong focus on quality and taste, by providing food that is refined and aesthetically presented, is an open network of interacting agents (restaurant employes, customers, other stakeholders, such as business partners), where various phenomena, including sustainable behavior patterns emerge as a result of interactions and systemic fluctuations in order to increase co-evolution and adaptability.

- Implementation of sustainable practices in the restaurants can be seen as a complex phenomenon, directed to financial, social and environmental performance, covering different business functional areas and relationships with customers and other stakeholders.
- Scientific exploratory empirical research with fine dining restaurants in Lithuania revealed that sustainability is a significant part of restaurant practices, especially in the case of fine dining. These sustainable practices are especially related to waste management and partially - to use of local seasonal food. Because the market is small and the season to get fresh organic food is limited, the restaurants are dependent on other sources, including other countries, in order to get qualitative food products. The research revealed the efforts to manage the costs and to find a balance between price and quality. It also revealed that the relationships with different stakeholders should be improved: with local farmers - regarding local seasonal and ecological products, with the employees - regarding oriented training towards sustainability, with the customers - regarding the significance of sustainability. In general, the implementation of complex sustainability strategies in fine dine restaurants is still about to be developed in the future.

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THE ROLE OF THE CIRCULAR ECONOMY IN THE LABOUR MARKET AND EMPLOYMENT RATE IN THE EUROPEAN UNION

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The aim of this study is to examine the role of the circular economy in employment and to prove this with statistically significant results. The paper includes an analysis of the 27 European Union Member States along specifically selected indicators. The methodology of the study is based on general statistical approaches, and the results obtained with correlation and regression methods are compared with cluster and compatibility analysis. The background to the topic is the fact that the circular economy not only promotes sustainability, but also generates dynamic labour market changes that offer new opportunities for both workers and enterprises. By focusing on recycling waste and extending the life of products, this economic model encourages the emergence of new industries. Consequently, the shift towards innovative practices is also stimulating the growth of the service industry. However, while the circular economy model has never been more popular, the average EU-27 circular material use rate has increased from 11.0 % in 2012 to just 11.4 % in 2021. The research area of the paper was influenced by the availability of statistical data. The results can be used as situation analysis to green the employment market and labour economics.

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1 Introduction

The concept of the circular economy involves shifting from a linear production model to an economic system that conserves resources, minimizes waste, and emphasizes closed-loop processes (Ghisellini et al., 2016). It offers an alternative viewpoint focusing on reducing resource flows, extending product lifecycles through reuse and recycling (Bocken et al., 2016). Sustainable development requires a comprehensive evaluation of economic, environmental, technological, and social dimensions within the economy or industrial process in question (Ren et al., 2013). The circular economy, especially its strategy, can lead to various social consequences. These potential effects are determined by the different groups of people involved, such as employees, small enterprises, and local societies in the product supply chain, and consumers of products and services (Padilla-Rivera et al., 2020).

2 Theoretical background / Literature review

The circular economy aims to promote sustainable development by driving innovation at three interconnected levels: individual products, businesses, and consumers (micro level), industrial symbiosis and eco-industrial parks (meso level), and cities, regions, nations, and the Earth as a whole (macro level) (Saidani et al., 2019). The shift to a circular system is projected to significantly impact the social aspect of sustainable development through its radical transformation of production and consumption systems (Saidani et al., 2019). However, academic discussions primarily focus on its environmental and economic aspects with only marginal consideration for social factors such as labor practices, human rights, and community welfare (Geissdoerfer et al., 2017). The full understanding of the social implications in relation to more than 114 definitions of the circular economy remains limited (Kirchherr et al., 2017). The social impact of the circular economy on employment generation and economic localization has been widely discussed in academic research (Clube, 2022). Studies have found that core circular economy positions, such as waste management, maintenance, and rental services, may require a lower level of education compared to other sectors (Burger et al., 2019). On the other hand, jobs related to design and digitalization call for higher education and technical expertise. The challenges of securing a suitable labor force for both skilled enabling roles and manual core occupations in developed areas are anticipated. However, some academic research lacks empirical evidence and does not thoroughly

explore aspects of overall welfare when discussing the generation of employment opportunities through corporate entrepreneurship (Geissdoerfer et al., 2017). Additionally, there is uncertainty surrounding the impact of job creation in circular economy. It remains unclear whether the population possesses the necessary skillset and interest in circular economy jobs and if job concentration in one area may result in decline elsewhere (Clube, 2022; Luthin et al., 2023). Given the limited research on quantifying job creation in the circular economy, Horbach et al. suggest using green jobs as a proxy measure based on UNEP's definition, which includes roles focused on preserving ecosystems, reducing resource consumption through efficient strategies, decarbonizing the economy, and minimizing waste and pollution. If we solely consider employment figures (gross jobs), it is difficult to determine whether the expansion of the circular economy will create extra (net) jobs or merely substitute/displace current ones (Mitchell & Morgan, 2015). While circular economy offers advantages for society, its correlation with societal effects lacks clarity including aspects such as regional disparities in demand distribution and existing required skill levels (Padilla-Rivera et al., 2020).

3 Methodology

The paper analyzes material footprint, circular material use rate, and employment in circular economy sectors in all European Union Member States from 2012 to 2021. The chosen timeframe is specific due to the availability of complete data for this period.

3.1 Data

Data on the material footprint, circular materials usage rate, and employment in the circular economy from 2012 to 2021 are available from Eurostat (Eurostat, 2024a,b,c). We have analyzed the development of each indicator over time and conducted cluster analysis to classify Member States. Additionally, we assessed full-time employment rates and their percentage of total employment. Furthermore, we standardized individual indicators for a three-phase triangular matrix analysis of employment distribution in Europe and different countries.

3.2 Application of the relative growth rate method

An examination of the material footprint, circular material utilization, and employment diffusion in the context of a circular economy was conducted across Europe and at the level of individual Member States using time series analysis and visual representation. The relative growth rate (RGR) was determined, according to Poorter & Garnier (1996) for the European Union Member States (Equation 1). The RGR was calculated for the period 2012-2021 for different indicators at EU-27.

$$RGR = \frac{\ln(NC_1) - \ln(NC_0)}{t_1 - t_0} \quad (1)$$

where: RGR: relative growth rate; NC_1: value of the quantity of the analysed indicator at the end point in time; NC_0: value of the quantity of the analysed indicator at the initial time; t_1: end point in time; t_0: initial time.

3.3 Standardisation and single value formation

The initial phase involves standardizing baseline data with various units and dimensions to condense them into a unified metric scale (Equation 2) according to methods of Oliinyk et al. (2023). The subsequent stage entails defining a benchmark, where the values of EU Member States are contrasted against the maximum value within the specified set of values.

$$Z_{ij} = \frac{x_{ij} - \bar{x}_{ij}}{s_i} \quad (2)$$

This is succeeded by computing the Euclidean distance, which indicates how far the indicators are from a specific reference point. Ultimately, an integrated index with uniform dimensions is computed for three-axis matrix analysis.

4 Results

4.1 Material footprint in the EU-27

Between 2012 and 2021, the average per capita use of materials in the European Union (EU-27) was 14.385 tonnes per capita, rising from 14.393 tonnes per capita in 2012 to 14.763 tonnes per capita in 2021. The rate of change over the period

under review is an increase of +2.57%. The biggest change (+83.1 %) was in Hungary, where the per capita use of materials was 8.134 tonnes in 2012, rising to 14.896 tonnes in 2021. The average annual change is +7.55 %/year. The largest decrease was calculated for Greece (-22.9 %). Greece's use in 2012 was 15.67 tonnes/capita, falling to 12.1 tonnes/capita in 2021. The average rate of change by year was -2.72 %/year between 2012 and 2021. Figure 1a illustrates the average EU-27 footprint and the evolution of its calculated RGR.

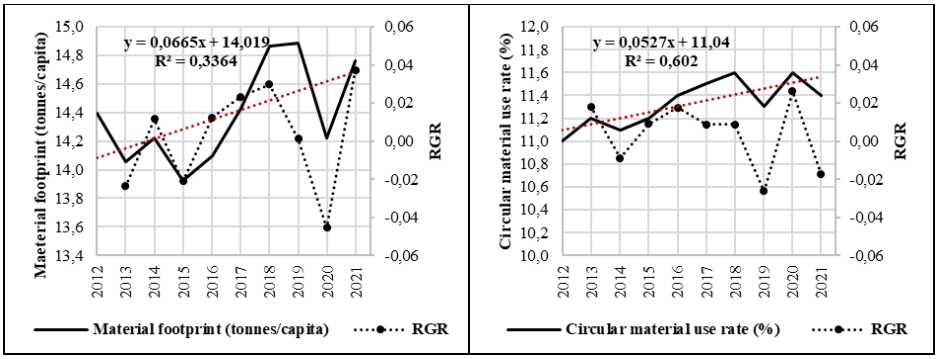

Figure 1.a: Relationship between material footprint and RGR results in the EU-27 between 2012 and 2021. b.) Relationship between circular material use and RGR results in the EU-27 between 2012 and 2021. The solid line in the data series represents material usage, whereas the dashed line illustrates the proportional growth.

The two series of values show similar patterns, with a slight fluctuation followed by an increase until 2018, then a decrease until 2020. The impact of the COVID-19 pandemic is unclear, as there was an increase in the footprint's evolution between 2020 and 2021.

4.2 Circular material use rate in the EU-27

Between 2012 and 2021, the average circular material use rate in the European Union (EU-27) was 11.3 %, rising from 11,0 % in 2012 to 11.4 % in 2021. The rate of change over the period under review is an increase of +0.40 %. The biggest change (+8.90 %) was in Malta, where the circular material use rate was 3.90 % in 2012, rising to 12.8 % in 2021. The average annual change is + 0.989 %/year. The largest decrease was calculated for Luxembourg (-13.50 %). Luxembourg's rate in 2012 was 17.6 %, falling to 4.10 % in 2021. The average rate of change by year was -1.50

%/year between 2012 and 2021. Figure 1b illustrates the average circular material use rate and its calculated RGR evolution. The circular material rate showed continuous increase until 2018, then declined in 2019 before sharply rising until 2021. The RGR displayed a fluctuating pattern, reaching a peak in 2016 and hitting its lowest point in 2019 within the timeframe of 2012 to 2018.

4.3 Employees working in the circular economy in THE EU-27

Between 2012 and 2021, the average full-time equivalent (FTE) of the persons employed in the circular economy in EU-27 was 4,014,343 FTE. This value represents approximately 1.99 % of total employment. The average FTE value of the EU-27 was rising from 3,786,069 FTE in 2012 to 4,284,745 in 2021. The rate of change over the period under review is an increase of +13.2 %. The biggest change (+58.1 %) was in Cyprus, where the employment rate of circular economy was 5,582 FTE in 2012, rising to 8,827 FTE in 2021. The average annual change is +5.38 %/year. Meanwhile, the rate of total employment rose by +0.6 %. The largest decrease was calculated for Finland (-4.38 %). Finland's value in 2012 was 43,654 FTE, falling to 41,744 FTE in 2021. The decline is minimal and the change in the rate of total employment is approximately -0.2 %. The average rate of change by year was +0.304 %/year between 2012 and 2021. Figure 2 illustrates the average FTE values of employees working in the circular economy and the evolution of its calculated RGR.

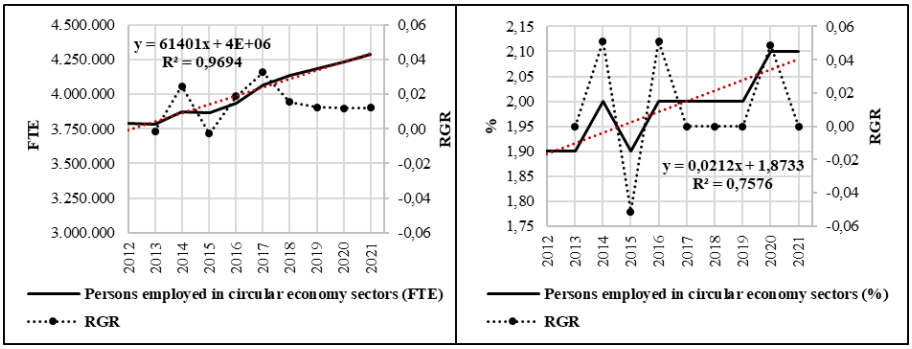

Figure 2.a: Relationship between FTE values of employment in circular economy sectors and RGR results in the EU-27 between 2012 and 2021. b. Relationship between percentage of total employment circular economy sectors and RGR results in the EU-27 between 2012 and 2021. The solid line in the data series represents material usage, whereas the dashed line illustrates the proportional growth.

Employment in circular economy sectors has consistently increased from 2012 to 2021. The RGR value, however, has shown fluctuating patterns with noticeable peaks in 2014 and 2017. This period can be divided into three phases: growth between 2012 and 2014, a plateau between 2015 and 2017, and subsequent stabilization until the year 2021.

5 Discussion

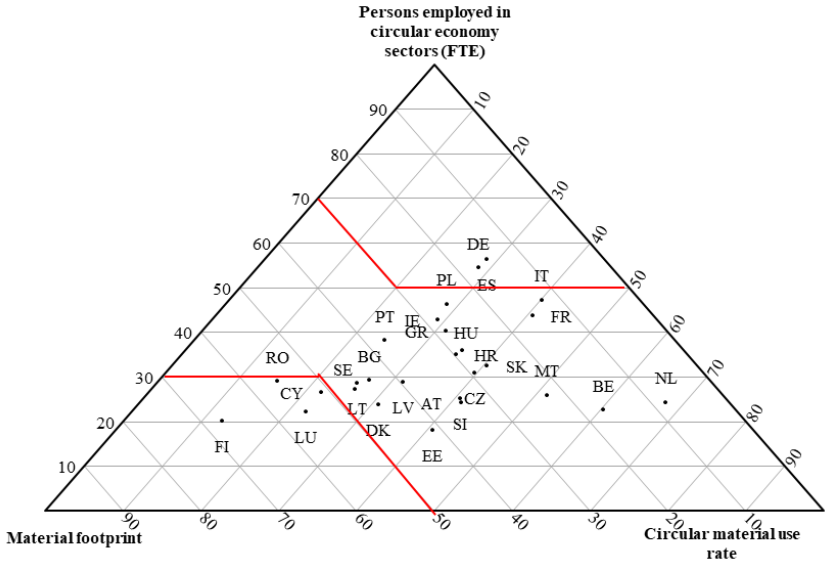

Figure 3: Clustering of European Union Member States in a three-factor matrix system

The countries with the highest employment rates in the circular economy were mainly from the second group of the 27 Member States based on material footprint (Figure 3). In 2021, Germany had 785,297 full-time equivalent positions (ranked 1st), a circular rate of 12.7% (ranked 8th), and a footprint of 16.003 tonnes per capita (ranked 16th). Similarly, Italy ranked second for employment rate, third for circular rate, and twenty-fourth for material footprint. In contrast to this situation, Netherlands had employed 105,173 FTE in the circular economy with a footprint of 7.484 tonnes per capita and a recycling rate of 28.5 %. Therefore, as observed from data showing high usage rates along with minimal environmental impact indicators denotes increasing sectoral employment trends. Cyprus, Malta, and Luxembourg had the lowest number of full-time equivalent employees in the circular

economy in 2021. Cyprus was ranked 23rd with a circular rate of 2.80 %, while Malta held the 6th position at 12.8 % and Luxembourg was placed 21st with a rate of 4.10 %. In 2021, Malta had a per capita footprint of 12.371 tonnes (ranking 22nd), Cyprus had a footprint of 25.161 tonnes (ranking 7th), and Luxembourg had the EU-27's third highest footprint at 31.083 tonnes per capita. The analysis of these countries was based on three indicators as described earlier. Given the complexity of the topic, there is potential for further exploration, and one possible direction could be to consider adopting Kocsis (2014) method for future analysis.

6 Conclusions

In conclusion, the circular economy signifies a move towards sustainable development by redefining production and consumption patterns. The analysis shows that the influence of the circular economy on employment generation varies across different sectors, with core roles requiring diverse skill sets. However, there is often a lack of empirical evidence, leading to uncertainties about overall welfare effects and potential regional differences. An examination of employment rates in European Member States in 2021 indicates a correlation between high circular economy usage and increased sectoral employment. Germany and Italy illustrate this trend as leading countries in employment rates; however, disparities arise with Cyprus, Malta, and Luxembourg showing lower employment rates despite substantial material consumption. The complex relationship between circular practices requires further research for a comprehensive understanding. Furthermore, the findings highlight the importance of tailored policies and strategies for each country's circumstances.

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ADOPTION OF SUSTAINABILITY-ORIENTED INNOVATION: CASE OF SHARED MOBILITY IN THE CZECH REPUBLIC

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Purpose: The aim of the paper is to investigate whether use of shared mobility could be explained by an attitude towards risk while controlling for sex and age on a sample of Czech university students. Methodology: An online questionnaire was used to collect data. There were 529 respondents. Ordinal regression was used to test an effect of risk-aversion, gender, and age on use of shared mobility. Findings: Risk-aversions and age were found to have a significant impact. Risk-aversion is negatively associated with use of shared mobility, and age is positively associated with use of shared mobility. Research limitations: The research was conducted on a sample of university students. This may explain why the effect of age on shared mobility is positive though other research found it to be negative when surveying also older respondents than in the sample at hand. Implications: It would be advisable for shared mobility platforms to decrease perceived risk of shared mobility (obviously it would be appropriate to minimize actual risk as well), so even more risk-averse people feel fine using it. Originality/value: The original approach in this paper was to risk risk-aversion as a trait as opposed to measuring perceived risk of shared mobility.

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1 Introduction

As the world continues to face numerous environmental and social challenges, the adoption of sustainability-oriented innovation has become increasingly imperative.

In the pursuit of sustainable development, the adoption of sustainability-oriented innovation plays a crucial role (Silvestre & Ţîrcă, 2019). In the policy discourse, there is a consensus that to find solutions to these challenges, we need to do things differently and that innovation is key.

Shared mobility services, such as ride-sharing, bike-sharing, and carpooling, have gained popularity in 21st century as a sustainable alternative to traditional transportation methods (Goldman & Gorham, 2006). However, the adoption of shared mobility has faced challenges in finding a viable business model (Sxoinaraki & Πάνου, 2017). Operators in the car-sharing industry have struggled to create sustainable business models, leading to a highly competitive and unstable market.

The transportation sector, in particular, has been a focal point for implementing sustainable solutions, with the rise of shared mobility services offering a promising avenue for reducing environmental impact (Storme et al., 2021; Brůhová Foltýnová et al., 2020).

2 Theoretical Background / Literature Review

Numerous studies have examined the socio-demographic attributes associated with the utilization of shared mobility. Martin et al. (2010), identified that carsharing drivers were predominantly young (mostly under 30), university educated, and had moderate incomes (with a majority reporting slightly above the median household income). Efthymiou et al. (2013) confirmed this fining when identified a higher propensity for carsharing among individuals aged up to 25 years. Age was as a factor identified also by PrietEo et al. (2017), Becker et al. (2017), and Hjorteset and Böcker (2020) – all of them found that carsharing users were predominantly young, highly educated males. Burghard and Dütschke (2019) identified significant carsharing usage among young, car-free couples without children or young parents, often utilizing carsharing as a supplementary transport option. Education was further highlighted as a significant factor in carsharing adoption by Münzel et al. (2020).

In summary, the consensus suggests that being male, younger, highly educated, and of middle-income status increases the likelihood of carsharing adoption.

Apart from that, Turn (2023) identified a total of 151 individual criteria affecting car-sharing (both quantitative and qualitative) in 6 thematic areas - Economic and technical issues; Transport issues; Social issues; Environmental issues; Organizational issues; and Other issues.

Shared Mobility in the Czech Republic

In this context, the case of shared mobility in the Czech Republic provides a compelling example of how sustainability-oriented innovation is being embraced within the transportation industry. Sharing economy initiatives, such as carpooling and ride-hailing services, are a bit behind in the Central Europe when compared to Western counties, where it helps revolutionizing traditional mobility concepts and paving the way for more sustainable practices. The concept of carsharing remains nascent and innovative for Czech constituents. Despite a noticeable surge in its utilization in recent years, the adoption rate has not yet reached a substantial threshold, notwithstanding the considerable prospects for its proliferation. As indicated by the Czech Carsharing Association (2023), the presence of carsharing vehicles on Czech roads was limited to a mere 90 in 2015. By 2019, this figure had escalated to approximately 760, and by 2023, the aggregate number of carsharing vehicles reached 1890, underscoring the burgeoning trajectory of carsharing services within the Czech Republic (Association of Czech Car-sharing, 2024). Just to put it into context, the population of the Czech Republic was 10,900,555 as of 31 December 2023.

Hartmanová et al. (2020) in their groundbreaking article Psychosocial aspects of the use and provision of carsharing services in the Czech Republic identified following common barriers to carsharing use: Societal mindset or lack of financial literacy among Czech citizens; Limited carsharing coverage in urban and suburban areas; Requirement for advanced travel planning (logistics); Higher operational costs for frequent and long-distance trips.

Regarding the benefits of carsharing, both users and providers highlighted: Resource conservation, particularly financial savings compared to car ownership; Time efficiency in comparison to alternative transportation modes, such as public transit;

Environmental sustainability; Enhanced convenience, as users are relieved of concerns regarding car service and maintenance.

An extensive adoption research carsharing users' behavior and attitudes (Vejchodska et al, 2023) was conducted in the Czech Republic to shed light on the adoption of sustainability-oriented innovation in the realm of shared mobility. The study aimed to understand the factors influencing the adoption of shared mobility services and the impact of these services on sustainable transportation practices in the Czech Republic. The study found that several factors contributed to the relatively high adoption of shared mobility in the country. These factors included the increasing importance of environmental responsibility among individuals and communities, the convenience and affordability of shared mobility options, and the support and promotion of shared mobility by government policies and regulations. It offers insights into variances in the attitudes, motivations for participation in carsharing programs, and transportation behaviors among individuals who possess another car compared to those who do not. Authors came to interesting findings:

- Individuals who adopt carsharing without access to another car tend to utilize shared vehicles more extensively compared to their counterparts with additional car availability in their households.
- They also demonstrate a reduction in overall kilometers driven by private cars.
- Presence of another car in the household influences the shift in car usage subsequent to carsharing adoption, with the sale of a car being a contributing factor to decreased overall car usage.
- Drivers with access to another car within their household exhibit a lower likelihood of reducing kilometers driven post-carsharing adoption.
- Households lacking an additional car appear to exhibit lower levels of car dependency on average compared to those utilizing carsharing as a supplementary or tertiary car option.
- Demonstrate greater environmental consciousness and a stronger inclination towards policies promoting alternative modes of transportation and limiting private car use,

These findings prompt discussion regarding whether carsharing enhances the acceptability of restrictive transportation measures aimed at curbing private car ownership and usage.

Internationally, Becker et al. (2017), and Hjorteset and Böcker (2020) also concluded that carsharing users tend to possess fewer private vehicles.

3 Methodology

Data were collected using an online questionnaire on the web platform 1ka.si. The sample size was 529 (289 men and 240 women). It was a convenience sample consisting of university students. There was no monetary nor other type of incentive given to respondents. The known limitation is that 95% of respondents were up to 24 years old.

The dependent variable was use of shared mobility. It was measured on a scale from 1 to 4 where 1 meant yes, often; 2 meant yes, sometimes, 3 meant no, but I think about it; and 4 meant no. The independent variable was risk-aversion. It was measured on a 1-10 Likert scale where 1 meant risk-loving, and 10 meant risk-averse. Control variables were gender, and age.

Ordinal regression function of IBM SPSS 27 will be used to analyze impact of risk-aversion, gender, and age on use of shared mobility. A variance inflation factor (VIF) will be used to evaluate the amount of multicollinearity.

4 Results

The ordinal regression model of shared mobility is provided in Table 1. All VIFs were lower than 1.06, therefore, collinearity is not a problem.

Cox and Snell pseudo-R^2 is 0.070, Nagelkerke pseudo-R^2 is 0.077, McFadden pseudo-R^2 is 0.030, and the significant of the full model is below 0.001.

The analysis of the sample at hand indicates that use of shared mobility has a positive and significant relationship with risk-loving (as reversed risk-aversion) and age. No significant effect of gender was identified, although the sample consisting of about 55% men and 45% women was reasonably close to a half-and-half split.

Table 1: Ordinal regression model

		Estimate	Std. Error	Wald	df	Sig.
Threshold	[use = 1]	-2.981	0.678	19.332	1	0.000
	[use = 2]	-1.124	0.660	2.897	1	0.089
	[use = 3]	-0.329	0.659	0.250	1	0.617
Location	Risk aversion	0.224	0.041	29.771	1	0.000
	Age	-0.086	0.030	8.090	1	0.004
	[Gender=man]	0.111	0.170	0.429	1	0.513
	[Gender=woman]	0[a]	.	.	0	.

Legend: a. This parameter is set to zero because it is redundant.

5 Discussion

Risk-aversion and age explain the best the threshold between frequent and occasional users, and the worst the threshold between people who never used shared mobility but consider doing so and people who do not consider doing so. The latter is not a huge problem as both categories represent non-users anyway. The threshold between occasional users and people who never used shared mobility but consider doing so is significant at 0.1 level. The reason why significance is not lower is likely the fact that some of people who had considered shared mobility already tried it and by doing so (even though they did not find appealing) moved to the other group.

Overall, findings are not in line with previous research as previous findings indicated that men are more likely to use shared mobility while there was no significant difference between men and women in our sample (it holds even when risk-aversion is removed from the model; that confirms VIF evaluation that collinearity is not an issue), and with regards to age, previous findings indicated that use of shared mobility decrease with age while the relation was positive in the sample at hand (this could be because our respondents were young adults).

6 Conclusions

The aim of the research was to investigate selected factors impacting use of shared mobility. The primary question was whether risk-aversion could explain this phenomenon as risk-aversion was mentioned in many articles on shared mobility but never actually used in the investigation. Gender and age were selected as control

variables because they were found to be significant in several studies of shared mobility.

Our findings indicate that risk-loving (as reversed risk-aversion) and age have a positive impact on use of shared mobility in young adults. No significant effect of gender was identified in the sample at hand.

A known limitation is reliance on a convenience sample - university students in particular – where 95% of respondents were up to 24 years old. This could explain why the identified effect of age was positive, though it may be an inverted U-shaped relationship in the population.

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SILVER INTEGRATION FOR AGE-INCLUSIVENESS – IMPLEMENTING SUSTAINABILITY DEVELOPMENT GOALS IN RETAIL BANKING

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Purpose: The main goal is to explore the advancement of knowledge on senior customers' needs in a banking environment, integrating the Sustainable Development Goals (SDG) in the context of the silver economy. Methodology: The study employs a systematic literature review on senior retail banking customers to identify how banks integrate silver economy into their Environmental, Social and Governance (ESG) strategies and how they are reflected in the literature. Findings: The paper supports the concept of "silver banking" and shows the research gap in analysing seniors and the sustainability performance of retail banks. Limitations: Responding to SDG goals in banking, the research recognises this environment based on the Web of Science. Implications: Banks can foster an inclusive and sustainable approach by addressing the needs of the ageing people with a range of ESG-linked initiatives within retail banking, including age-inclusive banking products, services, environments, and community engagement programs tailored to seniors. Originality/Value: The research contributes to the discussion on SDG by highlighting the opportunities for banks to contribute to societal well-being through the lens of silver banking. It offers insights into opportunities associated with an ageing demographic, advancing an inclusive and responsible approach to retail banking concerning Sustainable Banking Goals.

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1 Introduction

The silver economy is a complex phenomenon encompassing various interconnected areas. It refers to the economic opportunities and challenges associated with the ageing population, particularly the growing demand for products and services catering to the needs and preferences of older people. The concept assumes the potential of seniors, increasing their socio-economic contribution to society and improving the quality of life in old age (Reshetnikova et al., 2021). The increasing life expectancy of people in industrialised countries significantly affects many aspects (Colurcio et al., 2022). Technological development results in the necessity to improve the educational qualifications of seniors. The elderly customers express concerns about digital literacy, complex user interfaces, and the lack of personal assistance (Sespiani & Ernungtyas, 2022; Wang & Wu, 2022). Banks have made notable progress in adapting to meet seniors' capabilities, but substantial room remains for advancement.

The article explores the intersection of the silver economy, retail banking, and Sustainable Development Goals (SDG), aiming to verify if financial institutions incorporate senior-focused initiatives into their Environmental, Social, and Governance (ESG) frameworks.

This topic holds significant importance for academic research due to several reasons. Understanding senior consumers' financial needs and challenges becomes crucial for fostering social inclusion and well-being as the global population ages. Research in this area can show how financial institutions can better serve this demographic and contribute to a more inclusive society. The silver economy stands for a substantial market opportunity for retail banks. Academic analysis can help businesses identify market trends, consumer preferences, and innovative strategies to tap into this growing segment. By studying how financial institutions adapt their services, academia can inspire industry innovation and improve customer experiences.

The main goal is to explore the advancement of knowledge on senior customers' needs in a banking environment, integrating the Sustainable Development Goals (SDGs) in the context of the silver economy.

We defined a research question (RQ): *Which SDG goal reflects the problems of senior-focused approaches in the banking sector?*

The paper's structure consists of three parts: a theoretical background implementing the SDG matrix and its reflection on silver banking, a methodological part based on a systematic literature review (SLR) and its results, and a discussion and conclusion.

2 Theoretical Background and Literature Review

SDG and ESG requirements have become crucial for banks due to a growing recognition of their role in promoting responsible and sustainable business practices. Arguello et al. underlined that customers' emotions during service in branches strengthen their interpersonal relationship with the bank (Arguello et al., 2020). Moreover, Kaur et al. noticed that communication between banking employees working in the branch and customers can influence client's intentions to use digital banking products and channels (Kaur & Arora, 2021). The sense of having competence affects the perception of the service as easy. Mbama et al. drew similar conclusions (Mbama et al., 2018). Customer experience influences satisfaction and loyalty, which helps to reduce operating costs and improve sales, efficiency, and profit. Arguello et al. also discovered two primary service quality factors influencing positive customer emotions - quality of staff and quality of outcome (Arguello et al., 2020). When defining segments of older people, specific socio-economic characteristics such as age, level of income, and education level are considered. De Nardi et al. add seniors' consumption level to this list (De Nardi et al., 2010). By examining the behaviour of seniors during the COVID-19 pandemic, Santosa et al. broke the stereotype that the older generation finds it difficult to accept or even resist technology (Santosa et al., 2021).

The intersection of SDGs and silver banking brings both challenges and opportunities. For consumers, ensuring that financial products meet the unique demands of seniors and addressing concerns such as healthcare costs and income stability help inclusiveness. It is closely related to SDG in education, well-being, and health promotion. Products and services for seniors can be designed in a sustainable, environmentally friendly manner, using low-impact materials, minimising energy consumption, and promoting recycling and transportation services to reduce negative impact on the natural environment. Banks and bank associations make a

significant effort to take a step forward to describe the patterns and ways to create inclusive products and services (ABA, 2023), which may require education and building social awareness (Colurcio et al., 2022). With an ageing population accessing banking services, understanding and addressing the unique requirements has become imperative, especially in the era of non-financial ESG reporting and willingness to achieve inclusion and diversity within SDG in the banking sector (CSRD, 2022). On the banking side, the challenges lie in developing sustainable financial solutions that prioritise seniors' economic well-being and align with broader SDGs.

3 Methodology

SLR method was used to study retail banking for seniors. Based on earlier research findings, it was conducted to gather insights into the silver economy and its implications for the banking industry. The purpose is to evaluate the adjustment of retail banking products and services to the capabilities of older people, using bibliometric analysis of scientific papers published between 1999 and 2023, indexed in the Web of Science (WoS) database.

The process consisted of several phases. The main stages were defining search terms, selecting a database, setting up search criteria, selecting software, synthesising, analysing, reporting, and sharing results. The research domains studied were the silver economy and banking. We chose the WoS from several recognised databases, among the most extensive for publishing high-value and highly cited articles. It is highly regarded due to its quality procedures. Furthermore, WoS offers convenient tools for filtering and exporting data in all scientific areas to explicate clustering criteria.

4 Results

The range of full search uses the following formula: (((((ALL=(silver economy)) OR ALL=(elderly people)) OR ALL=(senior)) OR ALL=(generation 60+)) OR ALL=(baby boomers)) OR ALL=(client 60+). The number of papers found initially by such a search was as high as 1 372 276. The results for only "silver economy" were lower and consisted of 2859 records (2.08% of the global search). We found four scientific areas of published papers focused on the economic-related disciplines:

multidisciplinary studies (2.352% of full search), environmental studies (2.051%), educational research (1.64%), and business economics.

We narrowed the database using the Business Economics filter in the next stage. The number of papers left was 22,311. Then, we added a "bank" component to the search protocol, and 3978 records were shown in total, while only 837 records were in 2000-2023. As a result, the search was limited to 312 publications.

The SDG approach was addressed in the articles from the defined search in the "silver economy" and "bank" areas. The strongly emphasised goals were: SDG8 Decent Work and Economic Growth (91 papers; 28%), SDG1 No Poverty (79; 25%), SDG 10 Reduced Inequality (65; 20%), SDG9 Industry Innovation and Infrastructure (41; 13%), SDG 03 Good Health and Well-Being (21; 7%), SDG 11 Sustainable Cities and Communities (12; 4%), and SDG4 Quality Education (11; 3%).

After filtering with Meso and Micro Citation Topics, we achieved a set of 152 articles in which we interpreted the co-occurrence of keywords using the entire counting method. In conjunction with the thematic variety of approaches in a selected group of articles related to the silver economy and banks, we defined five internally consistent clusters.

The thematic area of the articles from Cluster 1 is associated with market discipline and risk in the context of debt, wealth, and economic growth. Articles from Cluster 2 focus on topics related to banking and improving performance through effective governance, innovation, leadership, and management. Papers covering the keywords from Cluster 3 delve into consumer behaviour and service industries. They explore issues related to the consequences of customer satisfaction and loyalty, models and strategies for building trust and commitment, and the impact of service quality on overall customer experience. Cluster 3 is related to silver banking and relations between the banks and elderly consumers. Cluster 4 articles primarily focus on corporate governance determinants and their impact on investment quality, indirectly affecting consumers. Cluster 5 articles delve into the relationship between banks, corporate social responsibility (CSR), and economic crises. They also examine the impact of CSR initiatives on consumer trust, confidence, and financial well-being during crises.

5 Discussion

Based on our analysis, we may attempt to conclude that the issue of the silver economy is rarely explored in the academic literature focusing on retail banking customers. Following the article's first goal, we investigated the advancement of knowledge on senior customers' needs in a banking environment, which allowed us to explain and prove the importance of the silver economy in the context of SDG goals.

A detailed content analysis divided articles into five thematic groups: senior management and executives, senior employees, senior customers, and silver entrepreneurship, particularly emphasising customer service in retail banking. A group of articles referred to the respondents who were seniors in the sense of people working in senior management positions. The keywords related to the silver economy and banks included trust, credibility, commitment, and perspective. The analysis showed that researchers in English literature rarely address the topics of banking products and services for senior citizens and the adjustment of traditional banking services to seniors' capabilities.

Some authors emphasise that seniors are a heterogeneous group that requires an individual approach (Horská et al., 2013), and banks often do not meet these needs, leaving challenges that can make banking difficult (Labrèche, 2023). Senior-friendly banking services are essential to ensure that elderly customers can manage their finances effectively and independently, which is why they go back to bank branches in high-touch interactions (Valenti & Alderman, 2021) when modern technologies are challenging for older adults (Jin et al., 2021).

Along with the article's second goal, we integrated the United Nations Sustainable Banking Goals in the context of the silver economy concerning RQ "Which SDG goal reflects the problems of senior-focused approaches in the banking sector?". It can be concluded that sustainable banking practices involve ethical considerations, such as fair lending and investment in affordable housing or community development projects, which can uplift neighbourhoods and create a more inclusive and resilient society (SDG11). Thus, we propose aligning the SDGs crucial for silver economy topics with the Silver Banking Goals. The SDG goals presented in Figure 1 reflect the problems of senior-focused approaches in the banking sector (RQ).

Transparency and accountability are vital in figuring out the authenticity of a bank's commitment to sustainable and ethical practices (SDG16). Sustainable banking is an integrated approach that balances economic prosperity with social and ecological well-being (SDG3). Older customers face challenges with traditional banking services, such as mobility, hearing and vision impairment, and cognitive decline (SDG9, SDG 10), making it challenging to use banking services, leading to frustration and lack of financial independence (SDG1). These services can help elderly customers keep their economic independence, reduce their reliance on caregivers, offer enhanced security features, such as fraud alerts and secure online banking, help seniors manage their money, and achieve their financial goals (SDG1) while promoting financial literacy becomes pivotal to empowering them to make informed choices (SDG4).

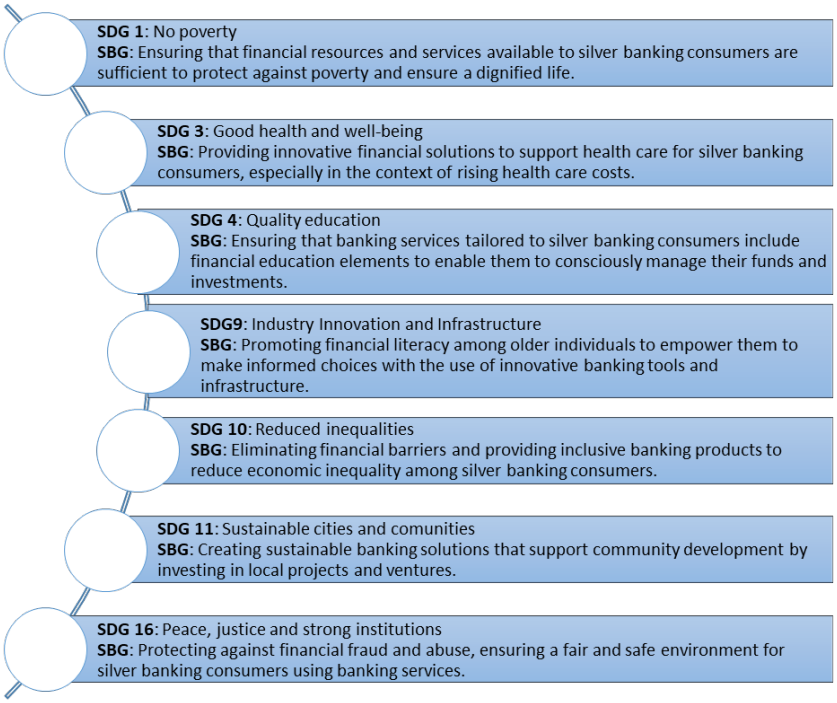

Figure 1: The Matrix of the Sustainable Development Goals (SDG) and their reflection in the Silver Banking Goals

Source: own elaboration based on sustainable development goals defined by United Nations, THE 17 GOALS | Sustainable Development (un.org)

Senior-friendly banking services can address these challenges by providing tailored services that cater to the unique needs of elderly customers, like significant print statements, audio-enabled ATMs, and specialised customer service representatives (CFPB, 2023).

6 Conclusions

The article offers inspiration and support for scientists and retail banking managers in redefining directions and priorities for senior customers. It contributes by systematising literature on the silver economy and retail banking services in the context of sustainable development goals, which is associated with matching the SDGs with Sustainable Banking Goals in specified areas.

The ageing population presents both opportunities and risks to banks, which consider the implications of the silver economy in their risk assessments. By implementing customer-centric strategies and innovative approaches, financial institutions can create inclusive and accessible banking experiences for older individuals, empowering them to participate in human interactions and digital banking services (RQ).

Based on the research results, we suggest introducing the concept of "silver banking" as a new term to distinguish the communication channel in the banking sector tailored to the ageing population. This concept makes it possible to systematise comprehensive knowledge of the silver economy and banking. The limitation of the article was the language, as only publications prepared in English were considered, and the Web of Science database was used only. Then, attention should be paid to the broad meaning of the word senior. Further research should investigate the extent to which current retail banking offerings are tailored to suit the capabilities of senior citizens, focusing on elderly customers' attitudes, preferences, and challenges while using various banking services.

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PUBLIC-PRIVATE PARTNERSHIP TO SCALE UP CIRCULAR ECONOMY (THE GEORGIA CASE)

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Public-private partnerships (PPPs) are considered an important enabling mechanism for promoting a circular economy. The paper aims to study PPP tools to scale up the circular economy, present Georgia's position, identify opportunities, and develop relevant recommendations. Georgia currently operates at a circularity level of 1.3%, indicating a significant circularity gap of 98.7%. Despite several steps successfully taken in Georgia already, more opportunities should be opened up and turned into assets to promote circularity and promote sustainable development. There is low interest from businesses in the innovative approaches required to transition to circularity, indicating that extensive measures need to be taken. Their potential to raise their company reputation should be accented, and the appropriate campaign directed with this emphasis, so as to raise awareness among both the businesses and the public (as potential customers). As the state has the most important role in the growth of circularity, there is a need to expand the relevant legal framework. Georgia's future steps in scaling up its circular economy should be actively connected with the private sector through identifying, implementing, and evaluating processes, and through the institutional duties of PPP projects.

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1 Introduction

Public-private partnerships (PPPs) are considered an important enabling mechanism for promoting a circular economy, involving collaboration between government institutions and private sector groups to scale up sustainable and circular practices.

There are different definitions of PPPs. According to the World Bank, a PPP is a long-term contract between a private party and a government entity, seeing the provision of a public asset or service, in which the private party bears significant risk and management responsibility, and where remuneration is linked to performance (PPP Reference Guide, 2017).

The toolkit of PPPs in the circular economy covers a wide range, and includes:

- Waste management - creating cooperation for more efficient collection, processing, and disposal of waste; implementing Extended Producer Responsibility (EPR) programs;
- Resource efficiency - collaborating on projects to improve resource efficiency and eliminate waste, which promotes the use of circular design ideas in product development;
- Circular supply chain - developing partnerships to create circular supply chains that reduce resource consumption and waste, and which promote circular buying techniques;
- Cooperation in the field of innovation and technology, which includes the promotion of disruptive technologies supporting circularity, and the use of digital technologies to track and manage circular supply chains;
- Involvement of the private sector in policy development for the realization of circular economy goals, and the adjustment of regulations and incentive mechanisms to promote circular practices;
- Creation of financial structures and investment models to support circular economy initiatives;
- Broadening the educational potential through uniting educational programs to improve understanding of circular economy ideas;

- Increasing public engagement in the circular economy, including encouraging knowledge-sharing, capacity-building activities, and promoting sustainable consumption behavior;
- Investing in infrastructure that enables circular economy initiatives such as recycling centers and green logistics;
- Creating methods to track and report progress towards circular economy goals; creating indicators to evaluate the effectiveness of circular projects;
- Encouraging cross-sector collaboration spanning several stages of a product's life-cycle to develop holistic solutions and achieve synergistic effects.

The use of public-private partnerships to expand the circular economy has a multidimensional nature, and, as such, there are yet a number of gaps from the point of scientific study of the fact. According to the previous literature analyses, effective multi-stakeholder collaboration being among the opportunities needing utilization so as to better transition to a circular economy has been less often highlighted in scientific research (Papachashvili et al., 2023). This finding gave us a certain incentive to explore the role of public-private partnerships in expanding the circular economy. It is also worth noting that neoliberal governance is often vulnerable to achieving sustainable development goals, and the active cooperation of stakeholders to achieve synergistic effects is thus becoming increasingly popular.

Despite several successful steps that have already been taken in Georgia toward the circular economy and some private sector involvement in waste management, the public-private partnership policy has not yet been fully formed (Pavliashvili et al., 2022).

The paper aims to study public-private partnership (PPP) tools to scale up the circular economy, present Georgia's case in this theoretical context, identify opportunities, and develop recommendations for the use of the PPP mechanism in the transition to a circular economy.

To address the research question of the paper, a case study and a review of the literature were chosen as the methodological techniques. Using pertinent key terms, we primarily conducted searches in the EBSCO database for relevant material and

then examined the relevant scientific literature. For the analysis of the specific situation in Georgia, the work is based on the official material of the Ministry of Environmental Protection and Agriculture of Georgia, Georgia's Circularity Mapping Report, statistical analysis based on the quantitative research conducted by Geostat, and analyzing the reflections of the issue in various Georgian publications.

2 Literature Review

To study the role of public-private cooperation in the expansion of the circular economy, it is possible to use a general framework (PPP Reference Guide, 2017) that defines the main components of PPPs, typically including:

Policy - articulating the objectives and reasons for using PPPs to deliver public services;

The scope and implementation principles of the PPP program - the legal framework that sets the rules for the participation of the government in PPPs, and which establishes the norms and restrictions for their implementation. This includes PPP-specific legislation, public financial management rules, and sector-specific regulations;

Processes and institutional duties for PPP projects, which include identification, development, appraisal, implementation, and management within the Public Investment Management system, and the roles of the various institutions involved. A well-managed PPP process ensures efficiency, transparency, and consistency in project quality.

The public financial management strategy involves controlling, reporting, and budgeting fiscal commitments under PPPs to assure value for money, minimize the burden on future generations, and manage fiscal risk;

Other arrangements include involving auditing entities, the legislature, and the public in the PPP initiative, and holding responsible parties accountable for their activities. This program covers the elements of a PPP framework, including examples and recommendations for practitioners.

Analyzing and evaluating the effectiveness of public-private partnerships in various fields is a subject of wide interest. Still, academic publications specifically evaluating PPPs in the circular economy context tend to be scarce.

We present some research findings from studies conducted on the EBSCO base:

Perceptions of the importance of public-private partnerships in expanding the circular economy were studied in Croatia. Researchers consider such perceptions as important social capital. Interestingly, it was found that there are misconceptions about the effectiveness of such cooperation, of note the fact that students who had been taught about public-private partnership models at university were more likely to recognize certain misconceptions about public-private partnerships, and were more likely to think it possible to successfully implement such projects in Croatia (Bogovac et al., 2021).

In the context of the circular economy and the EU Green Deal, for the development of adequate PPP models, the case study of Bulgarian cosmetic and fragrance SMEs is interesting. Researchers demonstrated that Bulgarian SMEs could extract greater economic value. The study highlights the importance of public-private partnership contracts, which give R&D centers a legal chance to deliver valuable technologies to the market (Vladikov & Raychev, 2021).

A lot of research has been devoted to finding ways to efficiently manage waste to achieve the goal of expanding the circular economy. Researchers indicate that capacity-building seminars and round-tables should be organized to improve communication and cooperation with stakeholders within the frames of public-private partnerships; the municipal government should lead the management of solid waste; and a steering committee composed of representatives of all other stakeholders should be established to oversee the work of the municipal government. The feasibility of creating a private-public partnership should be considered in light of local stakeholders' level of knowledge and trust (Koiwanit & Filimonau, 2023).

To achieve inclusive effects in public-private cooperation, researchers suggest that it is preferable to improve producer involvement from the design stage so as to build projects that meet their actual needs; that project implementation and decision-

making should be shared more evenly among partners, requiring regular feedback; and that project results and evaluation should be viewed as additional support for ongoing local dynamics. To strengthen recycler involvement and project evaluation, the successes of recycling organizations should be better recognized, and project outcomes can then be more focused on the project's added value (Giovannini & Huybrechts, 2017).

Understanding approaches to environmental governance is essential to the transition to a more circular economy in the waste and resource management industry. Voluntary quality assurance standards covering waste and resource flows around the world are increasingly centralized. As the transition to a circular economy takes place against the backdrop of neoliberal environmental governance, the question of achieving meaningful results through voluntary standards is being critically discussed. For example, based on qualitative research findings, researchers note that while proponents of standards and the circular economy see improving the quality of recycled materials as critical to building trust in existing and emerging markets, they point to the assumption that markets always prioritize cost over quality, and that standards are secondary. Furthermore, policy instruments such as standards should question existing neoliberal market relations rather than just follow them (Flynn & Hacking, 2019).

A study conducted in China found that sustainable public procurement has a considerable beneficial impact on the attainment of business-sustainable production targets, and thus should be included in public policy instruments. Researchers indicate that public procurement serves as a crucial link between public demand and market supply, potentially influencing company behavior. Furthermore, the government should implement differentiated policies tailored to the region's economic development conditions and corporate development characteristics, as well as establish a long-term evaluation mechanism that will allow the government to play a longer-term demonstration and leadership role (Li & Cao, 2023).

Another study conducted in China also points to the importance of public-private partnerships in the transition to a circular economy and, based on a case study, concludes that innovative approaches are needed to overcome problems such as "long negotiation time", "lack of transparency", and "uneven risk and return

allocation", which in turn lead to "ineffective delivery" and "poor value for money" (Bao et al., 2019).

Research in the renewable energy sector has demonstrated the relevance of public-private cohesion in interactions, which is required to establish a trust and consultation framework that promotes the success of territorial initiatives. The measure of centrality of the interacting players reveals that the project leader serves as a facilitator to the interaction networks, allowing for the exchange of information, knowledge, and collective learning (Niang et al., 2022).

Yet another study concludes that public procurement can promote circular economy and related business models by establishing criteria and requirements for extending product lifespans, improving efficiency and/or intensity of use, and efficiently cycling biological or technical materials, as well as ensuring clean and risk-free cycles. Circular procurement might involve purchasing high-quality circular items, developing new circular products, using CE-friendly business models, and investing in circular ecosystems (Alhola et al., 2019).

3 Georgia's Case

Developing sustainable business models is a complex challenge that must address profit-making and environmental challenges simultaneously, while maintaining awareness of business interests and benefits.

Research has found that there are ecological benefits for those enterprises that introduce innovations, and up to 10% of enterprises in Georgia have been found to already be taking advantage of such benefits-through-innovation. Fig.1 demonstrates the level of importance given to the received ecological benefits by those innovating Georgian enterprises, while Fig.2 shows what it was that pushed those Georgian enterprises to the decision to produce innovations with ecological benefits (by impact level).

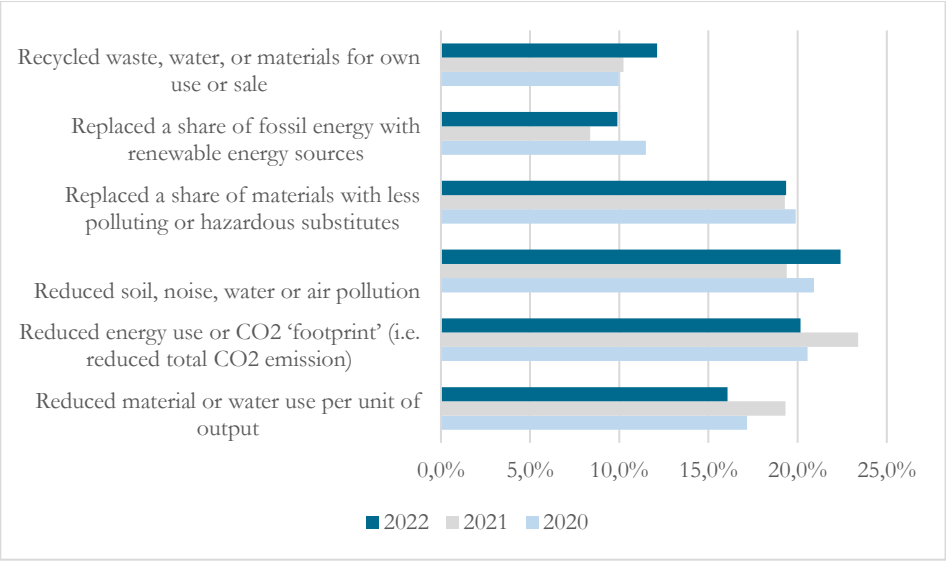

Figure 1: The level of importance given to the received ecological benefits by innovating Georgian enterprises, according to the types of benefit, %, 2020-2022
Source: Innovation Activity of Enterprises, 2016-2022, Georgia.

Georgia recently embarked on an expedited journey toward transitioning to a circular economy. Through collaborative efforts involving the government, civil society organizations, and international partners, Georgia has initiated the formulation of a circular economy strategy. Notable progress has been made, including the introduction of Extended Producer Responsibility (EPR) into the national Waste Management Code. As Georgia progresses on its circularity journey, it stands to gain from the experiences of more advanced economies, and to forge robust partnerships. Leveraging initiatives such as the ongoing program supported by the Government of Sweden, Georgia can discern the most effective pathway toward achieving a circular economy (Pavliashvili & Prasek, 2020).

Between 2019 and 2022, the Georgian Society of Nature Explorers (GSNE) "Orchis" collaborated closely with the Ministry of Environmental Protection and Agriculture (MEPA) to execute the Circular Economy Program in Georgia, generously funded by the Government of Sweden. This initiative comprised two main components. The first component focused on raising awareness about the Circular Economy and furnishing recommendations to diverse groups of key stakeholders, aiming to expedite the integration of circular economy principles

across various economic sectors. To achieve this goal, eight conferences were convened, targeting policymakers, businesses, the financial sector, municipalities, universities, academia, project promoters, and SMEs. Additionally, special sessions were held for the Parliament of Georgia as part of these efforts. Two manuals were developed on the topic of circular economy: one tailored for policymakers and project promoters, and another designed for universities. Additionally, a collection of thematic articles was compiled and made available to the public. Another significant aspect of the program involved assessing the level of circularity within Georgia's economy. This endeavor was undertaken in close collaboration with the Government of Georgia. To facilitate this assessment, the government formed an Inter-Ministerial Coordination Board made up of 36 representatives from various ministries and governmental agencies. This board was chaired by Deputy Minister Acad. Solomon Pavliashvili from the Ministry of Environmental Protection and Agriculture of Georgia (MEPA Information, 2024).

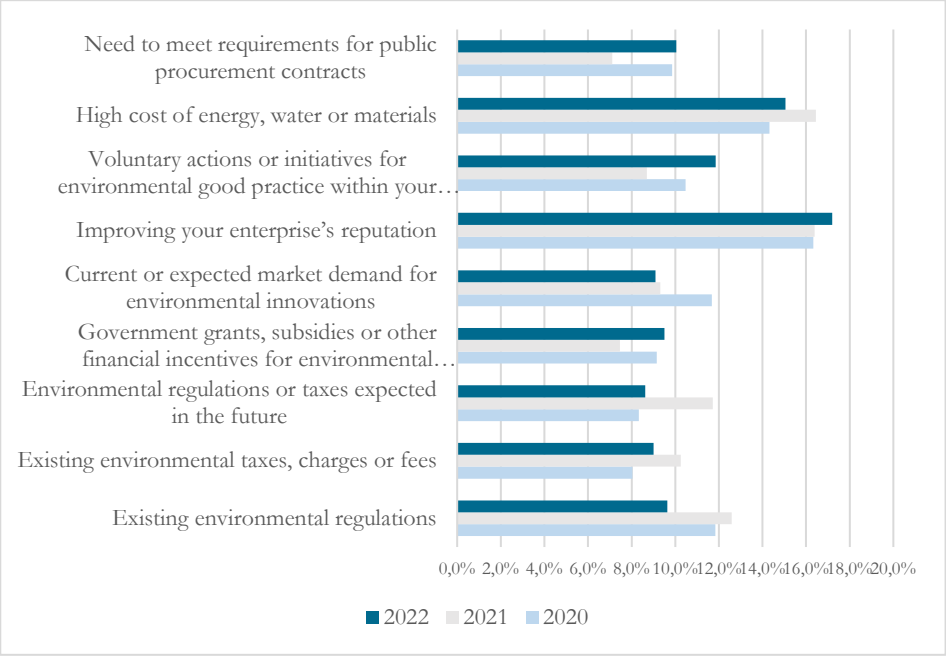

Fig. 2. The distribution of impact categories that drove those Georgian enterprises to decide to introduce innovations with environmental benefits, %, 2020-2022
Source: Innovation Activity of Enterprises, 2016-2022, Georgia.

The process of circularity mapping entailed two years of dedicated effort and close collaboration between the team at GSNE "Orchis," comprising 13 experts, and the Inter-Ministerial Coordination Board of the Government of Georgia. An initial assessment of all 90 economic sectors registered in Georgia was carried out to conduct the circularity mapping, focusing on economic criteria and the volume of waste generated. Subsequently, 14 sectors were singled out for in-depth analysis of their circularity potential. This involved compiling detailed profiles for each sector, including material flows (such as raw materials, products, by-products, and waste), losses, and waste generation. The analysis also assessed the proportion of recycled waste and estimated the potential for recycling using the RESOLVE framework. Furthermore, the mapping process included formulating recommendations for national quantitative circular economy policy targets and ambitions, identifying sector-specific opportunities, and outlining policy options tailored to each sector. Ultimately, recommendations for the Circular Economy Road Map and Strategy for Georgia were developed (Pavliashvili et al., 2022).

A crucial aspect of the mapping process was clustering industries into groups based on similar circularity criteria, key player indicators, and sector administration processes. The results of the circularity mapping revealed that Georgia currently operates at a circularity level of 1.3%, indicating a significant circularity gap of 98.7% that underscored the substantial potential for enhancing the circularity of Georgia's economy simultaneously (Prasek & Tchelidze, 2023).

As part of their in-kind contribution, the circular economy program team at GSNE "Orchis" identified 15 potential circular economy pilot projects. They meticulously developed concept notes and business plans for these projects, intending them to be financed by financial institutions and other donors. This proactive approach aimed to showcase practical examples of circular economy principles in action, fostering investment and support for sustainable initiatives within Georgia's economy (GSNE "Orchis", 2024).

Now the UNDP's Governance Reform Fund (GRF), which is funded by the Government of Sweden, supports the Georgian government in the development of a National Roadmap to a Circular Economy, and capacity building. These activities are also implemented by GSNE "Orchis" in close collaboration with the government, specifically with the MEPA and Ministry of Economy and Sustainable

Development, within the frames of the 'Supporting the Government of Georgia in Enhancing Governance and Policies for a Transition to a Circular Economy' program. The key objectives of the roadmap development are designing recommendations regarding the national ambition level, targets for circularity, and metrics for the desired impacts; analysis of the potential focus areas and key policy gaps; and generating recommendations for potential incentives so as to accelerate the progress to circularity, and eventually to develop a national strategy and action plan for circular economy for Georgia. Together with the preparation of the circularity roadmap, the mentioned sub-project includes building the capacity of governmental agencies that have a key role in the transition to a circular economy. This capacity building includes five thematic seminars, in Circular Economy, Environmental, Social, and Governance (ESG), and Green Public Procurement, to ensure informed participation of these key stakeholders in the development and implementation of the National Roadmap to a Circular Economy (MEPA Information, 2024).

4 Conclusions

The theoretical study of the issue reaffirmed the vital need for the comprehensive and collaborative approaches of stakeholders to address the challenges and opportunities associated with the transition to a more circular and sustainable economic model.

Despite the several steps that have already been successfully taken in Georgia, more opportunities should be opened up and turned into assets to promote circularity and sustainable development.

The small indicator of the circularity of the Georgian economy, and the low interest of businesses in the relevant innovative approaches for the transition to circularity, indicates that extensive measures need to be taken.

The results of the research show particular interest from businesses in raising their company reputation, and, as such, campaigns should be directed with this emphasis, so as to raise the awareness of both the business sector and the public (as potential customers).

Both the theoretical and case study of Georgia revealed that the state has a key role to play in the growth of circularity, and there is a need to expand the relevant legal framework, including public finance management rules and sector-specific regulations.

Georgia has taken some steps towards the development of regulations, but future work must be related to the provision of public services to achieve a broader circular economy.

Further, it is important to reflect the transition to circularity in the strategy of public financial management, which accordingly reflects the control, reporting, and budgeting of fiscal obligations within PPPs.

It is vital for Georgia to support and take onboard the knowledge of international organizations and developed countries with successful practices.

The future steps of Georgia to scale up its circular economy should be actively connected with the private sector through identifying, implementing, and evaluating processes, as well as establishing the institutional duties of PPP projects for further effective cooperation. As the private sector can increasingly deliver results through public-private initiatives, this collaboration must be strengthened.

Expanding the connection between higher education institutions and businesses based on public-private partnership contracts will open the most important potential asset.

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UNRAVELING THE LAYERS OF DIGITAL COMPETITIVENESS IN THE ECONOMIC SYSTEMS

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The subject of digitization and its impact on all aspects of life is the subject of daily discussions. However, the effect that the digitalization process has on socio-economic systems remains in the background. More specifically, increasing their competitiveness contributes to their more efficient functioning. The article's main purpose is to trace the evolution of the understanding of the nature and aspects of the manifestation of digital competitiveness.

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1 Before the Introduction

This article is the first step and a kind of foundation of scientific research dedicated to the evaluation of the digital competitiveness of Bulgaria's socio-economic system. For this reason, the following text does not have the typical (adopted in recent years) structure but is an unveiling of the concept of digital competitiveness today - from the standpoint of the different levels of its manifestation, as well as the specific factors that impact it.

2 From Economic Competitiveness to Digital Competitiveness

One of the constantly discussed topics directly related to the development of economies and societies is that of competitiveness. The category of competitiveness has been the subject of numerous theoretical and practical studies since the 1970s. Michael Porter (Porter, 1998), for example, defines competitiveness as a process based on productivity and focuses on the microeconomic foundations of competitive advantage that underpin productivity in nations, regions, and clusters. In this period, the competitiveness of economic systems was mainly studied from the standpoint of the efficiency of production activity, efficient use of resources, etc.; nowadays, the topic related to the concept of "digital competitiveness" is gaining wider popularity.

As already indicated, the topic of digital competitiveness is relatively new compared to the background of traditional understandings of competitiveness. In this sense, a correct understanding of the nature of digital competitiveness is crucial to the research. Although it is a new category in the literature and practice, there are various definitions and concepts, and understanding of which is crucial to the study. They help to understand how countries position themselves and compete in the opportunities the digital age offers. Some of the most summarized definitions for digital competitiveness define it as:

Table 1: Main definitions of digital competitiveness

Author	Definition
IMD (IMD, 2023)	The capacity of an economy to adopt and explore digital technologies leading to the transformation in government practices, business models, and society in general.
Stankovic, Marjanovic, Drezgic, Popovic (Stankovic, Marjanovic, Drezgic, & Popovic, 2021)	A multidimensional structure that encompasses various factors of the process of digital transformation through the ability of learning and application of new technologies, technology factors that enable digital transformation, and digital readiness factors that assess the preparedness of an economy and citizens to assume digital transformation.
Bukht and Heeks (Bukht & Heeks, 2017)	A country's capability not only to create and use digital innovations but also to obtain positive effects from the development of the so-called digital economy
Mlynarzewska-Borowiec (Mlynarzewska-Borowiec, 2021)	The country's ability and readiness to create and use digital technologies and benefit from the development of the ICT sector.

Source: Author's table

These definitions make it possible to derive the main characteristics of digital competitiveness: *economic and social impact* (ECDC, 2024); *competitiveness based on digitization; competitiveness based on implementation and use of digital innovations; people's participation in the digitization process.* Digital competitiveness not only predetermines and strengthens an economy's ability to apply and use digital technologies to innovate and improve business processes but also influences its ability to adapt to ever-changing global market conditions. In addition, digital competitiveness is also a key factor in the development of society and increasing its well-being.

In this context, looking at digital competitiveness at different economic levels offers a unique perspective for analysing the state and development potential of countries in the digital era. It enables the systematic approach to be applied in the implementation of the analysis, through which approach the specific aspects and connections between the different levels can be deduced. This article aims to explore the key components that shape digital competitiveness at the global, national, regional, and corporate levels and to analyse the current trends and challenges that socio-economic systems are facing and will face in the future.

The main levels at which digital competitiveness can be studied are: global, national, regional, industry, company and individual. Each of these levels provides unique opportunities to analyse and understand the key factors that influence the ability of economies to take advantage of digital technologies.

Figure 1 presents the main levels (layers) of digital competitiveness and the relations between them. As can be seen in the figure, each of the presented lower levels (systems, as elements of the system at the previous level) have a different degree of participation in the formation of the degree of digital competitiveness of the higher system. At the same time, an important clarification that needs to be made is about the presence of two-way relationships, also expressed through the impact of the degrees of digital competitiveness and its manifestation of the higher-ranking system on the lower-ranking system.

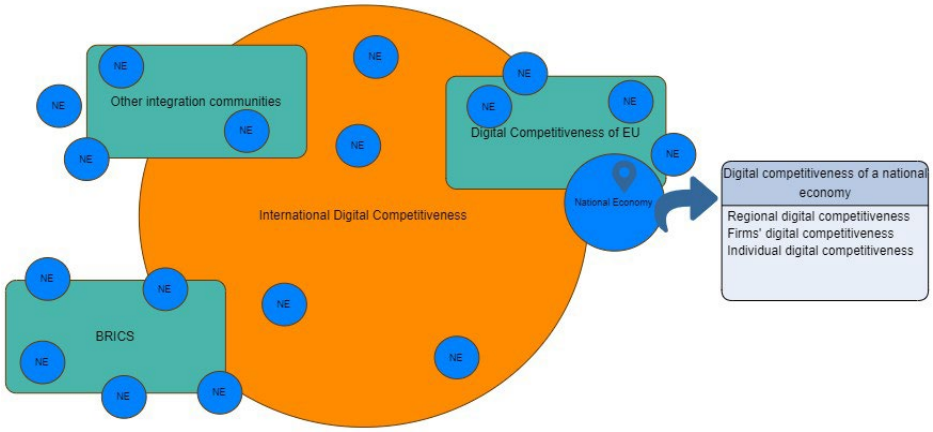

Figure 1: Main levels (layers) of digital competitiveness
Source: Author's figure

At the global (international) level, trends and dynamics of digital competitiveness between the countries of the world economy are analysed. International rankings, global indices (e.g. EU Digital Economy and Society Index, IMD Digital Competitiveness Index) are explored and digital development strategies are compared. The focus at the national level is on an analysis of the digital competitiveness of individual countries. National policies, regulations, infrastructure, investment in technology, the level of digital skills among the population, and the digital inclusion of businesses are explored.

Examining digital competitiveness at the regional level provides information on how different areas or regions within a country are coping with digital transformation. This includes an analysis of regional differences in digital infrastructure, broadband

access, regional innovation ecosystems, and local digital education initiatives. The digital competitiveness of the various economic sectors and branches is examined at the sectoral level. The specific challenges and opportunities for digitization in industries such as finance, manufacturing, healthcare, education and others are analysed.

The company level focuses on the analysis of the digital competitiveness of individual companies. It assesses how companies apply digital innovation, technology, and business models to improve their competitive position, operational efficiency, and customer service. At the lowest level (individual), research focuses on individual's digital skills and competencies and their ability to use and benefit from digital technologies in personal and professional contexts.

Each of these layers provides a different perspective and allows researchers, policymakers, and business leaders to identify strengths and weaknesses as well as opportunities for improvements in the context of the digital economy. The following presentation provides an in-depth review of the main concepts related to digital competitiveness at different levels. The main purpose of this report is to identify the specific characteristics of digitalization and digital competitiveness in the Bulgarian socio-economic system.

3 The Bedrocks of the Digital Competitiveness

The presence of different levels (layers) at which the concept of digital competitiveness is considered also implies the presence of relevant specifics regarding the factors that affect the levels of competitiveness formed by the processes of digitalization in the respective system. However, several factors can be deduced, the impact of which is considered at each of the investigated levels of manifestation of digital competitiveness. Of course, the direction, intensity and power of impact and manifestation of each of these factors vary depending on the level of its manifestation. A summary of the factors is presented by Figure 2.

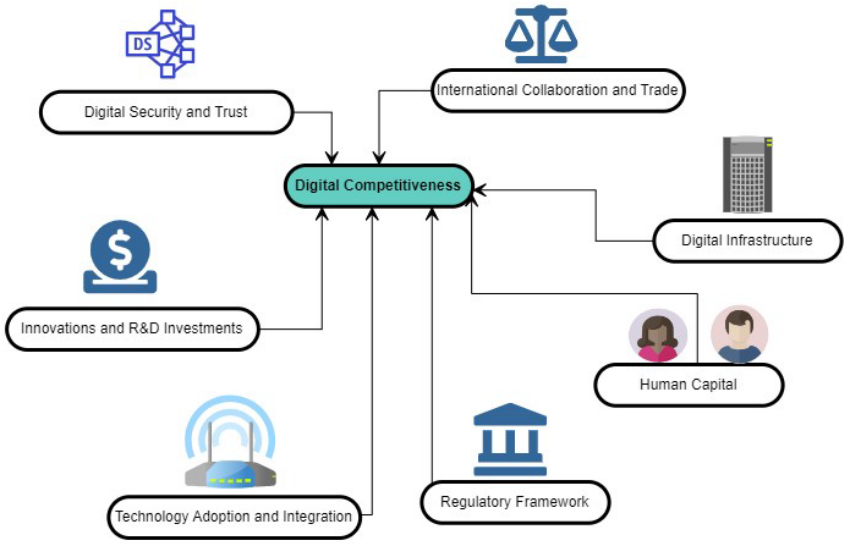

Figure 2: Main factors that affect the digital competitiveness
Source: Author's figure

3.1 Digital Infrastructure

The main factor that affects the level of the digital competitiveness is the **digital infrastructure.** It is the foundational layer upon which the digital economy is built and thrives. Digital infrastructure encompasses many physical and virtual assets like high-speed broadband networks, mobile telecommunications, data centers, cloud computing resources, and IoT (Internet of Things) platforms. They enable efficient data storage, management, and transmission, supporting everything from everyday internet usage to complex, data-intensive processes in businesses and governments. The availability and quality of digital infrastructure directly influence a country's ability to provide digital access to its citizens and businesses. High-speed internet and robust mobile networks are crucial for ensuring widespread digital connectivity, which is fundamental for accessing online services, participating in the digital economy, and fostering social inclusion. Countries with extensive, reliable, and affordable digital infrastructure can achieve higher levels of digital literacy and participation, essential components of digital competitiveness.

At the company level, the digital infrastructure catalyzes economic growth and innovation. It enables businesses to operate more efficiently and to innovate by leveraging digital technologies such as cloud computing, big data analytics, and AI. Countries that prioritize the development of advanced digital infrastructure create fertile ground for start-ups and innovation hubs, attracting investment and talent. That is why we can conclude that digital infrastructure is more than just a technical necessity; it is a strategic asset that underpins national digital competitiveness. It influences a country's ability to innovate, participate in the global digital economy, and ensure prosperity and inclusivity for its citizens.

3.2 Human Capital

The second factor of digital competitiveness is **human capital,** which includes the human intellect, creativity, skills, and knowledge that drive innovation, technological advancement, and the efficient use of digital technologies. Human capital in the context of digital competitiveness encompasses a broad spectrum of competencies, ranging from basic digital literacy to advanced technical skills in areas such as artificial intelligence (AI), machine learning, data science, and cybersecurity. However, it's not solely the technical skills that matter; equally important are the soft skills, such as problem-solving, critical thinking, and adaptability, which enable individuals to navigate the rapidly changing digital landscape.

Digital literacy at an individual level refers to an individual's ability to use information and communication technologies to find, evaluate, create, and communicate information. It is the lower but essential layer in the structure of national competitiveness.

Beyond basic digital literacy, developing advanced technical skills is crucial for fostering innovation and maintaining competitiveness. Specialized skills in software development, cloud computing, AI, and big data analysis are in high demand across industries. Countries that invest in higher education and vocational training programs in these areas are more likely to produce a workforce capable of leading digital innovation and contributing to the nation's digital economy.

One of the elements of the traditional external environment that impacts the development of a system (national, regional, company) is the regulatory framework of a country or/and the regulatory framework of the international system. This topic

is even more important when we discuss the development under the process of digitalization.

This framework, which encompasses laws, policies, and regulations governing the use of digital technologies and the internet, serves as either catalysts for growth and innovation or barriers that hinder progresses in the national economic system. For instance, regulations encouraging the development and adoption of emerging technologies, such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT), can significantly boost a nation's competitiveness. By providing clear guidelines and support for research and development (R&D), these frameworks not only foster innovation but also attract investments from both domestic and international tech companies eager to operate in a supportive regulatory environment.

3.3 Digital Security and Trust

Digital security and trust are central to the adoption and effective use of digital technologies. Regulatory frameworks that prioritize cybersecurity, data protection, and privacy not only protect individuals and businesses but also enhance trust in digital platforms and services. Regulations such as the General Data Protection Regulation (GDPR) in the European Union have set global benchmarks for data protection, compelling companies worldwide to elevate their privacy standards. By establishing clear rules for data handling and consumer protection, countries can create a secure digital environment that fosters growth and innovation.

The essence of technology adoption transcends the basic use of digital tools; it involves a holistic transformation of business processes, government operations, and societal functions. This transformation is characterized by the strategic implementation of technologies such as artificial intelligence (AI), the Internet of Things (IoT), blockchain, and cloud computing across various sectors. At the core of technology adoption is the drive toward an innovation-led economy. Countries that successfully integrate new technologies into their economic not only boost productivity but also pave the way for new industries and job creation.

3.4 Innovation and R&D Investments

Innovation in the digital realm encompasses a broad spectrum of activities, from developing cutting-edge technologies like artificial intelligence (AI), blockchain, and quantum computing to the creative application of existing digital solutions in new or improved products, services, and processes. It's the lifeblood of the digital economy, ensuring that a nation remains competitive, adaptable, and forward-looking. Nations that cultivate a strong culture of innovation are better positioned to solve complex problems, enhance the efficiency of their industries, and improve the quality of life for their citizens.

The R&D investments are crucial for fostering innovation as they enable the exploration of new ideas, the development of breakthrough technologies, and the improvement of existing digital solutions. By investing in R&D, countries signal their commitment to advancing their technological capabilities and securing a competitive edge in the global market.

R&D investments contribute to digital competitiveness in several key ways: *attracting talent; supporting start-ups and SMEs; enhancing collaboration; driving economic growth.*

3.5 Internal Collaboration and Trade

When talking about national digital competitiveness, internal collaboration and trade emerge not merely as components but as the very threads that interweave to strengthen the digital economy. This intricate relationship underscores the importance of cohesive interaction among businesses, government entities, and educational institutions within a country, as well as the fluidity and efficiency of trade among these internal stakeholders.

Internal collaboration refers to the synergistic efforts between various sectors within a country, including public, private, academic, and non-profit organizations, to foster a conducive digital ecosystem. This collaboration is instrumental in nurturing innovation, streamlining regulatory processes, and facilitating the seamless exchange of knowledge and resources.

Internal trade, or exchanging goods, services, and information within a country, is equally critical for digital competitiveness. The ease with which businesses can trade internally

4 Conclusion

Digital competitiveness is proving to be a critical element in the modern economy, determining the ability of countries, regions, and organizations to use digital technologies to achieve economic growth, innovation and improve the quality of life. This competitiveness is underpinned by multiple factors, including the development of digital infrastructure, the quality of human capital, the regulatory and legal environment, the degree of adoption and integration of digital technologies, and the ability to innovate and collaborate internally.

To remain competitive in a rapidly changing digital world, countries and businesses must invest in expanding their digital infrastructure, train and develop their human capital in digital skills and technologies, and create an enabling regulatory and legal environment that promotes innovation and protects both businesses and consumers. Furthermore, the importance of domestic and international collaborations cannot be understated, as they facilitate the exchange of knowledge, technology, and best practices.

Ultimately, digital competitiveness is driven by a vision for the future and the ability to adapt to the ever-changing digital ecosystem. It requires a commitment to continuous learning, innovation, and collaboration at all levels - from individual to national. Only through joint efforts and strategic planning can countries build sustainable and thriving digital economies that will not only withstand the challenges of today's world but also make the most of the opportunities that digitization offers for tomorrow.

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COMPARATIVE REVIEW OF MARKETING PERFORMANCE MANAGEMENT MODELS - CLASSICAL MODELS VS DIGITAL MARKETING MODELS

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The aim of this scientific paper is to present and analyse the fundamental differences and shared aspects in literature, regarding the measuring and evaluating marketing performance between the traditional and innovative digital marketing performance management models. Special attention is being paid to the need of their integration, in order to present marketing performance of organisations in a more realistic, comprehensive and inclusive manner, and to enable an effective marketing performance management, ultimately leading to the effective overall organisational performance management. Their interaction and integration is one of the crucial challenges of contemporary scientific research in marketing, and contemporary marketing practice globally. Classical marketing performance management models need to be complemented with contemporary digital marketing performance assessment models, and their integration leads to innovative, comprehensive models that integrate classical and innovative approaches. Such an inclusive approach is aimed at providing organisations with a comprehensive understanding of their marketing performance, enabling them to make informed decisions and strategically navigate the complexities of the modern market. This will be a main focus of this paper, and methodologically, apart from the theoretical elaboration and a literature review, a blended methodological approach will be implemented in the paper

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1 Introduction

Marketing Performance Management is a critical aspect of contemporary marketing, as it helps organizations to analyze data, make predictions, and optimize marketing plans, campaigns, and resources. It represents a comprehensive approach to measuring and evaluating marketing performance, which involves integrating different marketing models, strategies and tactics.

The interaction between traditional and digital marketing strategies drives the need to revise the models used for marketing performance management, in order to ensure that organizations remain competitive and can easily adapt to market changes. The fundamental differences and shared aspects in measuring and evaluating marketing performance between classical and digital models emphasize the need to develop an inclusive approach.

Moreover, when creating such an inclusive approach, the focus should also be placed on identifying and analyzing the key performance indicators – KPI's that are specific to both classical models and digital marketing performance measurement models.

This approach will provide organizations with a comprehensive understanding of their marketing performance, enabling them to make informed decisions and strategically navigate the complexities of today's marketplace.

2 Literature review

The literature review showed that the classical models for measuring and evaluating marketing performance are partial, and should be integrated with contemporary models for measuring and evaluating performance in digital marketing. Classical marketing performance models are more focused on aligning marketing initiatives with business objectives. Subsequently, they involve monitoring and measuring the outcomes of these initiatives, emphasizing broader organizational metrics as key indicators of the initiatives' effectiveness in generating positive results. Classical marketing performance models provide a historical overview of all marketing activities and collect and aggregate data while improving organizational efficiency.

Digital marketing performance assessment models, on the other hand, focus on digital marketing channels such as social media, email, etc. These models use technology to measure and analyze data and optimize marketing performance accordingly. Coulombe (2015) in his article "How to integrate traditional and digital marketing" suggests that by integrating classical and contemporary digital marketing strategies and models, organizations can attract more potential customers, equip and motivate their sales and marketing teams and increase their chances of achieving their business objectives.

Several studies have provided valuable insights and frameworks for measuring marketing performance. Gao (2010) offers a detailed review of marketing performance studies and proposes a unified marketing performance measurement approach. The study highlights the importance of understanding and evaluating marketing performance for an organization's overall productivity.

According to other authors, marketing performance can be defined as the efficiency and effectiveness of organizational marketing activities in relation to market-related objectives, such as revenue, development and market share (Homburg et al., 2010). Ambler, argues that there is a great deal of imprecision in defining marketing performance, but it can be measured using marketing metrics. Marketing performance measurement is the assessment of the relationship between marketing activities and business performance (Bruce & Ambler, 2001).

Järvinen (2016) in his research paper states that the academic marketing literature has gained advanced knowledge by assesing the metrics used by organizations and combining them with the theoretical frameworks that establish connections between the diverse impacts of marketing on the market outcomes, financial values and organizational performance.

Basimakopoulou et al. (2022) in their artcle "A literature review on Digital Marketing: The Evolution of a Revolution" suggest that the future of marketing appears to embrace augmented and virtual reality. Therefore, technology, together with the development and adoption of specific organizational capabilities and the integration of robust business processes, is crucial.

3 Methodology

The methodology of this scientific research paper is based on comprehensive data collection and analysis from primary and secondary data sources. The range of resources includes books, journals, internet literature, articles, reports and other relevant materials on the research problem, brought together through the application of scientific research methods such as induction, deduction, analysis and synthesis. In addition, the methodology extends to researching Internet databases, adding a digital dimension to the entire research process. In order to make a comparative review and to present the fundamental differences and shared aspects in the literature regarding the measurement and evaluation of marketing performance between classical and digital models.

The main aspect of this research methodology includes a careful examination of the relevant literature, with a review of classical scientific studies, contemporary literature and existing scientific research studies, articles and reports related to marketing performance management models and their development from classical models to innovative, digital models. The aim is to establish a comprehensive understanding of the research subject.

4 Comparative review of marketing performance management models

Classical marketing performance management models are partial, limited and not sufficiently inclusive of digital marketing performance. Their focus is on traditional marketing performance which they express it through classical performance measurement indicators. On the other hand, if the performance of digital marketing is managed exclusively through classical models, the obtained results would not be complete and reliable.

Contemporary digital marketing performance assessment models if used exclusively on their own without integrating classical marketing performance management models, would not give the completely desired results.

The integration of these two generations of models, will lead to innovative, comprehensive models that integrate classical and innovative approaches in measuring marketing performance.

As a theoretical basis,the most typical models from both groups are first anylized, which further during the research will represent the basis for an appropriate upgrade to the new comprehensive approaches.

The traditional approach in marketing performance management includes the use of various models, such as Balanced Scorecard, Marketing Dashboard, Media (Marketing) Mix Modeling. These models provide a framework for analyzing marketing performance, identifying key performance indicators and optimizing marketing resources. The most widely accepted performance management model is the **Balanced Scorecard (BSc)** model. Kaplan and Norton (1992) describe this model, which derives from the vision and mission of the organization, based on four key perspectives – financial, customer/consumer, internal processes and learning and development, according to which marketing performance objectives are defined. Furthermore, the achievement of the goals is monitored through the key performance indicators (KPI's) which are grouped in the marketing performance scorecard. Such a model covers the strategic and tactical level of organizations. Whereas the **Marketing Dashboard (MD)** consists of key elements that include the summarization and integration of key performance indicators with the underlying drivers to communicate performance across the organization (Clark et al. 2001). A properly created Marketing Dashboard model provides a mechanism for efficient management and allocation of resources, in order to improve overall marketing performance. Classical **Marketing Mix Modeling (MMM)**, is a revolutionary modeling tool of the 20th century, that collects and analyzes data, uses channel attribution models, and conducts market research surveys to measure the impact of marketing efforts. This is a model that, through an analysis technique, allows marketers to measure the impact of their marketing performance to determine how the various elements contribute to their ultimate goal. These three models that are selected for the purposes of this research are models that deal with the assessment of marketing performance management, including the classical key performance indicators in traditional marketing that are compiled of long-term and short-term, financial and non-financial metrics, which are key components in managing the organization's overall marketing performance.

However, classical marketing performance management models are partial and have limitations, as they do not take into account the impact of digital marketing strategies and models, which are becoming increasingly important in today's digital environment.

Contemporary digital marketing performance assessment management models have changed the way organizations approach managing overall marketing performance. They provide new opportunities for how organizations can reach their target market and drive growth in marketing performance.

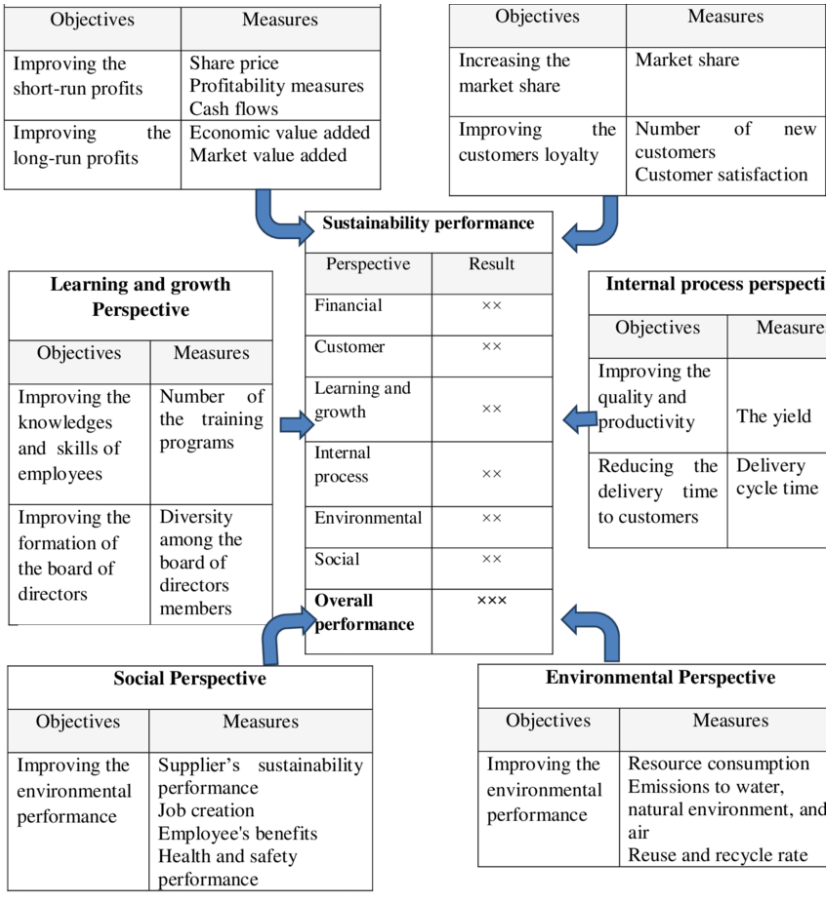

Figure 1: The Contemporary Balanced Scorecard model

Source: Abdelrazek, A. Fathi, Sustainability Balanced Scorecard: A Comprehensive Tool to Measure Sustainability Performance, IJSSER 2019, Vol.4, Issue 02, February 2019, p. 956

The models already mentioned are models that undergo transformation over time and are adapted for application in digital marketing performance management. Although the **Balanced Scorecard model** was originally designed to perform traditional business functions, it can be effectively adapted to measure performance in digital marketing. Using the BSc model in this context is key for organizations to ensure that their digital marketing strategies align with wider organizational goals and deliver measurable results. In the advanced BSc model, in addition to the existing four perspectives, another key perspective is added - the sustainability perspective (Kalender&Vayvay, 2016). The fifth perspective enables companies to include social, economic and environmental pillars in marketing performance management and marketing strategy. The contemporary **Marketing Dashboard** takes advantage of the positive aspects of the new blockchain technologies and artificial intelligence, and it helps organizations to monitor customer data, their standardization and quality, and increases the coordination between different departments, as well as between partners in the supply chain. The data captured in these technologies is readily available. Artificial intelligence has its share and progress in automating certain parts of the model and while graphs can be generated based on statistically collected data, the marketer only has to verbalize the hypotheses to be tested in the research in measuring marketing performance (Pauwels&Reibstein, 2023). The new generation of **Marketing Mix Modeling** represents a major advance in marketing performance measurement that overcomes the limitations of classical MMM (Deloitte Digital, 2022). With new comprehensive insights, advanced forecasting capabilities, increased emphasis on actionable business results and its adaptability to change, it empowers marketing managers to make informed decisions, optimize their strategies and maximize marketing performance.

In addition to the above classical models, these advanced contemporary models for measuring and evaluating marketing performance in digital marketing, accompanied by key performance indicators in digital marketing compiled of short-term and long-term, financial and non-financial indicators, are key components in managing digital marketing performance in organizations.

4 Conclusions

The research findings propose that organizations could improve their efficiency and effectiveness of measuring marketing performance by integrating both classical marketing performance management models and digital marketing performance assessment models.

However, the detailed interaction between the classical and digital marketing assessment models in order to better understand and optimize their integration for improved organizational performance, should be researched in detail as a further study.

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UNDERSTANDING THE IMPACT OF THE ECOLOGICAL TRANSACTION ON THE HUMAN CAPITAL OF UNIVERSITY STUDENTS: A CROSS-COUNTRY ANALYSIS

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Firm live in an increasingly competitive environment is subject to rapid change. Hence, new skills and knowledge in sustainability and green management practices represent new competitive levers. For this reason, it is necessary to train a new generation of workers and managers oriented towards these new practices. In this respect, Universities hold the most suitable means for training young workers and managers. The current study aims at examining how universities are responding to the needs of a new human capital. The study is based on the exploratory and inductive methodologies through a multi-step methodological process, a questionnaire was administered to university students from 4 different countries (Georgia, Hungary, Ukraine and Italy). This study offers several elements of originality. In particular, a multilevel analysis is offered on the educational needs of students in terms of sustainability and green management skills. Furthermore, a comparative analysis between 4 different countries is offered. The findings of this study offer interesting practical implications. In particular, the results highlight that university students are interested in deepening their preparation on sustainability issues to increase their employability. In addition, the results can suggest indications to university managers and decision makers to guide the educational offer

Keywords:
human capital, sustainability, green management, higher education, cross-country analysis

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1 Introduction

The documents for the European Commission, Industry 5.0 focuses on three main directions: Human-centric, Sustainable and resilient. Researchers predict that Industry 5.0 will help the formation of Society 5.0. Consequentially, it is critical to prepare the workforce for the future challenges. Furthermore, developing an effective response to upskilling and reskilling is a challenge for universities. Organizations need new skills and knowledge to survive and increase their competitiveness. Considering these issues, various international research organizations and institutes (UN, World Economic Forum, etc.), as well as scholars (Sobolieva & Harashchenko, 2020) are focusing their attention on challenges of sustainable development and green management in the digital era. The last decades in management studies are marked by the intensification of the social corporate responsibility implementation and the shift of its focus towards environmental challenges (Taylor, 1992). Firms began to successfully integrate an environmental component into development strategies through the transformation of the production paradigm to the concept of three zeros: in addition to the two zero goals (defects and inventories), companies strive to achieve zero waste and emissions (Florida & Davison, 2001), which is the beginning of the development environmental management systems (EMS). This paper examines the literature relating to sustainability and green management issues. The brief analysis of the relevant literature allows the authors to understand the recent theoretical evolutions and analytical perspectives. The methodology part includes explanation of the steps and phases of the analysis. A questionnaire was created for university students. The paper ends with its implications, limitations, and future research direction issues.

2 Theoretical background

The European Union and the United Nations to shape more sustainable, safer and better world for all. According to the UN (2015) "the Agenda for Sustainable Development By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development" (Goal 4; 4.7 p.17/35).

In order to promote sustainable development and digital transformation, the education system as a whole, and universities in particular, have an important role to play. Researchers predict that focusing on the university will determine success

for sustainable development, the teaching, research and commercialization. The effective dialogue with business and public bodies helps to enter the market. It should be mentioned that this kind of relationship is possible to achieve in the modern model of universities (Etzkowitz and Zhou, 2008, Guerrero *et al.,* 2016, Gera et al., 2021, Vesperi & Gagnidze, 2021).

The development of green management directly depends on the spread of green values in the organization, that is, the greening of organizational culture (Harris & Crane, 2002). This is ensured by the inclusion of an environmental component in the company's policy and strategy through decision-making and their implementation at all levels of the organization, considering green values. Organizational culture is highlighted as one of the important drivers of SME sustainability (Campos et al., 2013, Shatilova et al., 2021). Consideration of sustainability issues in the development of strategies, dissemination of knowledge and skills on sustainable development during education and training for personnel, were also named among the drivers. The authors believe that the education system is one of the key tools to achieve sustainability and sustainable development. This paper examines the literature relating to Sustainability and Green Management Issues. The methodology part includes explanation of the steps of the methodological process. An overview of the student survey questionnaire conducted by the authors is provided. The paper ends with its implications, limitations and future research direction issues.

3 Methodology

This study has the main objective of identifying and understanding the impact that ecological transaction issues are having on universities' educational offer. Universities represent complex organizations that have a direct impact on the human capital of society and future managers and employees. This study is based on a multi-step methodology. Qualitative and quantitative data were collected.

The first step of the methodology reports and reviews from the European Commission and other international organizations, such as the World Economic Forum and the UN, by consulting the official websites. Over 20 official documents were collected and analyzed about ecology transactions, human capital and universities/higher education. Subsequently, an academic literature analysis was

carried out, with the objective to offer a theoretical overview of the academic debate around the topics covered by this study. From the elements collected, both from the analysis of official documents and from the scientific literature of reference, a questionnaire was formulated. The questionnaire consists of 32 multiple choice items. To make the questionnaire more understandable and easier to read, the questionnaire was divided into three sections. The questions were grouped based on their informative purpose. Only n. 221 were considered complete and correctly completed.

4 Results

The questionnaire was administered to university students from four different countries (Georgia, Hungary, Italy and Ukraine). The small percentage of differences, in terms of participation, were subsequently neutralized using statistical tools. Figure 1 offers an overview of the geographical distribution of respondents.

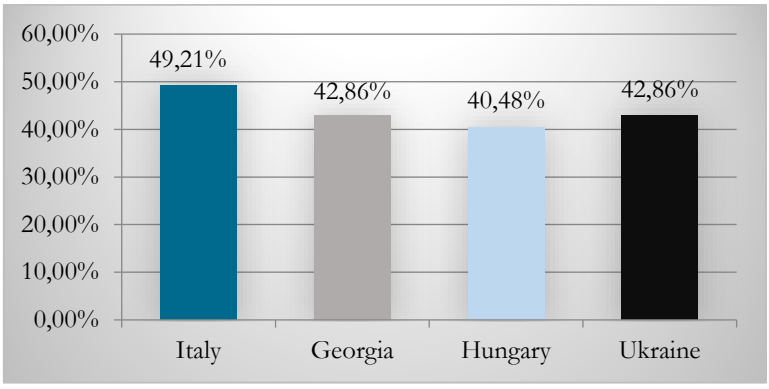

Figure 1: Geographical distribution of participants
Source: elaborated by the authors

By analyzing sections II and III of the questionnaires it was possible to understand the training needs of university students on the topics of sustainability and green management.

By descriptive statistical tools (mean, median, max and min value), it was possible to analyze the results of the individual sections and draw a first picture on the need of university students' training in terms of sustainability and green management skills.

Subsequently, the results of the individual sections were analyzed from a comparative perspective to understand the relationships with the variables taken into consideration.

The results of this study show that universities play a key role in the new challenges of sustainability and digital transactions of organizations and society. The results highlight that complex competitive challenges can be overcome by acting on the training offer, especially in universities. The results of the questionnaire show that these challenges can be overcome by orienting the university educational offer. Analyzing the data, what emerges is the lack of attention to the issue of sustainability in the choice of university or course of study by future university students. But during their university carrier they increase their sensitivity towards sustainability and green management issues.

At the same time, the presence within university structures of a center for raising awareness of environmental issues (separate waste bins, water recycling, etc.) has no value in the choice of university. From data analysis it emerges that university students, after having followed courses focused on the topics of sustainability, circular economy and green management, develop greater awareness. The average value of the category stands at around 3.82/5.00. Despite the fact, that students were less concerned with its sustainable practices when choosing a university to study, they highly appreciate the importance of teaching courses on sustainable development issues. In addition, students did not show a high desire to take an active part in the development of such courses, most respondents expressed to delve deeper into the study of the challenges of sustainable production and consumption. Human capital towards the issues of sustainability and green management, necessarily requires change in university educational offer. For this reason, the present study, thanks to a comparison between university students from four different countries, allows the authors to offer a transversal overview of the phenomenon. The results highlight a tendency for the female gender to be more oriented towards the issues of sustainability, the circular economy and green management. In summary, the results of this study highlight that the training of future university students must necessarily include the issues of sustainability, circular economy and green management. To respond to these new needs, an in the educational offer of universities is necessary. The students are particularly sensitive to all aspects of sustainability and consider every aspect significant for their future

employability. Changes within complex organizations such as universities (and higher education institutions, HEIs) are not easy to manage. First, changes in the training offer determine profound impacts on the change in the company's human capital and on future managers. On the other hand, changes in complex organizations, such as universities, are not immediate and simple, but require change management intervention.

5 Discussion

Changes in the higher education system have direct consequences on individuals' behavior. Therefore, introducing the issues of sustainable development and digital education can lead to a generation of citizens and managers who are more attentive and ready to respond to these new challenges.

From a practical point of view, the results of the study highlight the training needs that university students feel are most needed. The results can guide managers in planning the new training offer. From a methodological point of view, the results highlighted the effectiveness of the multistep methodology based on the administration of a questionnaire. In fact, the involvement of the students made it possible to recover privileged and solid information. At the same time, feedback was quickly collected.

6 Conclusions

The outcomes of this study have different implications. The results will help the university to better manage the process of changes and exploitation of the academic knowledge. At the same time, the findings can help the external actors of the university to understand the business opportunities based on academic knowledge and competitive advantage in the market. In particular, the results highlight that university students are interested in deepening their preparation on sustainability issues to increase their employability. In addition, the results can offer indications to university managers and decision makers to guide the educational offer.

Links established between universities, can strengthen sustainable development through international cooperation and benchmarking (Vesperi *et al.*, 2024); exchanging knowledge and sustainable practices; holding trainings, seminars,

conferences. The result of interaction between universities could introduce the joint educational programs on sustainable development (Vesperi et al., 2023), such as the Joint International Master in Sustainable Development launched by the joint efforts of eight universities from three different continents (Brudermann et al., 2017).

In fact, by acting on the training of university students, it is possible to introduce new skills and new knowledge within organizations. In general, in digital era, cooperation between countries is very important. The reason for this is that the three main directions of Industry 5.0 cannot be realised without international efforts.

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AI-DRIVEN STRATEGIES FOR SUSTAINABLE BUSINESS DEVELOPMENT: LESSONS AND INNOVATIONS POST-2008 ECONOMIC CRISIS

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In this paper, the main aim concerns the impact of AI as a driving force behind sustainable business strategies analysed after the 2008 financial crisis. Although there are some existing empirical studies regarding the impact of AI on the sustainability and growth of enterprises during financial crises, there is still room for further research and empirical contributions. Thus, by using a systematic review of literature and appropriate case studies, this research seeks to analyse how AI-driven approaches have been incorporated into operations for improved sustainability and efficiency in the post-crisis era. Methodologically, this study adopts a mixed method approach whereby case studies' qualitative analyses and quantitative data evaluation stand alongside one another to grasp the big picture of AI's effect. Finally, the results show that AI has provided sufficient support to sustainable business, which promotes economic revival and the formation of resistant future-focussed strategies. Thus, this paper provides contribution towards understanding technology-sustainability linkage with economic recovery for policymakers, practitioners, and researchers.

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1 Introduction

The financial crisis of 2008 has become a significant moment in world economic history, indicating that business strategies should be strong and lasting. A global financial crisis sparked by the U.S housing market downturn (Smith & Taylor, 2010) is the second most devastating event after the Great Depression, which caused an emergency characterised by very high unemployment and bank failures. During the crisis, AI was recognised as a crucial source of innovation, developing the key for sustainable growth in the 21st century. The role of AI became closely connected with the issues associated with the turbulence of the modern era Enterprising Turbulence through its ability to provide high-speed data processing, automate repetitive tasks, and provide decision support to complex business issues (Miller, 2013; Anderson & Rainie, 2014).

The introduction of AI into business processes after 2008 symbolised a shift towards leaner and more resource-efficient practises that agreed with the growing global focus on sustainability and corporate responsibility. This was not just an adaptive response to bad economic times but a strategic reorientation to align business operations with the emergent sustainability paradigm (Kapoor & Lee, 2013). This transformation was possible because AI allowed supply chains to be optimised by enabling data-based decisions in resource management, and therefore redefined sustainability in business operations (Thompson, 2016).

Using a systematic review of primary and secondary sources, interviews with industry and academic leaders, and case studies of AI application in different sectors, this research provides examples of how AI can be applied and its impact on businesses. Further, it focuses on ethical and social consequences of AI application in corporate activities, such as data confidentiality and the rise in unemployment, because of automation (Davis, 2014; White & Case, 2016; Patel & Jain, 2015).

This study makes a valuable contribution to the discussion of technology-focussed business transformation by examining the cross-section of AI, post-2008 economic recovery, and sustainable business practises. It seeks to share its findings and discussions with leaders, policy makers, and academic communities on the opportunity that AI offers in growing the economy eventually as well as resilience.

2 Literature Review

The 2008 crisis made business strategies re-evaluated by focussing on AI innovation and sustainability. Johnson and Kapoor and Lee (2013) were the first to investigate the role of AI in economic recovery, whereas Fischer and Krause (2018) and Vaughn and Turner (2019) discussed AI in financial forecasting and risk management, noting its potential for more solid economic frameworks. Henderson et al. (2021) studied the effect of AI on sustainable supply chain management under market volatility.

AI's combination with sustainable practises is significant. Thomson (2016) and Greene et al. highlighted the role of AI in environmental sustainability. Larson and Zhao (2019) and Marshal and Raju (2020) focussed on the impact of AI on Sustainable Development Goals, and Kim and Park (2021) associated AI-driven business practises with sustainable urban development and social advantages.

Davis (2014), as well as White and Case (2016), raised ethical issues, such as data privacy and job losses due to automation. Nguyen et al. (2020) and Santos and Eisenhardt (2018) proposed ethical AI governance. Evans and Stone (2021) dealt with AI's influence on consumer privacy. The literature also covers the difficulties of AI in a traditional sector and SME integration (Smith & Ander and Barnes, Milton 2017; Lee and Chang, 2021), while Johnson and Harcourt (2022) discuss the regulatory balance. This is an all-inclusive review that emphasises the central role of AI in post-2008 economic recovery and durable business strategies.

3 Methodology

This research uses a mixed-method approach to investigate the role of AI on sustainable business growth after the financial downturn of 2008, combining both qualitative and quantitative methods to cover AI's impact on businesses along multiple aspects (Brynjolfsson & Hitt, 2003; Fountaine et al., 2019). It seeks to provide information to business leaders, policymakers, and scholars on how AI can promote sustainable development and recovery. This methodology uses different data sources comprising business performance reports and sustainability indices to analyse aspects of operational efficiency and environmental impact (Porter & Heppelmann, 2015; Wirtz et al., 2019).

The study uses regression and panel data analysis to evaluate the AI adoption rate and its sustainable business outcomes, taking into account external factors (Athey & Imbens, 2017; Varian, 2014; Baltagi, 2008). This kind of econometric analysis provides data necessary for making an informed decision (Agrawal, Gans, & Goldfarb, 2018) and improves understanding of AI' s practical implications (Brynjolfsson & McAfee, 2017). In emphasising specific AI aspects that support sustainability, the research highlights the direction econometric analysis could play in guiding AI investments towards substantial sustainability outcomes (Brynjolfsson & McAfee, 2017).

4 AI Technologies and Economic Recovery

Post 2008, the integration of AI marked a turning point in economic recovery, improving resilience, job creation, and sustainable development. During this time, innovations in AI were on the rise, and it led to the stabilisation of the economy (Kaplan & Lee, 2013; Fischer Krause, 2018). AI played a significant role in the developments of financial sectors through risk analysis and fraud detection, which helped in disciplining economic systems (Moretti & Lee, 2019), and logistics and supply chain, where AI-based optimisations brought substantial cost savings and efficiency improvements (Henderson et al., 2021; Baxter & Schmidt, 2020).

AI in sectors such as manufacturing with predictive maintenance and quality control has led to a significant rise in productivity (Greene et al., 2017; Larson & Thompson, 2020). The retail and customer service sectors also benefit from AI through inventory management and personalisation in service (Vaughn and Turner, 2019; Chen and Lee, 2022). Rather than predicted job losses, AI resulted in job creation in machine learning, data science, and AI ethics (Smith & Anderson, 2017) and created new markets in autonomous vehicles and smart technologies (Jones et al., 2021; Kim & Park, 2021).

In addition, AI plays a significant role in environmental sustainability, more specifically in the sector of efficient resource management and waste reduction (Thompson, 2016; Walters & Patel, 2021). AI's use in energy, including smart grids and renewable energy optimization, was a vivid example of AI's promise for sustainable economic progress (Greene et al., 2017; Nelson & Simmons, 2022).

5 AI-driven Sustainable Business Practices

The integration of AI in sustainable business practises is a huge step towards marrying economic growth with environmental and social responsibility. Environmental Sustainability: AI improves energy efficiency and waste reduction in manufacturing with the help of smart sensors and analytics (Larson & Thompson, 2020; O'Neill & Adams, 2021). In energy management, AI fine-tunes usage and increases renewables, thus improving grid management and lowering the carbon footprint (Nelson & Simmons, 2022; Greene et al., 2017).

Ethical Business Practices: The AI systems lead to ethical business practises because they guarantee fair labour practises and workplace safety (Walters & Patel, 2022). They further improve corporate social responsibility with the help of advanced data analytics and pattern recognition, which help in solving complex social problems (Chen & Lee, 2022; Morrison & Crane, 2019).

Nevertheless, AI's promise for sustainability is hindered by several challenges, such as ethical issues of AI bias and data transparency (Davis, 2014; Nguyen et al., 2020). The environmental effects of consumer electronics, for example, the power consumption and life span effects of AI technologies, require careful oversight (Hawkins & Kim, 2021).

6 Challenges and Ethical Considerations

The utilisation of AI in sustainable business practises has transformative possibilities, but also challenges in the ethics aspect, as data security and ethical maturity in AI implementations are of concern. This entails assessing the technology impacts on employee readiness and the environmental consequences of AI system deployments.

Solving the ethical puzzles of AI and environmental challenges, thus, requires judicious and sustainable use of AI emphasising on privacy of data, ethical deployment in various sectors, and workforce adaptation. This integrative approach guarantees that AI in business performs constructively in relation to sustainable business practises and at the same time minimises the hazards it presents.

7 Lessons Learned and Future Outlook

In the last decade, AI has underlined how businesses are revolutionising their operational efficiency and contributing to sustainability (Kapoor & Lee, 2013; Fischer & Krause, 2018). AI's role goes beyond data processing to automating tasks, which is beneficial to environmental and social sustainability as part of corporate strategies (Greene et al., 2017; Larson & Thompson, 2020).

The adoption of AI by businesses has shown improvements in sustainability, implying the synergy between business longevity and the strategic sustainability practises (Walters & Patel, 2021). Nonetheless, issues of data privacy, ethics, and human capital are some of the aspects that require caution when integrating AI into the organisation (Davis, 2014).

Quantum computing and AI integration with back-chain and IoT represent new practises in dynamic AI development models, thus calling for dynamic policies that align AI development with ethical standards and society values (Kim & Park, 2021; Chen & Lee, 2022; Lee & Chang et al., 2022). Policy makers are advised to concentrate on fostering an environment that promotes ethical AI development and spending on workforce force education (Reynolds and McKee, 2021).

Nevertheless, questions still remain about the possible societal impacts of AI eventually, which highlights the need for studies dealing with AI's ecological friendliness and energy conservation practises (Hawkins & Kim, 2021; Marshall & Raju, 2020).

8 Conclusion

The study, however, focuses on discussing the essentiality of Artificial Intelligence (AI) in developing human strategies for a business to be sustainable during the post-global economic crisis after 2008 that dictated innovative revival and growth by getting out of tradition. One of the leading innovations that has emerged from this is AI, which serves as a significant facilitator in promoting sustainable business growth. Having conducted a comprehensive literature review and provided several in-depth case studies, this research questioning the role of AI-driven strategies

within business operations pays particular attention to their contribution towards post-crisis sustainability and efficiency.

Using a multi-method approach that combines qualitative case study analyses and quantitative data analysis, the research provides an extensive picture of AI's implications. It does not sidestep the issues and moral conundrums that the introduction of artificial intelligence confronts direct attention to a discussion on the tenuous line between technological advancement and socially responsible action.

The findings of this research are revealing; AI has greatly been the enhancer of both sustainable business practises as it not only drives economic growth but also lays a foundation for strong future look forward organisations. This paper, addressing the convergence of AI with sustainability and economic revival issues, adds significantly to scholarly discussions on how AI contributes to business problems; it has practical implications for policymakers wielding terrorism combating methods while being useful for businesses 'decision-making processes as well.

This paper goes beyond a study to highlight that AI is not only transforming the nature of business organisations but also redefining how business will be conducted in the future with respect to sustainability. It promotes constant innovation within this sphere while pinning the ultimate importance of maintaining economic and environmental health on our global community.

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Clustering Students for Effective Communication Based on Enrollment Choices - Why do Students Choose the University?

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This study focuses on the primary stakeholders of higher education institutions, students, with a particular emphasis on first-year students. The aim of the study is to segment students by institutional choice and to characterize them by demographics and by level and field of education. An online questionnaire (2,330 students) was used to investigate the factors that influence the outcome of the decision-making process at the time of application. Based on the factors (education and reputation; dormitory and services; opinion of others; city), four groups of students could be distinguished: Uninterested Students; Conscious Students; Ambitious Students; and City Lovers. The focal points (avatar, headline, visual content and textual content) of a communication campaign were identified with the help of marketing master students (12) using the Design Thinking method.

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1 Introduction

Competitive environments in higher education (HE) are shaped by globalization, which extends beyond regional and national boundaries to international levels. While traditional marketing strategies have historically facilitated university–corporate collaborations, current trends stand challenges for marketing professionals. In order to increase competitiveness, universities must adopt effective marketing tools like profit oriented companies. Relying on European Commission data of Hungary (2.92%), the share of students in the population in 2020 was significantly lower than in neighboring countries such as Austria (4.73%), Slovenia (3.65%), and Croatia (3.99%). The differences in enrollment rates can be attributed to a variety of factors such as the quality of higher education and institutional tradition, which influence the willingness of young people to pursue further studies. Universities face major challenges in enrollment, recruitment, and retention. The decision-making process for selecting a higher education institution involves financial, psychological, and social considerations, as well as institutional image, or reputation. Today, universities are increasingly focusing their marketing activities on corporate branding, recognizing that a positive institutional image is a key factor to success in the competitive higher education market. This research focuses on the primary stakeholders of higher education institutions, university students, with a particular emphasis on first-year students.

The basic research question was what groups or clusters of students can be distinguished based on institutional choice and how they can be characterized based on demographics and educational circumstances. After the literature review, the paper presents the methodology of the empirical research, followed by the research results and concludes with the conclusions.

2 Theoretical Background / Literature Review

Students engage in a complex set of considerations when choosing a higher education institution, including factors such as institutional excellence, academic reputation, geographic location, accessibility, and financial considerations (Winkler, 2014). Researchers have highlighted the multifaceted nature of these decision-making processes (Ariffin et al., 2014, Azzone and Soncin, 2020, and Srivastava and Dhamija, 2022) and identified other aspects such as campus amenities, employment

prospects, and economic feasibility. Previous literature has highlighted the importance of geographic proximity, institutional prestige, and program reputation (Winkler, 2014; Walsh & Cullinan, 2017; Srivastava & Dhamija, 2022). On the other hand, socioeconomic status and proximity to hometown determine institutional choice. The influence of social networks, family, and structural factors such as location, institutional image, and academic standing significantly shape student preferences (Walsh & Cullinan, 2017; Dhaliwal et al., 2019). Financial considerations, including tuition and expected economic returns, also play a role in the decision-making process (Srivastava & Dhamija, 2022; Dhaliwal et al., 2019).

The segmentation of students based on psychographic (motivational) and demographic factors has received considerable attention in contemporary research due to the increased importance of recruitment and retention within higher education institutions (Nonis et al., 2021). Goodrich et al. (2020) emphasized the relevance of such segmentation by highlighting the utility of psychographic variables, which encompass attitudes, lifestyles, values, and interests. Using K-means clustering Goodrich et al. (2020) have distinguished six distinct segments within the U.S. student market and tailored specific messaging strategies accordingly. These segments were: 1) motivated post-traditionals, 2) focused scholars, 3) unsupported trailblazers, 4) dependent wonderers, 5) privileged experientials, and 6) prestigious collegians (Goodrich et al., 2020:442). Motivated post-traditionals prioritize practical factors such as convenience to work, affordability, and class availability. Focused scholars prioritize academic support, caring faculty, small class sizes, and campus involvement as they pursue successful careers or advanced education. Trailblazers are driven by their desire to set a positive example for their families by pursuing a college degree. Dependent wanderers are students without clear career goals who seek guidance and support, prioritizing colleges with supportive environments and good value. Privileged experiencers are socially conscious students from affluent backgrounds who prioritize campus social life and career-enhancing amenities. Prestigious collegians value challenging academics, extracurricular involvement, and a prestigious college reputation for career and graduate school readiness.

3 Methodology

The goal of the study is to segment undergraduate students by institutional choice and characterize them by demographics and by level and field of education. Based on the literature review, the authors assume that people can be classified into homogeneous customer groups and that they can be profiled.

The empirical research focused on first-year students at a single university in Central Eastern Europe. First-year students admitted to the university completed a questionnaire at the time of enrollment that asked a wide range of questions to understand students' views of the university's enrollment marketing. The questions assess students' aspects in choosing an institution, sources of information, but it also examines student applications by faculty, education, level, and funding. In addition, student demographics such as gender, age, location, and type of residence are assessed. In this paper, the authors focus on students' institutional choice. The questionnaire was launched on July 27, 2023, following the release of the 2023 admissions cut-offs by the Ministry of Education. A total of 2,330 students were reached, with the last response received on September 7. The survey was conducted through an online platform on the university's website and was completed anonymously.

The questionnaire consisted of three distinct sections: (1) choice of institution, (2) sources of information about programs, and (3) sociodemographic characteristics. Participants described their choice by indicating their level of influence on a 5-point Likert scale, ranging from 1 indicating minimal influence to 5 indicating complete influence. Relying on the literature review, 15 institutional choices were examined, like practical training, university-industry link, available scholarships, reputation of the institution, free language learning opportunities, tuition fees, better chance of getting into college, low college fees, sport facilities, opinions of friends, friends, opinions of family members, city, distance from home and job opportunities.

Sociodemographic characteristics included gender, age (in years), residence status (in Hungary or abroad), and type of locality (village, town, county center, or capital city).

Respondents represented a variety of academic disciplines, with the majority specializing in engineering (47.1%), followed by social sciences (15.7%), economics (13.9%), law (9.6%), health and physical education (7.8%), agriculture (4.0%), and the arts (1.8%). The gender distribution was 48.7% female and 51.3% male, with the majority belonging to Generation Z. The majority of respondents live in Hungary, with a significant proportion living in towns and villages, accounting for 84.2% of the sample.

Data analysis was performed using SPSS 26.0 software. Cluster analysis, specifically Ward's hierarchical cluster analysis using agglomerative clustering (Malhotra, 2022), was used to address the research questions. The Euclidean square distance metric was used to quantify dissimilarities between data points. After assessing the prerequisites, various cluster solutions were explored, culminating in the selection of a five-cluster solution. These five clusters were then treated as nominal variables. The relationship between cluster membership and basic demographics and educational circumstances was examined using cross-tabulation (chi-square analysis). This analytical approach took into account both the expected values and the characteristics of variables measured on nominal scales.

After the clusters were typed, the clusters were personalized and social media messages were created using design thinking with the participation of 12 Master of Marketing students. Design thinking is a human-centered methodology for creative problem-solving, encompassing user empathy, creative ideas and prototypes (Johnson et al., 2021, Dykhnych et al., 2022). It involved five different phases: (1) empathy (understanding the problem, choice of students), (2) definition (characterizing each segment), (3) ideation (brainstorming), (4) prototyping (anemify and avatarify each segment) and (5) testing (creating social media posts with headline, visual and textual content).

4 Results

Previously, factor analysis was conducted and four factors were distinguished from the 15 motivators (based on the factor scores) explaining 64.2% of the total variance: education and reputation (22.68%); dormitory and services (15.83%); opinion of others (14.19%) and finally the city (11.50%). Accordingly, the average of the variables belonging to a factor was calculated and this calculated value was used to

create the clusters. The clusters created using the factor scores run as a check showed full agreement, however, we have retained the use of factor averages for better interpretation. The coefficient, the elbow criterion and the preliminary hypotheses all resulted in four clustered solutions.

The first cluster represents 13.5% of the sample, with 314 respondents. For the factors examined, they are those who were not influenced by anything when choosing their higher education institution. Accordingly, they are the *uninterested* ones. The second cluster includes the largest share of the sample, 42.5%, with 989 respondents. In their case, all factors are rated higher than the average, i.e. for them everything is an influencing factor, i.e. they take everything into account when making their choice. In their case, however, the influence of other people's opinions is prominent, but as all factors are above average, they are the *conscious* students. The third cluster contains 10.8% of the sample, 252 people. In their case, the additional functions that are not part of the core service of higher education institutions do not matter, so they are the ones who decide on the basis of education and reputation alone, they are the *ambitious* ones. The fourth cluster accounts for 33.1% of the sample, with 771 people. In their case, the basic service and the opinion of others do not matter, but the city itself and the opportunity of a college do. They will be our *city lovers*.

It is interesting, however, to see how we can profile our clusters in terms of the relationships we find with other variables. There are significant relationships between clusters and gender (Khi² value 21.859, sig. 0.000), generations (Khi² value 15.999, sig. 0.014), residence (Khi² value 64.161, sig. 0.000), disciplines (Khi² value 102.964, sig. 0.000), form of funding (Khi² value 40.479, sig. 0.000) and form of education (Khi² value 86.383, sig. 0.000).

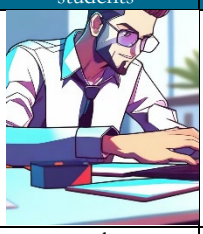
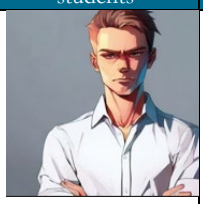
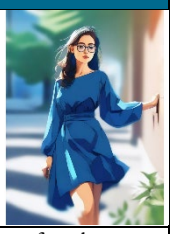
- Clusters and *gender*: Women are more likely to belong to the uninterested and city lover clusters, while men dominate the conscious and ambitious clusters.
- Clusters and *generations*: Generation Z is overrepresented in the uninterested and ambitious clusters, Generation Y tends to align with the city lovers cluster, and Generation X shows a stronger presence in the conscious cluster.

- *Residence* and clusters: Residents of the capital are more present in both the uninterested and ambitious clusters. Residents of the county cities in the city-loving group, the city dwellers in the conscious group, while the residents of the municipalities are also present in the conscious and city-loving groups.
- Clusters and *disciplines*: The faculties offered by the institution under study were clustered according to disciplines, with the resulting groups being natural sciences, social sciences, engineering and law and economics. The natural sciences are the clustered group, the social sciences are the city-loving and uninterested group, engineering is highly represented in the ambitious and knowledgeable group, while students of economics and law are also more represented in the city-loving group.
- *Form of funding* and clusters: In this case, the knowledgeable group is the majority of those in publicly funded courses, while the other three have a higher than expected proportion of self-financed students.
- *Form of education* and clusters: The proportion of those enrolled in higher education is higher in the cluster of the knowledgeable and the city-lovers, the proportion of those enrolled in a postgraduate course is also higher in the cluster of the city-lovers, the proportion of those enrolled in a bachelor's course is higher than expected in the cluster of the knowledgeable and the ambitious, while the proportion of those enrolled in a master's course is higher than expected in the cluster of the uninterested and in the cluster of the ambitious.

Based on the results of the design thinking, the marketing master's students personalized each cluster using the Canva software and the application of Anemify and then Avatarify. After personalization, posts on social media were created to target specific groups, with Instagram being the platform of choice for younger generations (Z, Y) and Facebook for middle-aged people (X). When developing the creative content, visual content was chosen as a priority, as it is suitable for display on the university's website. The table summarizes the creative elements (headline, visual content, textual content) that could be used in the recruitment campaign to reach the student groups identified in the quantitative research (Table 1). The result of this scientific process is a well-crafted social media plan that meets the diverse

needs of our clusters. By integrating design thinking principles, the authors ensured effective communication.

Table 1: Characteristics of students

Clusters	Uninterested students	Conscious students	Ambitious students	City lovers
Avatar				
Gender	female	male	male	female
Generation	Z	X	Z	Y, X
Residence	capital city, city	town, village	capital city	city
Disciplines	social sciences	engineering	engineering	law, economics
Form of education	MA	vocational training, BA	BA, MA	vocational training, MA
Reputation Services Opinion City	2.51 (SD: 0.95) 2.28 (SD: 1.03) 1.19 (SD: 0.37) 2.06 (SD: 0.72)	3.87 (SD: 0.75) 3.61 (SD: 0.93) 3.75 (SD: 0.82) 3.91 (SD: 0.80)	3.88 (SD: 0.64) 2.05 (SD: 0.83) 1.68 (SD: 0.66) 3.12 (SD: 0.98)	3.28 (SD: 1.03) 3.29 (SD: 1.06) 1.55 (SD: 0.51) 4.15 (SD: 0.77)
Headline	'Apply with us' 'Find your goals and grow with us'	'Come and experience the most exciting years of your life'	'The choice is yours'	'Learn in the city, get a degree at university'
Visual content	young females talking and chatting to each other	man in suit in front of laptop	young males wearing gown and gown hat	young very elegant females, yuppies
Textual content	Quality education Diverse student programs Career support	#evolvewithus Get a quality education at our university and secure your career	Expand your knowledge and become the best	Become a part of an extraordinary community

Source: Based on the results of empirical research and design thinking
Note: The source of the images is based on our own prompt using Microsoft Copilot.

5 Discussion

Knowing the resulting groups, and the variables and factors that determine their basis, makes it possible to plan a more precise strategy. Similarly, by understanding the student population and developing research with longitudinal data, the institutional strategy for attracting students can be made more effective. By defining a message, a visual content and a message targeted at specific groups, it is possible to gain ground and attract potential students in a market that is currently very limited and highly competitive. The aim, of course, remains to attract the uninterested among the four groups of students and, where possible, to increase the proportion of aware and ambitious students among those who are admitted. Another direction of research development is a longitudinal extension to test the temporality of the hypotheses. A limitation would be the limited resources available for implementation. The novelty of the research lies in the approach, the manageability of the groups formed on this basis and the combination of methods. By applying design thinking, the groups studied are more tangible and easier to interpret for decision making. In the following, the stability over time and the applicability of the research results will be demonstrated through longitudinal research with the available data.

6 Conclusions

In the present study, our aim was to understand and thus strategically manage the groups of students who have chosen to study at a particular higher education institution. To this end, we used a questionnaire to investigate the factors influencing the outcome of the decision-making process at the time of application. The resulting factors were then used for group mapping, first to define the strategically important groups and then to profile them by finding similarities and differences. Using the Design Thinking method, we identified focal points (avatar, headline, visual content and textual content) that could be used and built upon to further develop the communication campaign.

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Agile Leadership Competencies: Trends and Development Among Hungarian Managers

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Technological development, digitalization, and other innovations have significantly changed the world of work and other aspects of our daily lives (health, education, administration, et cetera). The present study focuses on agile leadership competencies emerging in the domestic economy. We measured these competencies with a questionnaire administered to Hungarian company managers. We calculated the means of the clusters of related variables, including agility, empathy, thoughtful decisiveness, and digital literacy. We defined the baseline characteristics relevant to these clusters. We then identified four different groups of companies. First, we identified those with average indicators across the board. Next, we found an outstanding and agile group. After that, we found those who are not yet receptive to adaptation to the digital era but may become so in due time. Finally, we identified those who are completely uninterested in the indicators studied. We have found that experienced senior managers in medium-sized companies are most likely to be agile leaders and able to embrace digitalization and modernization. Furthermore, we have analyzed and described the best agile practices in small and large companies, focusing on key competencies.

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1 Introduction

Our study focuses on agile leadership competencies and their emergence in the domestic economic environment. With the dynamic advance of online spaces, we are witnessing a significant change in the world of work, as in all other areas of our daily lives (health, education, administration, et cetera). This *new world* has not just created new leaders and forced existing leaders to change. Practices and decision-making mechanisms have evolved. So, too, have the attitudes and methods of management. Leaders must develop their skills and continue to learn. The researchers gave a short survey to Hungarian company managers to assess the existence of agile leadership competencies. The initial survey was conducted before COVID. Another, identical survey was given in 2022. Comparisons of the results of each survey administration have allowed us insight into leadership trends over these last few turbulent years.

2 Theoretical Background / Literature Review

The diffusion of agile methods and the transformation of the market environment have significantly changed corporate operations and management behavior. Digitalization has had a major impact on communication and how people interact and has enormously impacted the efficiency of business and corporate processes. A company's tangible and intangible resources, competencies, and external capabilities can form the basis of its competitive advantage, especially if the corporate philosophy supports its exploitation. It is easy to see that building on their continuous development is crucial to realizing long-term profit (Nagy et al., 2019).

In recent decades, stakeholder relations have taken on a new form, and marketing processes have changed. Agile behavior is needed because the external business environment has changed, and agility is essential to surviving in a rapidly evolving environment.

In a volatile, uncertain, complex, and ambiguous (VUCA) world, businesses need agile, value-oriented, inspiring, collaborative, and appreciative (AVICA) leaders (Bennett & Lemonie, 2014; Gupta, 2018; Troise et al., 2022).

In our research, we followed the concept of the agile leader based on the theories of Hayward (2018), who points out that the paradox of opportunity creation versus disruption characterizes the work of agile leaders. Despite the apparent contradictions in the dual processes of creation and destruction, they are inseparable. A leader must be willing to tear down what is no longer useful to build a better, more agile organization. Only through this process of creative destruction can the leader construct an organization that can thrive through the uncertainty of the post-modern epoch.

The aim is to challenge and continuously improve existing systems, processes, and activities, especially according to customer needs, and to create a culture where trust and empathy foster collaboration and encourage learning with clear directions (Parker et al., 2015). Hayward (2018) identifies four key characteristics of agile leaders:

- Learning agility—a mentality of being able to learn quickly from experience. Agile leaders are sensitive to positive, constructive criticism and adapt (if needed) after reflection (Özgenel & Yazıcı, 2021). This mentality revolves around the triad of action, thinking, and learning.
- Empathy—faith in the competence of their people. Agile leaders act with fairness and good faith and allow for experimentation, which is risky, but try to reduce the risk by providing support. Agile leaders consistently foster quality relationships that motivate peers to achieve new results, even in the face of failure (Wilson, 2020).
- Thoughtful decisiveness—a five-step process that involves careful consideration of new ideas by leaders and their teams. This process includes pausing, consultation, decision-making based on lessons learned, implementation, and review. After this process, leaders pause again for reflection (Zuber et al., 2022).
- Digital literacy—the ability to deliver a digital customer experience per market trends. Consumers now expect to be able to use digital platforms and tools. A series of expensive developments without purpose. Rather, *relentless prioritization* of the essential and useful is critical to agile practice. Leaders who are unfamiliar with technology must consult with qualified and

younger peers and subordinates to craft the digital experience customers and clients demand (Kateryna et al., 2020).

Agile leaders need a broad range of skills, and these skills must be developed consistently to be able to respond dynamically to diverse challenges and make decisions effectively (Gren & Lindman, 2020). Mental, psychological, and technological readiness are all essential components of agile leaders' toolkits (Karácsony, 2016).

Hayward (2018) examined the four broad categories of agile leadership traits and three specific characteristics within each trait, resulting in a total of 12 characteristics being evaluated.

Table 1: Attributes Checklist of Agile Leaders

Learning agility	Curious, asking questions rather than jumping to conclusions
	Learning from experience all the time, and changing my behaviour as a result
	Frequently asking for feedback so I can improve
Empathy	Able to manage my reactions to difficult situations so that I remain calm and collected
	Balanced in how I interact with others, so they feel I am reasonable and fair
	Trusted as a leader by all my stakeholders
Thoughtful decisiveness	Thoughtful, pausing to reflect when a decision is important
	Consultative, asking for input from advisers and experts before reaching a conclusion
	Determined, acting quickly once a decision has been made
Digital literacy	In tune with how technology is changing my customers' buying experience
	Technologically inquisitive, always trying out new technologies
	Active online to understand new apps and experiences

Source: Hayward, 2018, p. 52

3 Methodology

This research is based on the previously mentioned work by Hayward (2018). It begins by examining the four agile leadership traits reported by Hayward and identifying three specific characteristics associated with each trait by the researchers. The resulting 12 characteristics were rephrased as statements attached to a five-point Likert scale indicating the extent to which leaders believed themselves to have these characteristics.

The questionnaire was distributed online to potential respondents in two periods (one before (2019) and one after the COVID-19 pandemic in 2022). Sample selection was largely a matter of convenience, which limits the representativeness of the research and the extent to which the results are broadly applicable. However, it remains useful as exploratory, foundational research, potentially guiding later investigations. The questionnaire mapped the agility of managers, using other grouping criteria as needed like size, leadership levels, etc. The research can be seen as almost a longitudinal study because the measurement instrument and sample composition were similar in both deployments. In addition to investigating agility at one moment in time throughout Hungary, this research aimed to evaluate the effects of COVID-19 on the agile abilities of the managers under investigation.

A total of 521 responses to the Agile Leaders Questionnaire were received, 281 of which were received during the pre-COVID-19 period and 240 during the post-COVID-19 period. A quarter of the companies surveyed had fewer than 40 employees, and half had fewer than 300. Nine percent of respondents had over 10,000 employees in their organizations. Regarding managerial experience, there were 199 persons with 0 to 4 years of managerial experience, 172 persons with 5 to 10 years, 69 persons with 11 to 16 years of experience, and 81 people with more than 16 years of experience. Ninety-eight survey takers were first-line managers, 121 were senior managers, 156 were middle managers, 118 were operational managers, and 28 were management experts. *Years of experience* (as bracketed above) was treated as a ratio independent variable, and bracketed organization size was treated as an unevenly spaced ordinal independent variable.

4 Results

A comparison of the two survey response sets reveals increasing awareness of agile leadership methods, with awareness levels rising from 64.3% to 69.9% over a few years. The proportion of leaders with at least some knowledge of the specifics of agile methods has also increased (57.8% to 62%). This same trend is evident, albeit to a lesser extent, in the proportion who consider themselves agile leaders (68.1% to 69.5%). It probably means that many people implement agile leadership methods without knowing the name.

Based on the baseline sets of variables, we conducted a cluster analysis (using Ward's Minimum Variance Method) to obtain more extensive information than whether someone claims to be an agile leader based on the answers given. The Cronbach's alpha for the given responses is 0.822, which makes our scale reliable.

Based on the variables, a four-cluster solution is appropriate. For the analysis and profiling of the clusters, a theoretical clustering of the baseline variables was used, taking their arithmetic means and examining the association of the clusters with other variables. Accordingly, the researchers calculated the means of the clusters of variables, such as agility, empathy, thoughtful decisiveness, and digital literacy. They defined the baseline characteristics, taking these into account. Where it helps to differentiate, the researchers also looked at the baseline variables.

The four clusters show a significant difference for all four groups of variables; however, this difference (verified by post-hoc testing) is most pronounced in the fourth cluster group in the first three competencies (agility, empathy, and prudence). However, it is also detectable for the other clusters. Differences in digital literacy levels are indicative of this distinction.

- The first cluster is the largest, accounting for 53% of the sample (276 people). The managers in this cluster are average in all aspects, with all characteristics being typical, with a small uncertainty only in the digital values. Thus, they are *average leaders*.
- The second cluster is also the second largest, representing 28% of our sample, with 146 people. In their case, the variables mentioned are higher than in the previous cluster, and they also have the highest digital skills. Their understanding of the importance of digitalization makes them *agile leaders*.
- The third cluster accounts for 12.7% of the sample, with 66 participants. In their case, the values are very similar to the previous ones. Still, digitalization is close to their lowest value, making them the *non-digital leaders*.
- The fourth cluster is the smallest (6.3%, 33 people) but the first to be isolated during the clustering process. For them, agile values are not important. They believe that everyone else thinks as they do. According to Vecsenyi's (2018) categorization of firms in CE countries, they are *dinosaurs*.

However, exploring whether any other relationship between the different variables examined in the empirical research and clustering can be found is interesting.

At The Time of Data Collection

The data collection represents two distinctive periods, the pre and post-COVID periods. Although the time relationship/trend is not statistically significant, the proportion of average and agile leaders increased, and the proportion of non-digital and dinosaur managers and firms decreased.

By Firm Size

In the present case, the association between cluster membership and firm size is significant—i.e., the firm's size in which one is a leader determines the group in which one is placed according to the research (Khi2 14.815, Sig. 0.022). In this case, average and agile leaders tend to be found in medium-sized firms, non-digital leaders are found in small and large firms, while dinosaurs tend to be found in small firms.

Management Levels and Clusters

The relationship between these is also significant (Khi2=22.918, Sig. 0.028). In the present case, the average leaders' cluster is largely composed of middle managers and senior-level experts, and agile leaders are overrepresented in the first-line and senior managers sectors. In the non-digital leaders' group, there are also a considerable number of top (first-line) managers and middle managers. In contrast, the dinosaur group is mainly composed of lower-level operational managers.

Agile Methods and Clusters

Average leaders and agile leaders have heard of agility, while the other two groups (non-digital and dinosaurs) have not. The relationship is also significant (Khi2=10.018, Sig. 0.018). The same pattern is found regarding knowledge of agile methods (Khi2=10.996, Sig. 0.012) and whether the respondent considers himself an agile manager (Khi2=26.588, Sig. 0.000).

No significant differences were found for the other variables.

5 Discussion

Overall, the clusters can be profiled as follows.

Table 2: Characteristics of the Leadership Clusters

	Average leader	Agile leader	Non-digital leader	Dinosaurs
Agility	Average	Higher	Average	Lower
Empathy	Average	Higher	Higher	Lower
Thoughtful decisiveness	Average	Average	Average	Lower
Digital literacy	Average	Outstanding	Lower	Lower
Company size	Medium-sized firms	Medium-sized firms	Small firms and large firms	Small firms
Leadership levels	Middle managers and senior-level experts	First-line managers and senior managers	First-line managers and middle managers	Lower-level operational managers
Awareness of agile	Yes	Yes	No	No
Knowledge of agile	Yes	Yes	No	No
Implementation of agile	Yes	Yes	No	No

Source: Authors' research

Based on these results, the clusters created for the sample correspond to the clusters identified by existing theory. The researchers identified the companies with average indicators; the outstanding, agile group; those not yet receptive to digitalization; and those completely uninterested in the indicators studied (dinosaurs). Knowing these groups, the researchers can differentiate them according to their ability to operate sustainably; the researchers can also see the differences in the agile leadership skills defined and expected by today's age.

6 Conclusions

The groups defined by the characteristics studied have different levels of agility, empathy, thoughtful decisiveness, and digital literacy. Accordingly, as the aim is to develop these characteristics to a better level, more attention can be given to the problem groups when it is worthwhile to improve their performance. Experienced senior managers in medium-sized companies have proven to be agile leaders more

than any other group. Companies and groups that wish to become more agile can learn from and imitate these exceptionally agile leaders.

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CEE Universities and Sustainable Development Goals: Specific Patterns?

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The present contribution, going beyond the author's previous general work on the topic provides a panorama and an analysis of the performance of EU CEE-11 universities (universities from the 11 Central and Eastern European Member States of the European Union) regarding the United Nations' Sustainable Development Goals (SDGs). The analysis uses the results of the Times Higher Education Impact Rankings that are available in five editions (for the period 2019-2023). The present analysis focuses on the individual SDGs: it provides a picture of which individual SDGs look to be the most strongly represented in the performance of EU CEE-11 universities and which ones are less present in it. Based on the results, we discuss the presence or the absence of specific patterns regarding the individual SDGs in the case of the universities in the CEE region and in the countries constituting it. Based on the findings of this analysis, proposals for future actions are presented.

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1 Introduction

This paper deals with the performance of EU CEE-11 universities (universities from the 11 Central and Eastern European Member States of the European Union) regarding the United Nations (UN) Sustainable Development Goals (SDGs). The analysis is based on the results of the Times Higher Education Impact Rankings which are available in five editions (for the period 2019-2023). The paper focuses on the individual SDGs, providing a picture of which individual SDGs look to be the most strongly represented in the performance of EU CEE-11 universities and which ones are less present in it.

A brief outline of the theoretical and historical background of sustainable development is followed by a description of the methodology and the presentation and interpretation of the results. Remarks related to potential policy replies and related future research conclude the paper.

2 Theoretical Background / Literature Review

During the last five decades, sustainable development has become one of the most discussed multidisciplinary issues. Without the need to establish an exhaustive list, the most important milestones of this process have been the following:[1]

- The United Nations Conference on Human Environment in Stockholm in 1972, set up an action plan based on 26 principles and 109 recommendations (United Nations, 1973).
- The Brundtland Report defined the notion of "sustainable development" 15 years later (Brundtland, 1987).
- The Rio Earth Summit in 1992 put sustainability again into the focus of attention of masses of people.
- The Marrakesh Agreement Establishing the World Trade Organization (World Trade Organization, 1995), in which reference to the objective of sustainable development was made.

[1] This part is an edited and updated version of the overview by Szemlér (2023).

- The Kyoto Protocol (United Nations Framework Convention on Climate Change, 1997) was an important milestone (despite the difficulties regarding its ratification).
- The definition of the 8 UN Millennium Development Goals in 2000 in the Millennium Declaration (United Nations, 2000).
- The adoption by the UN of the 2030 Agenda including the 17 SDGs (United Nations, 2015) which, since then, constitute a cornerstone of the analyses on sustainability; see Box 1 for the sort titles of the SDGs.

Table 1: The UN Sustainable Development Goals

SDG 1: No poverty; SDG 2: Zero hunger; SDG 3: Good health and well-being; SDG 4: Quality education; SDG 5: Gender equality; SDG 6: Clean water and sanitation; SDG 7: Affordable and clean energy; SDG 8: Decent work and economic growth; SDG 9: Industry, innovation and infrastructure; SDG 10: Reduced inequalities; SDG 11: Sustainable cities and communities; SDG 12: Responsible consumption and production; SDG 13: Climate action; SDG 14: Life below water SDG 15: Life on land; SDG 16: Peace, justice, and strong institutions; SDG 17: Partnerships for the goals

Source: UNDP (n.d.).

Several analyses have dealt with the presence of various aspects of sustainable development in higher education. Owens (2017) as well as Chankseliani & McCowan (2021) focus on SDG 4 and related university strategies. The works of Boeve-de Pauw et al. (2015) and Crespo et al. (2017) discuss empirical examples of potential actions in higher education to reach the SDGs. In Hungary, the wide range of contributions in Lányi & Kajner (eds.) (2019) offer a panorama on sustainability in higher education; Szemlér (2023) tackles the performance of Central and Eastern European universities based on their presence in the THE rankings 2019-2022.

3 Methodology

This paper presents the "strengths" of EU CEE-11 universities in the Times Higher Education Impact Rankings. These rankings are available for five years, from 2019 to 2023, concentrate on four broad areas (research, stewardship, outreach and teaching) and take into account all 17 SDGs.

Any university providing data on SDG 17 (briefly defined as partnerships for the goals) plus at least three other SDGs can be included in the overall ranking. Szemlér (2023) analysed the final overall score of the EU CEE-11 universities; the present

paper focuses on the three best scores (the SDGs that represent the best results for the given university) that appear in the final overall score.[2] For this analysis, the top three SDGs of the participating EU CEE-11 universities have been selected and analysed. The method used in the paper is descriptive and comparative analysis.

4 Results

Table 2 presents the results based on the five available editions of the THE Impact Rankings. For each year and for each country, the SDGs in the top 3 positions (1., 2., 3.) are presented. Each cell of the table contains the numbers of SDGs mentioned (for the given country's higher education institutions in the given year at the given (1st, 2nd, or 3rd) position. The figures in brackets show the number of mentions of the given SDG(s).

It is worth mentioning that no university from Estonia appears in the rankings; of course, it does not mean that there would be no activity related to sustainability there, but we cannot evaluate it when we use these rankings. In some countries, we have data only for a part of the five-year period. This can be explained by the novelty of the rankings and the gradually increasing interest towards it. This latter is reflected in the increasing number of participating higher education institutions (while in 2019, 467 (among them 17 EU CEE-11) universities participated in the THE Impact Rankings, the corresponding figures for 2023 are 1591 and 80).

Table 2: The top 3 SDGs in the EU CEE-11 universities (number of SDGs; in brackets: number of mentions)

Year	2019			2020			2021			2022			2023		
Position	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.
Bulgaria	5 (1)	4 (1)	3 (1)	8 (1)	11 (1)	4 (1)	8 (1)	11 (1)	7 (1)	11, 5 (1)	4 (2)	8, 9 (1)	5, 16 (1)	3, 8 (1)	4, 7 (1)
Croatia	-	-	-	-	-	-	16 (1)	8 (1)	11 (1)	4, 3 (1)	3, 11 (1)	5, 8 (1)	5 (2) 8 (1)	4 (2) 14 (1)	3, 5, 16 (1)
Czechia	3, 5, 8, 11 (1)	4 (2) 11, 12	13 (2) 9, 16	3, 5, 7, 8,	8 (2) 12, 13,	9 (2) 4, 7,	3 (2) 4, 7,	8 (2) 3, 7,	11 (2) 2, 4,	4 (2) 3, 8,	3, 5, 7, 11,	3, 8, 16 (2)	8 (4) 3 (2)	16 (3) 2, 3,	3, 4, 5, 8,

[2] The final overall score of a university is the combined score in SDG 17 (with a 22% weight in the final score) and of the scores in the top three scores of the other 16 SDGs (with a 26% weight each in the final score). Full information on the latest methodology is available at THE Impact Rankings (2023a).

Year	2019			2020			2021			2022			2023		
		(1)	(1)	10 (1)	16 (1)	16 (1)	8, 9, 13 (1)	9, 12, 16 (1)	5, 6, 8 (1)	11, 13 (1)	12, 16 (1)		9, 13 (1)	4, 5, 7 (1)	11, 12, 14, 16 (1)
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	3 (2)	4, 9 (1)	8, 11 (1)	3 (2) 4, 8, 13, 14 (1)	3 (2) 4, 5, 14, 16 (1)	9 (2) 1, 4, 5, 8 (1)	3 (3) 2, 10, 11 (1)	16 (2) 4, 5, 8, 9 (1)	14 (2) 4, 5, 8, 10 (1)	3 (2) 1, 4, 8, 11, 12, 16 (1)	3, 5, 8, 15 (2)	4, 11 (2) 6, 9, 10, 13 (1)	8 (4) 2, 3, 4, 5, 10, 15, 16 (1)	3, 8, 16 (2) 1, 4, 5, 7, 12 (1)	4, 11, 15 (2) 3, 5, 8, 9, 10 (1)
Latvia	8, 9 (1)	11 (2)	13, 16 (1)	16 (2) 3, 7 (1)	8, 13, 15, 16 (1)	11 (2) 8, 9 (1)	3, 8, 9, 11, 16 (1)	5, 8, 9, 11, 16 (1)	4, 8, 13, 15, 16 (1)	3, 4, 5, 9, 16 (1)	5, 9, 13, 15, 16 (1)	11 (2) 7, 8, 16 (1)	8 (2) 3, 9, 16 (1)	5 (3) 8, 11 (1)	4, 8, 9, 12, 15 (1)
Lithuania	-	-	-	-	-	-	-	-	-	5, 8, 16 (1)	4 (2) 9 (1)	4, 10, 11 (1)	5 (2) 3, 8 (1)	5, 9, 10, 16 (1)	4, 7, 8, 10 (1)
Poland	3 (1)	4 (1)	9 (1)	1, 5, 8, 13, 14 (1)	9 (2) 5, 10, 11 (1)	4, 10 (2) 16 (1)	8, 11 (3) 10 (2) 3, 4, 9, 15 (1)	5 (3) 10 (2) 1, 4, 9, 11, 13, 14, 15 (1)	10 (3) 13 (2) 1, 4, 5, 9, 10, 11, 14 (1)	3, 8 (3) 2, 8 (2) 4, 5, 7, 9, 11, 15, 16 (1)	9, 15 (3) 5, 10 (2) 7, 8, 11, 12, 13 (1)	13 (4) 4 (3) 11, 16 (2) 3, 5, 6, 10 (1)	8 (6) 3 (4) 10 (3) 5, 7, 16 (2) 2, 4, 11, 12 (1)	5, 9, 16 (3) 3, 4, 10, 11, 13, 15 (2) 1, 8 (1)	8 (4) 11 (3) 3, 4, 5, 9, 10 (2) 6, 7, 9, 10, 12, 13, 15, 16 (1)
Romania	16 (2) 3, 4, 8 (1)	4, 5, (2) 10 (1)	10 (2) 4, 5, 9 (1)	3, 16 (2) 1, 5, 8 (1)	5 (3) 4, 8, 10 13 (1)	4 (2) 1, 5, 9, 11, 16 (1)	4 (4) 1, 3 (2) 8, 16 (1)	5 (6) 4, 8 (2)	4, 16 (2) 4, 5, 7, 9, 13, 14 (1)	4 (4) 1, 3, 5, 8 (2) 7 (1)	5 (5) 4, 16 (3) 8 (2)	4 (4) 1 (3) 5, 11 (2) 9, 13 (1)	5 (5) 4 (4) 8 (3) 1, 3 (2) 16 (1)	4, 5 (5) 8, 16 (2) 7, 9, 11 (1)	4 (4) 1, 5, 10 (2) 3, 7, 8, 9, 11,

Year	2019			2020			2021			2022			2023		
															13, 15 (1)
Slovakia	4, 13 (1)	9, 16 (1)	3, 4 (1)	16 (2)	3, 8, 13, 16 (1)	4 (2)	3 (2) 7, 9 (1)	10, 16 (2)	4, 8 (2)	3 (2) 5, 8, 9 (1)	16 (3) 10, 11 (1)	4 (2), 8, 10, 13 (1)	8 (2) 3, 9, 11, 16 (1)	16 (2) 3, 9, 10, 11 (1)	4 (3) 5, 8, 11 (1)
Slovenia	-	-	-	8 (1)	4 (1)	9 (1)	11 (1)	9 (1)	8 (1)	3, 11 (1)	9 (2)	4, 10 (1)	9 (1)	16 (1)	8 (1)

Source: author's compilation based on THE Impact Ratings data: THE Impact Rankings 2019 (2019); THE Impact Rankings 2020 (2020), THE Impact Rankings 2021 (2021), THE Impact Rankings 2022 (2022), THE Impact Rankings 2023 (2023).

5 Discussion

Based on the results presented in Table 2, no specific "CEE pattern" can be identified. The SDGs in top positions are manifold and change considerably over time in many cases. Countries show specifics that in many cases differ from each other to a great extent.

In the case of some countries, however, there is a quite clear and stable "image" of the top 3 SDGs. In Czechia, Hungary and Latvia, SDGs 3, 4, 5 and 8 have an important share, while in Romania, the share of SDGs 4 and 5 in top positions is highly over the average. There is nothing surprising in these results, as these SDGs are directly (in the case of SDG 4) or indirectly closely related to education.

In many countries, the small number of participating institutions (and, as a result, observations) constitutes an important limit to general conclusions. In addition, the fact that the number and the circle of participating institutions change (beyond the general increase of the number of participants also because there are institutions that have withdrawn from the ranking) makes comparisons more difficult and less robust.

6 Conclusions

The THE Impact Rankings constitute an important – but not the only[3] – indicator that can contribute to the better visibility of the universities by presenting their commitment to sustainability. As visibility is crucial for higher education institutions in the strongly competitive market, participation in the THE Impact Rankings is expected to increase further, and the analysis of the figures in it can lead to more general and robust conclusions.

An important field for further investigation can be the change in the participating universities' positions (or their stabilization) in the ranking. As the number of participating institutions will develop (in relative terms) more slowly, the positions in the individual years will be more and more worth comparing with each other. As that stage seems approaching, a deeper analysis of the "strengths" – including the examination of the real content of the top 3 SDGs in the participating universities and the reasons for their importance for the universities – can be an interesting and relevant future research task.

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[3] An important example of is the UN Principles for Responsible Management Education (PRME) Programme; for details, see United Nations (n.d.).

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Examining the Key Role of the Onboarding Process From the Perspective of HR and the Experience of Employees

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One of the greatest assets of a well-run organization is its people. However, it is not enough for an organization to find the best people. It also needs to be able to keep them. A well-run organization aims to quickly turn employees into engaged, motivated, and effective workers. One of the most important processes for achieving this is onboarding. This emerging discipline entails integrating, training, and mentoring a new employee. An effective onboarding program also helps to reduce staff turnover. This research aimed to assess 1) the focus and documentation of the onboarding process, 2) the continuous feedback generated during the onboarding process, 3) and the direct manager's supporting role in the onboarding process. While the interviews conducted during this research suggested that only large companies have established mentoring or training programs, this was not confirmed by our analysis of the questionnaire data. Employee responses supported the facilitating role of direct colleagues in the process of onboarding and aided new employees in the process of integrating into the organizations studied. The results of this research provide suggestions for developing more effective and efficient onboarding processes.

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1 Introduction

Rapid and dynamic changes in the current economic situation are challenging organizations, not only in terms of future-oriented changes, such as digitalization or the rise of artificial intelligence, but also in terms of negative trends and events, such as inflation, high energy and raw material costs, and the war between Russia and Ukraine. However, for an organization to respond well to all of this and focus on resilience, renewal, and sustainable development, it needs to be well-run, stable and able to recognize that its greatest asset is its intellectual capital, is its people. The central task of human resources (HR) management is to find, recruit, and retain the right number of people with the right skills to achieve the organization's strategic objectives. Retention—one of the critical tasks of HR—starts with the onboarding process. Onboarding is an emerging discipline that involves the integration of a new employee into the firm, including training and learning processes and integration into the organizational culture.

An inadequate onboarding process can result in an employee leaving the organization, increasing turnover, but most importantly, the cost of recruiting and training an employee is a cost that will never be recovered. If the onboarding process is unmanaged, slow, and difficult, it will hurt efficiency and productivity. It is, therefore, important that onboarding is a prominent part of the human resource management value chain.

Part of the program is a mentoring activity, where the manager's task is to select colleagues from the team who are experienced and who, in addition to providing professional information, will also provide details about the organizational culture, what the company expects, and what the standards are. These relationships are essential to building long-term employee loyalty to an organization (Snell & Bochlander, 2013).

Hampel and Lemont (2011) categorize onboarding processes around three main themes. These are knowledge, relationships, and feedback. Knowledge refers to the information that needs to be transmitted to the new employee during onboarding. Relationships are also critical, as onboarding takes place within a team where goals are achieved through cooperation. Finally, timely and useful feedback—often

lacking in organizations—is essential. These three points form the basis for achieving goals with good results.

This study aims to assess the key role of onboarding processes in organizations of different sizes, focusing on the triad of knowledge, relationships, and feedback. Accordingly, the following hypotheses were defined:

H1: Onboarding is more important for large organizations than small and medium enterprises (SMEs).
H2: All of the organizations surveyed did not have formal induction and training programmes at the time of the survey.

Furthermore, in the context of the results, this paper makes recommendations for organizations that have not yet developed their onboarding processes or would like to improve them.

2 Theoretical background

Human resource management aims include retaining employees, reducing turnover, and increasing productivity and efficiency. Stein & Christiansen (2010) note that the first pillar of achieving these goals is onboarding, a well-managed, documented process to ensure new employees can perform their job tasks safely and to the best of their abilities as soon as possible. They also observe that even in companies where onboarding processes are in use, they do not consider a program longer than two weeks, and few organizations plan it for more than three months. The onboarding program can be formal, a formal onboarding program following a documented onboarding plan, or informal, in which case the employee gets to know his/her job and tasks without any plans or instructions, on an ad hoc basis in the context of the situation that arises (Bauer, 2010). If it is in written form, it can be easily delegated and transferred to colleagues. Its implementation is easily controlled and modified.
The onboarding process starts with the job offer advertisement and ends with productive work in the organization. The sections of the process are:

2.1 Selection

The selection process aims to find the most suitable applicant. The selection process is a decision-preparation process in which the probability of a potential applicant achieving the expected performance is assessed (Juhász & Matiscsákné, 2013).

2.2 Orientation program

This program is part of the integration process but is not the same as full integration. However, as we have seen in our results, many people confuse the concepts. Orientation is the briefing of new staff. It is a one-way flow of information, where, even in groups, workers hired simultaneously are present in different programs. These include training in work safety, accident prevention, and fire safety. Here, the organization can introduce the different departments, and workers can learn about their jobs and roles. This time is also when the administration, such as presenting job descriptions and other information about the work. (Bokor et al., 2009)

2.3 Mentoring and trainer program

We distinguish between on-the-job and off-the-job training programs. Mentoring is part of on-the-job learning opportunities. In classical mentoring, a more experienced and knowledgeable mentor shares his/her knowledge, skills, and experience with a less experienced colleague, with the mentor serving as a tutor, teacher, and patron (Bencsik & Juhász, 2016).

Next is the formal trainer/training method, which is mentioned separately in the literature and is the most widely used approach to preparing employees to work in an organization. This method is mainly used among blue-collar workers. It includes a variety of traditional and digitally supported simulations, situational exercises, and computer-based, programmed training. The trainers are mostly employees of the organization who are given specific preparation for the task in question.

2.4 Feedback

Positive feedback—a confirmation that one is on the right path—is extremely important in a new employee's training and induction process. Focusing on small successes increases motivation and commitment. Additionally, managers need to ask

for feedback, of both positive and negative sorts, from colleagues and mentors on how the onboarding program is going and whether the process needs to be changed or modified (Gregory et al., 2020).

Entry interviews, which should be conducted with the new employee in the second or third week and then in the third month, are critical to the onboarding process. The direct manager, an HR representative, and the employee should be present during these interviews. Here, too, the focus is on the progress of the induction and integration process, discussing successes, difficulties, and further work needed to achieve preparedness targets. These are rarely included in the onboarding process of most organizations.

3 Methodology

The research used qualitative and quantitative methods to investigate the focus of onboarding processes from the perspective of both HR managers and employees.

3.1 Interviews

Qualitative research was carried out through semi-structured interviews. Interviews were conducted with HR managers from 10 organizations in different locations in Hungary. Critical topics could be explored in more depth in the case of smaller companies for whom the managing director served as the representative interviewee. Interviews took place between September and October 2023. The mostly one-to-one interviews, which lasted around 45 minutes, allowed the interviewee to open up and share their deeper thoughts honestly, helping to achieve the research objective. The interview covered a range of topics from basic information about the company to employee satisfaction.

3.2 Online questionnaires

Quantitative research was based on an online questionnaire. These employee questionnaires— with questions that matched the research topic and the interview questions—were sent directly to employees. A total of 161 completed questionnaires were received from all over Hungary. The online questionnaire was published in July 2023, and the online filling-in period was closed in October 2023. The questionnaire

included open and closed questions, with the latter allowing responses on a four or 10-point Likert scale. The Excel Analysis Toolpack (by Microsoft Corporation) was used to analyze the responses to the questionnaire using descriptive statistics and the chi-squared test to examine the interaction of the different variables. If the chi-squared test results indicated that a relationship could be detected between the variables, then Cramer's coefficient test was used to analyze the closeness of the relationship. Regarding company size, return rates for surveys and interview participation rates were essentially the same. This similarity allowed for the easy and meaningful comparison of results of both the quantitative and qualitative methods.

4 Results

4.1 Mentoring within onboarding

The first research question (H1) was designed to highlight the presence of a mentoring program within the onboarding process. This topic was chosen because onboarding is present in all organizations to some degree, and the research has confirmed this. The orientation program, which in many places is also mixed with induction, training, and team building to promote socialization, is also a significant feature in all companies. The answers to the interview questions showed that these processes are a focus of onboarding but that a training/ mentoring/coaching program is missing in many places. Regarding interviews, six large companies have a mentoring program, while four SMEs do not. We did not distinguish between mentoring and training programs for knowledge and physical workers. It is worth noting that a mentoring program is in place for knowledge workers in one of the multinational companies surveyed. In contrast, its physical workers are trained by colleagues on the job. An analysis of the employee questionnaire results found no significant correlation between company size and the presence of a mentoring program. This finding was tested with the chi-squared test. Of the 95 large companies, 75.79% have a mentoring program, compared to 68.18% of the 66 SMEs. Table 1 summarizes the responses received.

Table 1: Distribution betweeen large companies and mentoring scheme

Monitored board				Expected board		
Organisations	Without mentor	With mentor	Total	Without mentor	With mentor	Total
Large company	23	72	95	25,9627	69,0373	95
SME	21	45	66	18,0373	47,9627	66
Total	44	117	161	44	117	161

Probability value (P) with Chi-square test: 0,28673 < 0,01. This inequality is not true, so there is NO significant correlation between the two variables.
Source: Authors' research

4.2 Induction and training programs

The following section examines whether onboarding is formal or informal in firms, thus addressing the second hypothesis (H2). We did not differentiate by firm size in the interview responses, so we examined the ten firms together. Out of the ten companies, four companies indicated that they had a documented onboarding plan, and six companies did not have a documented onboarding plan (see Table 2). Thus, H2 was proven true.

However, as a positive point, it should be mentioned that of the six companies without a formal onboarding process, two indicated that they recognized the importance of an integration plan and were developing integration systems. Additionally, one has a documented onboarding process that, while complete, has yet to be implemented. One can reasonably surmise from these findings that companies are beginning to recognize the key role of onboarding in retention and effectiveness.

Table 2: Companies' integration plan from a documentation perspective

Integration plan	Without integration plan	Under construction	Documented
Code of the company	1, 3, 9, 10	5, 6	2, 4, 7, 8
Percentage	40%	20%	40%

Source: Authors' research

5 Discussion

The first hypothesis (H1) was that onboarding is more pronounced in large companies. The present research results suggest that onboarding processes are becoming increasingly widespread, with firms recognizing that inadequate onboarding and induction protocols can hinder the effective performance of new employees as soon as possible. Among the elements of onboarding, the orientation program is the most important in organizations, and integration into the organization through team-building programs also appears to be a focus of companies. On the other hand, mentoring and training programs receive much less attention. In the interviews conducted for this research, only large companies were found to have such programs.

However, the analysis did not show a significant relationship between the answers to the online employee questionnaire, where the correlations were tested using a chi-squared test. Thus, the results of the employee questionnaires do not suggest that onboarding or training is more pronounced in large firms, and the first hypothesis is only partially confirmed.

In the second hypothesis, it was presented that the training program does not appear to be a regulated process in companies. Since only four of the firms in the interview had a documented induction program, this hypothesis was confirmed by the results of our research. However, it should be noted here that there is a forward-looking trend that two more companies have onboarding processes under development and plan to implement them in a documented form.

6 Conclusion

Discussions with HR directors in organizations highlighted that high-quality onboarding processes are essential for minimizing manufacturing scrap, processing feedback, and serving as the basis of annual training plans. The right onboarding process can also help an organization maintain low employee turnover and increase employee satisfaction. Based on this paper's findings, the research recommends that SMEs start developing and formalizing internal onboarding procedures and modernizing the mentoring and training process. The involvement of managers in this process is particularly important, as in many cases, SMEs do not have a

dedicated HR department. Improved onboarding processes are critical to improving worker engagement and retention and reducing costs.

Next, it is worth highlighting three key points of a successful onboarding process.

1. Documentation of integration processes: An important step is to document and standardize the integration process for companies with multiple sites or subsidiaries. Documentation gives the process a sense of focus, direction, and structure. Furthermore, the onboarding process can be reviewed more easily for timeliness and correctness when thoroughly and clearly documented.

2. Feedback conversations: We would like to illustrate the importance of these conversations with the PDCA circle, known from lean production and also used in human resource management. We would like to illustrate the importance of these conversations with the PDCA circle, known from lean production and also used in human resource management. (Plan-Do-Control-Act) Do what you have planned, but to make sure you are going in the right direction, you need to control, so have feedback sessions. Keep in mind that the time, energy and money invested in training is increases your company's knowledge capital. Than if necessary, act accordingly, so that the newcomer can perform as expected in the position as soon as possible. (Makoto & Jun, 2013).

3. The importance of internal training during induction: Separate from the training and development process, there is a need for onboarding training aligned with the company's operations. Effective training should avoid burdening the mentor or colleague with a duty to explain a program's basics to the new employee. Rather, the mentor/colleague should be able to add *high-level* knowledge to the new employee's understanding. The induction/onboarding workload placed on the mentor can be reduced through simulations, training with AR glasses, or e-learning training, all of which are already becoming more sophisticated due to digitalization and Industry 4.0 innovations. Artificial intelligence may also make the onboarding process faster and smoother over time. Training can be more efficiently planned, organized, and coordinated with the help of artificial intelligence, which can allow for the fast assessment of the skills and deficiencies of employees. An AI-enabled virtual assistant can also handle general issues during orientation by addressing questions related to organizational structure, rules, and regulations, allowing the HR

department to focus on other tasks. For example, personalised support for employees or other higher level tasks (Ahmić, 2023).

Hungarian companies have yet to reach their full industrial and commercial potential. However, with dedication to onboarding process improvement and thoughtful adoption of powerful technologies, they will be able to achieve world-class status.

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Effective Employment Policy as a Component of Strengthening Economic Development (Case of Georgia)

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Poverty is one of the greatest challenges for Georgia, which is directly related to the issues of effective management of active or passive employment policy. The purpose of the research is to identify the challenges of employment policy and future opportunities in Georgia. The paper presents the results of qualitative and quantitative research with target groups (socially vulnerable persons, unemployed, large families, pensioners, employees etc.) And then the economic and statistical analysis of the collected data is conducted. Logistic and multinomial models are used for analysis. For binary dependent variables, logistic regression is constructed. Based on the research, conclusions and recommendations are formulated for the implementation of effective employment promotion policies and to approach sustainable development goals.

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1 Introduction

According to the UN Sustainable Development Plan 2030, the most prioritized are social issues. The first three goals of sustainable development are the eradication of poverty and hunger and the creation of an effective healthcare system in the UN member states. In addition, within the framework of the partnership, it is emphasized that decent working conditions, economic growth and also reduction of inequality within and between countries should be ensured.

Sociological studies confirm that poverty is one of the greatest challenges for Georgia, which is directly related to the issues of effective management of active or passive employment policy. In various surveys, in which businesses were included along with citizens of Georgia, most of them named the challenges of employment as the main difficulty. Today in the country we have a large number of job seekers, unused human resources, as well as an imbalance between the demand and supply of professions. It should be noted that there are half a million people receiving social assistance in Georgia, there are frequent cases when people refuse to get employed and look for jobs in order to receive or maintain social assistance from the government. As a result of long-term unemployment, part of the population needs retraining in order to improve their qualifications and more assistance for integration into the labour market. Unused workforce hinders both business and the social and economic development of the country as a whole.

According to the 2022 data from the National Statistical Service of Georgia, the unemployment rate is 17.3%. The unemployment rate among young people is particularly high. 1.2 million people are employed and 344 thousand are unemployed. It should also be noted that 31% of employees are self-employed and mostly structurally unemployed (Tavartkiladze, 2021).

Despite many programs supporting employment (training of job seekers, targeted programs, career planning services; supportive employment, profiling of people, etc.) we still have unused labour resources on the one hand and vacant places with a shortage of labour on the other hand (Tavartkiladze, M ., Phirtskhalashvili, A., 2021) and is characterized by short-term and unstable employment due to certain reasons.

Some of the international organizations represented in Georgia are actively working on the problems in the socio-economic direction of Georgia. For example, the representation of the Friedrich Ebert Foundation in Georgia - one of the main directions of the foundation's activity is social justice, economy and labour rights. With the support of the foundation, more than one study has been carried out, which reflects the socio-economic situation of the population of Georgia and examines the possibilities of getting out of the current situation (Friedrich Ebert Stiftung, 2016).

It should be noted that the social security system in Georgia is mainly based on the social assistance (living allowance) program, which was created in 2006 and has been changed many times since then, although the research conducted by the United Nations Children's Fund (UNICEF, 2022) shows us that it still functions with significant gaps - for example, The program covers only 54.3% of the poorest part of the population. For this analysis, it is more important to note that the current system is focused on the poorest part of society and its purpose is not to financially support people during unemployment. In general, social assistance systems, by their content, focus on poverty reduction, and thus, their target is the poorest households. Consequently, those working in the informal sector, who sometimes earn more than the average salary, are not included in the mentioned system. There are no accurate data on this topic in Georgia, although the conducted studies confirm that part of the recipients of subsistence allowance are engaged in informal economic activities in the country. Consequently, these people remain without any social protection mechanism (Tavartkiladze, M., Phirtskhalashvili, A., Shaburishvili, 2022), which puts them at great risk in case of temporary or long-term unemployment.

There are frequent cases when individuals refuse to seek and employ work in order to receive/maintain social benefits from the state. Studies also confirm (Boschman S., Maas I., Vrooman J., Kristiansen M., 2021) that taking a low-income job will reduce the intensity of the job search and may indicate low productivity and therefore will not give people their own means of subsistence. As a result of long-term unemployment, a large part of the working-age population remains outside the labour force.

Based on the urgency of the issue, tracking and studying the mentioned challenges will help the decision-makers in the direction of employment to change the existing unfavourable reality.

2 Methodology

We conducted in-depth interviews with representatives of state agencies and non-governmental organizations to reveal the current situation, challenges and future opportunities in the employment market in Georgia. In order to verify the results identified within the qualitative research, we conducted quantitative research across Georgia with target groups: socially vulnerable persons, unemployed, large families, pensioners and employees. More than 600 people were interviewed throughout Georgia. And then we made an economic and statistical analysis of the collected data. We used logistic and multinomial models for analysis. For binary dependent variables, we constructed logistic regression, and to analyse variables with several possible outcomes, we constructed multinomial regression. The article presents the chances of an individual falling into the socially vulnerable category; Models of risks of individuals falling into the category of socially vulnerable, causes of unjustified job loss and corresponding measures, etc.

3 Employment market research results in Georgia

According to the studies conducted to evaluate the quality of enforcement and effectiveness of regulations in the direction of employment, it was determined that:

The age variable is a statistically significant variable. An increase in age by 1 year decreases the chances of an employment offer by a numerical value of 0.035;

German, Russian and Turkish languages are not significant variables in terms of the influence of language skills on employment chances. Only the English language is statistically significant. Knowledge of English at the first level increases the chance of a job offer by 1.08, knowledge at the second level by 1.06, and knowledge at the third level by 0.94;

Marital status turned out to be quite an important variable for research purposes. The second category (single) increases the chances of a job offer by 0.7 with almost 100% statistical accuracy. Category 3 (divorced) and 4 (widowed) with a 10% error probability of 0.4 and 1.7;

The gender variable has a small positive value, which means that men have relatively more chances of employment;

A doctor's degree increases the chances of employment by 1.73, a master's degree by 1.44, and a bachelor's degree by 1.58, i.e. more than a master's degree. This is an interesting and logical fact because bachelors are more motivated and more job seeking than masters who have more academic aspirations and less work motivation than bachelors do;

According to the research, it was revealed that 25.8% of the respondents worked overtime without pay, and 16.8% were restricted from taking annual paid leave. The right to use annual paid leave was restricted the most in the private sector - 46.6%. It should be noted that this right was violated by 16.1% of employees in the private sector;

22.6% of the respondents did not work in the night shift. And 10.9% did not benefit from the relevant benefits;

The research found that there is little discrimination of citizens based on their gender. Only 1.1% of the respondents indicate the facts of discrimination;

11.1% of the respondents lost their jobs without reason, although 81.8% of them did not take any measures, this fact indicates the low trust in the relevant structures and the need for financial or consulting assistance of such persons;

For 8.5% of the respondents, their health condition worsened during the performance of official duties. According to the collected data, for 52.9% of respondents, the employer did not provide assistance when their health condition worsened;

Research has shown less awareness and effectiveness of employment sources. 54.9% of job seekers refer acquaintances-friends for employment. Only 0.5% applied to the Department of State Employment Programs and registered at worknet.gov.ge;

Due to the Covid pandemic, 22.6% are working remotely and have kept their jobs, while 40.2% are not working and the Covid pandemic has further reduced their chances of working;

The research revealed a low awareness of the activities of trade unions and a general underestimation of their role. According to the results, 43.4% have no information about the benefits of joining a professional union;

More than half of the respondents do not have information about social security and social assistance projects or cannot use them.

72.4% of respondents have no information that socially vulnerable persons, in case of employment, maintain their social status for 12 months, and the benefits for the next 12 months. And 3.3% do not trust the received information, because obtaining a socially vulnerable status is a difficult bureaucratic process;

51% of the respondents believe that the higher education funding program for entrants needs to be improved according to the results of the national exam, not their social status, and 14.2% believe that it is unfair. 58.5% of respondents have no information about internship and subsidy programs. Only 9.3% benefited from the mentioned programs. 69.4% of the respondents with secondary education have no information about the state programs of professional training and retraining. The mentioned circumstance testifies to the low awareness of the programs and, accordingly, their low contribution to employment.

We used logistic and multinomial models to inspect the collected information. For binary dependent variables, we constructed logistic regression, and to analyze variables with several possible outcomes, we constructed multinomial regression.

With the model of an individual falling into the socially vulnerable category, we investigated the chances of individuals falling into the socially vulnerable category. In particular, we evaluated the influence of age, gender and education parameters on the chances of an individual falling into the socially vulnerable category (Table 1). The z-value tests the null hypothesis that the coefficient is zero. By default, for a 5% significance level, it should fall outside the ±1.96 limits. The significance in the

model is much higher than 5%. This is also confirmed by the probability of Pr(>|z|), which is much lower than 0.05 for all parameters.

```
Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.4630  -0.7831  -0.6044   1.1488   2.2753

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)    -2.007719   0.486601  -4.126 3.69e-05 ***
age             0.019413   0.006186   3.138   0.0017 **
gender1fe2male -1.039027   0.263062  -3.950 7.82e-05 ***
Education       0.721091   0.100477   7.177 7.14e-13 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 719.64  on 600  degrees of freedom
Residual deviance: 649.32  on 597  degrees of freedom
  (7 observations deleted due to missingness)
AIC: 657.32

Number of Fisher Scoring iterations: 4
```

	Estimate	OR
(Intercept)	-2.0077	0.1343
age	0.0194	1.0196
gender1fe2male	-1.0390	0.3538
Education	0.7211	2.0567

Figure 1: Risks of individuals falling into the socially vulnerable category

The Probability of an individual falling into the socially vulnerable category increases with age (Figure 1). Men are less likely to fall into the socially vulnerable category than women. As for education, the risk of falling into the socially vulnerable category increases for individuals with lower levels of education. With increasing age, the risk of an individual falling into the socially disadvantaged category increases 1.02 times. Men are 0.4 times less likely to fall into the socially vulnerable category than women. And, for individuals with lower levels of education, the risks increase 2.06 times.

We included another variable, working ability (Figure 2), in the model. Adding this variable further increases the explanatory power of the model, and returns the age variable to statistical significance. According to the results, the risk of falling into the socially disadvantaged category among individuals with disabilities is 3.2 times higher than among able-bodied individuals. Note that the age variable has changed its sign. In this case, the model tells us that with increasing age, the chance of falling into the socially vulnerable category is 0.9 times lower. We may look for a logical explanation

for such a result: we have seen above that in the distribution of respondents, the population between 18 and 50 years prevails. That is, the population of the age that is more active in terms of employment and opportunities, so their chances of falling into the socially vulnerable category may be lower.

```
Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.3840  -0.4495  -0.1889   0.3857   3.6287

Coefficients:
                    Estimate Std. Error z value Pr(>|z|)
(Intercept)          3.78134    0.93891   4.027 5.64e-05 ***
age                 -0.01697    0.00850  -1.996 0.045928 *
Shromisunarianoba12  1.15237    0.57699   1.997 0.045802 *
D114                -1.54803    0.16490  -9.388  < 2e-16 ***
D214                -0.86480    0.09940  -8.700  < 2e-16 ***
gender1fe2male      -0.82497    0.34041  -2.423 0.015372 *
Education            0.53160    0.13842   3.840 0.000123 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 700.61  on 580  degrees of freedom
Residual deviance: 369.72  on 574  degrees of freedom
  (27 observations deleted due to missingness)
AIC: 383.72

Number of Fisher Scoring iterations: 6


                                Estimate      OR
(Intercept)                       3.7813 43.8746
age                              -0.0170  0.9832
Shromisunarianoba12               1.1524  3.1657
D114                             -1.5480  0.2127
D214                             -0.8648  0.4211
gender1fe2male                   -0.8250  0.4382
Education                         0.5316  1.7017
```

Figure 2: The model of the risks of individuals falling into the socially vulnerable category

```
================================================================
                              Dependent variable:
                    ------------------------------------------
                                2                       3
                               (1)                     (2)
----------------------------------------------------------------
Education                     0.719                   1.223
                             (0.378)                 (0.326)

age                           0.991                   1.031
                             (0.029)                 (0.024)

A215                          0.732                  0.460**
                             (0.410)                 (0.373)

A912                        0.00002***              0.0002***
                             (0.989)                 (0.985)

A613                          0.774                   0.950
                             (0.523)                 (0.485)

A813                          0.688                   1.345
                             (0.416)                 (0.383)

Constant           494,383,717,392.000*** 2,195,872,668.000***
                             (1.141)                 (1.079)

----------------------------------------------------------------
Akaike Inf. Crit.           404.115                 404.115
================================================================
Note:                                *p<0.1; **p<0.05; ***p<0.01
```

Figure 3: The model of losing a job without reason.

Within the framework of the research, we built a model of the reasons for losing a job without reason and corresponding measures (Figure 3), in which the question asked the respondents whether they lose their job without reason and whether they turn to you for help, according to the experience of the last 5 years, is analysed.

2.6% of respondents lost their jobs without reason and applied for help. 8.5% of respondents lost their jobs without reason and did not apply for help. 88.9% did not lose their job without reason. Our target group is the 2nd group: lost their job without reason and did not apply for help. Let's estimate a multinomial model to see the odds of falling into this group given the different characteristics of different individuals. It turns out that the only statistically significant predictor is work experience, which tells us that as the number of years of work increases, an individual has a higher chance of falling into the first group to lose his job and apply for assistance than the third group of not losing his job.

4 Conclusion

The state employment policy takes into account a number of support measures for job seekers, as well as social benefits for the unemployed. Despite numerous such measures, there are challenges in the effective implementation of the employment policy and there is a need to respond to them.

It is important to adapt social assistance packages to market requirements. In connection with this, recommendations have been made in the study, including:

- -Eliminating the problems of the phenomenon of dependence on social support. It is important to turn people into competitive, motivated citizens who will fully participate in the labour market. Qualitative and quantitative studies have shown that a share of the socially vulnerable are informally employed, with the reason that they will be deprived of benefits. It is important to give them a better salary instead of an allowance, to employ them and to turn able-bodied people into competitive, motivated citizens who will fully participate in the labour market.
- Registration and control of the unemployed as job seekers;
- introduction of unemployment allowance;

- Eliminating the problem of unstable jobs
- Implementation of a complex reform in the direction of employment
- Introduction of social insurance
- Revision of the poverty reduction policy and legislative changes regarding the provision of targeted assistance.

We hope the established recommendations will render assistance to the employment policymakers for the development of the policy respective to the latest challenges and for seeking the facilitation ways of new opportunities for sustainable development.

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Sustainability Awareness in Supply Chain Planning Under Uncertainty

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Nowadays great emphasize is being placed on the fragility and vulnerability of organizations regarding the uncertainty and unpredictable conditions. The environmental and social awareness are changing the concept of growth that guided companies for decades. Profound restructuring of supply chain, SC, is emerging regarding the sustainability impacts that is being placed in the top priorities of companies' agenda. Besides, the international dimension of SC, as well as the complex partnership networks present great challenges to the paradigm of fully integrated SC. Following these motivations, a novel proposal was developed to help the decision-making process within an uncertain environment. The goal of the approach is to develop a planning framework to help SC managers to balance between environmental footprint, social responsibility, service level to customer and economic criteria. A mathematical formulation is proposed and the model applicability is shown through the solution of an industrial example. The practical implementation involves the development of a decision model framework (MILP formulation) to optimally manage performance indicators and to assure sustainability requirements. The impact of sustainable policies in the SC planning strategy is evaluated for different managing scenarios. These bring new insights concerning SC planning under uncertainty.

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1 Introduction

Currently, managers have to make faster decisions and commonly have to revise them rapidly. The accelerated digital transformation together with the intensification of sustainability considerations, increased the need to transform classical management practices. Also, the environmental and social consciousness are changing the concept of growth that guided companies for decades. So, sustainability is now a days a top priority for most part of the companies' agenda.

Also, a novel paradigm emerges from the modern world development, that emphasizes the requirements of applying new approaches to deal with traditional problems (Strimovskaya & Barykin, 2023).

Besides, recent worldwide occurrence like Covid-19 and the Ukraine War turned more visible the impact of uncertainty exposure and, therefore, the assurance of service levels to customers' results progressively more complex.

Following those motivations, this paper addresses the Supply Chain (SC) optimal planning supported on sustainability indicators, for the economic-operational, environmental and social dimensions under uncertain market conditions. Based on this objective two research questions were formulated, namely:

RQ1: How much different are the planning solutions based on sustainability KPI objective compared with cost and benefit objectives?
RQ2: How effective are MILP approaches on handling the optimal sustainability planning under uncertainty conditions?

So, after this short introduction, next section highlights some scientific contributions that help understanding the research proposal. The methodology used to guide the development of the ongoing work is then presented in section 3.

The mathematical approach used to solve the problem is detailed at section 4, and the validation of the proposal is done through the solution of a real case study regarding a Portuguese distribution SC, section 5. The achieved results are then discussed in section 6, and a set of conclusions as well as future work directions are considered at the last section, section 7.

2 Theoretical Background / Literature Review

In order to better understand the scientific contributions made so far in the area of Supply Chain Sustainability, subject to uncertainty, some bibliometric analysis was done at Web of Science database, using the Boolean sentence *supply chain planning* AND *sustainability* AND *uncertainty*.

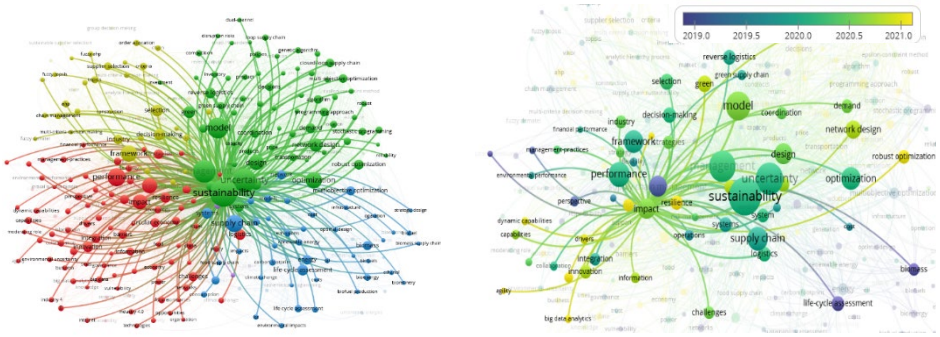

Figure 1: Bibliometric analysis (a) clustering of keyword cooccurences; (b) Timeline with the highlight of sustainable impact.

Using WOS, the scientific contributions were collected and then analyzed using *Vosviewer software* to obtain the clustering of cooccurrences, Figure 1 (a), and the corresponding timeline 1 (b). Accordingly, the results obtained showed 4 main clusters centered namely at: circular economy with uncertain challenges (red color), Supply Chain sustainability and Network Optimization (green color), Supply Chain & Life-cycle assessment (blue color), and the light green for frameworks & decision making, 1 (a).

Regarding the three years contributions (e.g. 2019 to 2021) represented in figure 1 (b), we can see that *agility*, *big data analytics*, *robust optimization*, *innovation* and *resilience* are recent occurrences (yellow clusters), while compared with life-cycle assessment (dark blue clusters).

A general perspective on the collected research papers shows some important challenges regarding the highlight topics & contents, the methodologies, and the implemented practices.

Following this perspective, Strimovskaya & Barykin (2023) showed the importance of the Industrial Informational Integration (III) as a new subject that claims a multidimensional approach to achieve the company's goals in a volatile, uncertain, complex, and ambiguous (VUCA) environment. The study deals with the resource allocation problem by applying efficient approaches based on mathematical modeling, experts' assessment, optimization methods, and others. Nevertheless, recent developments emphasize the need to apply a new paradigm to deal with recurrently problem, as well as the necessity of novel trends to SC design and planning (Mottaghi et al., 2022).

Besides that, Rusch et al. (2023) provide a comprehensive overview of current Digital Technologies (DT) applications in sustainable product management, SPM (e.g., product design/assessment, supply chain management, and business models). The study revealed that DT such as the Internet of Things (IoT), big data, artificial intelligence, or blockchain, are considered as enablers for a more sustainable and circular economy (Rusch et al., 2023). So, authors concluded there is clear room for greater adoption and optimization of DTs, so as to accelerate the transition towards a more sustainable and circular economy.

Regarding social measures, Bubicz et al. (2021) presented a systematic literature review that highlights how this dimension has been incorporated in supply chain management research in the period 2008-2018, and what research gaps still exist. A set of categories and cross-analysis between categories were defined to perform the study. The main research gaps and trends regarding social concerns in supply chains were identified and summarized. These revealed that social sustainability concerns have been increasingly addressed, but further research is required to obtain more comprehensive social supply chains.

The social commitment was transversally implemented on different areas. Torrado & Barbosa-Póvoa (2022) presented a study for the healthcare industry. The design and sustainably optimization of SC processes is vital, specially under an uncertain environment. Studies from the last 10 years addressing the *strategic-tactical* approach and for the *operational-tactical* were analyzed and a comprehensive contribution on each sustainable pillar, was drawn.

Concerning the industrial standpoint, a systematic review of the indicators used for measuring industrial sustainability identify a total of about 1041 indicators, with 290 for economic, 410 for environmental, and 341 for social dimensions (Mengistu & Panizzolo, 2023). Authors noticed that the majority of the indicators were mentioned only once and few had been frequently used, showing a lack of consistency (i.e., a lack of consensus) for measuring sustainability performance in different manufacturing industries.

On the other hand, distribution networks and particularly food supply chains registered a growing importance, both at the industrial and scientific levels. The challenges faced in food supply chains are at the intersection of several areas and go beyond the traditional cost minimization concern. Particularly, the uncertainties due to an ever-increasing product variety, more demanding customers and a highly interconnected distribution network. This implies that companies in the area need to manage the risk/cost trade-off without disregarding freshness, sustainability and corporate social responsibility (Jinil Persis et al., 2021).

Finally, concerning closed-loop supply chains Cardoso et al. (2016) proposed a mixed integer linear programming (MILP) formulation that integrates risk measures into the design and planning, while considering demand uncertainty of final products. The paper explores a European supply chain case study, and some managerial insights are outlined based on decision makers' risk profile and goal of the risk minimization (Cardoso et al., 2016).

3 Methodology

The research cared out in this paper follows a *Design Science Research Methodology* (Pries-Heje et al., 2017),that comprehends the steps of: i. *Problem ID & Motivation* (i.e., problem definition and its importance), ii. *Definition of Objectives of a Solution* (main characteristics to accomplish), iii. *Design & Development* (MILP formulation, that is the artefact), iv. *Demonstration* (suitable framework and use of the mathematical model to solve the problem), v. *Evaluation* (effectivity and efficiency of the MILP proposal, improving requirements and eventual back to design), and a solution Communication or the iterating back to the design through the integration of new objectives and analysis, figure 2.

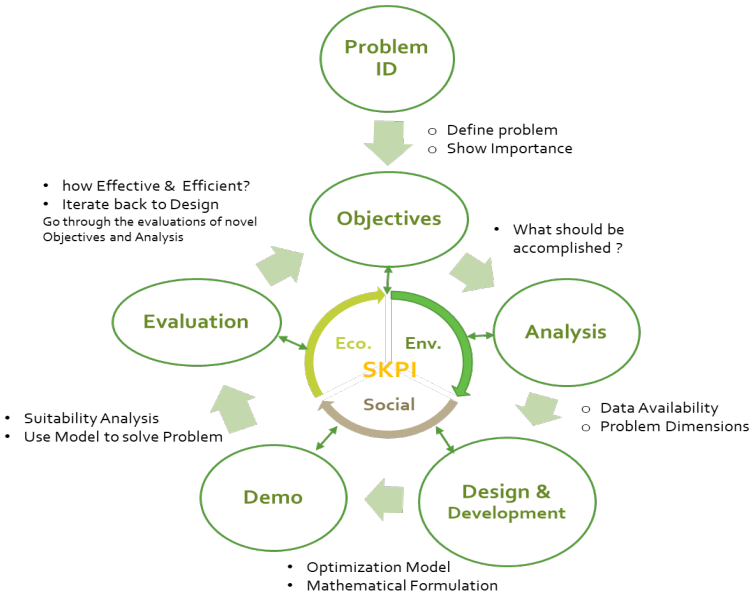

Figure 2: Methodology followed in the research work.

The former two steps (i. and ii.) were already described at the introduction, as well as the problem *Motivation* that was emphasized by the literature review and the bibliometric analysis.

4 Design & Development – MILP Formulation

This paper sections presents the main characteristics of the novel MILP (*Mixed Integer Linear Problem*) formulation proposed. The goal of the approach is to develop a framework to help SC managers at the planning decision level, under uncertain environment (i.e., Volatile, Uncertain, Complex, and Ambiguous, VUCA).

The objective function considers supply chain environmental commitment, social concern, and economic performance criteria, while ensuring the operational service level to customers.

$$\min z : z = \sum_{t}^{T_H} \sum_{w=1}^{Nw} p_w \varepsilon_{w,t} \Big|_{Sc} \qquad (1)$$

In here, index *w* is used to represent each indicator, on the set of *Nw* =12 KPI. The $\varepsilon_{w,t}$ is the absolute value of the difference between the observed value and the *target*, balanced by the coefficient p_w used to establish different evaluation scenarios.

$$\sum_{t=1}^{T_H+1}\left[\underbrace{\sum_{v=1}^{Nv}\sum_{l:l\,\epsilon SS_v} Fc_v\, Y_{l,t} + \sum_{l=1}^{Nl}\sum_{s:s\in SSL_l} Cr_s\, Sr_{s,t} + Cc_s\, Sc_{s,t}}_{Fixed} + \underbrace{\sum_{v=1}^{Nv}\sum_{l:l\,\epsilon SS_v} Ckm_v\, d_l\, Y_{l,t}}_{Varable}\right] \leq PB$$

The formulation constraints can be grouped in four classes, namely: 1) *capacity* constraints (e.g., vehicles capacities, warehouse capacities, cross docking capacities, materials related capacities, suppliers & customers capacities, reverse logistics capacities); *suitability* constraints (e.g., vehicle suitability, SS_l, for the transportation flow *l*, of materials *s*; warehouse spaces' suitability, SSL_l, other equipment & resource suitability's, reverse logistics suitability's, materials' suitability); *balance* constraints (e.g., bill of material for all materials in every location, *s*); *cost* constraints (e.g., fixed and variable costs, for a given *Planning Budget*, PB, based on the assignment of vehicles to material flows, $Y_{l,t}$ binary variables, (2)).

These are the main characteristics to accomplish in the MILP planning model.

5 Case Study – Demonstration and Evaluation Steps

The case study under consideration refers to a famous Portuguese Distribution Company with Iberic representation. The company offers integrated logistics, automotive services, positive cold facilities, reverse logistics, container unloading and urban distribution. Globally, the company manages 3 large product families: Industrial (e.g., pulp and paper, automotive); Food & Beverages; and other Non-Food products.

This study presents a branch of the company for the central region of Portugal, that manages about 800 clients, among them there are Shopping Centres, Hypermarkets, and other retailers. The ongoing research started with a sample of 107 customers.

Regarding the fleet of transportation vehicles, 4 typologies were considered that differs in terms of capacities (T1-10, T2-18, T3-20 and T5-33 Euro pallets), for a total number of 15 vehicles.

Warehouse capacities are distributed between storage areas (e.g. racks) and cross docking area.

Besides, a set of twelve KPI were selected, 4 for economic & operational (e.g., KPI1, to KPI4), 5 for environmental (e.g., KPI5 to KPI9) and 3 for social (e.g., KPI10 to KPI12) dimensions, respectively. The first set of KPI refers to vehicles' control, namely, *travel & route costs*, *service level* (e.g., rate between the delivered and ordered amounts), *vehicles' occupation rate* (e.g., full or partial charge), and to the regulation of *warehouse costs*. Concerning the environmental dimension, it cares about: *vehicles' carbon emissions*, *route dependent emissions*, *typology dependent emissions*, and *waste* produced and *energy* consumption in the OLC (*Operational Logistic Centre*), the warehouse facility on Central Region. Finally, the social KPI are related with *driver's working hours*; *working time table*, and *number of traveling stops* (used as a measure of the *Resting periods*).

Data were collected for a period of 10 months and a set of scenarios approach was considered to study planning uncertainty regarding customers demand levels for the 3 product families.

Moreover, former results involve both, direct measurements and calculated data. Carbon emissions were assessed based on the traveled distances, and route dependent emissions were stated based on the customers visited on each route and planning scenario. Also, typology dependent emissions were evaluated through the traveled distances per vehicle typology, summed up for the typologies used in each scenario.

The applicability of the proposed mathematical formulation is shown through the solution of the case-study application. The practical implementation involves the solution of the MILP formulation using GAMS Studio software.

6 Discussion of Former Results

MILP proposal was evaluated. The achieved planning results were analyzed for the sustainability dimensions that were modelled.

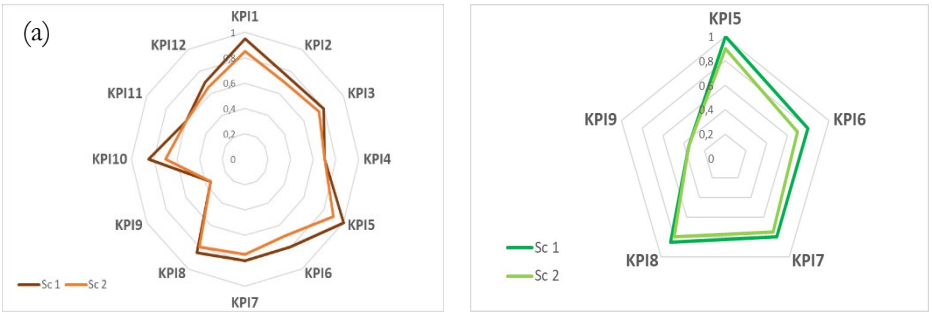

Figure 3: Results observed for the 12 KPIs (a) and details of 5 environment KPI (b), for the planning scenarios Sc1 and Sc2.

Key performance indicators, KPI, were normalized to allow a combined representation of the twelve scores, for two operational scenarios.

As shown in Figure 3, the major differences between scenarios were achieved for environmental KPIs, particularly for those related with travelling distances and vehicles assignment, KPI5, 6 and 7. Thus, KPI10 related with the *working hours,* and KPI12 for the *traveling stops* resulted also with the higher variability between scenarios. Globally, the worst value was reached for KPI9 related with the energy consuption and the best resources assignment during the planning period was obtained for KPI5 on Sc1.

7 Conclusions

The impact of sustainable policies in the SC planning strategy was evaluated for different scenarios. These bring new insights concerning SC planning under uncertainty.

The achieved planning results were analyzed for the sustainability dimensions that were modelled. The performance indicators give important managing insights and a more comprehensive planning was reached.

Future analysis will be drawn to explore KPI challenges and managing scenarios. Also, further developments will be done on the modelling approach in order to enhance planning decisions.

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Scenario Planning for Organizations' Sustainable Development: Using Scenarios for Effective Change Management

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The complexity and the dynamics of the organizations' environment determine the level of uncertainty which they face, and a turbulent environment, defined from these aspects presents the most complex, and rapidly changing environment. Strategic planning enables companies to understand the complexity of the environment, to anticipate and respond to changes, and to define how the future will look like, but scenario planning wraps up the whole process of planning into a future framework -"the future will be like this". As such, scenario planning leads to the establishment of a flexible organization which is robust to sudden radical changes, through thorough research of the future, enhanced managerial awareness of environmental uncertainty, and enhanced organizational learning. Furthermore, scenario planning may be used for many business applications, such as risk management, crisis management, contingency planning, change management and many more. In the case of change management, managers by implementing scenario planning, identify the signals of change from the internal and external environment, examine their effects and formulate plans for adopting changes. Therefore, this research paper aims to show the relationship between scenario planning and change management processes in organizations striving towards sustainable development in the contemporary turbulent environment.

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1 Introduction

According to Cassar (2019) organization's sustainable development presents adopting business strategies and activities that meet its needs and stakeholders while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future. Translated on a micro level, the concept of sustainable development demands that organizations not focus only on goals of maximizing profits, but and on environmental and social goals (Rockström and Sukhdev, 2015). Standing from this point of view organizations need approaches that will enable them achievement of environmental protection, social well-being and economic growth (Paul, 2022). However, given the trade-offs that might arise between these aspects, organizations need to make an accurate balance between the achievement of profits, human resources well-being, and environmental protection. In the era of a sustainable and inclusive economy, there is no space for short-term revenues and long-term goals of maximizing profits and creating value primarily for shareholders. Organizations have to commit to social and environmental responsibility, i.e. to preserve the planet Earth and to enable people to be well, productive and empowered (Schoenmaker & Schramade, 2019).

The concept of sustainable development, imposed on the evidence of climate change, population growth and modernization (Armitage & Johnson, 2006; Curry et al., 2012; Butler et al., 2014), additionally increases the complexity and the dynamics of changes that happen in the business environment. Organizations in this constellation of complex and dynamic, i.e. turbulent environments, are facing continuous challenges, tasking managers to commit to sustainability and induce appropriate changes in their strategies, structures, processes, and culture. To be effective in these tasks, managers must lead organizations through transformational and complex changes. These transformational changes on the organizational level require:

1. Strategic planning based on scenarios that present alternative images of the future environment; and
2. Effective change management at an organizational level.

Strategic planning and the formulation of strategic plans for technological development, marketing, and sustainable development (or for any other purpose) is applied by any type of organization. However, despite the enormous effort that is put into these strategic plans, most of them are either not fully implemented or fail due to a lack of full understanding by all employees. The root of this common problem lies in the fact that the strategic plan is based on an envisioned single forecast for the future. However, this future might be incorrect, leading to undesirable outcomes and not leaving space for adaptation (reformulation of strategies) under the newly changed external and internal organization factors. Therefore, contemporary planners and managers should exploit the uncertainty in alternative future environments, i.e. scenarios and use these scenarios as test conditions for the strategies to determine which strategies are effective in different scenarios (Danevska, B.A., 2022). Scenarios can be used to build a signal system that allows planners to change strategies without waiting for the next planning cycle (Ringland, 2010). In this situation, scenario planning gives the company the greatest advantage.

When analyzing scenario planning functions (Chermack, 2011; Danevska, B.A. 2022) the value of it can also be found and as basis for effective change management.

Scenario planning through its functions of thorough research of the future, integration of different types of data for the future; and enhancement of managerial awareness of environmental uncertainty, provides a solid foundation for determining the need for change. In other words, scenario planning provides identification and prioritization of key drivers and uncertainties that shape the future. More specifically, the identified key drivers are called predetermined elements in the process of scenario planning, and they can be somewhat similar for companies operating in the same industry. In the case of achieving an organization's sustainable development, for instance, planners envision the changes in climate change, the loss of biodiversity, the behaviour of organizations' stakeholders (customers, government, shareholders, employees, suppliers, and community), energy consumption, poverty, social exclusion etc. All these predetermined elements cannot be controlled or influenced by a single organization and they form the basis of each developed scenario. However, the critical uncertainties are changing the direction of the scenario narratives. When discovered in the scenario planning model, they represent the "aha moment", that forces managers and planners to expand their mental

models. This facilitates the next stage in the change management process when companies are preparing and planning for change. Examples of such critical uncertainties might be major technological, macroeconomic, legal shocks or ecological catastrophes, and these uncertainties have the power to fundamentally change businesses (Wulf et al., 2010). From this point of view, scenario planning can foster the development of dynamic capabilities to respond to environmental changes (Ramirez &Wilkinson, 2016). Furthermore, scenarios are used as "wind tunnels" for assessing different strategic alternatives towards changes and implementing them in the third stage of change management models.

The implementation of strategies is facilitated by the newly acquired institutional knowledge developed from the simulations of different strategies in the developed scenarios. Managers, planners, and employees, through effective communication, share the visions and actions that lead to the desired goal. In total, the process of scenario planning by itself presents adaptive and continuous learning on an organizational level, because it incorporates the three fundamental steps of perception, theory building, and acting (Balarezo et al. 2017).

The last stage of change management models involves ensuring that the changes implemented within an organization become ingrained into its culture, processes, and systems, and continue to deliver value even after the initial implementation phase. Scenario planning enables organizations to build resilience that helps them better withstand challenges and continue to sustain the changes despite external pressures.

Considering how scenario planning can facilitate the change management processes, still in the literature, cannot be found many articles and empirical evidence of connecting and using scenario planning as a strategic tool for change management. Therefore, this paper tries to narrow down this gap and give a further base for researching this relationship, i.e. how scenario planning complements change management models towards sustainable development. The paper is divided into three sections, where firstly, a literature review is given, secondly, the methodology of investigating this relationship is shown and lastly findings from the research are presented and discussed.

2 Theoretical Background / Literature Review

Scenario planning used as a tool for futures thinking enables dealing with and in an uncertain environment. Furthermore, when organizations are in the process of development, organizational changes imply instable and uncertain environment and without built strong value system and embedded culture for sustainability, people fail to adapt to change.

Organizational change towards sustainable development is a transformational change that asks for a larger scale and scope of changes. As each transformational change, an organization's sustainable development involves at the same time redefinition of mission, strategy, organizational structure, human resources, organizational performance, business processes and culture (Harvard Business School, 2020). From a change management perspective, success in sustainable development depends on the organization's human resources, i.e. capacity to deal with the embraced changes, and customers and stakeholders that "adopt and use" sustainability in the first instance (McNevie, 2024). The emphasis in an organization's sustainable development is on people (Doppelt, 2010) and their ability to grapple with and manage complexity. Scenario planning enables overviewing and structuring of this complexity in the external and internal environment. In the literature related to change management towards sustainable development, many authors, such as Sancak (2023), Stouten et al. (2018), Benn et al. (2014), and Doppelt (2010) only propose organizational change models for organization's sustainable transformation, thereby deriving or focusing on the most significant of the environmental, social and governance goals. Walker (2017) in her practitioner workbook published by the Institute of Environmental Management and Assessment provides guidance and approaches to change management towards organizational sustainability, by considering all the change management theories classifications, models, and experiences of change agents, planners, and CEOs. Furthermore, according to the empirical evidence provided by Walker, scenario planning is used as a strategic tool for organizational transformation towards sustainable development. It was used to shift people's mindsets to another future environment where new risks and opportunities arise.

Scenario planning, as a strategic tool for moving towards sustainability has been investigated by other researchers but mostly on a national, community or global level. For instance, Butler et al. (2016) investigate how scenario planning used on a community level can be utilized when planning for adaptation. Romero et al. (2016) findings from central Romania, have shown that scenario planning can be used for generating consensus, sharing the vision among all stakeholders and as an input for a long-term transition towards sustainability, including for the design of strategies and action plans. However, the research conducted by Benn (1999) goes on an organizational level by investigating how scenarios can help libraries in their sustainable development. In conclusion, he remarks that the main issue is how sustainable development is achieved and what it requires.

3 Methodology

Based on the theoretical background and empirical evidence provided by many authors in the area of scenario planning, change management and sustainable development, this research paper by using primary data tries to make a connection between scenario planning and change management towards an organization's sustainable development. The primary data were collected by surveying Macedonian companies from the aspect of how scenario planning can be used as a solid foundation for effective change management. The survey in Microsoft Forms was distributed via business social networks to reach a greater number of responses from different-sized companies coming from different sectors. The survey was filled out by upper and middle-level managers involved in strategic planning and change management, from January to March 2024.

4 Results and Discussion

The conducted research incorporates 21 filled-out questionnaires coming from the IT (4 companies), service (9), trade (3), financial sector (2), construction (1), food (1), and metal (1) sectors. The questionnaire was separated into two parts. The first part contains questions related to the demographic characteristics of surveyed companies and the second part, contains questions related to the character of planning in the business organization, i.e. the methods of thinking about the future, goals of planning, and utilization level of scenarios as tools for conducting the different stages in change management process.

According to the criteria of number of employees and domicile, the demographic structure of this research is as follows: 6 micro-enterprises, 11 small-enterprises, and 2 medium-sized enterprises, while 2 are foreign enterprises, and 19 are domestic enterprises.

Related to whether managers think about the internal and/or external environment and how they will develop in the future, only one service company thinks about how organizational external factors will develop in the future, while 20 companies think about how both factors will develop in the future. In the next question, managers were asked to assign a frequency of usage of different methods for thinking about the future on a Likert scale from 1-5 (where 1 - never used, 2- very rarely used, 3 – rarely used, 4 – very often used, 5 – always used).

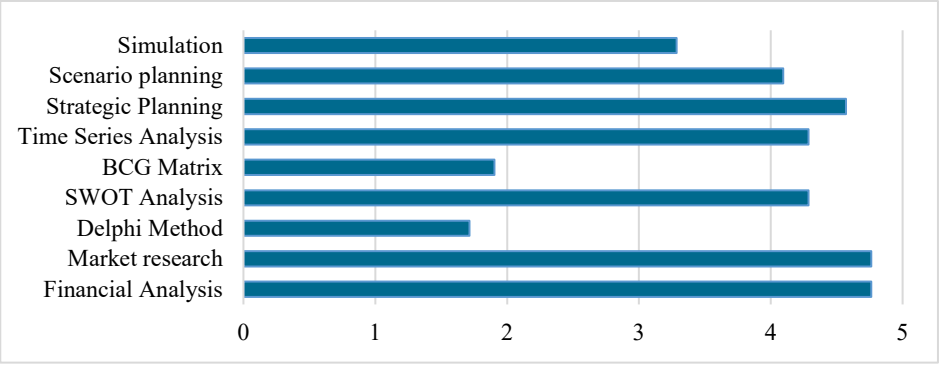

Figure 1: Frequency of using different methods of thinking about the future
Source: Own research

According to the results (Figure 1), the weighted frequency average, i.e. 4.76 have the methods of financial analysis and market research (very often used with tendency towards always used), strategic planning as a method has weighted average frequency of 4.57, scenario planning 4.09, time series analysis 4.29, and SWOT analysis of 4.29, which means that are very often used. Both questions, related to how internal and/or external environment will develop in the future and the methods that managers use for thinking about the future, provide evidence for existing a long-term and whole perspective among the surveyed companies related to their environment, and the usage of more sophisticated methods for thinking about the future.

Related to the purpose of planning, i.e. for what is used in organizations, managers have given the following answers: 28% answered that they were using the planning for strategic decisions; 22% for the design of operation processes; nearly 21% for routine decisions, i.e. for realization of everyday activities; and 27% for introducing changes, i.e. for initiating transformation in their organization. In conclusion, more than 50% of managers plan for making a long-term impacting decision and for transformational changes, which explains the attitude that managers have for planning, i.e. their focus on the future, strategic thinking, fostering a culture of adaptability and change management, which can be considered as a fundamental aspect of effective leadership and organizational development.

Since, the main research question in this paper is to assess the relationship between scenario planning and change management towards sustainable development, managers were asked to assess whether scenario planning and envisioned pictures about the future environment of their organizations' sustainable development have facilitated in the steps of conducting change management. According to the results: 57% agree that scenarios have helped them in identifying signals that ask for change management; 47.6% somewhat agree that scenarios helped them in identifying the objective of change management and in creation of vision of change, while around 43% agree that scenarios facilitate the creation of vision of change. 47.6% agree that scenarios help them in encouraging employees to think as expansively as possible about the possibilities for change, based on their strengths. 57% agree that scenario planning helps them in prioritizing the ideas/areas for action that might facilitate organization transformation for achieving change management objective, and 66.7% somewhat agree that scenario planning helps them in monitoring and evaluation of implemented actions towards achieving sustainability.

Actually, through scenario planning managers are systematically thinking about the future global business environment and anticipate the changes that will arise, the problems associated with them and alternative solutions. Scenario planning and the functions of scenario planning reinforce the organizational sustainable transformation and development, thereby complementing change management processes through continuous revision of organization's long-term plans and goals, looking to the future and the opportunities or threats it will bring.

5 Conclusions

Strategic planning and effective change management are two of the most important management processes that every organization needs to follow for pursuing sustainable development. Furthermore, a strategic planning approach based on scenario planning adds value to the whole sustainable transformation of an organization, in terms of ensuring effective implementation of planned changes. This is achieved through utilizing scenario planning functions that enable organizations to have: a platform for assessing alternative strategies; integration of different types of data for the future; thorough research of the future and future opportunities; encouragement of managerial awareness regarding environment uncertainty; expansion of managers' mental models; encouragement and acceleration of continuous organizational learning; platform for business model testing and flexible company which is robust to sudden radical changes. Furthermore, according to the results of the research, managers have answered that scenario planning complements change management processes, through assisting them in identifying signals that ask for change management (57%); identifying the objective of change management (47.6%); finding ideal and existing examples of the desired future, i.e. creation of vision of change (43%); encouraging employees to think as expansively as possible about the possibilities for change, based on their strengths (47.6); prioritizing the ideas/areas for action that might facilitate organization transformation for achieving change management objective (57%); and monitoring and evaluation of implemented actions towards achieving sustainability (66.7%).

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SYNERGY OF TACKLING GRAND CHALLENGES – FROM THE BUSINESS DIPLOMACY'S PERSPECTIVE

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In a fast-developing and uncertain world, grand challenges emerge as a collection of programs encouraging creativity to address significant worldwide development and health issues. It is essential that grand challenges are debated at various levels comprising spheres of policymaking, publicity, and academics worldwide. Depending on the urgency of a challenge, the opinion and prioritisation of stakeholders may vary. Nevertheless, stakeholders demand collective business actions to handle these grand challenges jointly. A synergistic approach to business strategy draws the attention of scientific researchers and practitioners in the way that it could combine many crucial factors to create a dynamic in business. By applying a critical and integrative literature review, this paper aims to conceptualise the creation of competitive advantages and innovative dynamics from the perspective of business diplomacy. The consonance from business diplomacy, which is about stakeholders' engagement and negotiation, and shared values creation will ensure the operation of a company. This is a synergistic approach as business diplomacy and shared value creation are capturing the significant profit of synergy. This research will analyse the interconnection between business diplomacy and shared value creation based on synergy.

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1 Introduction

A synergistic approach to business strategy draws the attention of scientific researchers and practitioners in the way that it can combine many crucial factors to create a dynamic in business. It is essential in the context that grand challenges are debated throughout the world. Stakeholders demand more collective actions from firms to handle these grand challenges jointly. Internationalising and internationalised companies risk losing legitimacy, social license to operate, and a bad reputation. To safeguard their reputational image, many companies opted for CSR activities to avoid being confronted by stakeholders.

Nonetheless, the reliability of CSR is decreasing because scholars are exposing the dark side of CSR, which is economic benefits only for companies rather than society and companies as a whole. Creating shared values is an excellent choice to prove that a company is thinking of values for its stakeholders and society when implementing its business activities. It is also a cost-benefit for companies. Moreover, The consonance from business diplomacy, which is about stakeholders' engagement and negotiation, and shared values creation will ensure the operation of a company. This is a synergistic approach as business diplomacy and shared value creation are capturing the significant profit of synergy. This research conceptualises how firms could create their competitiveness and innovative dynamics as synergistic consequences for jointly tackling grand challenges. While creating shared values implies mutual understanding and common objectives between businesses and stakeholders, business diplomacy-related studies explain how this implication could be achieved.

2 Theoretical research

2.1 Innovative dynamics and competitive advantages

Market globalisation offers business opportunities for firms to contribute to the development of the national economy and to where they have business operations (Ordeix-Rigo, 2009). The internationalisation of firms is a complex strategy in the present day as competitive advantages are changed by non-business stakeholders (Ruël, 2020). Historically, dynamic capabilities were considered a driver for enterprise-level competitive advantage in rapidly changing technological

environments (Teece, 2007). As part of a dynamic capacity-building approach, organisations can learn to adapt to changing environments by defining new products and processes (Teece, 2018). Competitive advantages will be subject to changes by economic and non-economic stakeholders from the business environmental spheres (Henisz, 2016).

Egea et al. (2020) claimed that drivers of competitiveness changes were related to sustainability factors. Yeow et al. (2018) suggested that enterprises with dynamic solid capabilities could profitably adapt to environmental changes by aligning with organisational changes and competencies. Notably, dynamic capabilities in the management literature are related to the use and distribution of organisational resources. In this sense, resources are directed to enhance competitiveness and address challenges to the rapid changes in the environment (Lin et al., 2016; Zollo & Winter, 2002). Scholars proposed that dynamic capabilities stemmed from the resource-based view, where firms allocated their resources to innovate processes or technologies to survive business environmental changes (García-Leonard et al., 2023; Peteraf et al., 2013; Yeow et al., 2018).

In the post-environmental changes, companies face increased demand for addressing social and political issues (Fitzpatrick et al., 2020). These demands are sorted by allocating firms' resources. However, they must be aligned with business interests with firms (Bolewski, 2018; Marques, 2018). Stakeholders' demands increase, so firms must allocate resources to address these demands. This action assists companies in ensuring their responsibility and accountability towards society. In this way, firms can survive environmental changes by employing business diplomacy. Firms that apply a business diplomacy agenda will likely allocate their resources to pursue diplomatic aims and initiatives (Ordeix-Rigo and Duarte, 2009). In a highly competitive landscape, business diplomacy helps firms gain competitiveness to secure their position in the market (Henisz, 2016). Nobre (2017) and Willigen (2020) claimed that through the lens of diplomatic research, a firm acts as its diplomatic agent to pursue and protect its business interests. Tran (2023) stated that corporate social responsibilities play a role as the soft power of firms to enhance their influence in the market. Hence, firms will acquire more dynamic capabilities if they implement good business diplomacy strategies. Dynamic capabilities define the extent of allocating organisational resources to scan and seize new business

opportunities during environmental changes (Arifin and Frmanzah, 2015). Firms acting as their diplomatic agents will be discussed in the below section.

2.2 A conceptualisation of business diplomacy from the perspective of mainstream diplomacy

The conceptualisation of diplomacy is constantly evolving around negotiation, building and maintaining relationships from one state to other states, mediation, and creating a network with a specific subject according to the type of diplomacy. Based on the above essences, business diplomacy is conceptualised with the business sector—either private or public companies implant business diplomatic activities. The conceptualisation would stretch out the notion of diplomacy to the business sector. The nature of diplomacy changed from state-to-state to state-to-multi-stakeholders with the emergence of globalisation. In addition to the proliferation of parties, negotiations must address the diversification of political identities and ways of life (Scholte, 2008). Heine (2013) stated that globalisation and the development of communication led to the growth of several international actors such as NGOs, companies, social communities, etc. Modern diplomacy is where the government and other parties have collaborated in various diplomatic networking activities (Cooper, 2013).

Ruel (2013) and Tran (2023) defined business diplomacy as building and maintaining a positive relationship and network among host state representatives and non-governmental representatives. This is to preserve MNCs' legitimacy and license to operate. Interactions between firms and stakeholders also affect firms' reputational capital and capacity to form and impact the operational environment (Alammar and Pauleen, 2022; Saner and Yiu, 2014). Alammar and Pauleen (2016) and Marschlich and Ingenhoff, 2022) have expanded the topics by including internal and external business players. Therefore, MNCs would leverage the premise of CSR engaging with stakeholders to protect their reputational image and validity (Amann et al., 2007; Tran, 2023).

3 Discussion

3.1 Synergy approach from business diplomacy and value creation

Andersen et al. (1959) defined synergy as a concept describing the acquisition of resources for more competitiveness and the ability to adapt to external changes and pressures in the business environment. Weber and Dholakia (2000) justified the M&A strategy by using a Marketing synergistic approach to the financial development from the standpoints of related-industry companies with a wide range of financial measurement indicators such as stock prices, revenues, or investments. Scholars examined the economic benefits of synergy, which are conceived of return on investment via four major types: sales, operations, investment, and management (Holtström and Anderson, 2021; Zollo and Meier, 2008). Holtström and Anderson (2021, p. 29) outlined the list of "market power synergy, operational synergy, management synergy, and financial synergy". Scholas also conceptualised synergy toward two broader and precise separate ramifications, which were "*a complementing effect (using resources more efficiently) and a synergy effect (using the companies' unique resources)*". From this point, synergy could seize companies' societal and value creation faces according to the recent social demands. Social well-being must be maintained at a particular level in industrialised nations through consistent economic expansion. Business diplomacy plays a role in harmonising companies and society in the host country (White, 2015; Windsor, 2018). Businesses have always encountered great difficulty managing the alteration of various perspectives on their position in a broader political and social environment in the host country, especially when those perspectives contrast their economic goals or corporate interests (Muldoon, 2015). The company's operations and strategies must be more directly correlated with the larger social values and principles of CSR (Tran, 2023a; Ingenhoff and Marschlich, 2019). CSR is now considered a crucial leverage for negotiating and enhancing international companies via business diplomacy (Tran, 2023b; Yiu and Saner, 2017). The business strategies of numerous top firms in major worldwide businesses progressively include social and economic challenges. CSR integrated with business diplomacy could be a perfect synergistic factor companies could utilise to optimise their operation and gain legitimacy and social license (Saner, 2019; Weber and Larsson-Olaison, 2017). The diplomatic agenda toolbox includes research and development programs, funding or sponsorship activities, partnerships with local communities, etc, in the host countries (Saner and Yiu, 2014). CSR activities act as

either instrumental or political tools to address societal sustainability issues, enhancing visibility and influence (Marschlich mand Ingenhoff, 2021). Accordingly, CSR can be regarded as a diplomatic action due to its impacts on policymaking, public opinion agendas, and societal transformation (White et al., 2011).

To this end, firms engaging in business diplomacy agenda could create synergy effects which lead to positive outcomes for both firms and stakeholders. Firms could address and jointly solve social, environmental and economic issues from the stakeholders' sides. On the other hand, firms could gain and maintain legitimacy and social license to operate, along with the increase in reputational capital and market competitiveness. Hence, companies must enhance their dynamic capabilities and innovations to cope with environmental changes and meet stakeholders' demands (Breznik, 2012). These outcomes are a result of synergy effects for both firms and stakeholders. Delić et al. (2016) perceived that the synergy effect resulted in multiple positive outcomes for companies, but it was vital for them to recognise common objectives with stakeholders. The above section indicated that CSR could be regarded as a political and instrumental tool to influence public opinion, policy-makers, civil communities, etc. Oetzela and Doh (2009) have recognised that NGOs and social communities could potentially increase risks by drawing attention to the detrimental effects of foreign investment and influence. In nations where innovative incentives fail, the social costs of certain items and the legal responsibility they cause outweigh the value of the business assets, causing negative externalities (Gande et al., 2020). Corporate shared value (CSV) is not generally corporate social responsibility but rather a novel strategy for achieving economic prosperity and emphasising the link with social welfare (Baldo, 2014). From a perspective, CSV is intrinsic to a company's prosperity and competitive advantage. This strategy could entail an innovative and more improved level of cooperation.

3.2 Business diplomacy and creating shared values as a synergy for grand challenges.

Global challenges have captured the attention of scholars in business management and companies. Aside from lucrative operations, companies are a joint hand in dealing with international issues. Furthermore, society, communities, NGOs, and governments have stricter demands for collective actions from the business sector. Quayle et al. (2019) saw that grand challenges are complicated, all-encompassing

issues demanding interdisciplinary cooperation by utilising many sectors' varied perspectives, experiences, skills, and capabilities. George et al. (2016) stated that grand challenges have been formed by global issues that are only being solved by collective activities in the form of collaboration. Grand challenges emerged from the involuntary minimisation of businesses' unsustainable behaviour rather than drastically altering the behaviour of all actors and levels to increase the sustainability of the entire system (Gorissen et al., 2014). There are "bridging approaches" discovered by Ricciardi et al. (2021):

Table 1: "bridging approaches" to deal with grand challenges

No	Approaches	Interpretation
1.	Embeddedness	Entrepreneurs are seen as deeply ingrained in their environment and as facilitators of social learning. Thus, companies should be embedded in the socio-economic issues.
2.	Stakeholders	The "embeddedness" could formulate "performance criteria" that involve stakeholders who could justify companies' legitimacy based on companies' practices of business activities.
3.	Institutions	This theory could facilitate integrating companies' business activities into the host's societal and economic issues.
4.	Design	This approach aims to structuralise a connective and progressive governance and management system attached to sociopolitical and economic issues in the host country.
5.	Process	This term refers to cooperating with stakeholders to create an ecosystem that could leverage co-evolution in accordance with SDGs.
6.	Effectuation	This approach reflects companies' perspective on the grand challenges and opportunities around it. Furthermore, flexibility and capacity to adapt in uncertain contexts were bolded.

Source: built based on Ricciardi et al. (2021)

The research by Ricciardi et al. (2021) shared similarity with creating shared values as they could accelerate an ecosystem that benefits businesses and society. The dynamics capabilities exist where companies could re-design their business model and process to deal with grand challenges and respond to stakeholders' demands. This transition will increase a company's reputational capital and enhance its influence in the host market.

If collating the perspective of Itami and Roehl (1991) with two effects of synergy with six approaches of strategy to handle grand challenges from Ricciardi et al. (2021), the first three approaches will correlate with the *"a complementing effect (using resources more efficiently)"*. It describes the external factors complementing the synergy

strategy to construct collective solutions to grand challenges with external participating factors such as the framework of SDGs or viewpoints contributed by stakeholders. The second group consists of 3 other factors aligning with the *"synergy effect (using the companies' unique resources)", which* portrays the internal factors shaping the paradigm shift in business strategy and activities toward inclusion of societal and economic issues in the host country (Holtström and Anderson, 2021, p. 27). From three means for companies to create shared value of Porter (2011), and combining with two synergistic effects of Itami and Roehl (1991), the relationship should be concluded as follows:

Table 2: The relationship of Shared values creation, synergistic effects and the grand challenges' "bridging approaches"

No.	Approaches by Francesca Ricciardi, Cecilia Rossignoli, and Alessandro Zardini (2021) to deal with grand challenges	Manners for Companies to Create Shared Values designed by Porter (2011, p. 05)	Synergistic effects by Itami and Roehl (1991)
1.	Embeddedness	*"Enabling local cluster development"*	*"complementing effect (using resources more efficiently"*
2.	Institutions		
3.	Stakeholders	*"Redefining productivity in the value chain."*	
4.	Process		*"synergy effect (using the companies' unique resources)"*
5.	Design	*"Reinventing products and markets"*	
6.	Effectuation		

Source: built based on Itami and Roehl (1991); Porter (2011); Ricciardi et al. (2021)

Synergy from the side of shared value creation is defined based on the emergence of grand challenges and how companies need to cope with them. However, it is essential to recognise the importance of stakeholders who were mentioned and involved in the synergy. Business diplomacy serves the synergy as a concept contributing to protecting a company's image, reputation, and social license to operate via dialogues and communication with internal or external stakeholders. Marschlich and Ingenhoff (2019) reaffirmed the critical importance of stakeholder engagement. They stipulated that the firms' actions must align with the stakeholders' expectations in the host nations by actively taking part in decision-making processes regarding sociopolitical concerns and fostering constructive connections. Knowledge transfer to multiple stakeholders is essential and should be implemented through dialogues. These diplomatic strategies could help stakeholders to acknowledge a company's business strategy and practices. Nevertheless, companies

need to hear opinions from stakeholders. Therefore, companies should create two-way communication to learn about socio-economic and political contexts in the host country.

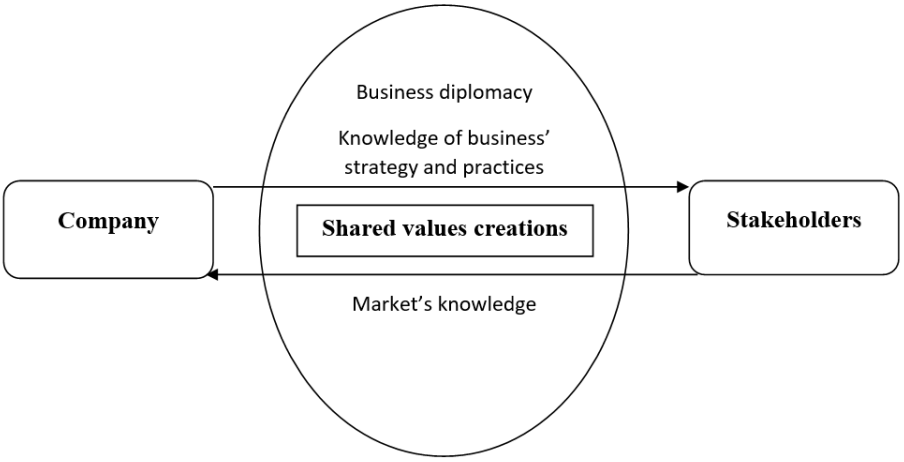

Figure 1: proposed communication roadmap
Source: proposed by the author

Figure 1 describes the communication roadmap proposed for the "two-way" communication strategy. A company communicates its business strategy and practices to stakeholders with its shared values, which correlate with socio-economic concerns and political context. In this sense, a company could prove that the shared values contribute to the development of the host's economy and society. In exchange, that company could acquire more knowledge from the market's context and stakeholders' perception, including customers, competitors, and governmental actors in the host country, to shift the company's strategy accordingly. Information gathered from the host market could translate into competitive advantages for firms: "simultaneous global integration, local and professional differentiation, and worldwide learning and knowledge-sharing" (Søndergaard, 2014, p. 357). Salam et al. (2023) highlighted the exchange of market information and intelligence between businesses and stakeholders as the core agenda of business diplomacy. From that point, business diplomacy helps companies to reconcile their and stakeholders' values (Salam et al., 2023). Business diplomacy handles the strategy of interactions between a multinational company and its "external non-business counterparts",

which affect the company's reputational capital and capacity to shape its organisational context (Saner and Yiu, 2014). The reconciliation of shared value promotes firms' innovative capabilities to respond to stakeholders' demands. Furthermore, innovation or innovative capabilities could be regarded as a driver for competitive advantages (Egea et al., 2020).

4 Conclusion

It is undeniable that grand challenges are rising strongly recently, especially after the Covid-19 pandemic. The energy crisis, the Ukraine War, and poverty and economic regression cause uncertainties which demand close collaborations between companies, governments, and stakeholders. Implementing international business is severe due to the harsh public pressure in the host and home countries where global companies operate. Business diplomacy is a concept describing a representation of companies in the host and home markets. This concept stimulates the nature of conventional diplomacy, which is state-centric. This concept will help businesses recognise the importance of stakeholders in their operations. Businesses could gather more information and gain legitimacy from these stakeholders.

However, leverage is a must for exchange. CSR activities are usually regarded as a good advantage as they involve elements of sustainability. Nevertheless, when scholars find out about political and instrument CSR, the credibility of companies decreases within the communities. Porter (2011) proposed the transition from CSR to CSV. The synergistic nature emerged from this stage when global companies could brace for both CSV and business diplomacy. This resonant from the two factors could ensure an effective operation in the host market and create shared values for the host country's society to deal with grand challenges. A compelling business diplomatic agenda could assist businesses in forming a market entry process by acquiring market intelligence. Business diplomacy forms a win-win business environment and mutual understanding between firms and stakeholders. In this case, firms must reconcile their values to the stakeholders' values and demands. In the modern world, businesses are required to be involved in tackling grand challenges. These grand challenges will enhance innovation and dynamic capabilities, leading to competitive advantages. As a result, a company could gain more competitiveness in the context of internationalisation.

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The Importance of Effective Communication in Lean Transformation Success — Insights From a Hungarian Manufacturing Study

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With the help of a detailed survey, this article aims to examine how effective communication can aid the lean transformation process within a company. Lean methodologies enable companies to create processes and systems that are so efficient that they give them a significant competitive advantage in the marketplace. On the one hand, these improvements can be made by reducing costs and losses and, on the other, by increasing value to the customer. In this study, a survey was carried out in Hungary among 20 Hungarian companies with lean practices, collecting more than 800 employee responses and focusing on the benefits of lean practices in manufacturing companies. Both managers and employees expressed the same opinion, highlighting the importance of communication in the transformation process. The research was conducted among companies with lean experience, and the results and conclusions described can be applied to the lean implementation projects of Hungarian manufacturing companies. Lean practitioners identified communication as almost as important as team composition and management commitment. The research showed that the success of the transformation depends not only on implementing but also on sustaining and remaining dedicated to change, which is only feasible with the right form and frequency of communication.

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1 Introduction

Although originally an American practice, *lean production*, as now seen in Hungary, was filtered through the work processes and culture of a Japanese company, Toyota. Despite this complex heritage, the emphasis on efficiency in time and resources remains unchanged even as it spreads outside the automotive sector. Lean production has become an indispensable and widely applied methodology that can be used by large companies and small and medium-sized enterprises alike (SMEs) (Koloszár & Pankotay, 2017).

Rarely would a company begin its operations with lean solutions and management embedded in its culture. A company must reach a certain level of maturity before its operation can be understood and analyzed sufficiently to be refined by lean thinking. A decrease in competitiveness and the undeniability of losses may become the first call to action. This research will assess the introduction of lean processes through the lens of value creation, particularly regarding production and management efficiency improvements that benefit a company's owners and customers (Omenzetter, 2018).

This text examines the role of effective communication in facilitating the transition to lean processes within companies, particularly in times of crisis and rapid change. The two aspects of lean business thinking focused on in this study are the relationship between management (including corporate leadership) and communications. Efficiently designed processes provide a practical framework for innovation, and implementing lean thinking and design is integral to building such a framework.

By surveying 20 Hungarian companies with lean practices and gathering over 800 employee responses, the researchers have empirically established communication's crucial role in achieving competitive advantages through cost reduction, loss minimization, and enhancing customer value. Both managers and employees emphasize communication's significance in the transformation process. This research identifies cases from large market players to smaller manufacturing companies, offering insights relevant to lean implementation projects in Hungarian manufacturing. Communication is a key factor alongside team composition and management commitment and is vital for initiating and sustaining change.

The study reveals the importance of communication frequency and form in ensuring transformation success. Additionally, it explores the connection between communication, management levels, and organizational maturity, presenting critical factors and their impacts on lean transformation effectiveness.

2 Theoretical Background

A successful introduction of lean thinking is contingent on effective communication so that new, even better processes and higher quality and value are formed. Effective communications are crucial to TQM, lean operations, and the deployment of the Scandinavian model. Kotter (2009) also stresses that the direction—*top-down* or *bottom-up*—can affect its implementation and that the importance of change, particularly to a radically different way of thinking and operating, must be communicated by a team supported by management. Furthermore, communicating and celebrating first successes is critical. Doing so decreases the risk of duplicated efforts and maintains morale as the transformation to lean operations continues.

Liker's (2003) 14 principles provide a summary of the lean approach, showing the focus points along which lean is built in the life of an organization:

1. Base management decisions on a long-term philosophy, even at the expense of short-term financial goals.
2. Create continuous process flow to bring problems to the surface.
3. Use "pull" systems to avoid overproduction.
4. Level out the workload—meaning *ensure that work happens without bottlenecks and that every intermediate part is supplied when needed, without backlogs or excess* (Japanese: *heijunka*).
5. Build a culture where problems are addressed immediately and get quality right the first time.
6. Standardize tasks. They are the foundation for continuous improvement and employee empowerment.
7. Use visual control (observation) so no problems are hidden.
8. Use only reliable, thoroughly tested technology that serves essential people and processes.
9. Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others.

10. Develop exceptional people and teams who follow the company's philosophy.
11. Respect the company's extended network of partners and suppliers by challenging them and helping them improve.
12. Directly investigate (go and see) to thoroughly understand the situation (Japanese: *genchi genbutsu*, literally: *real location, real thing*).
13. Make decisions slowly and build consensus across the organization, thoroughly considering all options and their effects on the relevant parties, and when a decision has been made, implement it rapidly (Japanese: *nemawashi*, literally: *turning to the roots*).
14. Become a learning organization through ongoing self-reflection and acknowledgement of errors (Japanese: *hansei*) and continuous improvement (Japanese: *kaizen*).

Considering these principles, it becomes clear that lean thinking and culture must permeate a company, from the material flow and automation operative production line departments to the management principles affecting every aspect of the organization. Lean transformation cannot be implemented incrementally. The research of Sisson and Elshennawy (2015) points out that the successful implementation of lean transformation requires the simultaneous appearance of at least 16 supporting elements. The timeliness of lean process introduction across organizational regions and the decisive role of resources (exclusive allocation of material and human resources) were both highlighted by Sisson and Elshennawy as critical to the effective adoption of lean.

Just as the support of HR and senior management is necessary, so is the support of external consultants and resources. Companies that successfully implement lean often do so with the aid of the Toyota Production System (TPS), which facilitates the move towards quality awareness and excellence in leadership. As part of this transition, communication processes must be extensive and customized to meet the company's and its operations' demands. Thus, in this study, we examined the implementation of TPS in Hungarian lean companies, taking ideas for the research focus from the international literature. Highlighting the research of Colazo (2021), this research investigated whether the communication of managers or subordinates in a centralized network model *or* communication in a shared, decentralized relationship model will be more successful in lean implementations. Communication

shared across the widest possible spectrum seems effective—it appears to support lean implementation better—but *to seem* is not the same as *to be empirically established*. Thus, the need for our research. Lean literature itself deals a lot with lean implementation and lean organizations. Womack-Jones (1997) provides an example of lean implementation in management and lays the ground for the present investigation.

Lean as a production philosophy clearly defines the basic principles to be followed, which are understandable for companies and the market. Although principle nine is about managers, it represents a very advanced level of corporate culture (Shook, 2010), which market participants will also experience through the company's behaviour. The supportive behavior of an authentic leader is very advantageous and motivating for internal and external stakeholders. Companies must learn from their experiences to increase their internal efficiency, improve their market competitiveness, or (ideally) both. To achieve this, a company can use information communication tools and today's database management systems. This utility should be immediately apparent during the introduction of lean.

Understandably, little information about how the company manages its internal data and its *continuous improvement* processes is revealed to external actors. However, these will enhance product quality, which adds value to the customer experience (Balogh et al., 2020). The learning organization is open to market trends and, in this way, cooperates with other actors for the sake of joint success. This willingness to adapt is visible and notable and sends a message to buyers, sellers, partners, and potential clients. The virtues of lean are evident to market players, and if they can be communicated well, they will likely be appreciated. The question arises whether, in the case of internal changes, these same virtues are known by the employees involved. Every member of an organization should understand the importance of lean adoption. Undoubtedly, even shop floor workers are key players, no matter how much research points to the success of top-down transformations. The information must be accurately delivered to the individuals working in the work processes to foster success from the beginning (Ohno, 1998; Shingo, 1989; Koenigsaecker, 2009; Chay et al., 2015).

3 Methodology

This study entailed a detailed survey of 20 Hungarian companies with lean practices, garnering over 800 employee responses. This methodology aimed to investigate the role of effective communication in facilitating lean transformation within organizations of various sizes. Both managers and employees participated in the survey, highlighting the importance of communication in the transformation process. The research focused specifically and intently on manufacturing companies and identified cases from various company sizes, offering insights relevant to lean implementation projects in Hungary. Through empirical analysis, the study examined the relationship between communication, management levels and investment in the process, organizational maturity, and the effectiveness of lean transformation efforts.

4 Results

Most organizations participating in the survey have between 50 and 1,000 employees. Three companies with over 1,000 employees and one with less than 50 employees participated in the research. Nearly 52% of the manufacturing companies that participated in this research are Hungarian subsidiaries of multinationals. The proportion of privately (non-foreign) owned Hungarian companies is 33%, with the remainder being publicly traded Hungarian companies.

Table 1: Informational Channels of Organizational Lean Activities

Communication Form	Percentage of Total Communications
Education and Training	17%
Regular Discussion	16%
Informational Meeting	16%
Informal Discussion	14%
E-Mail	13%
Public Bulletin	9%
Newsletter	7%
Homepage	7%
Total	99%*

**Note*: Total is less than 100% due to rounding down several percentages.

More than 50% of the organizations participating in the survey have consciously and methodically applied the lean approach for more than five years, and 15% are still at the beginning of the journey, with 35% being at an intermediate state of

implementation. More than 55% of the respondents participating in the survey indicated the position of subordinate/employee, 30% of respondents indicated middle manager, group leader and nearly 15% senior manager.

In Table 1, we can see the distribution of the communication forms used by the respondents. Effective lean implementation in an organization largely depends on the quality of communication, so the communication channels used in companies were an important research point. The extent to which certain layers of the organization value the tools/platforms used by the company as useful can help during a lean transformation. Reported preferences for each tool can be seen below.

Table 2: Preferred Lean Communication Methods

Communication Form	Percentage Indicating Preferred
Training and Organized Discussion	50%
Informal Discussion	14%
E-Mail	13%
Public Bulletin	9%
Newsletter	7%
Homepage	7%

In Table 2, we can see the preferred communication methods chosen by research participants. Based on the survey, personal forums are still valued over distance and impersonal communication methods. Informational or regular meetings, education, and even informal oral communication do more than any other tool.

5 Discussion

Effective communication plays a paramount role in the lean transformation journey of companies as they endeavor to adopt lean practices and principles. Communication serves as a linchpin for disseminating information about the goals, strategies, and expectations associated with the lean initiative across all levels of the organization. Clear communication channels ensure that employees understand the rationale behind lean transformation, fostering buy-in and commitment from all stakeholders.

Moreover, communication facilitates the exchange of ideas, feedback, and best practices among team members, promoting a culture of continuous improvement vital to lean implementation. Through transparent and open communication,

employees feel empowered to voice concerns, suggest improvements, and participate actively in the lean transformation process. Additionally, effective communication helps align the efforts of different departments and teams towards common lean objectives, minimizing silos and promoting collaboration. Furthermore, clear communication about roles, responsibilities, and performance expectations ensures accountability and ownership among employees, driving the sustained adoption of lean practices.

Regular communication channels provide platforms for sharing progress updates, celebrating successes, and addressing challenges encountered during the lean journey. Communication also plays a crucial role in managing change by addressing fears, uncertainties, and resistance that may arise during the transition to lean practices. By cultivating a culture of transparency and trust, communication enables leaders to solicit employee input and support, building a sense of ownership and engagement in the lean transformation process. Moreover, communication helps manage expectations regarding the timeline, resources, and outcomes of lean implementation, ensuring realistic goals and objectives.

The human touch remains critical. The respondents highly preferred personal communication compared to other channels. Since the lean approach is based on involving and collaborating with employees, striving to create organizational forums that provide space for personal, two-way communication is a worthwhile undertaking.

Through effective communication, leaders can articulate the benefits of lean practices regarding improved efficiency, quality, and customer satisfaction, inspiring employees to embrace change and adapt to new ways of working. Furthermore, communication channels such as training programs, workshops, and mentoring sessions facilitate the dissemination of knowledge and skills important for successful lean implementation.

Finally, ongoing communication ensures that organizations remain responsive to evolving market dynamics, customer needs, and internal challenges, enabling continuous refinement and optimization of lean practices over time. Effective communication is indispensable for navigating the complexities of lean transformation. Without it, lean transformation is bound to fail.

6 Conclusions

The drive toward lean transformation comes as no surprise during times of crisis and rapid change, as it can help an organization avoid losses and construct efficient production processes. This article explored how effective communication supports lean transformation within companies when they need to do so. A survey among 20 Hungarian companies with lean practices was conducted, gathering over 800 employee responses. From a wide range of issues potentially relevant to lean adoption, a specific topic of particular interest to the Hungarian market became the focus of the current study.

This study highlights communication's vital role in achieving competitive advantages through cost reduction and enhancing customer value. Both managers and employees emphasize its significance in the transformation process. The research identified cases from large market players to smaller manufacturing companies, offering insights relevant to lean implementation projects in Hungarian manufacturing.

Communication is a key factor alongside team composition and management commitment, vital for initiating and sustaining change. The study provided evidence of this assertion and revealed the importance of communication frequency and form to ensure success when transforming an ordinary organization into a lean one. Additionally, it explored the connection between communication, management levels, and organizational maturity, presenting critical factors and their impacts on lean transformation effectiveness.

As evident from the responses, personal communication emerged as the favored channel among respondents, underscoring its significance. Given that the lean methodology emphasizes employee involvement and collaborative problem-solving, there is a clear imperative to establish organizational platforms conducive to personal, timely, and interactive communication. An organization dedicated to lean implementation must prioritize the creation of forums that facilitate open dialogue and mutual engagement, both of which are essential to lean thinking.

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Price Patterns in Vienna's Hospitality: Analyzing the Impact of Ratings, Reviews, and Proximity on Hotel Rates

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This scientific paper presents an empirical research study that aims to investigate the relationships between various factors and room rates within the context of 346 hotels in Vienna listed on booking.com. The research utilized a combination of web content mining and multiple linear regression techniques to collect and analyze data. The variables extracted from the hotel listings included customer rating valence, amount of ratings, star category, distance to town center, and room rates. The statistical analysis employed multiple linear regression to examine the links between the variables and room rates. The results indicated significant links between star category and price, distance to town center and price, amount of customer ratings and price, and the valence of customer ratings and price. These findings provide valuable insights into the factors influencing room rates in the Vienna hotel market and contribute to the understanding of pricing strategies and customer preferences in the context of information systems and tourism.

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1 Introduction

The digital transformation within the hospitality sector, particularly through platforms like Booking.com, has reshaped the dynamics of hotel room pricing and consumer choices. This paper delves into how quantifiable hotel attributes like star rating, location relative to city center, and both the volume and sentiment of customer reviews, affect pricing strategies. Such a comprehensive analysis is vital in understanding the nuanced ways in which digital visibility and consumer feedback can influence hoteliers' pricing decisions (Abrate, Fraquelli, & Viglia, 2012). By integrating theories from e-commerce and consumer decision-making, this study aims to provide insights into the strategic adjustments hotel managers make in the digital era. The inclusion of customer review valence alongside volume offers a more detailed exploration of how consumer perceptions, reflected through reviews, play a crucial role in pricing mechanisms (Alabdullatif & Akram, 2018). This approach acknowledges the complexity of online consumer behavior, where decision-making is influenced not just by static hotel attributes but also by dynamic user-generated content (Aeknarajindawat, 2019). Riedl et al. and the exploration of online consumer behavior provides a foundational framework for understanding these interactions, suggesting that digital platforms offer both challenges and opportunities for pricing strategy optimization in the hospitality industry (Riedl, Brandstätter, & Roithmayr, 2008). The study's insights into the effects of customer reviews and location on hotel pricing strategies highlight a strategic approach for navigating economic fluctuations, underscoring its relevance to sustainable business practices in the hospitality sector. By emphasizing the critical role of strategic decision-making based on quantifiable data, the research underlines a pathway for hospitality businesses to navigate economic uncertainties while pursuing sustainable growth.

2 Theoretical Background / Literature Review

Decision-making on online platforms is a complex process influenced by various factors, with price being a significant determinant. Consumers employ different strategies to navigate the vast array of options available, relying on cognitive and emotional responses to make informed choices. Exploring the cognitive process involved in electronic commerce, it becomes evident, that price comparisons and perceived value affect consumer decisions (Riedl et al., 2008). Also delving into emotional aspects, it was found that aesthetic and functional website design elements

can influence consumer preferences and decisions (Lux, Hawlitschek, Adam, & Pfeiffer, 2015). In addition, the role of online reviews and ratings, in conjunction with price, guide consumers in making purchasing decisions (Jiang & Benbasat, 2007). These studies underscore the complex nature of online decision-making, where price is interwoven with other informational cues to shape consumer behavior. The strategic presentation of price, coupled with user-friendly website design and credible reviews, can significantly influence consumer choices, underscoring the importance of a holistic approach to online retail and service platforms (Jiang & Benbasat, 2007).

Especially in the context of hotel room rates on booking platforms, pricing strategies are pivotal for balancing profitability with customer satisfaction and market competitiveness (Abrate et al., 2012). Traditionally, hotel pricing has been influenced by factors such as location, amenities, service quality, and seasonal demand. Revenue management in the hospitality sector plays an important role, emphasizing the importance of understanding customer price sensitivity and segmenting the market to optimize pricing strategies (Kimes, 2000). This approach allows hotels to maximize revenue through dynamic pricing, adjusting rates based on demand fluctuations (Abrate et al., 2012). The advent of online platforms has transformed hotel pricing strategies. With the increased transparency and ease of price comparison provided by online travel agencies (OTAs) and review sites, hotels are now more than ever focused on competitive pricing. To adapt, hotels have employed sophisticated revenue management systems that analyze vast amounts of data from various sources, including OTAs, competitor pricing, and booking patterns, to adjust their pricing in real-time (Altin, 2017). The role of online reviews and ratings in influencing pricing decisions was already often analyzed, noting that a positive online reputation can allow hotels to command higher prices (Gu & Ye, 2014). Moreover, the concept of perceived value plays a crucial role in online settings. Consumers often equate higher prices with superior quality or service, making price an integral part of the value proposition on digital platforms (Xiang, Magnini, & Fesenmaier, 2015). This perception underscores the need for hotels to strategically manage their online presence, ensuring that pricing is aligned with the value communicated through online content and customer feedback.

Also, the dynamics of online hotel booking intention is complex, influenced by a range of factors critical in the digital booking environment. Notably, online reviews stand out as a pivotal element affecting decisions, where their quality, sentiment, and freshness are a key (Aeknarajindawat, 2019; Alabdullatif & Akram, 2018; Chan, Lam, Chow, Fong, & Law, 2017; Eibl & Auinger, 2023; Hu & Yang, 2019). Review recency and valence particularly have an evident positive impact on booking choices (Alabdullatif & Akram, 2018; E. L. Kim & Tanford, 2021; Vinzenz, 2019). The authenticity perceived in online reviews, shaped by their quality and the consistency of user experiences, is crucial (Chakraborty, 2019). Moreover, the interaction between hotel room rates and reviews plays a vital role, where attractive pricing may be contradicted by negative reviews, highlighting the nuanced relationship between cost and perceived value (Hu & Yang, 2019). The influence of a hotel's popularity, including its brand and the scarcity of available rooms, also significantly affects decisions (D. Kim & Park, 2017; Park, Yin, & Son, 2019). Attributes such as amenity descriptions, cancellation policies, and facilities enhance perceived value, influencing preferences (Chaw & Tang, 2019; Chowdhury & Deshpande, 2020). The hotel's star rating serves as a credibility indicator, affecting booking intentions (Lee & Kim, 2020), while visual elements and loyalty rewards play into the decision-making process (Aeknarajindawat, 2019; Chaw & Tang, 2019).

3 Methodology

This section outlines the methodological approach employed in the empirical research conducted to investigate the relationships between quantitative hotel attributes and room rates within the context of 346 hotels in Vienna. The study utilized a combination of web content mining and statistical analysis techniques to analyze the collected data. To obtain the necessary data, a web content mining tool called Octoparse was utilized. This tool allowed for the systematic extraction of information from the listings of the 346 hotels in Vienna. The following quantitative variables were identified and hence collected for each hotel: customer rating valence, amount of ratings, star category, distance to town center, and room rates. To explore the links between the collected quantitative variables and room rates, the study employed multiple linear regression. Multiple linear regression is a statistical technique suitable for analyzing complex models with multiple independent and, in this case, one dependent variable. It enables the identification and assessment of relationships between variables (Cohen, Cohen, West, & Aiken, 2013). Given the

inherent diversity in the measurement scales of the extracted variables, ranging from ordinal scales like the star category (1 to 5 stars) to continuous scales such as distance measured in kilometers, a standardization process was imperative to ensure comparability across variables. This necessitated the application of z-standardization, a statistical normalization technique that recalibrates each data point to a unified scale by subtracting the mean and dividing by the standard deviation, thereby aligning the data with a mean of zero and a standard deviation of one. Such a transformation is crucial for the integrity of multiple linear regression analysis (Field, 2013). It enables a direct comparison and integration of diverse variables into a coherent model, ensuring the reliability and validity of the findings by normalizing measurement units (Tabachnick, Fidell, & Ullman, 2013). The analysis involved constructing a model to examine the extent to which the independent variables (customer rating, amount of ratings, star category, and distance to town center) could explain the variations in the dependent variable (room rates). By evaluating the strength and significance of the relationships, the analysis determined whether there were any significant correlations between the variables.

4 Results

Analyzing the results from the multiple linear regression model provides a compelling insight into the factors affecting hotel prices on online travel agencies (OTA) listings. This model's statistics and correlation matrix indicate the relationships between the defined independent variables and the dependent variable, price. The standardized data reveal that the "Star Category" has a positive relationship with price, as seen by a coefficient of 0.264 and a statistically significant p-value ($p < 0.0001$). This suggests that hotels with higher star ratings are typically priced higher, a finding that is consistent with expectations and previous literature on hotel pricing strategies (Agušaj, Bazdan, & Lujak, 2017). "Distance to Town Center" has a negative coefficient of -0.353, with a highly significant p-value ($p < 0.0001$), indicating that hotels closer to the town center of Vienna tend to have higher prices. This aligns with the concept that location is a key determinant in the valuation of hotel properties (Zhang, Ye, & Law, 2011). The "Customer Rating" variable has a positive coefficient of 0.169 ($p = 0.014$), suggesting that better customer ratings are associated with higher prices, highlighting the impact of customer perceptions on pricing (Xie, Zhang, & Zhang, 2014). The "Amount of Ratings" variable shows a negative coefficient of -0.260 with a highly significant p-

value ($p < 0.0001$), indicating that a larger number of reviews does not necessarily correspond to higher prices, which could be due to various reasons such as the presence of more reviews for budget hotels (Mellinas & Martín-Fuentes, 2018).

Table 1: Variable statistics multiple linear regression

Variable	Value	Standard error	t	Pr > (t)
Star category	0.264	0.049	5.411	<0.0001
Distance to center	-0.353	0.046	-7.729	<0.0001
Customer rating	0.169	0.069	2.462	0.014
Amount of ratings	-0.260	0.047	-5.493	<0.0001

The model's goodness-of-fit statistics are also telling, with an R^2 value of 0.374, indicating that approximately 37.4% of the variance in hotel prices is explained by the model. Which also indicates that there are several other factors influence hotel pricing strategies which are not displayed within quantitative data on online hotel booking platforms but rather qualitative data or strategic decision by the respective hotels management board or other micro- or macro- economic factors. The f^2 effect size of 0.598 is considerable, indicating a strong effect size (Cohen, 2013). The analysis of variance further supports the model's strength with an F-statistic of 44.280, which is highly significant ($p < 0.0001$), suggesting that the model is a good fit for the data.

5 Discussion

The positive relationship between star category and room rates is consistent with the literature that suggests higher-rated hotels tend to command higher prices due to perceived quality and service standards (Agušaj, Bazdan, & Lujak, 2017). This finding underscores the importance of star categories as a signal of quality that consumers rely on when making booking decisions, supported by Riedl et al. (2008) who emphasize how consumers use price and quality indicators in e-commerce settings.

The negative correlation between distance to the town center and room rates highlights the premium placed on location, as proximity to central areas is highly valued by travelers for convenience (Zhang, Ye, & Law, 2011). This insight into

consumer preferences for location over price reflects the decision-making strategies where consumers weigh the trade-offs between cost and convenience, as discussed by Jiang & Benbasat (2007).

Surprisingly, the amount of customer ratings showed a negative correlation with room rates, suggesting that hotels with more reviews do not necessarily charge higher prices. This could indicate that a higher number of reviews may be associated with more budget-friendly hotels, which align with Mellinas & Martín-Fuentes (2018) observation that hotel size might influence the number of reviews. This finding diverges from the expectation that more reviews would correlate with higher prices due to increased popularity or perceived quality.

The significant positive relationship between review valence and hotel room rates indicates that customer feedback directly influences pricing strategies, alongside other critical factors such as star category and location. This finding underscores the importance of online reputation management, highlighting how hotels leverage positive customer reviews to justify higher prices while maintaining competitive positioning in the market. (Gu & Ye, 2014).

6 Conclusions

The study provides a nuanced exploration into how quantifiable hotel attributes on Booking.com influence room pricing strategies, specifically within the Vienna hotel market. It conclusively demonstrates that higher star categories and closer proximity to the city center significantly increase room rates, affirming the value placed on quality and location by consumers. Unexpectedly, the analysis reveals that a higher volume of customer reviews correlates with lower prices, challenging conventional beliefs that popularity, as indicated by the number of reviews, would elevate room rates. This surprising outcome suggests a complex interplay between visibility and pricing strategies, where increased reviews may not solely represent higher quality but also reflect broader accessibility or affordability.

This finding invites further investigation into the dynamics between customer reviews and hotel pricing, highlighting a potential area for future research. Future studies could explore the impact of review sentiment analysis on pricing strategies or examine how different types of hotels (luxury vs. budget) leverage reviews in their

pricing mechanisms. Additionally, the relationship between the actual content of reviews and pricing strategies presents another interesting way for exploration, considering the qualitative aspects of customer feedback beyond mere volume.

The paper's limitations include its focus on a single online platform and a specific geographic location, suggesting that findings might vary across different platforms or locations. Further research could extend this analysis to other cities or booking platforms to validate the generalizability of the results. Additionally, incorporating qualitative data or exploring the strategic decisions made by hotel management could enrich the understanding of pricing strategies beyond the quantitative attributes analyzed.

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RENEWABLE ENERGY IN HUNGARY: AWARENESS, CHALLENGES, AND OPPORTUNITIES

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A significant portion of sustainability relies on the utilization of renewable energy sources. To achieve broader adoption and integration, educating the populace becomes imperative. This study seeks to assess the level of general knowledge pertaining to renewable energy sources within the Hungarian population. It aims to ascertain from which communities or online platforms individuals primarily derive information regarding these energy sources, as well as to discern the type of content participants would be most receptive to, thereby fostering a deeper understanding of renewable energy sources. The primary research methodology employed an online questionnaire, which gathered responses from a total of 836 participants. While the research sample cannot be deemed fully representative, the larger sample size facilitates the exploration of pertinent correlations and relationships utilizing statistical variables. The findings reveal that 81% of the Hungarian population surveyed exhibits the highest familiarity with solar energy, while biofuels garnered the least familiarity at 47%. Additionally, it is notable that a majority of individuals primarily receive information about renewable energy sources from close acquaintances and television news. Podcast programs are identified as significant educational platforms, and individuals predominantly seek information on this subject through posts on online news portals and social media groups.

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1 Introduction

Looking back at the historical trajectory of the energy sector in Hungary, it has traversed a distinctive path. Despite the backdrop of an energy crisis in the 1970s, scant attention was paid to energy and its associated policies, rendering the energy sector a largely unfamiliar domain among the populace (Kiss, 2022). However, this crisis precipitated a transformative shift in consumer attitudes, whereby the previous apathy was swiftly supplanted by a newfound curiosity and receptiveness towards understanding energy (Csáki, 2021). This transformation can be attributed in part to the emergence of a generation more attuned to financial matters and environmental stewardship, alongside a significant rise in energy prices, which underscored the value of energy in the eyes of the public (Káposzta-Nagy, 2022). Moreover, the impact of the COVID-19 pandemic on consumer behavior has also contributed to a heightened awareness of energy matters (Csutora et al., 2024).

The burgeoning consciousness surrounding energy is palpable in everyday life, as evidenced by the scope and facets of various initiatives aimed at addressing environmental challenges (Csiszárik-Kocsir & Varga, 2023). Consequently, the energy sector finds itself increasingly tasked with the responsibility of providing alternative solutions to ensure a stable, long-term energy supply to consumers, all while remaining economically viable and aligning with sustainability imperatives. Beyond ensuring security of supply, the energy sector also bears an educational responsibility: it must lay the groundwork for fostering a generational awareness of renewable energy. However, this responsibility is a shared one, incumbent upon both the public and energy providers. While consumers must adopt energy-conscious behaviors and utilize energy responsibly, energy suppliers must also play a role in promoting awareness and facilitating the adoption of sustainable energy practices (Latapí Agudelo et al., 2020).

2 Literature review

Thanks to recent events and the proliferation of the internet and digital spaces, consumers now have numerous opportunities to access information and acquire fundamental, meaningful knowledge about renewable energy from diverse sources (Siphesihle-Nagy, 2021). Public receptivity and interest are further bolstered by the engagement of countless prominent companies and public organizations in the green

movement (Gergely, 2009), which lends renewables a sense of relevance and credibility while imbuing the concept of energy with tangible meaning and value. By bringing to the forefront one of society's most pressing issues, the price-sensitive public has shifted towards a perspective that prioritizes sustainability and environmental concerns over mere price considerations. However, dispelling the misconception that readily available goods are inherently less valuable will require considerable time (Rekettye, 2018).

Indeed, few things are more valuable than energy in the 21st century, serving as the cornerstone of modern civilization without which economies and societies can falter precipitously (Wani & Mir, 2015). Energy awareness, as an attitude, is indispensable for future generations, as we contend against dwindling resources, both in terms of energy sources and sustainable production, operation, and security of supply. The green transition looms large, presenting myriad challenges for industry stakeholders, encompassing issues such as generation capacity, energy mix, and system management (Czvikovszky et al., 2019; Kucséber, 2022).

An active dialogue has emerged between consumers and energy suppliers, breaking the decades-long silence and indifference that characterized their interactions. The challenges and exigencies of the climate crisis and carbon neutrality are becoming more widely acknowledged (Paul, 2021), thus paving the way for greater visibility for renewable energy. Prior to recent developments, neither financial nor energy awareness had taken root, given the preceding generations' limited interest in these matters. Generational disparities are evident in various domains, including attitudes towards renewable energy. In Hungary, where six generations coexist, diverse decision-making mechanisms, factors, modes, styles, and media consumption habits are observed among these cohorts (Törőcsik, 2016). While Generation Z predominantly relies on digital platforms for information gathering (Rimóczi & Kozik, 2023), earlier generations tend to rely on personal contacts (Horváth & Bauer, 2016) for information on renewable energy usage, related tenders, or energy in general.

Although energy awareness is still in its nascent stages in Hungary, the growing popularity of renewable energy and the underlying motivation transcending financial considerations indicate the emergence of energy-conscious and environmentally friendly attitudes. However, it is imperative to recognize that certain segments of

society are instilling energy-conscious approaches in their children, thereby nurturing a generation adept at energy literacy and conscious consumption (Pólya & Máté, 2021). Fostering energy awareness is a transnational effort, and the role of the public in the energy system extends beyond that of mere investors, buyers, or prosumers who invest in and install renewable energy systems. Communication perhaps has never been more critical for renewables than it is today, especially when consumers exhibit disinterest in understanding the workings of the energy industry and perceive energy market players solely as profit-driven entities. The primary step involves recognizing one's own role in actively contributing to carbon neutrality through more energy-conscious behaviour. Improving and shaping public attitudes towards renewable energy, alongside identifying the factors and concerns influencing acceptance, are essential tasks, both professionally and corporately (Lucas et al., 2021).

Historically, consumers have been viewed merely as solvent demand factors in the equation, but contemporary global environmental challenges necessitate their active participation in addressing the climate crisis. Online communication serves a crucial role not only in education but also in gauging public perceptions and attitudes towards renewable energy, thus informing the definitions of awareness, support, participation, and commitment that subsequently materialize under the umbrella of social acceptance. Nonetheless, online communication also plays a part in engendering consumer interest in energy, elucidating how the energy market functions, and even reframing concepts of utility and energy (Aldabas et al., 2015).

3 Methodology

The objective of the study is to map the connections between renewable energy and online communication and to identify the communication tools related to the education of renewable energy sources and the development of energy-conscious attitudes.

The target group of the quantitative study was primarily composed of consumers utilizing alternative energy, those interested in renewable energy sources, and individuals open to renewable energy sources. Participants were randomly selected from social media groups whose main theme is sustainability and environmental awareness. Emphasis was placed on assessing their knowledge, experience, and

opinions, as well as their online media consumption habits and interests. The survey also included owners of small household power plants in Hungary and individuals interested in renewable energy sources, with the assumption that social media, including specific groups on Facebook dedicated to renewable energy sources, their narrow circle of acquaintances, and a wide range of online communication tools such as social media advertisements, are factors influencing consumer choice of supplier.

The online questionnaire comprised a total of 43 questions in the aforementioned categories, although only a portion of the questionnaire results are presented in this research. The questions used in this research were based on the results of a previous research (Szeberényi, 2020). Data collection occurred from the beginning of October 2023 until the end of November 2023, with 836 respondents completing the questionnaire. While the number of completed items is sufficient to draw relevant conclusions, our research is not considered representative.

Data were recorded electronically on the Surveyplanet platform, where responses were analyzed and processed. Three research questions were identified for the study: 1. What knowledge do consumers have about renewables? 2. How are consumers informed about renewable energy? 3. How does online communication support society's acceptance and understanding of renewable energy as an alternative, environmentally friendly energy source?

4 Results and discussion

Renewable energy has emerged as a prominent topic of discussion in recent years, both offline and online, sparking fervent debates among industry professionals and the general populace alike. This lively discourse surrounding alternative energy sources has played an important role in disseminating information on the subject across various strata of Hungarian society. Concurrently, research findings indicate that a considerable segment of the surveyed population possesses familiarity with some form of alternative resource. Solar energy emerges as the most widely recognized, with 81% of respondents acknowledging it, closely followed by wind energy at 77%, and hydro energy ranking third at 65%. Conversely, biofuel emerges as the least recognized renewable energy source among respondents, garnering

recognition from only 47% of participants. Intriguingly, 19.5% of respondents demonstrate awareness of all renewable energy sources.

In relation to these results, a number of other published research results and studies highlight the importance of solar energy as the most recognized and used renewable energy source. For instance, the results on the Statista (2024) website also indicate that solar energy was the most significant sustainable energy source for renewable energy production in Hungary in 2022, producing 4.6 terawatt hours of renewable energy. Other mentionable plan is the summary provided by the International Energy Agency (2022) reveals Hungary's ambitious target of achieving 90% clean electricity by 2030, predominantly through the utilization of solar energy. Additionally, Hungary aims for an early phase-out of coal in power generation, slated for completion by 2025. It also highlights the government's plans to increase solar capacity to exceed 6000 MW in 2030 and 12 GW by 2040.

Furthermore, in addition to traditional offline media, the significant role of online communication is underscored by the fact that 19.4% of respondents encountered information about renewable energy sources through social media, while 8.3% came across the topic via online advertisements. Nonetheless, traditional avenues of information dissemination still hold sway, as a substantial proportion of respondents continue to derive information from their personal networks (24.5%). Despite the advent of the internet, television remains a popular medium, with 23% of individuals obtaining information about renewables through this platform, while 19.4% do so via social media. Additionally, traditional Above-the-Line (ATL) mediums, such as billboards, wield influence, with 5.3% of respondents citing them as sources of renewable energy messaging. The section of the survey pertaining to consumers' awareness of renewable energy serves as a reflective lens, with 56.7% of respondents opining that a significant portion of Hungarian society possesses only superficial knowledge on the subject. Conversely, 39.5% believe that the proliferation of internet resources empowers environmentally-conscious individuals to access requisite information. A mere 3.8% of respondents express confidence in the media's ability to furnish a comprehensive range of information on renewable energy sources. Concerning the distribution of respondents based on their sources of information on renewable energy sources, findings indicate reliance on online news portals (22%), general social media platforms (11.9%), energy suppliers' websites (8.1%), and personal networks (13.1%). Notably, social media platforms maintained

by energy suppliers (6.3%) emerge as significant sources of information, albeit being surpassed by books and trade magazines (8.3%) and platforms associated with energy communities focused on renewables, such as blogs and vlogs (7.2%). Podcasts also warrant attention, garnering mention by 7.5% of respondents, signalling their potential as a modern and effective online communication tool. Furthermore, the energy crisis and its reverberating effects, including skyrocketing prices, have upended the daily lives of countless consumers, prompting exploration into participants' perceptions of the crisis as an external event and its impact on their interest and receptiveness towards renewables. A considerable proportion of respondents (18.7%) express increased openness towards renewables as consumers, while 4.8% opine that the crisis has heightened their interest in the subject. Notably, despite the surge in green movements and activism, the broader appeal of environmental protection remains limited. Majority of respondents (70.7%) attribute their decisions to invest in renewables to rising energy prices, underscoring the role of external influences in driving consumer behaviour.

In terms of responsibility, respondents assert a collective obligation to lead energy-conscious lifestyles, indicative of a commendable level of energy awareness and willingness to assume responsibility within society. Notably, respondents prioritize the responsibility of the state over that of energy suppliers in disseminating information about the potential of renewable energy. Nonetheless, energy suppliers are not absolved of responsibility, as a significant proportion of respondents (76.5%) believe that it falls upon them to encourage the public to adopt energy-conscious lifestyles and impart knowledge about renewables.

5 Conclusions

In Hungary, prior to the energy crisis of 2022, renewable energy occupied a peripheral position, with a considerable portion of consumers exhibiting low levels of energy awareness. However, during the crisis period and subsequent years, there was a notable shift towards heightened awareness, attributed to evolving societal attitudes. This phenomenon underscores the challenge of catalyzing proactive engagement on certain issues, such as energy, climate protection, and finance, in the absence of external catalysts prompting action.

Achieving broader adoption of renewable energy hinges on three critical factors. Firstly, education plays a pivotal role in imparting foundational knowledge about electricity and dispelling prevalent beliefs and misconceptions surrounding renewable energy sources and their functionality. Secondly, the development of an effective online communication strategy is imperative to support educational efforts regarding renewables. This entails providing consumers with quality, engaging content that fosters active dialogue and facilitates knowledge acquisition. Thirdly, instilling a sense of value and importance regarding energy is essential to pique consumers' interest in learning and practicing energy awareness. Understanding the finite nature of certain energy sources, such as fossil fuels, underscores the need for consumers to assume responsibility for their energy consumption.

Leveraging a diverse array of online communication tools can aid in reaching consumers effectively. Findings from the study underscore the potential of the digital realm, with a significant proportion of respondents expressing openness to receiving newsletters and podcasts/episodes on renewable energy, as well as engaging with such content on social media platforms. Regarding the social media presence and activities of service providers, respondents actively follow and engage with the content generated by these entities, indicating a perceived responsibility on the part of energy companies to promote energy-conscious attitudes. Indeed, consumers explicitly expect relevant service providers to play an active role in fostering energy awareness.

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Adaptive Reuse and Counterpreservation; A Study of Haus Schwarzenberg

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Sustainable development has throughout the years become an important topic in multiple fields. Despite this, it is rarely approached from a sociologically spatial intersection. This is the perspective from which we tackle sustainable development in this article, where we question the sustainability aspects of two different approaches in the field of building renovation. Our attention is drawn to the unique image of Haus Schwarzenberg, which with its antique appearance, strongly stands out from the rest of the Mitte neighborhood. We first approach the problem of sustainability from the perspective that Sanders calls counterpreservation, as well as from the slightly more familiar approach of adaptive re-use. We are interested in what these approaches to preserving historical authenticity bring to their immediate environment and what their impact is on society as such is. Even more than their impact here and now, we also analyze its prospects for the future and what potential counterpreservation and adaptive re-use carry with them.

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1 Introduction

According to most theoretical understandings, sustainability is most often comprised of three aspects, i.e. the environmental, the social and the economic aspect (Kalandides and Gresillons, 2021). Focusing mainly on the social aspect of sustainability, we analyze markers such as quality of life while, at the same time, remain aware of the importance of an intersectional approach to sustainability (Miltin, 1992). Stemming from this approach, which draws from the knowledgebase of spatial sociology, we approach the issue from the perspective of the sustainable neighborhood (Medved, Kim and Uršič, 2019), which in and of itself brings many different approaches to renovation and adaptation that have been implemented in the past. Because of this, we choose to focus on two similar but still differing concepts, counterpreservation and adaptive re-use.

Counterpreservation is a relatively new concept in the field of urbanism, which was described by Sanders (2016). It provides a very unique insight into the retention of historical context of a structure through the preservation of its architectural features. It makes use of the dilapidated and the tarnished in order to preserve an authentic story, but, at the same time, it often serves as a bulwark in activists' fight against gentrification or other political intervention due to its resistance to revitalization guidelines. Adaptive re-use, on the other hand, is a far older approach that has been rigorously studied in architectural papers although it is much less present in sociological treatises. Adaptive re-use is similar to counterpreservation in its aim to rehabilitate old and unused buildings for a new socially beneficial use, although the two also have some meaningful differences which we will elaborate on at a later point.

We ground all these concepts on the example of Haus Schwarzenberg. It is a place for alternative artists and their studios, the galleries as well as a cafe, two museums and more. It is a building that has hosted a diverse population and served different purposes throughout its history, a housing complex, a broom factory, and a space for the development of alternative art. (Haus Schwarzenberg e.V., n.d.)

2 Literature review

The definition of sustainable development consists of two aspects (Jabareen, 2008; Robinson, 2004; Paris and Kates, 2003 and Mitlin, 1992), that is the aspect of sustainability or what is to be sustained and the aspect development or what is to be developed. Miltin (1992), Deakin (2001) and Parris and Kates (2003) all use a similar definition, with Deakin (2001, p. 6) stating that "today, sustainable development is widely viewed as development that improves the standard of living and quality of life, while at the same time protecting and enhancing the natural environment and honoring local culture and history"; Miltin (1992) presents quite a few more authors' perspectives, such as that of Pearce et. al. (1989) (in Miltin, 1992, p. 112), who focus on economics and who see sustainability as the possibility of wealth retention or growth. Some authors even contest the idea of further development entailing economic or productive expansion; instead, they advocate for ideas such as post- or de-growth (Shulz and Bailey, 2014).

Within the purview of sustainable development, one model that has proven quite popular in Europe is the sustainable neighborhood. Looking at Germany more closely, Medved, Kim and Uršič (2019, p. 23-25) focus their analysis on the neighborhood of Vauban (Freiburg), calling it a "typical example of a 'bottom-up approach' in sustainable urbanism" (Medved, Kim and Uršič, 2019, p. 24), and specifically point out the interpersonal organizational element of the local community, while emphasizing its focus on green spaces and communal gardens and "numerous multi-residential passive houses created by the bottom-up cooperatives" (Medved, Kim and Uršič, 2019, p. 24). This demonstrates a "socially oriented approach to housing development", and "encourages more intensive, daily face-to-face contact between neighbors" (Medved, Kim and Uršič, 2019, p. 26).

Within this framework of the sustainable neighborhood, the first concept we are concerned with is the idea of adaptive re-use. In the simplest of terms, adaptive re-use is a process in which a historic building is renovated and put to use in a new context than its original purpose, with some authors also adding that it stresses the importance of preservation (Lah, 2019; Mohamed, Boyle, Yang and Tangari, 2017; Mısırlısoy and Günçe, 2016). Lah (2019, p. 143-144) offers several examples of adaptive re-use, from "schools converted to condominiums," to "factories to artist studios". Importantly, adaptive re-use is not a new process; however, modern

adaptive re-use strategies are far more systemic when compared to the adaptive re-use of the past (Mohamed, Boyle, Yang and Tangari, 2017; Mısırlısoy and Günçe, 2016; Sandler, 2016). Adaptive re-use is also one of the most efficient practices of sustainable development, because it reuses the 'embodied energy', here defined as "the total energy required for the acquisition, processing, production, supply and installation of building material on the construction site" (Lah, 2019, p. 145) that was used to construct the building, which puts much less stress on the environments' natural resources (Lah, 2019; Mısırlısoy and Günçe, 2016). Adaptive re-use also brings several social benefits to the communities around it (Lah, 2019; Mohamed, Boyle, Yang and Tangari, 2017; Mısırlısoy and Günçe, 2016), as "renovation of the building heritage preserves knowledge, professions, jobs and favorably impacts on economic development", while maintaining "the identity of the space, the appearance of the landscape and its attractiveness" (Lah, 2019, p. 146).

When talking about adaptive re-use, it would not be unreasonable to also examine the process of gentrification, which often accompanies its implementation. Gentrification has many different and varying definitions, but what they have in common is that gentrification can be explained as "a process of spatial and social differentiation" (Zukin, 1987, p. 131). More modern definitions define the problem as a process within urban transition, in which "low property investment spurs a process of reinvestment and an accompanying shift in social demographics and built form." (Mathews, 2010, pp. 660-661). Adaptive re-use can, in this way, be seen as a gentrifying process in its very concept as it entirely revolves around the redevelopment of unprofitable and unused structures (Lah, 2019).

There are other processes of social development that buck this trend in some way. The process of revitalization often follows rigid guidelines, with orders coming from the top of complex political structures of governments or cities. However, there are some alternative approaches which tackle the idea of revitalization in a different, unconventional way. Plevoets and Sowinsk-Heim (2018) describe alternative approaches in urban planning with the words such as "DIY, "guerilla" and "insurgent". In 2016, the topic of city subcultural image was addressed by Sandler, who, in her work, described in detail an alternative project that is based on the initiative of the population and requires low costs, coining the term counterpreservation.

Counterpreservation is an innovative and unique approach to preserving the architectural, symbolic as well as purposeful features of the space. It is an approach in which the decay of the building is treated as genuine and desirable in terms of preserving the cultural heritage and historical characteristics of the space. Sandler (2011) describes counterpreservation as an organic approach to preservation that opposes rigid state guidelines on downtown revitalization. Counterpreservation often serves as a resistance to ruling politics. After the fall of the Berlin wall, counterpreservation served as an answer to three sociopolitical factors: gentrification, historical memory, and unification (Sandler, 2016, p. 20). The concept of counterpreservation therefore houses within it more than only the retention of an authentic historical image, but is also the consequence of activist demands, which are hinged on either the need for attainable housing costs, or on general accessibility of public spaces for everyone. It is the very activist potential of individual structures, which allows for their transformation and gives them meaning in a wider societal context. Without the activist tendency to preserve historical heritage and rebel against ruling ideologies, the decaying buildings would be merely aesthetically unsatisfactory complexes, and it is precisely because of the aesthetic deviation from the surrounding environment, that they are of vital importance to the population of the studied area.

Even though counterpreservation is often used by activists to oppose attempts at gentrification, we must mention that in some cases it can wield inverse results. To see this, we need to look at the role of art and artists in gentrification. Mathews (2010, p. 663) points out that artists themselves can be a powerful gentrifier, as due to their uncertain economic status and other factors related to their work, they most often occupy "marginal spaces of the downtown for their central location, social tolerance, aesthetic, and monetary appeal", such as old lofts and factories, driving up their value in the process. This label of gentrifier can also be extended to art itself, as it is often used in a wider process of spatial aestheticization, with the end goal of attracting more investors (Mathews, 2010, p. 662). We can see the echoes of this in Sandler's (2016, p. 22) analysis of berlin itself as she notes: "The rebelliousness of Berlin's alternative culture has itself become a tourist attraction, and as it increases the city's desirability and cachet, it also increases its real estate prices."

3 Case study

The findings presented in this study are the result of a hybrid methodological approach which combines a historical review of the existing literature on the development and transformation of the area of Haus Schwarzenberg with a field study that was conducted at the location and which included detailed observations of its characteristics and elements that connect it to our overarching concepts of adaptive reuse and counterpreservation.

Haus Schwarzenberg is a complex in the Miete district, which has been known to attract the attention of passers-by with its vintage visage as it stands out from the otherwise aesthetically consistent presentation of Hackescher Markt. The Haus Schwarzenberg project is backed by the organization Schwarzenberg e.V., which is concerned with the promotion of young alternative artists. In the time after the fall of the Berlin wall, the organization entered the then completely dilapidated building, which they cleaned of mold and equipped it with basic safeguards, giving it a new meaning for the local community in the coming years (Haus Schwarzenberg e.V., n.d.). The project of Haus Schwarzenberg represents the antithesis of the revitalization directives of the city center. Berlin has, to a certain extent, abandoned the traditional idea of urban development, which has been "superseded by an approach aimed chiefly at image creation by prioritizing aesthetics and culture in planning processes" (Brent, Grell, and Holm, 2013, p.53), a practice which is overall aimed at attracting "global players to the city and encouraged their involvement." (Brent, Grell, and Holm, 2013, p.55)

In general, the area of Hackescher Markt represents a model example of adaptive re-use, as the district was originally a market square which was gradually transformed into what it is today. This change is also evident in Haus Schwarzenberg, which has in its own way been reappropriated and transformed into a cultural center itself still containing many features that call back to its storied history (Sandler, 2016, p. 32). Though it is also worthy of note that compared to the systematic top-down approach that most adaptive re-use projects take (Mohamed, Boyle, Yang and Tangari, 2017), the appearance of Haus Schwarzenberg evokes a far more unstructured and less legible feeling (Sandler, 2016, p. 32), a feeling not too unfamiliar to the concept of counterpreservation.

4 Discussion

When talking about Haus Schwarzenberg, it can be stated that it stands out even inside its neighborhood. In our view, it is hard to deny that the building represents a wholly unique approach to retaining an authentic historical feeling inside the commercialized district in the heart of Berlin. Despite its standout nature and commendable goals to fight against gentrification, against being forgotten and to elevate alternative art, what arises here is the question of Haus Schwarzenberg's wider social significance, as well as the question of its long-term existence and impact on the environment.

If we approach the area from the perspective of social sustainability, we can confidently state that it plays an important role when it comes to connecting the population in opposition to ruling politics. It is exactly that constant support of the populus that allows Schwarzberg to maintain the space in the way that Sanders (2016) describes with the word counterpreservation. After a period of long wars and demarcation in this territory, any space that promotes the tolerant coexistence of all ethnic and religious groups seems more than desirable. Mutual support and the desire to maintain contact with one's own past and the past of close and distant relatives, as well as finally living in a peaceful environment, contributed to the fact that the space of alternative culture, which is physically embodied by Haus Schwarzenberg, did not fail like a large part of other attempts at similar spaces. We strongly believe that both the visual appearance as well as the activities carried out inside of it played a large part in retaining this alternative space. The sum of these two components allows for a greater identification with the space and strengthens the feeling of belonging, which consequently creates a connected community that strives to preserve and maintain their district, the people inside it and a greater overall quality of living. Despite several victories in preservation that Haus Schwarzenberg has achieved, its main objective is in our view still more of a utopian dream than a certain future. Already, in the near 30 years of their existence, the Schwarzenberg association has been forced to renovate certain areas of the structure to ensure the safety of visitors. We do acknowledge that Schwarzenberg e.V. strives to keep Haus Schwarzenberg as authentic as possible; however, even as is, this type of preservation cannot be sustained forever, especially inside an area that is in constant use. We must concede that at some point in the future it will be necessary to adapt the excessive area of this cultural complex, which will gradually blur the

boundaries of individual periods which today are reflected in the spatial image of Haus Schwarzenberg.

However, that change is not in our view a negative one. Already in its current form, it can be argued that individual periods of history are hidden behind the renovations that took place before Schwarzenberg e.V. took over the building. Haus Schwarzenberg is therefore a combination of counterpreservation and adaptive re-use. The changing of the building throughout German history thus subtly dictates its future. Along with the growth of society and its changing needs, the space will also have to adapt to those needs to maintain its relevance within that society. This need to adapt can be seen even in some of the less savory aspects of change we face today, as in many ways Haus Schwarzenberg is slowly becoming more gentrified and commercialized, processes which the people of Schwarzberg e.V. seem to strongly oppose. In fact, this battle is ironic in a way; despite the fact that the district is known for its rebelliousness and alternative bent, it is exactly this oppositional disposition that has caused Haus Schwarzenberg to become one of Berlin's leading tourist attractions, and consequently brought on the rising prices, investor interest and other signifiers of gentrification.

5 Conclusions

In this paper, we have discussed from different aspects the strategies employed in Haus Schwarzenberg's preservation, its path through history and its relation to the concepts of adaptive re-use and counterpreservation. Now at the end, we must answer the question proposed in the very beginning, i.e. what this means for the future of Haus Schwarzenberg and, more broadly, for counterpreservation as a model.

Regarding the first, we can without doubt state that, at least in the short term, there are no problems with which the Schwarzberg e.V. association has not been dealing for a long time. However, this changes when we look at a longer period, as the district will have to contend with the rising questions of gentrification, for which, if the district wishes to halt the process, a different strategy might be required; that is, if the process can even be halted or if that is even desirable. And with this we reach the second long-term problem facing Haus Schwarzberg and one that connects us to the latter question as maybe even an innate weakness of counterpreservation as a

concept that being that it is limited and must by necessity at some point begin compromising on its own ideals due to factors purely outside of its control. Indeed, this might be the problem for which finding a sustainable solution which still holds to the ideals of Schwarzberg e.V. might prove to be the most challenging task in the future.

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The Transformation of Polish Enterprises Towards Sustainable Development

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A company can be considered sustainable when it pursues its goals while maintaining ecological balance, and employee and community well-being. This perception of enterprise activities results from the spread of the concept of sustainable development, according to which enterprises should not only achieve their own goals, but also address the needs of a wide range of stakeholders. The transformation of enterprises towards sustainability is a difficult and multidimensional process. It requires changes in operation of an enterprise, e.g., including environmental, social and governance (ESG) factors into its business model. This article aims to show the process of transformation of Polish enterprises towards sustainability. The article analyzes ESG activities of companies from industries with different impact on the environment (chemical and banking) in 2021-2022. The results show that companies are aware of the need to include ESG factors in their business model. The scope and nature of the activities depend on the financial situation of the enterprise and its needs. In industries with a strong impact on the environment, environmental investments are more important. The activities of the enterprises over the analyzed years did not change significantly, suggesting determination in implementing the adopted strategy consistent with the sustainable development.

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1 Introduction

The popularization of the concept of sustainable development, the growing awareness of the impact of human activities on the environment, and the growing dynamics of changes in the modern economy are just some of the factors that encourage economic participants to verify their goals. One of the greatest global challenges in recent years is the implementation of economic, social and environmental goals simultaneously (including the transition to a low, and ultimately, zero-emission economy). This is an extremely difficult task for enterprises, but as research by Mondal et al. showed (2022), green entrepreneurs play an essential role in driving long-term economic growth and creating new businesses through sustainable innovation and green production methods.

The aim of the article is to discuss the process of transforming enterprises towards sustainable development. The article also seeks answers to the questions:

1. What does a sustainable company mean?
2. Does the scope and nature of activities undertaken by enterprises in the process of transformation towards sustainable development differ depending on the industry in which they operate?
3. Has the scope and nature of activities undertaken by enterprises in the process of transformation towards sustainable development changed over the years.

In order to achieve the research objectives, a critical analysis of the literature on the subject was used, employing the method of description, analysis and synthesis. The research part was carried out based on a case study of four companies, i.e., two operating in the chemical industry and two from the banking sector. Information on activities conducted in individual enterprises comes from the non-financial statements of these enterprises for 2021-2022.

2 Sustainable enterprise as an element of the implementation of the concept of sustainable development

The issue of a sustainable enterprise is inextricably linked to the concept of sustainability and sustainable development. Although the terms sustainability and sustainable development are often used interchangeably, despite many similarities,

there are some differences between them. Undoubtedly, both concepts refer to the principle of intergenerational solidarity (Law, 2019) and are an expression of the approach according to which current resources should be used effectively enough to ensure their availability to the extent that they meet the needs of today and future generations (Mohieldin, 2017; Hariram et al. 2023). Both sustainability and sustainable development are based on three pillars: "economic sustainability", "social sustainability" and "environmental sustainability" and focus on maintaining a balance between them (Mensah, 2019). The concept of sustainability defines the principles that coordinate all aspects of development to make it sustainable. Sustainable development is a goal or goals (forming Sustainable Development Goals) that can be achieved by functioning in accordance with sustainability (Ruggerio, 2021; Ozili, 2022).

One of the key challenges in the field of sustainability is the transformation of traditional enterprises into sustainable organizations (Pabian, 2017). The term sustainable enterprise does not have a single, universal definition in the literature on the subject, which is due to the fact that this issue is still relatively new and is constantly evolving and modified. The complexity and multi-level nature of the concept itself also means that it is described by scientists from different points of view. For the purposes of this study, only selected definitions of a sustainable enterprise will be presented to show the diversity but also convergence of approaches to the discussed issue.

A review of the definitions allows us to distinguish the features of a sustainable company. First of all, the method and scope of the organization's activities are consistent with the concept of sustainable development. A sustainable enterprise is an enterprise that contributes to sustainable development (Van Zanten and van Tulder, 2021) delivering economic, social and environmental benefits, in line with the three pillars of sustainability (Anbarasan and Sushil, 2018, Sargani et al. 2021).

Table 1: Definitions of a sustainable enterprise according to selected authors

Author	Definition
Salzmann et al. (2005)	…a strategic and profit-oriented response to the ecological and social issues of the organization's core and auxiliary activities
Potocan and Mulej (2007)	…in the most general sense, strives to achieve synergy in the economic, ecological, social and ethical aspects of its activities
Gao (2008)	…is the way of operation of companies that achieve their financial, social and ecological results in a sustainable and lasting way
Vermeulen and Witjes (2016)	…implementation of the strategy by individual enterprises in order to achieve balanced and lasting development
Jabłoński (2013)	... is a business carried out with the simultaneous use, in a systemic way, of the concept of enterprise value management and its social responsibility that provides value for a wide range of stakeholders
Zu (2013)	…is an organization that can anticipate and meet the needs of current and future generations of customers and stakeholders by creating and implementing innovations in new strategies... A sustainable company incorporates the principles of sustainable development in each of its business decisions, providing environmentally friendly products or services
Andriate and Fink (2017)	…an organization that implements activities in a way that ensures its ability to achieve corporate goals and at the same time increases long-term shareholder value by incorporating economic, environmental and social factors into its strategies

Source: own elaboration

Referring this to the company's goals, it should be noted that this is a departure from the traditionally formulated goals of the company, which were to maximize profit and increase its value for shareholders, towards meeting the needs of a wide range of stakeholders, which include, in addition to the owners mentioned above, also employees, financial institutions, business partners, and local communities (Pfajfar et al. 2022). A sustainable enterprise creates value for its stakeholders (Runaya, 2023). Stakeholder engagement can help implement sustainability strategies and create value for the company (Whelan and Ehiemere, 2023). In turn, the study by Bello-Pintado et al. (2023) shows that different stakeholders play different roles in companies' adoption to sustainability and implementation of sustainable practices. At this point, in the context of stakeholder influence, it is worth mentioning the phenomenon of greenwashing, which has become a significant problem in recent years. Greenwashing occurs when, in response to stakeholder expectations, a company creates a positive, environmentally friendly image of itself and its products/services without actually taking any real actions in this direction (Siano et al. 2017, Santos et al. 2023).

Transforming an enterprise towards sustainability requires changing its business model to a sustainable business model in order to create sustainable value. This value is also called "integrated value" or "sustainable value proposition", i.e., value that is a balanced combination of financial and non-financial (social and environmental) value (Moratis, 2017).

As defined by Geissdoerfer (2016), a sustainable business model creates, delivers, captures and exchanges permanent value for a wide range of stakeholders through a simplified description of the interdependencies between the individual elements of the enterprise and the interactions with its stakeholders (Geissdoerfer et al., 2016). At this point, it is worth repeating after Mignon and Bankel (2023) that there is no one universal pattern of a sustainable business model, therefore the transformation of each enterprise is an individual process. Such process takes into account enterprise's needs, but also the material and financial resources owned by the enterprise and/or resources to which it has access. In practice, the transformation of a business model most often involves the implementation of environmental, social and governance (ESG) factors into the company's operating strategy and taking into account these aspects in the business decision-making process. The transformation process often requires switching to ecological technologies and production methods that are friendly to the environment but also to society, especially employees. This position is confirmed by the results of the study by Kajtazi et al. (2023), which shows that technological innovations have a direct, positive impact on the sustainable development of the company, as do employee training and managerial skills of the management staff. An important element of the sustainable enterprise management model is ensuring the transparency of its operations, especially limiting and counteracting corruption (Cardoni et al. 2020).

2 Transformation of Polish enterprises towards sustainable development

The process of transforming enterprises towards sustainable development will be shown on the example of four enterprises, two from the chemical industry and two from the banking sector. This selection of enterprises was intended to show similarities and differences in the process of transformation of enterprises that have a different impact on the environment, i.e., from the chemical industry (with a strong impact on the environment) and banking (with a minimal impact on the

environment). The analyzed companies from the chemical industry are Grupa Azoty S.A. and the Orlen Group. The banks selected for the study were Bank Pekao S.A. and Getin Noble Bank S.A. The information was taken from ESG reports/non-financial statements that these entities are obliged to publish. The research period is 2021-2022, and the aim of the analysis is to determine the scope of ESG disclosures by individual companies and to compare the scopes between companies operating in the same industry and across industries. The aim of the study was also to determine the variability of the scope and nature of disclosures made to individual companies in subsequent years.

The synthetic results of the analysis are presented in Tables 2–5.

Table 2: Information content of the statement on non-financial information of Grupa Azoty S.A. for 2021-2022

	2021	2022
Description of the business model	The business model takes into account social values, ethics, organizational governance, risks and opportunities. The harmonious development of the company is based on innovation, knowledge and responsibility. The model assumes building company value through safe and useful chemicals and assumes the implementation of modern and comprehensive solutions in the chemical industry that meet the expectations of stakeholders.	Integrated business model as the key to success in the industry. Adjusting the production profile in a given period to the conditions dictated by the market. Skillful product flow management as a source of advantage. Correct placement of the received volume on the markets, thanks to knowledge of the markets and established trade policy. Flexible adaptation to a very dynamic market situation as a guarantee of success in the industry.
Description of activities implemented by the entity in the field of ESG	**Natural environment area** – Reducing energy consumption through actions to improve the energy efficiency of technological processes – Compliance with applicable legal standards in the field of atmosphere protection and constant adaptation of installations to emission standards – Reducing the carbon footprint – Waste treatment policy	**Natural environment area** – Reducing energy consumption through actions to improve the energy efficiency of technological processes – Compliance with applicable legal standards in the field of atmosphere protection and constant adaptation of installations to emission standards – Reducing the carbon footprint – Waste treatment policy
	Employee area – Applying clear employment and promotion rules and striving to ensure gender diversity	**Employee area** – Applying clear employment and promotion rules and striving to ensure gender diversity

	2021	2022
	– Additional benefits for employees – Application of the highest health and safety standards	– Additional benefits for employees – Application of the highest health and safety standards
	Social area – Investments for the local community, in the field of local initiatives	**Social area** – Investments for the local community, in the field of local initiatives
	Area of ethics and anti-corruption – Following the "Grupa Azoty Code of Ethical Conduct" defining the values applicable to all companies of the GA Capital Group: economy, professionalism, cooperation, respect, transparency	**Area of ethics and anti-corruption** – Development of the "Grupa Azoty Code of Ethical Conduct" defining the values applicable to all companies of the GA Capital Group: economy, professionalism, cooperation, respect, transparency
Identification of significant risks related to the entity's ESG activities	**Environmental risks** – Risk of serious industrial accidents affecting the environment – The risk is related to the processing, production, storage and transport of chemical substances that are hazardous materials – Risk related to failure to meet water and sewage management requirements – Risk of land contamination and related costs – Risks related to the use of radioactive substances – Risk related to failure to meet waste management requirements – Risk related to exceeding noise standards emitted into the environment	**Environmental risks** – Risk of increased exposure to failures and interruptions in the continuity of operation of production installations and technological limitations, including those resulting from the physical consequences of climate change – Risk related to the production and storage of hazardous materials – Risk related to the transport of hazardous materials and the risk of changing regulations and/or the right to transport without ADR, RID – Risk related to failure to meet water and sewage management requirements – Risk of land contamination and related costs – Risks related to the use of radioactive substances – Risk related to failure to meet waste management requirements – Risk related to exceeding noise standards emitted into the environment – Risks related to climate change, both relating to the Company's impact on the climate and the

	2021	2022
		effects of climate change on the Company – Risk related to the management of CO_2 emission allowances – Regulatory risk related to tightening environmental protection requirements – Regulatory risk related to tightening environmental protection requirements – Risk of negative impact on biodiversity and wild natural habitats
	Social risks – Risk related to the lack or limitation of supervision over corporate regulations – Risk related to non-compliance with good corporate governance practices and capital market regulations – Risk of violating national or international law regarding compliance management	**Social risks** – Risk of loss of social acceptance due to violations of Human Rights by the Company's employees or business partners – The risk of not meeting social expectations – Risk of personal data breach – Risk of violation or failure to fulfill employee rights regarding freedom of association at work and collective negotiations – Risk of accidents at work, occupational diseases and other threats – Risk of losing employees with important competences for the Company due to high employee turnover
	Governance risks – Risk related to the lack or limitation of supervision over corporate regulations – Risk related to non-compliance with good corporate governance practices and capital market regulations – Risk of violating national or international law regarding compliance management	**Governance risks** – Risk related to the lack or limitation of supervision over corporate regulations – Risk of violation of ethical principles and standards – Risk related to investor relations and compliance with information obligations – Image risk related to ineffective communication of social activities and initiatives related to sustainable development – Risk of violating legal provisions in the field of compliance management

	2021	2022
		– Risk of negative impact on the Company's brand

Source: own study based on statements about non-financial information of Grupa Azoty S.A. for 2021-2022

Table 3: Information content of the statement on non-financial information of PKN Orlen for 2021-2022

	2021	2022
Description of the business model	The business model assumes strengthening the position in the area of core operations, as well as further development, including coordination of the activities of the ORLEN Group companies. The aim of the undertaken activities is to increase the value of PKN ORLEN and the ORLEN Group, strengthen the position on home markets, and product and geographical expansion. To ensure efficient management, PKN ORLEN has implemented segment management principles aimed at achieving the common strategic goals of the ORLEN Group set by PKN ORLEN as the Group's parent company.	The business model assumes strengthening the position in the area of core operations, as well as further development, including coordination of the activities of the ORLEN Group companies. The aim of the undertaken activities is to increase the value of PKN ORLEN and the ORLEN Group, strengthen the position on home markets, and product and geographical expansion. To ensure efficient management, PKN ORLEN has implemented segment management principles aimed at achieving the common strategic goals of the ORLEN Group set by PKN ORLEN as the Group's parent company.
Description of activities implemented by the entity in the field of ESG	**Natural environment area** – Activities related to quality assurance, limiting the impact on the environment, introducing a procedure for monitoring the company's impact on the environment, compliance with occupational health and safety and information security. – Activities aimed at improving the company's energy performance – PKN ORLEN food safety policy – Implementation of a system for monitoring and reporting carbon dioxide emissions – Waste management procedure – Integrated permits for installations	**Natural environment area** – Activities related to quality assurance, limiting the impact on the environment, introducing a procedure for monitoring the company's impact on the environment, compliance with occupational health and safety and information security. – Activities aimed at improving the company's energy performance – PKN ORLEN food safety policy – Implementation of a system for monitoring and reporting carbon dioxide emissions – Waste management procedure – Integrated permits for installations
	Employee area – Introduction of the PKN ORLEN Code of Ethics	**Employee area** – Introduction of the PKN ORLEN Code of Ethics

	2021	2022
	– Developing a policy for managing the potential of ORLEN Group employees, maintaining continuity and efficiency of business processes by preventing competence gaps and securing knowledge transfer – Policy defining the working conditions and rules of disabled people – Well-being policy – Remuneration policy for members of the management and supervisory boards of ORLEN Group companies – Expert politics	– Developing a policy for managing the potential of ORLEN Group employees, maintaining continuity and efficiency of business processes by preventing competence gaps and securing knowledge transfer – Policy defining the working conditions and rules of disabled people – Well-being policy – Remuneration policy for members of the management and supervisory boards of ORLEN Group companies – Expert politics
	Social area – Introduction of a code of ethics regarding the company's relations with the external environment, including customers, shareholders, local community, business partners and competitors – CSR strategy – sets directions for activities in the field of social responsibility – PKN ORLEN's rules of conduct in relations with local communities – Purchasing Policy of the ORLEN Capital Group - a document defining the mission, vision and goal of the purchasing policy	**Social area** – ORLEN Group's CSR strategy until 2022 – sets the directions of activities in the field of social responsibility – PKN ORLEN's rules of conduct in relations with local communities – Purchasing Policy of the ORLEN Capital Group - a document defining the mission, vision and goal of the purchasing policy
	Area of ethics and anti-corruption – Introduction of a document describing the standards of ethical conduct of employees – Enterprise Risk Management Policy and Procedure – Rules for conducting inspections and verification proceedings – Rules and instructions for counteracting money laundering and terrorism financing – Anti-corruption policy in the ORLEN Capital Group	**Area of ethics and anti-corruption** – Code of ethics – Enterprise Risk Management Policy and Procedure – Rules for conducting inspections and verification proceedings – Rules and instructions for counteracting money laundering and terrorism financing – Anti-corruption policy in the ORLEN Capital Group – Policy for detecting and managing Conflicts of Interest

	2021	2022
Identification of significant risks related to the entity's ESG activities	**Environmental risks** – Climate change – New trends (market/society expectations regarding investments in environmental protection) – Regulations related to environmental protection (including new or more stringent requirements) – Pollution of the soil and water environment – Management of CO_2 and other gas emission allowances – Impact on the environment – Sewage and waste management	**Environmental risks** – Regulations related to environmental protection (including new or more stringent requirements) – Pollution of the soil and water environment – The effectiveness of internal corporate regulations regarding environmental issues – Monitoring and reporting of companies' environmental impact – Companies' perceptions of their environmental impact
	Social risks – Corporate social responsibility – Reputation, brand and marketing management – using the brand in association with unfavorable, controversial activities – Outsourcing and subcontractor risk - limitation of the ORLEN Group's control resulting from the activities of subcontractors or concluding outsourcing agreements	**Social risks** – Corporate social responsibility – Reputation, brand and marketing management – using the brand in association with unfavorable, controversial activities – Outsourcing and subcontractor risk - limitation of the ORLEN Group's control resulting from the activities of subcontractors or concluding outsourcing agreements
	Employee risks – Availability of employees and subcontractors – Allocation and development of human resources – Accidents at work and other hazards – Actions of employees and subcontractors	**Employee risks** – Availability of employees and subcontractors – Allocation and development of human resources – Accidents at work and other hazards – Actions of employees and subcontractors
	Governance risks – Embezzlement and other abuses – Employee actions leading to violations of the law – Abuse of customers and employees	**Governance risks** – Embezzlement and other abuses – Employee actions leading to violations of the law – Abuse of customers and employees

Source: own study based on statements about non-financial information of PKN Orlen for 2021-2022

Table 4: Information content of the statement on non-financial information of Bank Pekao for 2021-2022

	2021	2022
Description of the business model	The Bank's business model is based on customer segmentation separating the following areas: Retail Banking, Private Banking, Small and Medium Enterprise Banking, Corporate and Investment Banking	The Bank's business model is based on customer segmentation separating the following areas: Retail Banking and Private Banking, Corporate Banking, Corporate and Investment Banking
Description of activities implemented by the entity in the field of ESG	**Natural environment area** – Policy on optimizing energy consumption	**Natural environment area** – Policy on optimizing energy consumption
	Employee area – Gender equality and diversity policy – Policy for selecting candidates for the position of Management Board member and key function and assessing the suitability of proposed and appointed members of the Management Board, Supervisory Board and persons performing key functions in Bank PKO S.A. – Anti-mobbing policy – Policy of training and improving professional qualifications – Remuneration policy	**Employee area** – Gender equality and diversity policy – Policy for selecting candidates for the position of Management Board member and key function and assessing the suitability of proposed and appointed members of the Management Board, Supervisory Board and persons performing key functions in Bank PKO S.A. – Anti-mobbing policy – Policy of training and improving professional qualifications – Remuneration policy
	Social area – Compliance with the principles of the Code of Banking Ethics of the Polish Bank Association and the Canon of Good Financial Market Practices adopted by the Polish Financial Supervision Authority – Responsible marketing – Regulations on managing conflicts of interest at Bank Pekao S.A. – Rules for granting donations and sponsorship by Bank Polska Kasa Opieki S.A	**Social area** – Compliance with the principles of the Code of Banking Ethics of the Polish Bank Association and the Canon of Good Financial Market Practices adopted by the Polish Financial Supervision Authority – Social and sponsoring policy – Charity policy – Responsible marketing – Regulations on managing conflicts of interest at Bank Pekao S.A. – Rules for granting donations and sponsorship by Bank Polska Kasa Opieki S.A.

	2021	2022
	Area of ethics and anti-corruption – Anti-corruption policy in the Bank Pekao S.A. Group. – Violations Reporting Policy – Purchasing policy	**Area of ethics and anti-corruption** – Anti-corruption policy in the Bank Pekao S.A. Group. – Violations Reporting Policy – Purchasing policy
Identification of significant risks related to the entity's ESG activities	– Reputation risk – Credit risk – Operational risk – Risk of non-compliance – Market risk	– Reputation risk – Credit risk – Operational risk – Risk of non-compliance – Market risk

Source: own study based on statements on non-financial information of PKO S.A. for 2021-2022

Table 5: Information content of the statement on non-financial information of Bank Getin Noble Bank S.A. for 2021-2022

	2021	2022
Description of the business model	Getin Noble Bank S.A. offer includes products in the field of daily banking, financing, saving and investing, as well as other banking services. One of the elements of the business model of Getin Noble Bank S.A. is to focus on the quality of service in relationships with customers. The model defined in this way is based on a detailed analysis of customers' financial needs and tailoring the offer to their preferences	Getin Noble Bank S.A. offer includes products in the field of daily banking, financing, saving and investing, as well as other banking services. One of the elements of the business model of Getin Noble Bank S.A. is to focus on the quality of service in relationships with customers. The model defined in this way is based on a detailed analysis of customers' financial needs and tailoring the offer to their preferences
Description of activities implemented by the entity in the field of ESG	**Natural environment area** – Implementation of activities aimed at: – Improving energy efficiency – Elimination of plastic – Reducing water consumption – Modernization of the car fleet	**Natural environment area** – Implementation of activities aimed at: – Improving energy efficiency – Elimination of plastic – Reducing water consumption – Modernization of the car fleet
	Employee area – Code of ethics – Remuneration policy for Members of the Management Board and Members of the Supervisory Board of Getin Noble Bank S.A – Policy for assessing the suitability of persons	**Employee area** – Code of ethics – Remuneration policy for Members of the Management Board and Members of the Supervisory Board of Getin Noble Bank S.A – Policy for assessing the suitability of persons

	2021	2022
	performing key functions in Getin Noble Bank S.A.	performing key functions in Getin Noble Bank S.A. – Anti-mobbing procedure – Principles of professional development of employees at Getin Noble Bank S.A.
	Social area – Code of Good Practices of Companies of the Getin Noble Bank S.A. Capital Group. (specifies, among others, the principles common to the Group for making decisions on granting donations)	**Social area** – Code of Good Practices of Companies of the Getin Noble Bank S.A. Capital Group. (specifies, among others, the principles common to the Group for making decisions on granting donations)
	Area of ethics and anti-corruption – Policy for managing violations of ethical standards and conflicts of interest in the Getin Noble Bank S.A. Capital Group. – Getin Noble Bank S.A. Code of Ethics – Whistleblowing procedure – Policy on accepting and transferring benefits at Getin Noble Bank S.A. – Policy for managing conflicts of interest at the Bank – Policy for managing conflicts of interest in the area of bancassurance – Conflict and Ethics Policy and Gift Policy – Policy of accepting and giving gifts at Getin Noble	**Area of ethics and anti-corruption** – Policy for managing violations of ethical standards and conflicts of interest in the Getin Noble Bank S.A. Capital Group. – Getin Noble Bank S.A. Code of Ethics – Whistleblowing procedure – Policy on accepting and transferring benefits at Getin Noble Bank S.A. – Policy for managing conflicts of interest at the Bank – Policy for managing conflicts of interest in the area of bancassurance – Policy for managing conflicts of interest of persons performing management functions at Getin Noble Bank S.A – Conflict and Ethics Policy and Gift Policy – Policy of accepting and giving gifts at Getin Noble
Identification of significant risks related to the entity's ESG activities	– Operational risk (may have a significant negative impact on social and employee issues) – Risk of non-compliance (may have a significant negative impact on social, labor,	– Operational risk (may have a significant negative impact on social, employee and anti-corruption issues) – Risk of non-compliance (may have a significant negative impact on social, labor,

	2021	2022
	human rights, anti-corruption and environmental issues). – Credit risk (may have a significant negative impact on social and anti-corruption issues) – Risk of loss of liquidity – Market risk – Risk related to derivative financial instruments	human rights, anti-corruption, environmental issues) – Anti-corruption and environmental – Credit risk (may have a significant negative impact on social issues) – Risk of loss of liquidity (may have a significant negative impact on social and employee issues) – Market risk (may have a significant negative impact on social and labor issues) – Risk related to derivative financial instruments of compliance (may have a significant negative impact on social and labor issues)

Source: own study based on statements on non-financial information of Bank Getin Noble Bank S.A. for 2021-2022

3 Results and conclusion

The study shows that all enterprises took actions aimed at transformation towards sustainable development. When comparing the scope and nature of activities in the analyzed companies, it should be noted that activities were implemented in all areas, i.e., environmental, social and governance. The companies have analyzed their activities in terms of consistency with the concept of sustainable development and identified the risks to which they are subject. They monitor these risks and work on ways to reduce them. The list of risks and activities in the environmental aspect is broader in the case of companies operating in the chemical industry and this should be positively assessed. Comparing the activities undertaken by individual enterprises in the consecutive two years, i.e., 2021 and 2022, it can be seen that they do not change significantly, and in some cases they are identical. This may indicate consistent implementation of the selected strategy or confirm the thesis that published statements on non-financial information are a set of company declarations in selected areas, which are not followed by real actions. The expanded obligation to report in the field of ESG means that, on the one hand, enterprises are stimulated to take actions to ensure sustainable development of the company, but on the other hand, they are exposed to the temptation of greenwashing. According to the

RepRisk report, greenwashing has become increasingly common in recent years. For banks and financial service providers, subject to disclosure obligations under EU directives (NonFinancial Reporting Directive, Sustainable Finance Disclosure Regulation, EU Taxonomy), there has been a 70% surge in the quantity of greenwashing cases over the twelve months (RepRisk, 2023). This is a phenomenon that cannot be ignored, and which requires a healthy level of skepticism when analyzing individual companies' ESG disclosures. Especially because although companies are obliged by legal regulations to create non-financial statements, it has not been specified who should verify the correctness of their preparation and who is responsible for any errors they contain. Currently, an auditor who examines a company's financial statements notes whether they have been prepared but does not verify their content. The provisions constructed in this way, in the author's opinion, not only do not limit the phenomenon of greenwashing, but may even strengthen it.

Currently, non-financial information increasingly affects the financial results of enterprises, e.g., loss of reputation, customer or investor trust translates into lower sales revenues and more difficult and more costly obtaining financing (Pimonenko et al., 2020). For this reason, the question whether the implementation of the concept of sustainable development is a necessary condition for enterprises that want to achieve market success becomes extremely relevant. We can go one step further and ask the research question whether sustainable development of an enterprise is a source of competitive advantage for modern enterprises. The questions posed in this way determine the future direction of research.

The conducted research has certain limitations. The largest of them is the small size of the research sample. In future studies, it is planned to expand the research sample both in terms of the number of companies representing a given industry and the number of industries examined.

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Exploring Gender and Age Dynamics in Social Media Marketing: A Questionnaire-Based Analysis

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The article explores the realm of social media marketing, specifically delving into the perceptions and behaviors of users through a structured questionnaire and subsequent statistical analysis. With a primary aim to understand the dynamics between demographic factors and attitudes towards influencers and social media platforms, the study investigates the correlation between respondents' gender and their trust in influencers as a credible information source. Additionally, it scrutinizes the relationship between respondents' age and their presence on Instagram, a popular social media platform. Through rigorous data collection and analysis, the research endeavors to unveil insights into the evolving landscape of social media marketing, shedding light on how demographic variables shape individuals' engagement and trust in influencer-driven content and platform preferences. This article contributes to the existing body of knowledge by offering empirical evidence and statistical verification of the intricate connections between demographic characteristics and social media behaviors, providing valuable insights for marketers and practitioners seeking to optimize their strategies in the digital sphere.

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1 Introduction

We assume, that traditional marketing trends can not reach as many consumers as new marketing trends can. Therefore, we perceive a great potential in the use of new marketing trends for the purpose of reaching a wide audience of consumers and also for increasing the competitiveness of company. New marketing trend in which we perceive biggest potential is digital marketing. There are many advantages of this new form of marketing, such as broad reach of potential customers, it is easily accesible, easily measurable and less expensive than the traditional marketing forms. In the article we want to find out the dependence of gender and age, specificaly if there is dependence between the gender of respondents and whether they consider influencers as a reliable source of information and if there is a dependence between the age of respondents and whether they have an Instagram account.

2 Theoretical Background / Literature Review

According to Faruk, Rahman and Hasan (2021) the number of internet users is growing every day. They assume that up to 70% of e-commerce sales will be made using a mobile platform given that individuals spend an average of 6 hours and 42 minutes online each day. The consumer lifestyle and the way businesses interact with their clients have both been significantly impacted by these technological advancements. Under the impact of new technologies, people have adapted to the virtual world. Marketers started to concentrate their marketing efforts on this specific market as consumers started using the internet and spending more time on the social networks.It is quite interesting to compare the views of Kotler, Kartajaya and Setiawan (2017) and Petranova et al. (2011).

According to Kotler, Kartajaya and Setiawan (2017) the traditional marketing should coexist with the digital marketing rather than replace it. They stand for the opinion that, while traditional marketing is important in the early stages of consumer connection, digital marketing is important in the later development and strengthening of relationships with the customers. They believe, that the combination of the traditional and, later, the digital marketing is the best possible option for the company.

On the contraty, according to Petranova et al. (2011) the growth of the digital marketing is the result of expanding the client needs, a variety of offerings, and increasing the competition.

According to Petranova, businesses must present their products and services online, because they feel, that doing so will increase their chances of success and reduce their vulnerability to competition. If the companies are not present on the internet sooner or later they will be defeated by the competition. According to Invelity (2023) there are a lot of advantages of online marketing, namely : broad reach of potential customers, easily accessible, easily measurable, individual approach, low costs. As we previously mentioned numerous opportunities have arisen as a result of the development of the internet. The trend of social media was created. Social media enable interactive marketing communication implementation. As social media platforms like facebook, tik-tok, and Instagram have grown in popularity, a great number of so-called influencers with big followings have emerged. These people promote the products or services for a financial reward, which they then get from businesses or entrepreneurs in exchange for their services (Gučík et al., 2018).

The amount of money received by each influencer varies, depending on their amount of followers, the total number of people who follow them, and how well their so-called reach is used. This refers to in what extent they can persuade a customer to buy the product or service, how reliable an influencer is, and how many people will see their recommendations Karlíček et al. (2016).We can claim that the social network is no longer only a communication channel, where users communicate with one another. As a result of the development of the internet, the social networks enable businesses to promote their goods and services very successfully because customers can easily and quickly contact them through their accounts, or so-called profiles, on these networks. It is reasonable to state, that social media is the most efficient and modern communication channel in consideration of these benefits (Rajčák and Rajčáková, 2012).

Gučík (2018) claims that thanks to these profiles, businesses are able to connect with the customers, capture their attention, and persuade them in the favor of the company. Social networks have a crucial role in influencing the consumer behavior, individuals modify their content in response to experience, opinions, and also based on the agreed cooperation with various entrepreneurs. The goal of every

entrepreneur is to agree with the so-called influencer on the best possible business terms, on the mutually beneficial level of cooperation.An ideal scenario for this kind of collaboration is when a business owner gives a product to an influencer, who then promotes it, but the influencer firstly uses the product to ensure, that it is genuinely good before he presents it to his followers. The goal of a company using social media marketing is, of course, to increase the company's profit. By doing this, the given influencer will establish the credibility and, as a result, his followers will believe his personal recommendations. This will ultimately ensure a high demand for the product or service that the influencer promotes (Walters, 2015).

3 Methodology

In the article we want to find out if there is any dependce between the gender of respondents and whether they consider influencers as a reliable source of information and if there is a dependence between the age of respondents and whether they have an Instagram account. Article is a partial output from the questionnaire which contained 26 questions. In the article we looked at 4 of them. In the questionnaire, we used several types of questions, we used closed questions, that could then be evaluated statistically, scaling questions, specifically numerical assessment scales, as well as interval scales and we also used Likert scales. In the first question we asked respondents about their gender, respondents could choose from two options: Male or Female. In the second question we asked respondents about their age and gave possibility to choose from options: Less than 18 y., 18-25 y., 26-35 y., 36-45 y., 46-55y., More than 56 y.. Another question in which we examined was if respondents consider influencers as a reliable source of information, we asked our respondents to indicate how much they consider influencers to be a credible source of information, with 1 being a very credible source and 5 being a very unreliable source of information. And for our fourth question, if the respondents have an Instagram account, we gave our respondents 2 options from which they could choose: Yes or No. Questionnaire survey was created via Google forms and was send to our respondents. The survey filled out 575 respondents in total. The questionnaire was anonymous and was conducted from 10.10.2023 to 10.1.2024.

The conceptual framework is based on the following publications that have been studied, where the impact of age and gender has also been examined.

In the research paper, Hudders, L., & De Jans, S. (2022) examine how gender affects how successful social media marketing strategies are. It provides insights into how marketers may more effectively target gender-specific audiences by analysing a variety of criteria, including content preferences, platform usage habits, and purchasing behaviour.

Sun, J., Leunf, X.Y., and Bai, B. (2021) demonstrate how an influencer's attitude influences a follower's attitude and behavioural intentions on the choice to purchase a product. The current study also reveals a mediating influence played by followers' attitudes on social media posts. Moreover, female followers are impacted more directly by their influencer attitude, while male followers are affected more indirectly through their attitude toward the social media posts.

Instagram co-founder Kevin Systrom revealed in December 2018 that 500 million people visit the platform each month. Over 90% of Instagram users are under the age of 35, according to user demographics. Business Insider states that Instagram is largely made up of urban, youthful demographics with a significant skew toward women. In particular, 32% of users are men and 68% of users are women. In light of its widespread use, businesses have discovered that Instagram offers a new marketing niche Cooper, B. (2018).

From the articles and studies cited above, our hypotheses are as follows.

HA0: There is no group difference between the gender of respondents and whether they consider influencers as a reliable source of information.
HA1: There is a group difference between the gender of respondents and whether they consider influencers as a reliable source of information.
H0: There is no group difference between the age of respondents and whether they have an Instagram account.
H1: There is a group difference between the age of respondents and whether they have an Instagram account.

In order to statisticaly evaluate the survey, through the XLSTAT software we used the following statistical methods. We calculated the Correlation matrix, to describe the correlation between selected variables as well. The normality of the data was tested using the Shapiro-Wilk test and displayed in a table. As the Sig. Value of

Shapiro-Wilk tests were below 0.05, the data significantly deviated from a normal distribution. Based on the findings, that it is a non-normal distribution, we used in our next steps non-parametric tests.

We calculated the value of Cronbach's alpha, in order to find out if the data obtained from the questionnaire is statistically significant and reliable.We used the Chi-Square Test of Independence to test our stated hypothesis. This test determines whether there is a statistically significant relationship between two or more categorical variables and examines relationships between those variables. To calculate the intensity of dependence we used the Cramer's V coefficient. We calculated the Adjusted Standardized Residuals in order to demonstrate, where exactly the statistical significances are located.

4 Results

In our first stated hypothesis, we put our focus on the connection between two questions from the questionnaire survey. First question was the classification question about the gender of our respondents and the second question was question, where we asked our respondents to state how much they consider influencers to be a credible source of information, with 1 being a very credible source and 5 being a very unreliable source of information. We assume, that there is a dependency between the gender of our respondents and how they perceive influencers, whether they consider them as a reliable source of information or not. Based on the percentage evaluation of the responses of men and women separately, we can say that women are more inclined to buy products based on the influencer's recommendation than men (Tab. 1).

Table 1: Observed frequencies: Statistical differences in the perception of influencers based on gender.

Observed frequencies (I have already purchased a product or service in the past only based on an influencer's recommendation./ Gender):			
	Male	Female	Total
Completely agree	6	60	66
Agree	8	47	55
Neither agree nor disagree	8	46	54
Disagree	15	40	55
Completely disagree	90	255	345
Total	127	448	575

Source: Own processing

We continued with testing our first hypothesis and we used a statistical method chi-square (X2) test to verify the correctness of the first hypothesis. In the table below, the computed p-value is 0,007 and lower than the significance level alpha=0,05, we should reject the null hypothesis H0, and accept the alternative hypothesis Ha. Therefore, we can say, that there is a dependence between the gender of respondents and whether they consider influencers as a reliable source of information. The risk to reject the null hypothesis H0 while it is true is lower than 0,72%. Our assumed hypothesis no. 1 was therefore correct (Tab. 2).

Table 2: Chi-square test: Statistical differences in the perception of influencers based on gender.

Test of independence between the rows and the columns (I have already purchased a product or service in the past only based on an influencer's recommendation./ Gender):	
Chi-square (Observed value)	14,022
Chi-square (Critical value)	9,488
DF	4
p-value	0,007
alpha	0,05

Source: Own processing

In our second stated hypothesis, we focused on the connection between two questions from the questionnaire survey. First question was the classification question about the age of our respondents and the second question was question, where we asked our respondents to state if they have an Instagram account. In our second hypothesis, we assume, that there is a dependency between the respondent's age and whether the respondent has an Instagram account. Based on the percentage evaluation of the responses, we can say that with increasing age, less respondents have an account on Instagram, in other words, the older the respondent, the greater the probability, that they do not have an account on Instagram (Tab. 3).

Table 3: Observed frequencies: Statistical differences in the perception/use of Instagram based on age.

Observed frequencies (Please indicate whether you have an Instagram account./ Age):							
	Less than 18 years	18-25 years	26-35 years	36-45 years	46-55 years	More than 56 years	Total
Yes, I have	4	82	127	108	64	43	428
No, I do not have	0	4	29	48	31	35	147
Total	4	86	156	156	95	78	575

Source: Own processing

We continued with testing our second hypothesis and we used a statistical method chi-square (X2) test to verify the correctness of the second hypothesis. In the table below, we can see, that the computed p-value is < 0,0001 and lower than the significance level alpha=0,05, we should reject the null hypothesis H0, and accept the alternative hypothesis Ha. Therefore, we can say, that there is a dependence between the age of respondents and whether they have an Instagram account. The risk to reject the null hypothesis H0 while it is true is lower than 0,01%. Our assumed hypothesis no. 2 was therefore correct.

We calculated the intensity of this dependence through Cramer's V coefficient, whose value is 0,280128 and therefore exists very strong dependence between the age of the respondent and whether respondent has an Instagram account (Tab. 4).

Table 4: Chi-square test: Statistical differences in the perception/use of Instagram based on age.

Test of independence between the rows and the columns (Please indicate whether you have an Instagram account. / Age):	
Chi-square (Observed value)	45,121
Chi-square (Critical value)	11,070
DF	5
p-value	< 0,0001
alpha	0,05

Source: Own processing

Our next step was calculating the Residuals (Adjusted). Values displayed in bold are significat at the level alpha=0,05 and we can see, that statistical dependencies are not found in every age category. They are found only between answers yes I have an Instagram account and no I do not have an Instagram account of respondents aged 18 to 25 years, 26 to 35 years and 56 years and more. There can be several reasons for this (Tab. 6).

5 Discussion

Based on the percentage evaluation of the responses of men and women separately to our first stated hypotheses, we can say that women are more inclined to buy products based on the influencer's recommendation than men, therefore we can say, that women trust influencers more than men, this may also be caused, due to the

fact that men have different interests and hobbies and do not spend as much time following influencers as women do.

Based on evaluation of the responses to our second stated hypotheses, we can say, that with increasing age, less respondents have an account on Instagram, in other words, the older the respondent, the greater the probability, that they do not have an account on Instagram, We assume that young people have more free time to devote on social networks and have an Instagram account is also trendy and cool for them. When respondents are older, at their most productive age, they ussualy have more obligations, children, work etc., so we assume, that they do not have as much free time as they used to have, so this might be the reason why the percentage of respondents, who do not have an Instagram account is higher. We assume, that respondents aged 56 and older are not so skilled with the new technologies, maybe they do not even know Instagram platform, so we assume, that this could be the reason why he percentage of respondents, who do not have an Instagram account is even higher. Therefore, we assume, that business marketing via the social network Instagram may be beneficial, but it also relies on which age group the company focuses on.

6 Conclusions

For our first stated hypothesis, we rejected the null hypothesis and accepted the alternative hypothesis. Therefore, we can say, that there is a dependence between the gender of respondents and whether they consider influencers as a reliable source of information. Our assumed hypothesis no. 1 was therefore correct. We calculated the Adjusted Standardized Residuals and we found out, that the statistical significances were located in both male and female answers completely agree, and completely disagree. Based on the percentage evaluation of the responses of men and women separately, we can say that women are more inclined to buy products based on the influencer's recommendation than men, therefore we can say, that women trust influencers more than men, this may also be caused, due to the fact that men have different interests and hobbies and do not spend as much time following influencers as women do.

In our second stated hypothesis, we rejected the null hypothesis and accepted the alternative hypothesis. Therefore, we can say, that there is a dependence between the age of respondents and whether they have an Instagram account. Our assumed hypothesis no. 2 was therefore correct. We calculated the intensity of this dependence through Cramer's V coefficient, whose value was 0,280128 and therefore there exists very strong dependence between the age of the respondent and whether respondent has an Instagram account. We found out, that with increasing age, less respondents have an account on Instagram. Therefore, we assume, that digital marketing via the social network Instagram may be beneficial, but it also relies on which age group the company focuses on.

Based on finding, that women trust influencers more than men, we would like to offer some recommendations. Businesses should focus consider targeting their advertising strategy towards influencer marketing, which tends to focus more on women than men. This means seeking out influencers who have a larger following or influence among women specifically. When creating content on social media or other platforms, businesses should consider content that would resonate with the female target audience. This might include topics relevant to women such as fashion, beauty, family, health, and wellness.

When choosing influencers to collaborate with, businesses should consider not only their popularity and reach but also their ability to appeal to the female target audience. This could involve selecting influencers who predominantly have female followers or who are known for their appeal to women. These implications should help businesses better utilize influencer marketing to achieve their business objectives through more targeted engagement with the female target audience.

Considering the finding that fewer respondents have an Instagram account as age increases, it's crucial for companies to adopt a targeted marketing approach. They should carefully define their target demographic based on age groups.

If the target audience comprises older individuals, it may not be advisable to invest in Instagram marketing due to lower participation rates among this demographic. ompanies should conduct thorough market research to identify the age groups most likely to engage with their products or services. By segmenting their audience based on age demographics, they can tailor their marketing strategies accordingly. For

instance, if the target demographic consists mainly of younger individuals, investing in Instagram marketing would be recommended due to its popularity among this age group. Regardless of the chosen marketing channel, companies should continuously monitor the effectiveness of their strategies and be prepared to adapt based on evolving consumer behaviors and preferences. This may involve conducting regular surveys or analyzing engagement metrics to ensure that marketing efforts resonate with the target audience effectively.

We consider as limitation the unbalanced sample of respondents, a larger representation of women than men. However, we want to minimize this limitation by continuing in our research as we want to examine another atributes, for instance income, economic status or the residence of respondets.

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THE FUTURE OF EMPLOYEES' LEARNING: UNDERSTANDING GENERATION Z ATTIITUDES TOWARDS ARTIFICIAL INTELLIGENCE

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Generation Z's attitude towards ever-developing technology and related AI reflects the interweavement of curiosity, fear, and cautious optimism. Since AI is constantly developing, it certainly changes the labour market, organisation processes, different human resource processes, as well as the training and development of employees. The main purpose of the research reported in this paper is to examine the attitudes of Generation Z regarding the use of artificial intelligence in the context of employee training and development. Empirical research was conducted on a sample of 129 respondents from Slovenia, and hypotheses were tested by descriptive statistics and T-test. The research results confirm the positive attitudes of Generation Z members towards contemporary training models, regardless of their sociodemographic characteristics. This aligns with the finding that Generation Z shows a strong interest in AI, with many actively seeking out information on the topic and learning about it, either formally or informally. This paper contributes to the human resource management literature because it brings new insights into Generation Z, whose participation in the active workforce will significantly increase in the coming years.

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1 Introduction

Generations can be defined as groups of individuals born within the same years, facing similar socio-cultural circumstances and comparable challenges and tasks. Due to similar circumstances in which they grew up, individuals from the same generation share common values, beliefs, expectations, and behaviours (Taş et al., 2017). Throughout recent history there have been several workforce generations, such as Silent Generation, Baby Boom, Generation X, Generation Y, Generation Z, and lastly Generation Alpha (Serinikli, 2019). Generation Z, which is the subject of research reported in this paper, is not still fully integrated into the labour market and it is considered as the upcoming generation of the workforce.

Along with the changed characteristics of the workforce, there are also changes in work and management processes, caused by the rapid development of technology. This particularly applies to artificial intelligence (AI). AI is a comprehensive concept incorporating many technologies and strategies that aim to empower robots to carry out jobs and activities that often need human intelligence (Russell & Norvig, 2016). AI mainly aims to replace monotonous and repetitive tasks traditionally performed by humans. Replacing people with automation enhances the quality and tempo of work while reducing costs (Muro et al., 2019). Kaplan and Haenlein (2019) propose a tripartite classification of AI systems, namely analytical, human-inspired, and humanized artificial systems. Analytical AI possesses only those qualities that align with those of cognitive intelligence.

It's clear that AI has potential to transform all aspects of business, including human resources management. For example, integrating AI-based systems in business organizations will profoundly impact workforce demographics, job characteristics, employer-employee relationships, human-technology interactions, customer experience, and competitive advantage in a rapidly changing market environment (Connely et al., 2021). The connection between technological development and employee training and development is particularly interesting. It could be characterized as a two-way relationship. On the one hand, the development of technology affects the obsolescence of the employees' knowledge and skills and imposes continuous learning as a necessity. Continuous training and general encouragement of the learning culture become the only way to ensure organisational flexibility and success. On the other hand, technological development affects the

way how organisations conduct training and development programs. Generally speaking, AI contributes to the efficiency, personalization, and adaptability of training programs (Guan, 2021; Maity, 2019). However, modern technologies may not be equally accepted by all generations of the workforce.

While a lot of research explores how AI is transforming various HRM functions, there is still a limited understanding of specific generational preferences for AI-powered training methods and how each generation responds to them. Therefore, by focusing on Generation Z, the upcoming workforce generation, and their attitudes as well as potential concerns towards AI, our paper contributes to the expansion of the literature on the role of AI in the future of employee training and development. This fills a gap in the existing literature.

2 Methodology

Through this research, we aimed to assess the attitudes of members of Generation Z regarding the application of AI in the process of training and development of employees. In other words, through this research, we observed members of Generation Z as the upcoming workforce. A questionnaire consisting of a combination of closed questions and five-level scales for expressing the attitudes of respondents was created. Data collection was carried out in January 2024. Total of 129 respondents from Slovenia participated in the research. These are students, i.e. young individuals who, by their age, belong to Generation Z. Although a segment of the respondents has some work experience, it is expected that this category will fully integrate into the labour market in a few years.

The main purpose of this research is to examine the attitudes of Generation Z regarding the use of AI in the context of employee training and development. The aim of the conducted empirical research is to provide an answer to the question of whether members of the upcoming workforce have positive attitudes towards contemporary training models, regardless of their sociodemographic characteristics. Based on previous knowledge about Generation Z, two hypotheses were formulated. Both of them assume positive attitudes of young people regarding the significant and use of AI in the context of employee training and development. The defined hypotheses were tested using the appropriate statistical analysis according to the presented methodology.

Regarding sociodemographic structure, there is a significantly higher participation of women in the sample. Women comprise two-thirds of the sample or 63.57%. Also, respondents who study social sciences (79.85%) are significantly more represented in the sample than respondents who study in the field of natural and engineering sciences (20.15%). In terms of employment, students with permanent, temporary or occasional employment participated in the sample with 54.26%.

3 Literature background

Generation Z was the first generation to be born into globally connected world, where ICT technologies were prevalent, and therefore characterised them. Most of their communications and friendships are established via social media (Nagy & Kölcsey, 2017). Members of Generation Z are open to new ideas and can swiftly apply any useful innovation to their daily lives. These innovations include mobile communication, social media, wearable technology, and AI. Therefore, Generation Z individuals are also called digital natives (Kayıkç & Bozkurt, 2018).

Some research shows that the majority of Generation Z believes that the development of AI has and will positively influence society (Dióssy, 2021). Generally, they are optimistic about future changes that AI may bring (Jyothychandra & Sulaimann, 2022).

The research was based on the assumption that a certain number of respondents are not familiar with the possibilities of applying AI in the process of training and development of employees, and the collected data confirmed this. Namely, only 41.08% of respondents stated that they are familiar with the possibilities of applying AI in the employee learning process. For this reason, a set of nine statements was created that describe various possibilities of improving training and development activities with the help of AI. With the help of a five-point scale, ranging from "not important at all" to "extremely important", the respondents expressed their attitudes regarding the importance of each of the nine formulated statements. Taking into account the previous knowledge about the attitudes of members of Generation Z, the following research hypothesis was formulated:

H1: Members of Generation Z consider AI as a significant tool for employee training and development, regardless of the observed sociodemographic characteristics.

The respondents' general attitudes regarding the use of AI in employee training and development were examined with the help of a set of ten statements. Some of them are positive, and others are negative. Respondents expressed their attitudes using a five-point scale, ranging from "strongly disagree" to "strongly agree." To avoid biased attitudes, the order of questions was randomized. Also, during statistical data processing, positive and negative statements were reconciled. In this phase of the research, the following hypothesis was formulated:

H2: Members of Generation Z have positive attitudes regarding the use of AI in employee training and development, regardless of observed sociodemographic characteristics.

To test the hypotheses, descriptive statistics (mean and standard deviation) and T-test were applied. The data were processed using the statistical software SPSS.

3 Results

Research results indicate that respondents understand AI quite well. The level of understanding is estimated by a five-point item, and the average value is 3.21 (the value of neutral midpoint is 2.5). This result is not surprising because 51.94% of the respondents have had the opportunity to learn about AI through formal and informal training methods. The high level of interest of Generation Z in the concept of AI is confirmed by the fact that 93.80% of respondents stated that they search for information and learn about AI independently, of their own volition. Also, 95.35% of the respondents believe that every student, regardless of their field of study, should learn about AI.

As explained in the methodology section, respondents' attitudes regarding the application of AI in employee learning processes were examined using two five-point scales. The first of them contains nine items about possible ways of applying AI in employee training and development programs. For example, "AI tools can recommend customized learning paths, including workshops, courses and

developing opportunities, based on performance metrics and identified employee skill gaps". The other statements within this scale are also positive, indicating positive aspects of the application of artificial intelligence in employee training and development programs. The Table 1 shows the average-rated level of estimated significance for each of nine items.

Table 1: Descriptive statistic regarding the significance of AI tools for improvement of employees learning process

	N	Mean	Std. Deviation
AI_ Possibil_Using_in_Training_1	129	3.75	.848
AI_ Possibil_Using_in_Training_2	129	4.05	.860
AI_ Possibil_Using_in_Training_3	129	4.17	.911
AI_ Possibil_Using_in_Training_4	129	4.14	.882
AI_ Possibil_Using_in_Training_5	129	3.50	1.039
AI_ Possibil_Using_in_Training_6	129	3.63	.893
AI_ Possibil_Using_in_Training_7	129	3.81	.893
AI_ Possibil_Using_in_Training_8	129	3.88	.857
AI_ Possibil_Using_in_Training_9	129	3.87	.922
Valid N (listwise)	129		

Source: Authors

It can be observed that respondents, on average, consider all nine items as significant, because in each case mean values are above the neutral midpoint. The reliability of this scale has been assessed using Cronbach's alpha coefficient, which is 0.831. Such a coefficient value indicates high internal consistency of the scale, reflecting a high level of stability and reliability in measurement.

When considering the average-rated significance of all nine items, T-test has shown that there is no statistically significant difference among respondents of different gender ($p = 0.078$, $p > 0.01$), study field ($p = 0.365$, $p > 0.01$), or employment status ($p = 0.015$, $p > 0.01$). Also, there is no statistically significant difference in the attitudes of respondents who are familiar with the possibility of applying AI in the process of training and development of employees, compared to respondents who are not familiar with such possibilities of AI ($p = 0.980$, $p > 0.01$). The presented results confirm the first hypothesis (H1).

Table 2: Significance of AI tools for improvement of employees' learning process – differences between respondent groups

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
AIApplicat_Av_ GENDER	Equal variances assumed	3.161	.078	1.844	127
	Equal variances not assumed			1.780	88.296
AIApplicat_Av_ STUDY_FIELD	Equal variances assumed	.827	.365	-.771	127
	Equal variances not assumed			-.829	42.623
AIApplicat_Av_ EMPL_STATUS	Equal variances assumed	6.109	.015	.443	127
	Equal variances not assumed			.456	123.574

Source: Authors

The second scale used in the research aimed to assess respondents' general attitudes regarding the application of AI in employee training and development. In this scale, we used seven positive statements (for example "AI improves employee experience during the learning and development process") and three negative statements (for example "AI dehumanizes the learning and developing process"). As explained in the methodology section, the order of the questions was randomized to avoid biased attitudes. Also, negative statements were reconciled with the positive statements. Table 3 contains the results of the descriptive analysis.

Table 3: Descriptive statistic regarding the use of AI in the employees learning process

	N	Mean	Std. Deviation
AI_in_training_General_Attitudes_1	129	3.80	.823
AI_in_training_General_Attitudes_2	129	3.71	.831
AI_in_training_General_Attitudes_3	129	3.73	.855
AI_in_training_General_Attitudes_4	129	3.90	.975
AI_in_training_General_Attitudes_5	129	3.22	1.023
AI_in_training_General_Attitudes_6	129	3.49	.858
AI_in_training_General_Attitudes_7	129	2.53	.985
AI_in_training_General_Attitudes_8	129	3.74	1.057
AI_in_training_General_Attitudes_9	129	2.66	1.320
AI_in_training_General_Attitudes_10	129	3.22	1.294
Valid N (listwise)	129		

Source: Authors

On average, level of agreement of respondents with the statements has a higher value than the neutral mean. As the negative statements were previously reconciled with the positive statements, these results indicate a positive attitude of the respondents regarding the application of AI in the employees learning process. Regardless of the above, the combination of positive and negative statements within this scale resulted in a slightly lower Cronbach's alpha coefficient value of 0.524. This coefficient value indicates moderate internal consistency of the scale.

Table 4: Application of AI tools in employees' learning process – differences between respondent groups

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
AIUse_Av_ GENDER	Equal variances assumed	3.544	.062	1.379	127
	Equal variances not assumed			1.330	88.088
AIUse_Av_ STUDY_FIELD	Equal variances assumed	2.576	.111	-1.203	127
	Equal variances not assumed			-1.334	44.641
AIUse_Av_ EMPL_STATUS	Equal variances assumed	2.331	.129	.377	127
	Equal variances not assumed			.381	126.842

Source: Authors

Regarding the average-rated level agreement of respondents with these statements, T-test has shown that there is no statistically significant difference among respondents of different genders ($p = 0.062$, $p > 0.01$), study field ($p = 0.111$, $p > 0.01$), or employment status ($p = 0.129$, $p > 0.01$). Also, there is no statistically significant difference in the attitudes of respondents who are familiar with the possibility of applying AI in the process of training and development of employees, compared to respondents who are not familiar with such possibilities of AI ($p=0.944$, $p > 0.01$). The presented results confirm the second hypothesis (H2).

4 Discussion and conclusion

The rapid development of modern technology, especially in AI, is revolutionizing our world. Generation Z, commonly known as digital natives, was born and raised in an era of widespread access to the internet and other technologies. Consequently,

Generation Z individuals are defined by their strong dependence on and use of technology in every aspect of their daily lives. Additionally, findings suggest that while the majority of Generation Z members see great potential in AI and believe it will positively influence society, there are also some concerns, mainly regarding its potential to eliminate some jobs and reduce opportunities for interpersonal interactions. Also, ethical considerations of AI are raised (Jyothychandra & Sulaimann, 2022).

Regarding the application of AI in learning processes, the majority of research focuses on formal learning processes of young individuals, such as those in higher education. Such research indicates that members of Generation Z are "generally optimistic about the potential benefits of AI, including enhanced productivity, efficiency, and personalized learning, and expressed intentions to use AI for various educational purposes" (Chan & Lee, 2023). However, there is not much research that considers members of Generation Z as the upcoming workforce and thus examines their attitudes through the prism of future employment. In terms of employee training and development programs, it is quite certain that there will be integration between traditional learning approaches and new approaches based on AI in the future, which may not be equally acceptable for all generations of employees. The results of this research showed that the upcoming generation of the workforce considers AI as a significant factor for the improvement of employees' learning process. Generally, they have positive attitudes regarding the use of AI in the employee training and development process, regardless of their sociodemographic characteristics such as gender, study field or employment status. Interestingly, all respondents have positive attitudes towards AI, although some of them were not familiar with the possibility of applying AI in the process of training and development of employees. As expected, both tested hypotheses were confirmed, and the results of this research are aligned with the results of similar research (Andrschchuk et al., 2022; Hernández-de-Menéndez et al., 2020; Persada et al., 2019), and previous knowledge about Generation Z.

Despite the small research sample, which is the major limitation of this study, research that considers Generation Z as the upcoming workforce can have multiple benefits for employers. A better understanding of the young generation's perspective towards AI, helps organisations to design training and development programs that would align with Generation Z's needs. Also, organizations could use this knowledge

to attract and retain young professionals, which currently is one of the major problems in the human resources management practice. For future research, it would be useful to explore how attitudes toward AI differ across generations. It would be interesting to see how AI is received by younger generations who were born and raised with ICT compared to older generations who have had to learn how to use it.

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LIMITS TO DISCRETIONARY DECISION-MAKING IN RAPIDLY CHANGING ECONOMIC ENVIRONMENT: FISCAL POLICY AND SPECIAL INTERESTS

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Over the last few decades, a noticeable change in the approach to stabilization policy can be observed, namely a shift from discretion to rule-based policy. Rules in economic policy ensure predictability and reduce uncertainty, help policymakers avoid short-term pressures from special interest groups, act in line with long-term objectives, and facilitate communication and increase accountability. Nevertheless, we witness major (endogenous and exogenous) shocks that require quick decisions through discretionary decision-making. Economic policymakers must respond flexibly to a rapidly changing economic environment, and discretionary decision-making in this context might be beneficial. However, a constant re-evaluation (inconsistency) of economic policy decisions and new discretionary decisions might create an unstable economic environment. Policymakers face information asymmetry in the form of incomplete or distorted information supplied by the sphere of influence (interest groups). This study investigates the relationship between institutional quality, represented by the degree of transparent lobbying as a proxy indicator of information asymmetry, and economic policy consistency, characterized by the volatility of fiscal policy discretion. We find that the higher the transparency of the lobbying environment, the lower the variability of fiscal policy's discretionary component. Understanding the determinants of fiscal policy volatility is crucial for achieving sustainable development.

Keywords:
fiscal policy, lobbying, discretion, information asymmetry, decision-making

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1 Introduction

Discretionary tools shape fiscal policies, impacting sustainability. Governments must make informed choices to balance immediate needs with long-term viability, fostering economic, social, and environmental well-being. Fiscal sustainability is crucial for a government's long-term financial health. It involves maintaining public finances in a credible and serviceable position over time. Key aspects include revenues, expenditures, debt, and employee benefits, all measured in present value terms. Structural pressures, such as suburbanization, demographic changes, and business cycles, impact a government's sustainability. Sustainable fiscal development encompasses environmental, social, and economic dimensions. While short-term local budgets may use temporary measures, a fiscally sustainable budget focuses on long-term viability, minimizing economic distortion, and promoting community welfare, equity, and environmental well-being (Chapman, 2022; Pradhan, 2019).

Economic policy discussions have grappled with the tension between rules and discretion in recent decades. Policymakers face a dilemma: Should they adhere to rules-based approaches, which offer predictability and systematization, or embrace discretionary decision-making to adapt swiftly to changing economic conditions? While rules provide stability (e.g., Kydland & Prescott, 1977; Lucas, 1986; Taylor, 2011), discretion allows flexibility (e.g., Kelman, 1990; Duflo et al., 2018; Bandiera et al., 2021). However, the balance between these approaches remains delicate, especially during crises like epidemics and war. Enhancing institutional transparency could be a solution to mitigate risks. Yet, the literature lacks sufficient exploration of the link between transparency and decision-making consistency.

Our approach recognizes that information asymmetry significantly impacts economic policy consistency. Governments grapple with incomplete or distorted information from interest groups and lobbying while simultaneously exploiting this asymmetry for their own interests. To mitigate this, institutions—such as rules of the game—can minimize the impact of information asymmetry. We propose that transparency in decision-making is a crucial factor for consistent economic policy. Testing this theoretical approach using data on institutional quality and fiscal policy volatility reveals the consequences of inconsistency in economic policy.

This paper is divided into five sections. Section 2 provides the theoretical underpinning. Section 3 presents the methodology and describes the variables used. Section 4 introduces the empirical results, and Section 5 discusses the main findings and concludes the paper.

2 Theoretical Underpinning

The problem of asymmetry information is primarily linked with the agency, contract theory and the firm (Gravell & Rees, 2004), efficiency wage theory (e.g., Stiglitz 1974, 1976; Akerlof & Yellen 1986, 1990; Greenwald & Stiglitz 1988), credit markets and its implications for macroeconomic (Stiglitz & Weis, 1992). Later the literature also has started to cover the problem of imperfect/asymmetric information in economic policy, e.g., Mirrlees (1971), Baron and Myerson (1982), mainly in regulation as well as in taxation (e.g., Stiglitz 2002; Shapington and Stiglitz 1987; Lafont and Tirole 1993). Agur et al. (2021) have provided a foray into the intersection between the political economy factors and dynamic consistency problems of financial regulation, which have been examined separately in the previous literature. The information asymmetry with which the model works is on the side of the public, as it has a minimal overview of the healthy condition of the financial sector. The results confirm that policy credibility may fail, and welfare may decline due to the interaction between time inconsistency and political motivations. Like private actors in contractual relationships, governments also encounter information gaps when designing policies and remedies. In essence, attempts to rectify market failures or undesirable allocations may not only fall short of the mark but could potentially exacerbate the initial inefficiency or socially adverse outcomes. Stiglitz (2017) concludes that the problem is not just information asymmetry but mainly its endogeneity and underlines the relevance of institutions and the rules of the game. However, it is essential to note that the government, as a rule-maker, may follow the same patterns in seeking re-election and set or bend the rules to suit its interests.

Dynamic inconsistency vs rules-based decision-making is a common problem for economic policymaking. Inconsistency undermines credibility and the systems in which decision-making or judgments are made. Bandiera et al. (2021) outline that rules limit the government's ability, as an agent, to pursue its private interests at the expense of taxpayers and point out that the risk of misuse of discretionary instruments, especially in the case of weak institutions or external shocks, remains

high. And they further clarify that the flexibility of the rules consists, among other things, of the relaxation of transparency rules, including rules for a transparent decision-making process. On the other hand, discretion allows the government to use its knowledge of the context to respond quickly to unforeseen changes. Our approach builds upon the rational expectations of economic agents, but we place renewed emphasis on the context of information asymmetry compared to previous approaches in the literature. Asymmetric information, which typically favours the agent, can give rise to two primary challenges for the principal: adverse selection (related to hidden information) and moral hazard (related to hidden actions). Consequently, we posit that information asymmetry significantly influences economic policy decisions. To address this, enhancing the institutional environment's quality—particularly through transparency in decision-making—can mitigate information gaps and bolster the credibility of government decisions regarding economic policies and objectives.

In this paper, we restrict economic policy to fiscal policy, and from this perspective, we understand credibility as the low volatility of fiscal policy. We consider institutional quality (IQ) as a proxy for information asymmetry –- the higher the IQ, the lower the information asymmetry. We narrow down institutional quality to transparency in decision-making, which we assess using a set of measures that regulate/constrain economic policy decision-makers (the decision sphere) and economic policy influence holders (the sphere of influence).

3 Methodology and Data

In this study, we delve into discretionary policy, specifically emphasizing fiscal policy and its associated variables. To account for the impact of the business cycle, we adjust these variables and investigate their relationship with institutional quality. Our analysis builds upon prior research (Laboutková et al., 2020; Šimral and Laboutková, 2021; Laboutková and Vymětal, 2023), highlighting transparent decision-making rules as key indicators of institutional quality. Notably, decision-making processes, including policy implementation and realization, are often influenced by specific interests, such as lobbying. Considering these, we have identified 16 measures enhancing transparent decision-making and collected unique data. These 16 measures with 121 measurable indicators are grouped in the *catalogue of transparent lobbying environments* (CTLE). The obtained data is the result of the transparent

lobbying assessment according to CTLE for six countries in Central and Eastern Europe. The selection of Austria, the Czech Republic, Hungary, Poland, Slovakia, and Slovenia is based on a unique historical background (Habsburg legacy) but with varying institutional qualities were intentionally chosen. However, a small number of countries have shown limits for the demonstration of statistical links with fiscal policy volatility. In addition, the Czech Republic and Slovenia had to be excluded from the set of countries because equation (1) does not seem suitable for these countries' data. Another limitation is the static nature of the data; the data collection took place on time in the fourth quarter of 2019. Refer Table 1 for details.

Table 1: Descriptive Statistics

Variable	*No. of. obs.*	*Mean*	*Standard deviation*	*Min*	*Max*	*Type of transformation over the time window*	*Source*
	Variables included in the estimation of the fiscal policy rule						
F^1 - General government primary net lending/borrowing	297	-0,82	3,36	-29,29	4,98	Not applicable	International Monetary Fund, World Economic Outlook Database
F^2 - General government net lending/borrowing	297	0,17	0,72	-6,43	4,06	Not applicable	International Monetary Fund, World Economic Outlook Database
F^4 - General government revenue	297	42,45	6,77	22,43	56,36	Not applicable	International Monetary Fund, World Economic Outlook Database
F^5 - General government revenue	297	45,17	7,31	24,20	64,91	Not applicable	International Monetary Fund, World Economic Outlook Database
Output gap	297	-0,99	3,15	-13,16	7,95	Not applicable	Output gaps according to the European Union's Commonly Agreed Methodology
General government gross debt	297	68,32	38,45	6,16	211,90	Not applicable	International Monetary Fund, World Economic Outlook Database

	Variables included in the estimation of the volatility of fiscal policy discretion						
Life expectancy	224	79,67	2,82	73,96	83,20	Average	World Bank, World Development Indicators
Investment to expenditure	224	0,02	0,02	-0,02	0,07	Average	Authors calculation
CTLE - lobbyists	6	0,26	0,25	0,04	0,58	Level at time 2019	Laboutková et al. (2020)
CTLE - targets of lobbying	6	0,48	0,16	0,22	0,71	Level at time 2019	Laboutková et al. (2020)
CTLE - sunshine principles	6	0,57	0,11	0,41	0,71	Level at time 2019	Laboutková et al. (2020)
CTLE - monitoring and sanctioning	6	0,30	0,17	0,13	0,53	Level at time 2019	Laboutková et al. (2020)
CTLE - total	6	0,40	0,11	0,29	0,55	Level at time 2019	Laboutková et al. (2020)
Parliamentary election years	297	-	-	-	-	Not applicable	University of Gothenburg, Quality of Government (QoG)
Membership in EU	297	-	-	-	-	Not applicable	

To uncover the significance of the quality of the decision-making process in minimizing unwanted discretionary fiscal behaviour, we use Angello and Sousa's (2014) econometric model. We partially modify variables to capture the quality of the decision-making process better and, in our view, have the potential to influence governments' fiscal behaviour.

$$\Delta F_t = \alpha + \gamma \Delta F_{t\_1} + \delta GAP_t + \Gamma Z_t + \zeta_t^F \quad (1)$$

where F_t denotes the primary real budget balance or its components (real government revenue or real government spending), GAP_t is the output gap (to eliminate the impact of cyclical movements in revenue and expenditure), and Z_t is a vector of control variables, including typically a time trend and inflation. We consider general government gross debt and general government gross debt squared. Parameter α is a constant, γ captures the persistence of the fiscal policy instrument, δ tracks the responsiveness of fiscal policy to the business cycle, Γ is the vector of coefficients associated with the control variables, and ζ_t^F represents the discretionary component of the fiscal policy.

To estimate the standard deviations of the discretionary component for variable *F*, we consider real general government budget deficit, revenue, and expenditure, for consecutive, non-overlapping three-year periods from 2012 to 2020. Following Angello and Sousa (2014), we use the below model.

$$\sigma(\zeta_{i,t}^{F}) = \beta_0 \sigma(\zeta_{i,t-1}^{F}) + Y_{i,t}^{'}\beta_1 + \beta_2 Lex_{i,t} + X_{i,t}^{'}\beta_3 + \nu_i + \varepsilon_{i,t} \quad (2)$$

where $\sigma(\zeta_{i,t}^{F})$ is the standard deviation of the fiscal policy component of countries for the three-year non-overlapping period, $Y_{i,t}^{'}$ is the set of political and institutional variables, and $X_{i,t}^{'}$ is the set of macroeconomic variables, such as general government gross investment in non-financial assets as a percentage of general government expenditure and membership in the Eurozone. Variable $Lex_{i,t}$ denotes life expectancy at birth. The vector $\beta = (\beta_0, \beta_1, \beta_2, \beta_3)$ includes all parameters to be estimated, ν_i accounts for fixed effects, and $\varepsilon_{i,j}$ is an independent and identically distributed error term.

Similar to Angello and Sousa (2014), we eliminated the correlation between countries and exploratory variables and used the generalized method of moments (Holtz-Eakin et al., 1988) to estimate the following equation. In practice, we use the R software **(**Chaussé, 2010)**.**

$$\Delta\sigma(\zeta_{i,t}^{F}) = \beta_0 \Delta\sigma(\zeta_{i,t-1}^{F}) + \Delta Y_{i,t}^{'}\beta_1 + \beta_2 \Delta Lex_{i,t} + \Delta X_{i,t}^{'}\beta_3 + \Delta\varepsilon_{i,t}. \quad (3)$$

The periods are 2012–2014, 2015–2017, and 2018–2020. This reduces the number of observations in the second step, and thus, the number of possible choices of variables or regressors. These periods are relatively stable; therefore, we considered a constant as one parameters of the model.

4 Results

The provided econometric analysis has proved our hypothesis that the higher quality of the institutional environment demonstrated by greater transparency in decision-making reduces the information asymmetry and thus enhances the consistency of government decision-making regarding their economic policies. In this case, we have examined the volatility of fiscal policy instruments through the variables corresponding to catalogue of transparent lobbying environments.

The empirical findings validate the established hypothesis across the examined countries: greater transparency in the lobbying environment (as indicated by a higher CTLE score) corresponds to a higher quality institutional environment characterized by transparent decision-making processes (addressing who, why, and how). Specifically, this relationship is associated with reduced variability in the discretionary component of fiscal policy. Notably, this effect extends to key fiscal indicators, including primary net lending/net borrowing, general government revenue, and government total expenditure. Measures related to lobbyists and monitoring/sanctions significantly impact government revenues and expenditures. However, the hypothesis remains inconclusive for the categories of lobbied and sunshine principles.

Furthermore, our analysis reveals substantial persistence in fiscal policy volatility, as evidenced by the statistically significant coefficient associated with the lagged dependent variable. This persistence underscores the importance of inertia in the budgetary process and supports the use of a dynamic panel data model.

We also included another possible factor in our analysis, life expectancy, which is insignificant in a small sample of countries and behaves as a constant. However, a certain fraction of volatility does not change over a given period, and we express this stability using a constant term in our model, preferring life expectancy. Furthermore, we find that investment expenditure ratio is a significant economic variable with a statistically significant effect on volatility when excluded for total government expenditure in the baseline model.

The analysis of fiscal policy volatility was more extensive. We also added the other political factors of Eurozone membership and parliamentary election years to our models to control for their impact on the decision-making process. Our findings reveal no statistically significant associations.

5 Discussion and Conclusions

On the revenue side of the state budget, this dynamic often manifests through establishing various tax exemptions. A wealth of studies (e.g., Cao et al., 2018; Clausing, 2016; Devereux et al., 2008; Richter et al., 2009; Romero, 2019) supports the notion that tax exemptions incentivize lobbying efforts by interest groups aiming

to influence tax policy in their favour. Meanwhile, on the expenditure side, this phenomenon is evident in sectoral policies, where lobbying pressure seeks subsidies to bolster specific industries—a form of rent-seeking behaviour (Buchanan, Tollison & Tullock, 1980).

Moreover, the opacity of lobbying behaviour significantly impacts the efficiency of public procurement, a major component of discretionary government expenditure. When decision-making lacks transparency, corruption opportunities arise, particularly in public procurement.

However, well-set lobbyist regulations must also be complemented by an effective enforcement system. The results show that weak sanctions or insufficient compliance monitoring with established rules lead to higher volatility of discretionary fiscal policy.

The outcomes suggest that measures to ensure a transparent lobbying environment and, consequently, transparency in the decision-making process must be approached comprehensively, as it is clearly shown that their combination and logical interdependence significantly impact the fiscal policy setting. In a weakly regulated lobbying environment, lobbyists exploit this information asymmetry to their advantage.

The disadvantage is the one-shot data collection. In the next research stage, we can employ additional institutional quality indicators offering a more extended time series, such as Worldwide Governance Indicators and a more significant number of countries to test possible links at a robust level.

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Use of Artificial Intelligence in Slovenian Manufacturing Companies

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This paper deals with the current state and research trends of artificial intelligence in manufacturing companies. The main objective of the paper is to determine the adoption of specific artificial intelligence software in manufacturing. The results are based on a subsample of 141 manufacturing companies that are located in Slovenia. The data were gathered, obtained through the 2022 European Manufacturing Survey research project. The results show that the use of artificial intelligence differs heavily in specific manufacturing areas. The paper also presents the plans of Slovenian manufacturing companies in terms of introducing artificial intelligence software solutions by the end of the year 2025.

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1 Introduction

Artificial intelligence (AI) refers to a group of scientific disciplines and techniques that seek to mimic the mental abilities of humans. Although it may seem like a relatively young discipline, research and development in this field dates back to the Second World War, when Alan Turing and Warren McCulloch laid the foundations for so-called intelligent machines. The term "artificial intelligence", dates back to 1956, when it was coined by John McCarthy at a conference at Dartmouth (Council of Europe, 2024). While the technology represented enormous potential and interest for both academia and investors as early as the 1960s, it progressed only slowly over the next few decades, due to the inadequacy of computing power. In recent years, however, computing has undergone rapid and intense changes, which have led to an increase in the computational power of computers, and, consequently, to the rapid development of AI. OpenAI was one of the first companies to offer a prototype of a chatbot called ChatGPT, which was made available to the public free of charge in November 2022. In the first week, more than one million regular users were registered, and two months later the number of users exceeded 100 million. The figures confirm that there is a very strong interest in AI among individuals, and, in academia, the rise of AI is being equated with the discovery and use of electricity.

Therefore, in this paper, we present the results of the use of AI technology in manufacturing companies. AI has entered intensively into the daily lives of companies, individuals and society as a whole over the last year and a half. We point out that the survey was carried out in the first half of 2022, just before the big boom caused by generative AI tools such as ChatGPT. Undoubtedly, over the last year and a half, companies have realized the potential of these tools, and have started to integrate them into their everyday business. In line with the above, the results presented should be interpreted with caution, but they point to the fact that manufacturing companies had already started investing in and developing AI solutions before the second half of 2022.

This paper is organized as follows: first, we will introduce the use of specific AI solutions in manufacturing companies in general. The Methodological section explains the characteristics of the European Manufacturing Survey (EMS). After that, we present the use of selected AI solutions in Slovenian manufacturing

companies. Finally, a concluding discussion is provided for the findings, where some research limitations, and directions are given for future research.

2 Artificial Intelligence in manufacturing

AI offers a unique opportunity as an enabler for industrial systems, to solve complex manufacturing problems and improve the performance of entire systems based on learning from collected data (Peres et al., 2020). AI can be used for various tasks, such as data security, planning and control, monitoring of processes, prediction and diagnosis, and also for decision- making to achieve the desired goals.

The currently most important areas of application in manufacturing are process optimization, quality control, and predictive maintenance. In process optimization, the main focus is on making manufacturing processes more profitable and sustainable. Some applications of AI include predicting energy consumption and optimization challenges (Qin et al., 2018). In quality control, early detection of defects during each production step is highly desirable. This includes automatic visual inspection of parts (Ojer et al., 2020), multi-stage quality prediction (Peres et al., 2019) and online prediction of quality (Schmitt et al., 2020). The purpose of predictive maintenance is to avoid unplanned or unexpected downtime, while increasing machine uptime. The best maintenance strategy can be created based on maintenance effectiveness, costs, resources and previous data from various sources(Yan et al., 2017).

Based on that, the technologies examined in this paper are specific software that can be upgraded with an AI component.

The first is software for production process management (Oertwig et al., 2019), which is important for planning and controlling the production process. The providers of this software are numerous, and all offer additional functions, including AI functions.

Chiarini (2020) and Poth et al. (2020) discussed quality control software in terms of product control. The software helps to check whether all the parameters of the product meet the specification. With additional AI functionality, the operator checks

the AI component and teaches it whether the product is scrap or good, to prevent good products from being thrown away in the future.

The next software is the machine and equipment maintenance software (Lee et al., 2019; Cardoso and Ferreira, 2020). The software includes a maintenance plan to determine which repairs are carried out according to the plan. The AI functionality, equipped with sensors, checks for tool wear, and reports a possible failure with minimal downtime, saving the company money. The main goal of AI is to improve plant efficiency by minimizing downtime in production (Antosz et al., 2020).

The fourth software is used to manage internal logistics, and is usually used for mapping (e.g. transport, warehouse). Mathematical models and linear programming are usually used to find an optimal system for internal logistics (Knoll et al., 2019). However, by using sensors to track traffic and generate data that is fed into an AI algorithm, further dynamic changes and optimizations can be made, which, in turn, reduces costs for the company.

Halhoul et al (2021) conducted an extensive literature review on AI-based software for saving energy while maintaining optimal heating/cooling conditions. Their research shows that significant energy savings have been achieved at sites where such systems have been used.

The last software we included in our research is used to improve and innovate production processes. According to Machado et al. (2019), not much can be done to improve and innovate production processes without big data. In this case, sensors need to be placed in strategic locations to collect data, and big data cannot be analyzed with conventional software, but requires AI enhancements.

3 Methodology

The research data were collected using the EMS, coordinated by the Fraunhofer Institute for Systems and Innovation Research – ISI, the largest European survey of manufacturing activities. The survey's questions deal with manufacturing strategies, the application of innovative organizational and technological concepts in production, cooperation issues, production offshoring and backshoring, servitization, and questions of personnel deployment and qualification. Data on

performance indicators such as productivity, flexibility, quality, and returns are collected in addition. In our last EMS research round, we added questions on digital elements of products, new business models, artificial intelligence, the circular economy, etc. The survey takes place every three years. In most countries, EMS is organized as a paper-based survey at the company level (the core questionnaire has six pages). The persons contacted to fill in the questionnaires are the production manager or the CEO of the manufacturing companies. The responding companies present a cross-section of the main manufacturing industries. Included are producers of rubber and plastics, metal works, mechanical engineering, and electrical engineering.

The survey is conducted among manufacturing companies (NACE Revision 2 codes from 22 to 32) having at least 20 employees. The main objectives of the EMS project are to find out more about the use of production and information technologies, new organizational approaches in manufacturing, and the implementation of best management practices. Our research is based on EMS data from a Slovenian subsample from the year 2022 round. We received 141 responses – a 16% response rate. We classified manufacturing companies into three classes, based on the number of employees. The largest share of respondents was from medium-sized companies (around 49%), followed by small companies (31%) and large companies (20%).

4 Results

The use of AI was firstly explored through a question which pertained to the areas of application of specialized software, and if that software also uses any elements of self-learning, or, more specifically, AI. We were interested in the following areas in the manufacturing companies:

- production process management,
- quality control,
- machinery and equipment maintenance,
- internal logistics management,
- energy management,
- and improvements or innovations in products or production processes.

The general use of specialized software and AI-based software was explored and presented in Table 1. We have observed the incorporation of specialized software and AI functionalities in different operational areas of manufacturing companies. Firstly, we have observed the use of general software solutions in previously described areas (column "Have SW"). The proportion of companies using such solutions is significant, but varies by the examined areas. Unsurprisingly, two thirds of companies use manufacturing process management software, which is in line with the share of manufacturing companies that have integrated (ERP) or partial (MES) IT solutions in production. In addition, we wanted to know whether these software solutions already include self-learning algorithms or AI functionality. The column "SW+AI (all)" presents the total share of Slovenian manufacturing companies that use software solutions that already include self-learning algorithms or AI functionality. The column "SW+AI (SW owners)" presents the share of Slovenian manufacturing companies that use general software solutions, but include self-learning algorithms or AI functionality in these software solutions.

The data in Table 1 highlight a predominant reliance on specialized software in the management of production processes, with a 62% adoption rate; however, AI integration in this area is still at 8%. In the quality control, 43% of companies utilize specialized software, with 12% leveraging AI functionalities. Meanwhile, maintenance of machinery experiences a 37% adoption rate for specialized software, followed by management of internal logistics at 31% adoption rate. Only 8% of companies leverage AI functionalities for maintenance and 6% for internal logistics. The last two areas are Improvement or innovation of production processes and Energy management, with 26% and 23% adoption rates respectively. Similarly, as before, only 8% of companies leverage AI functionalities in the area of improvement and innovation of production processes, and only 6% of companies leverage AI in energy management. Even though there are companies that use specialized software, there are only a few who actually use software with AI.

In general, around 20-30% of companies that use a software solution for a specific domain include AI functionality in their software solutions. The overall share of Slovenian manufacturing companies using AI-enabled software is between 5% and 12%.

Table 1: Adoption of AI-based software in Slovenian manufacturing companies

Software (SW)	Have SW	SW+AI (all)	SW+AI (SW owners)
Software for Management of production processes	61,7%	7,8%	12,6%
Software for Quality control	43,3%	12,1%	27,9%
Software for Maintenance of machinery and equipment	36,9%	7,8%	21,2%
Software for Management of internal logistics	30,5%	5,7%	18,6%
Software for Energy management	23,4%	5,7%	24,2%
Software for Improvement or innovation of production processes	26,2%	7,8%	29,7%

Table 2: Planned use of AI-based software in Slovenian manufacturing companies by 2025

Software (SW)	Plan to use AI by 2025
Software for Management of production processes	20,4%
Software for Quality control	21,3%
Software for Maintenance of machinery and equipment	12,4%
Software for Management of internal logistics	8,2%
Software for Energy management	7,4%
Software for Improvement or innovation of production processes	10,6%

Table 2 shows the share of companies that are not yet using AI solutions, but plan to deploy them by 2025. It is important to reiterate that, at the time of the survey, companies were not yet aware of the potential of generative AI, so it can be assumed that, if they were not, these shares of planned use would be much higher.

5 Discussion and conclusion

This paper explores the current trends and applications of AI in manufacturing companies. Six major areas of AI application are provided: production process management, quality control, machinery and equipment maintenance, internal logistics management, energy management, and improvements or innovations in products or production processes. In order to gain insights into the actual use of AI and current areas of application in manufacturing companies, the data were used from the newest round of EMS 2022. Our results show that the share of companies using software solutions in these areas varies by the examined areas in terms of general use of software solutions, and in terms of software solutions with built-in AI functionality. The most frequently used software with AI functionality is in the field of Quality Control, where, especially, Computer Vision and Machine Learning Solutions are becoming an important role in manufacturing companies.

In our 2018 survey, only 5% of the surveyed population of manufacturing companies used AI in their processes. As we can see, the proportion of manufacturing companies using specific solutions based on self-learning algorithms / AI has increased significantly. Combining all 6 possible types of AI-based software, 20% of Slovenian manufacturing companies use at least one of these six types.

As is the case with all research, some limitations must be taken into account when considering the reliability, significance, and general use of the obtained results. Firstly, once again we must point out that our survey was conducted few months before the arrival of AI solutions that became generally more accessible in companies and society in general. Second, the data from Slovenia contain 141 companies in the EMS 2022 round. Although the sample is not small, further research should go in the direction of a larger sample of more countries.

In the future we will also make a more in-depth analysis regarding the use of AI, where we will consider company size, the technological intensity of the industry they belong to, and their status as the final producer or supplier. We will also look into the relationship between the introduced AI solutions and the use of specific digital technologies.

In 2025, we will conduct a new survey to put even more emphasis on AI issues. We can expect a significant increase in the share of manufacturing companies deploying and using AI capabilities in different ways. Tools such as ChatGPT and a range of similar tools and their derivatives have accelerated the use of AI enormously in the last year and a half. Businesses are realizing the huge potential of this technology, and, in particular, are discovering areas where AI technology can help them. These are often areas where, less than two years ago, manufacturing companies could not even imagine the potential benefits of AI.

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THE EFFECT OF STAKEHOLDERS ON SUSTAINABILITY DISCLOSURE QUALITY: A THEORETICAL FRAMEWORK

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As sustainable business practices continue to gain prominence in the corporate landscape, stakeholders play a pivotal role in influencing organizations' commitment to sustainability disclosure. This paper proposes a stakeholder theory-based model to examine how stakeholders influence firms' sustainability disclosure quality. The framework includes board composition, capital structure, ownership structure, and culture as key variables. Size, industry affiliation, profitability and growth opportunities are considered, with firm-specific characteristics as control variables.

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1 Introduction

As firms experience economic and technological growth, they often face scrutiny regarding their social and environmental impacts. The emphasis on transparency and accountability has driven the need for firms to disclose information about their sustainability initiatives, enabling stakeholders to assess their social and environmental performance. The increased public interest in sustainability issues has prompted the development of various legislative regulations all over the world (Minutiello & Tettamanzi, 2022). While some regions have legislative requirements for firms to make disclosures, it is worth noting that in many parts of the world, firms engage in voluntary disclosure practices. However, the credibility and reliability of such reports have received extensive criticism in the literature indicating that there is a lack of relationship between the quality of disclosure and sustainability reporting practices (e.g. Landrum & Ohsowski, 2018). Rather than being used as a tool for accountability, such reporting is seen as a means of protecting or saving corporate image. While firms' disclosures are anticipated to facilitate decision-making, the approaches to reporting are becoming increasingly diverse (Velte & Stawinoga, 2017). Although there have been initiatives (for instance, UNGC Principles, OECD Guidelines for Multinational Enterprises, Global Reporting Initiative Reporting Framework, ISO 26000, AA1000) to propose appropriate reporting framework, there are still questions about the quality of the information shared.

Previous research has focused primarily on the quantity of disclosure (Al-Tuwaijri et al., 2004; Cho & Patten, 2007; Clarkson et al., 2011), while only a limited number of studies have examined the topic of disclosure quality (Melloni et al., 2017). However, findings have presented conflicting outcomes, highlighting the need for additional research to obtain a more comprehensive understanding of the quality of sustainability reporting regarding nonfinancial aspects such as managerial attitudes and culture (e.g. Hahn & Kuhnen, 2013). According to stakeholder theory, which argues that the primary purpose of business is to create value for all stakeholders, businesses should consider and prioritize the interests of all stakeholders, not just shareholders, in all processes (Freeman, 1984). Indeed, sustainability reporting plays a vital role in enabling stakeholders to make informed decisions regarding the sustainability performance of firms. In this context, the concept of quality disclosure in sustainability reporting becomes crucial.

Within the scope of this study, we seek to answer to what extent stakeholders have an impact on the sustainability disclosure quality, that is transparent and accountable disclosure of sustainability practices. Considering the stakeholder theory, we aim to propose a framework to comprehend how stakeholders affect sustainability reporting quality of the firms. Accordingly, we assumed four main dimensions, specifically i) capital structure, ii) ownership structure, iii) board composition, iv) culture. Each dimension represents "creditors", "shareholders", "management" and "employees, customers and suppliers" respectively. Firm-specific characteristics consisting of size, profitability, growth opportunities and industry affiliation is considered as control variables.

The remainder of the paper is organized as follows. Studies on sustainability disclosure quality are discussed in the second section. Theoretical framework including the theory explaining sustainability practices, and variables used in the framework are explained in the third section. The study ends with conclusion.

2 Sustainability Disclosure Quality

Sustainability reports are the primary channel for communicating a firm's social and environmental impact. In practice, the financial report of a firm has a limitation in that it does not encompass information pertaining to non-financial aspects of firm activities. Thus, firms address these issues in their annual reports or through complementary reports (Martínez-Ferrero et al., 2015). It has grown in popularity and the frequency of information disclosure has increased significantly (Martínez-Ferrero et al., 2015). However, sustainability disclosure can, instead, serve as a mere facade for the firms to create an illusion of transparency and accountability essentially maintaining a "cosmetic behavior" (Di Vaio et al., 2023). Moreover, there are significant differences in the quality of sustainability reporting between firms, which can make it challenging for stakeholders to evaluate the sustainability performance of businesses since it is prepared on a voluntary basis and there are no standard models.

The existence of research directions to examine the quality of sustainability reporting in the literature makes it valuable to address the issue (Dewi et al., 2023). When analyzing these voluntary disclosures, where the subjective perspectives of the author(s) and the opinions of managers come into play, there is often a predominant

focus on the quantitative aspects. This emphasis on quantitative features can sometimes overshadow the quality of the information being shared. In particular, there is a need to clarify how information is disclosed rather than what is or is not disclosed since firms may choose to withhold unfavorable information below a certain threshold level of disclosure, thus sustainability reporting necessitates the establishment of specific reporting examinations (Hummel & Schlick, 2016).

As indicated by Hummel and Schlick (2016), quantity of classified sustainability disclosure items is major concern in previous studies. Rather, how information disclosed should be illuminated. Quality should lie in how the information disclosed changes stakeholders' knowledge of the firm's business strategy (Brammer & Pavelin, 2008). However, designing and implementing a sustainability report that meets the needs of these diverse stakeholders is an intimidating task. Previous studies have predominantly focused on disclosure quantity (Al-Tuwaijri et al., 2004; Cho & Patten, 2007; Clarkson et al., 2011), with limited attention to quality (Melloni et al., 2017). This has resulted in contradictory findings, highlighting the need for more comprehensive understanding of sustainability reporting quality and emphasizing the lack of research on determinants such as managerial attitudes and culture as asserted by Hahn and Kuhnen (2013). Hence, our intention is to propose a framework to comprehend how stakeholders affect sustainability reporting quality of the firms.

3 Theoretical Framework

We build our assumptions based on stakeholder theory proposed by Freeman (1984) in this study. Freeman (1984) defined stakeholders as shareholders, all individuals and groups associated with firm objectives. Stakeholder theory is based on three main pillars: the descriptive approach, which aims to define the behavior among stakeholders; the normative approach, which addresses the responsibility, ethics, and moral obligations of corporate behavior; and the instrumental approach, which focuses on engaging and interacting with stakeholders directly and indirectly (Bailur, 2006). These pillars collectively contribute to a comprehensive understanding and application of stakeholder theory. In particular, the last approach points to the interdependence of resources in achieving goals, making stakeholder theory an important tool for corporate sustainability practices.

Sustainability reporting can have positive and negative implications considering stakeholder theory. Stakeholder theory argues that stakeholders provide significant resources for firms, and in return, firms are expected to meet the expectations of their stakeholders. Therefore, sound relationships with the stakeholders should be formed (Wang et al., 2016). Aware of such power, stakeholders prioritize firms that conduct operations that have a positive environmental and social effect. The critical issue here is that stakeholders need to find firms reliable in sustainability practices (Mcwilliams et al., 2006). Therefore, sustainability reports can be expressed as an important strategic tool that requires establishing strong relationships with stakeholders.

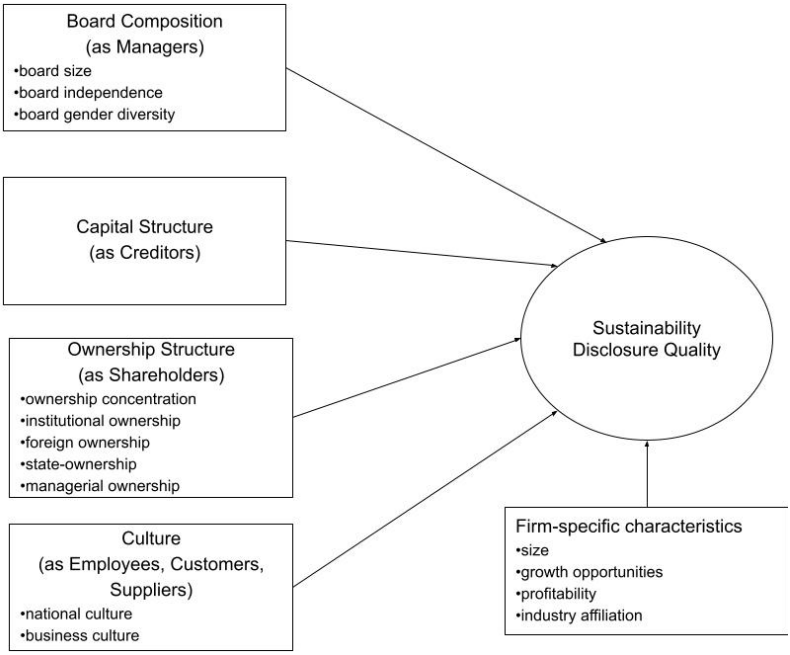

Figure 1: Theoretical framework

The conceptual framework we developed to determine the extent to which stakeholders influence the sustainability disclosure quality is illustrated in Figure 1. Accordingly, capital structure representing creditors, board composition representing the management, ownership structure representing shareholders and finally culture representing employees, customers and suppliers are the variables that we consider to be influential on the sustainability disclosure quality. As control

variables, we consider firm-specific characteristics such as size, industry affiliation, profitability, and growth opportunities.

3.1 Sustainability disclosure quality as a dependent variable

Stakeholder theory emphasizes the importance of considering and meeting the expectations of various stakeholder groups in achieving sustainable and responsible business practices. There is no consensus in the literature on high quality reporting disclosure. Although there seems to be a certain standard on how earnings are reported in mandatory disclosures, approaches to measuring quality in voluntary disclosures generally consist of ranking or self-constructed measurement methods. In particular, the question of whether a standard can be established for the latter approach is at the center of research stream recently (Hummel & Schlick, 2016). In quality measurements, it is common to use environmental and social scores by considering GRI guidelines (Al-Tuwaijri et al., 2004; Clarkson et al., 2008; Martínez-Ferrero et al., 2015). This approach helps stakeholders compare and benchmark firms' sustainability efforts and encourages firms to improve their sustainability practices. GRI (Global Reporting Initiative) offers sustainability reporting standards that guide organizatins in effectively communicating and demonstrating accountability for their environmental, economic, and social impacts, thus serves as a facilitator for transparency and dialogue between firms and their stakeholders.

3.2 Independent Variables

Extensive research has been conducted on the correlation between corporate governance and the disclosure practices of organizations (e.g. Amran *et al.*, 2014; Correa-Garcia *et al.*, 2020 Amran et al., 2014; Dewi et al., 2023). Numerous firms establish a new framework for sustainability and corporate governance by integrating a proactive commitment to sustainable business practices into their corporate identities (Sneirson, 2009). However, the role played by the board of directors in driving the sustainability agenda remains unclear. Therefore, we intend to understand the impact of the board of directors on sustainability reporting disclosure quality. Accordingly, board composition specifically board size, board independence, board gender diversity considered as proxies in line with Amran et al. (2014). A well-functioning board enhances sustainability reporting quality by curbing opportunistic behavior and promoting transparency through diverse membership.

Independent directors and female representation further bolster accountability and inclusivity, thereby improving the overall quality of information disclosed (Hahn et al., 2015; Correa-Garcia et al., 2020).

Extensive research indicates that culture has a significant impact on managerial decision-making (e.g. Hofstede, 1980). There is a clear link between cultural dimensions and stakeholders' preferences and actions as depicted by Tsakumis (2007). Specifically, firms that comprehend and adjust to customers' cultural norms, values, and communication styles are likely to establish trust and loyalty.

The establishment of the balance and its positive reflection on the corporate performance could be expressed as an important driving force of ownership structure. Specifically, Shleifer and Vishny (1986) stated that institutional investors can keep managers under discipline due to their high capabilities such as monitoring and intervention. Ownership concentration provides insights into shareholder control over corporate activities, with decreased concentration typically correlating with increased pressure for public accountability (Ghazali, 2007). Foreign ownership emphasizes long-term goals, necessitating greater transparency in sustainability disclosures (Ananzeh et al., 2023), while state ownership and managerial ownership have varying effects on disclosure quality, with stakeholder theory highlighting the importance of accountability in shaping sustainability practices (Eng & Mak, 2003; Ghazali, 2007). These ownership dynamics underscore the significance of including ownership structure in the developed framework for assessing sustainability disclosure quality.

Given that capital structure decisions play an important role in corporate stakeholder strategy, creditors stand out as stakeholders whose influence must be managed effectively, and managers are expected to meet their expectations for the firm's sustainability practices and prioritize transparency. However, empirical results are mixed. Clarkson et al. (2008) found a positive correlation between leverage and voluntary disclosures, while Bramer and Pavelin (2006) found negative relationship and Clarkson et al. (2011) found no significant relationship between the two variables. In this context, we included capital structure representing creditors into our framework.

3.3 Firm-Specific Characteristics as Control Variables

Larger firms have a greater influence, leaving a more significant impact, and consequently, they attract more attention, becoming more visible in the business landscape. As a result, these firms face heightened scrutiny and increased pressure from stakeholders (Gallo & Christensen, 2011). Larger organizations tend to prefer formal channels of communication to disseminate information about their activities. They recognize the importance of structured and specialized means of sharing information to ensure transparency and effectively communicate their initiatives to stakeholders (Brammer & Pavelin, 2008). Firms operating in industries with significant social and environmental impacts often find it necessary to engage in sustainability reporting driven by the sector-specific stakeholder pressure they face (Parsa & Kouhy, 2008). Moreover, sustainability disclosure within sectors can be influenced by mimetic tendencies, where firms imitate the reporting practices of their industry peers (Husillos et al., 2011). The assumption is that higher profitability provides the financial resources and resilience necessary to support sustainability reporting efforts and navigate any negative impacts that may arise from such disclosures (Kent & Monem, 2008). It is widely acknowledged that voluntary disclosure can help mitigate information imbalances (Clarkson et al., 2008). it is anticipated that firms with the most promising growth prospects would exhibit greater levels of sustainability disclosure.

4 Conclusions

In this study, we propose a model from the perspective of stakeholder theory on the extent to which stakeholders have an impact on the sustainability disclosure quality of firms. According to the developed framework, board composition representing the management mechanism on sustainability disclosure quality is taken into consideration. In this context, board size, board independence, board gender diversity are considered as relevant proxies. Capital structure proxied by leverage is taken into account to represent creditors. Ownership structure is considered as another variable that has an impact on sustainability disclosure quality representing shareholders. Ownership concentration, institutional ownership, foreign ownership, state ownership and managerial ownership are considered as relevant proxies. Finally, culture is also included in the model to represent firm employees, customers, and suppliers. National culture and business culture are also emphasized as relevant

proxies. Firm-specific characteristics as size, industry affiliation, profitability and growth opportunities are considered as control variables.

Testing of the model is envisaged to be carried out in the next stage. Accordingly, a longitudinal, or panel, data analysis that follows the sample of aforementioned factors could be considered as proper methodology. Also, developing countries stand out as a very suitable sample. Given that previous studies have predominantly focused on analyzing sustainability reports from developed countries as noted by Bachoo et al., (2013), examination of firms considering developing countries will lead to valuable insights. Developing countries, which play a key role in global industrial production, are under increasing pressure for economic and social sustainability, particularly on environmental issues. Maintaining competitiveness and accessing global markets requires compliance with international regulations. Accordingly, greener technologies and practices are needed in developing countries. Steps taken in this context encourage technological innovation, cost savings, improved market reputation and less environmental damage.

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Application of PrOACT Model in Innovation Decision-Making

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Innovations represent one of the key factors in improving business and a source of a company's competitive advantage. The PrOACT model has been identified as one of the methods that provide decision-makers with a holistic and systemic approach to decision-making. The research in this paper focuses on decision-making about innovations within the PrOACT framework. The research goal is to emphasize the importance of a systematic approach to innovation decision-making within the PrOACT framework. A case study was applied as a qualitative method of empirical research, involving a comprehensive analysis of collected data. Interviews were used as a primary data collection technique, and the analysis of regular financial reports served as a secondary data collection technique. The theoretical and methodological contribution of the paper lies in providing a holistic framework for innovation decision-making through the application of the PrOACT decision-making model. In practical terms, the research can offer guidance to managers of small businesses, especially teams in the IT industry, for decision-making based on the PrOACT model, allowing them to define goals adequately and consider relevant alternatives in making innovative decisions.

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1 Introduction

The rapid growth of information and communication technologies, increasing competition, the rate of technological changes, and global economic circumstances that lead to more frequent networking are some of the most important factors that have radically changed the functioning of modern organizations. In the face of such complex and dynamic business conditions, the need for innovation has never been more expressed (Gumusluoglu & Ilsev, 2009; Tellis et al., 2009; Zlatanović, 2020). Accordingly, innovations can be seen as a driver of economic development that plays a crucial role in enhancing the competitiveness of companies and national economies (Rosenzweig, 2017). Due to the globalization of business, companies are compelled to engage in intense competitive battles, especially in high-tech industries (Horn & Brem, 2013). This results in contemporary business conditions requiring companies to possess a complex set of skills and knowledge to ensure continuous innovation of their products, services, and processes (Mosey et al., 2002). Similarly, Du Preez & Louw (2008) indicate that successful innovation requires an integrated decision-making process, product design, and the implementation of new technologies. Managing complex information is an important part of activities in the modern decision-making process. Today's real-world problems involve complex sets of data, different perceptions, and numerous interest groups involved in the decision-making process (Kazimieras, Zavadskas et al., 2019). In fact, decision-making in the context of innovations falls within the domain of multicriteria decision-making based on conflicting goals and multiple decision criteria. Therefore, the use of the PrOACT decision-making approach as a simple and practical method of multicriteria decision-making is crucial for resolving complex problem situations. This method helps decision-makers to systematically think about all potential alternatives and their consequences, by identifying key decision elements and understanding them individually. It enables them to make the best decision, through the application of compensatory decision-making methods (Nikolić, 2024).

Certain researches examine the decision-making process in the context of innovations (e.g. Van Riel et al., 2004; Schneckenberg et al., 2017; Mosey et al., 2002), and some researches examine the PrOACT model of decision making (e.g. Utami, 2015; Nixon et al., 2016; Albert et al., 2018). However, no research deals with the application of the PrOACT model in innovation decision-making to the best of the authors' knowledge. This represents a certain research gap that this study aims to

address. Accordingly, the research subject of this paper is innovation decision-making, viewed within the conceptual framework of the PrOACT decision-making model. The research goal is to emphasize the importance of a systematic approach to innovation decision-making through the conceptual framework of the PrOACT model. The paper is structured into three connected parts. The first part presents some of the key theoretical aspects of the concept of innovation, the decision-making process, and the PrOACT decision-making model. Then, the research methodology is presented, explaining how the case study was created, data collection methods that were used, such as interviews and the analysis of regular financial reports of the company. The results of the conducted case study and their discussion are the subject of the third and fourth parts of the paper. Finally, certain conclusions, identified implications, and limitations of the conducted research are presented.

2 Literature review

Kariuki & Kilka (2017) state that innovations can be described as the implementation of discoveries, or as a process in which new products, systems, or processes emerge. Similarly, viewing innovations as an essential driver of economic success and growth, Schumpeter (1934) observes innovations as new products, new production methods, new markets, new supply sources, and new ways of organizations. In other words, innovations represent the crucial point of economic changes (Lundvall & Nielsen, 2007), that make innovative concepts increasingly significant in business practice. This is particularly the case for small and medium-sized enterprises, where innovative tools, such as innovative organizational structures, are widely applied (Horn & Brem, 2013). Therefore, it can be said that innovative organizations are those that consistently practice innovative behavior over a certain period (Nilakanta, 1996). For such organizations, the adoption of innovations is of particular importance, leading to increased organizational performance and improved business operations (Dos Santos & Pfeffers, 1995), as well as decision-making processes in unpredictable and unstable environments (Schneckenberg et al., 2017).

The complexity and uncertainty of the environment require organizations to manage information rationally, i.e., to create knowledge, to coordinate activities in problem-solving processes and manage environmental uncertainty (Nicolas, 2004). Crawford (1997) indicates that decisions are made in different forms, at different

organizational levels, and different stages of the innovation process. Additionally, the decision-making process is defined by the perspective from which it is observed, where the same internal or external decision stimulants can be perceived and interpreted differently by managers in different or even within the same organization (Papadakis et al., 1998). Characteristics of the decision-making process that can significantly influence the decision outcome include the duration of the decision-making process, the level of rationality of the decision-maker, the degree of political activity in the decision-making process, the number of individuals/groups involved in the process, and the level of compatibility/conflict of values and opinions of decision-makers (Goll & Rasheed, 2005). Differences in the level and nature of uncertainty, as well as the intensity of the consequences a decision has on organizational operations, can also be expected between different innovation phases. For example, preoperative screening and analysis of the business environment are crucial, where new products are assessed based on potential profitability, as well as the entire operational development phase of a new product or service (Van Riel, 2004).

Hammond et al. (1999) describe a structured approach to analyzing problems with multiple criteria and alternatives. This model emphasizes the importance of a valid Problem definition, identifying the most important outcomes or goals of the decision under consideration, and generating a creative and diverse list of decision alternatives or options. The final steps in the PrOACT model include analyzing the consequences of each alternative, with the goal of determining the usefulness of each alternative according to defined objectives, as well as making trade-offs or compromises using the dominated alternative and even swap method, which is used when decision-makers are in a situation where they must choose between conflicting goals (Barksdale & Smith, 2014). When using the dominant alternative method, it is necessary to respect to the following decision rules: if alternative A is better than alternative B for some goals and is not worse than B for other goals, then B can be eliminated from further consideration. In this case, it is said that alternative A dominates alternative B – B is the dominant alternative. On the other hand, in the even swap method, if all alternatives are equally rated for a considered goal (e.g., costs), then that goal can be disregarded when choosing between alternatives. In this process, when multiple alternatives are in play, a consequences table can be helpful (Hammond et al., 1999).

3 Methodology

A case study, as a qualitative method of empirical research, involves a comprehensive analysis and discussion of data to uncover causality and established relationships in the examined problem situations (Zhang & Holzer, 2002). The case study is characterized by the ability to elaborate and analyze the objects of study in detail, by revealing different perspectives on the observed problem (Jiao et al., 2017). Therefore, to determine the key innovation decision-making factors using the PrOACT model, primary data was collected through interviews with the company owner. Simultaneously, based on insights and the analysis of regular financial reports, secondary data was collected. In this research, the focus was on the application of a systematic decision-making process based on the identification and analysis of all relevant alternatives, as well as consideration of the goals of different interest groups. The application of the PrOACT decision-making model allows the identification and classification of various decision factors and determining their relative importance (Nixon et al., 2016), making it suitable for addressing the examined business problem. To protect data privacy, the company considered in the case study will be referred to as Company X.

Case Study

Company X is a relatively young company. It was founded in 2018, and in the first two years, it experienced a significant increase in all relevant business indicators. The owner of the company is a young entrepreneur who managed to turn his hobby into a profitable business. In the initial two years, the company exclusively focused on the development of computer games. He successfully assembled a team of 5 employees, primarily individuals with IT backgrounds, while he independently handled finance, marketing, and management tasks. After several successfully completed projects, the company was profitable. Below is an overview of the level and dynamics of the company's total revenues and expenses for the first two years of operation:

Table 1: Analysis of the structure of total revenue of Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Business revenue	4.870.593*	88,2%	4.153.493	88,5%
Financial revenue	70.278	1,3%	73.884	1,6%
Income from revaluation of other assets measured at fair value through profit or loss	566.207	10,2%	443.799	9,4%
Non-business income	17.448	0,3%	23.691	0,5%
Total revenue	5.524.526	100%	4.694.867	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

Table 2: Analysis of the structure of total expenses of Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Operating expenses	3.944.024*	87,8%	3.212.230	84,2%
Financial expenses	47.940	1,1%	40.844	1,1%
Expenses from the revaluation of other assets measured at fair value through profit or loss	490.341	10,9%	544.030	14,3%
Non-business expenses	7.708	0,2%	17.957	0,5%
Total expenses	4.490.013	100%	3.815.061	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

After the first two years, the company managed to significantly reduce its operating costs while keeping sales relatively stable, considering it operates in a dynamic market and primarily sells its products to foreign companies. So far, the owner has not faced any business problems, highlighting that his main advantage is a friendly relationship with employees. Every decision is made in collaboration with his team, characterized by a high level of creativity and mutual loyalty. Employees express satisfaction with the work environment, and salaries are competitive in the observed sector. However, at the beginning of 2020, an unexpected turn of events occurred. Their largest customer in the German market decided to end the collaboration. There was a minor error in one of the game's programming codes, but given the intense competition, the customer decided to end the partnership and accept an offer from a start-up company. This surprised the main manager of the company. Analyzing the previous business operations, he decided to take out a bank loan of 4,000,000 dinars to empower his employees with the latest technology and software

in this field. The decision was made based on a detailed analysis of the structure of funding sources (Table 3).

Table 3: Analysis of the structure of funding sources for Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Equity	7.571.570*	95,2%	8.048.166	95,8%
Debt, liabilities, and reserves	0	0%	0	0%
Short-term liabilities	381.505	4,8%	355.510	4,2%
Total liabilities	7.953.075	100%	8.403.676	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

The company did not have long-term liabilities, and considering that the return on equity was higher than the return on total assets, new borrowing for Company X would contribute to an increase in the profitability of equity. The owner believed that this was the correct financial decision; however, due to the loss of the largest customer, he is now facing a problem. The question is whether he will be able to repay the given loan. Through market analysis, an Austrian company engaged in selling mobile phone games was identified. They could potentially replace the revenue from the lost customer, if not double it, given the expansion of that market segment. However, for the target company to accept the project proposal from Company X, a quick response is needed, and a successful game must be developed within a short timeframe. Additionally, the problem lies in the fact that the company's team is accustomed to working on computer games, which, although similar, require specific expertise and thorough research of the segment. On the other hand, they can continue developing computer games, but without a major customer, this would mean simultaneously focusing on multiple projects. This would require each employee to work on one or more projects, potentially jeopardizing the high performance achieved through teamwork.

4 Results

According to Hammond et al. (1999), the PrOACT model is used to structure a problem situation and segment the decision-making process. It is employed for the valid formulation of problems, goals, determining different alternatives, assessing their consequences and leading to optimal decision-making. Based on the described

problem situation, the choice of the best alternative is outlined through the identification of individual elements that form the basis of the application of the PrOACT decision-making model: problem identification, goal setting, alternative development, consequence evaluation, and selection.

1. Problem Formulation: Company X is facing the loss of a significant international customer, jeopardizing its future business revenue used to cover expenses, including the repayment of the principal and interest on a long-term loan. Additionally, the company is at a crossroads between staying in the existing market or entering a more profitable market niche, potentially questioning its innovative capacity.

2. List of Goals:
Goal 1: Compensate and overcome the decline in sales revenue due to the loss of the international customer.
Goal 2: Ensure the repayment of the principal and interest on the long-term debt.
Goal 3: Enhance the company's innovation capacity in the future.

3. List of Stakeholders: The bank that approved the loan, company employees, existing and potential business partners, competition in the existing and potentially new market segment.

4. List of Alternatives:

Table 4: List of alternatives for Company X

Alternative 1
To timely do an innovation project that will enable collaboration with a new Austrian customer.
Uncertainty related to Alternative 1: The company lacks sufficient expertise in this field, leading to the hiring of new employees within the company. There is a question regarding the time pressure for completing the innovation project.
Risk tolerance associated with Alternative 1: High
Stakeholders (how stakeholders can influence Alternative 1 and how the alternative affects stakeholders): The bank would benefit as it ensures loan repayment. Company employees would have to endure stressful changes, including adapting to new colleagues, working under time pressure, and rapidly acquiring new knowledge and skills. By entering a new market segment and gaining expertise in the given field, the company would open doors to a growing market, reaping multiple benefits and expanding the base of potential clients. Additionally, by entering a new segment, the company will need to include new competitors in the business environment analysis, that involves quick differentiation.
Alternative 2
Continue operations in the existing area, with the company working on acquiring new projects or increasing the number of projects with existing clients.

Uncertainty related to Alternative 2: Given that the company has had lower-value collaborations with certain companies, the need for business partners for new computer games arises, jeopardizing the possibility of achieving sufficiently high sales revenue. On the other hand, time is needed to conduct a detailed market analysis of potential clients in the same field and to consider the possibility of meeting their needs.
Risk tolerance associated with Alternative 2: Low
Stakeholders (how stakeholders can influence Alternative 2 and how the alternative affects stakeholders): The bank may be at risk if the company lacks sufficient funds to repay the debt, resulting in late interest charges and, consequently, the company's bankruptcy. Company employees can continue working under the same conditions, avoiding stress caused by changes in the company. The company is more familiar with the existing market segment and the companies within it, which would be facilitated compared to entering a new niche. Additionally, competition conditions in the existing market remain unchanged.
Alternative 3
Stay in the existing market, gradually entering the area of developing mobile phone games.
Uncertainty related to Alternative 3: Possibility of delayed payment of obligations in the upcoming accounting periods while the company establishes itself in both market segments. The company will not meet the deadline to write a project that would attract the considered major customer, opting for a gradual entry into the niche.
Risk tolerance associated with Alternative 3: Medium
Stakeholders (how stakeholders can influence Alternative 3 and how the alternative affects stakeholders): The bank may charge late interest in case of delays. Company employees will gradually adapt to the change, having enough time to acquire new knowledge and skills. The company is familiar with existing partners, and it would have time to conduct a detailed analysis of potential companies in the new segment. The same applies to competitors.

Source: Authors

5. Table of consequences. Within Table 5, consequences for all three considered alternatives are presented based on the previously set goals. Projected sales revenue, as well as potential late interest charges, are expressed in monetary units (RSD), while the level of innovativeness for each alternative is represented by ratings from A to C, where A is used for the highest and C for the lowest level of innovativeness. Therefore, in the case of alternative 1, the projected sales revenue is the highest, the company would not incur the obligation to pay late interest charges, and the innovativeness level is high due to the development of a completely new product, i.e., the adoption of new knowledge and skills. Then, in the case of alternatives 2 and 3, the company would have to pay late interest due to unpaid obligations, and the level of innovativeness is rated lower compared to alternative 1.

Table 5: Table of Consequences for Company X

Goals	Alternative 1	Alternative 2	Alternative 3
Goal 1 (projected sales revenue for the year 2020)	7.000.000	4.000.000	4.500.000
Goal 2 (potential late payment interest)	-	250.000	300.000
Goal 3 (level of innovativeness)	A	C	B

Source: Authors

6. Trade-offs. In Table 6, the consequences of alternatives are ranked based on their contribution to achieving the specified goals. The ranking is done with numbers from 1 to 3, where alternatives that contribute the most to goal achievement are assigned the number 1, and those that contribute the least are assigned the number 3. For example, Alternative 1 has the highest projected sales revenue, the highest degree of innovation, and no potential late payment interest, making it ranked as the best in all three considered goals.

Table 6: Decision Table for Company X

Goals	Alternative 1	Alternative 2	Alternative 3
Goal 1	1	3	2
Goal 2	1	2	3
Goal 3	1	3	2

Source: Authors

7. Decision. According to Table 6, it can be concluded that Alternative 1 dominates over the other two alternatives, as it is better evaluated according to all three goals. This further leads to the choice of Alternative 1. Therefore, the decision of Company X is: To timely do an innovation project that will enable collaboration with a new Austrian customer. This will result in generating the highest sales revenue compared to the other two alternatives, developing new products, acquiring new knowledge and skills, and the company will not incur penalty interest in the process.

5 Discussion

By analyzing the data obtained in the case study of Company X, it can be concluded that it is a young company with a low degree of formalization, which positively influences the level of innovativeness. In highly formalized organizations, the

existence of explicit rules and procedures is likely to have a negative impact on idea generation, company flexibility, and innovation (Bidault & Cummings, 1994). The organizational culture is characterized by a high level of entrepreneurial spirit and tolerance for mistakes. Slater & Navar (1995) and Wallach (1983) argued that a supportive organizational climate positively affects the creation and exchange of knowledge among employees and team cohesion. Additionally, the company features new technology, which positively impacts innovation (Rosenzweig, 2017). However, employees of the company need to work on acquiring knowledge and skills to handle new software and programs to overcome the innovation barrier involving a lack of narrowly qualified employees. Darroch (2005) highlights that companies that effectively manage the knowledge of their employees have a higher level of innovativeness. Considering innovation barriers, time constraints create additional pressure on employees, representing an organizational factor with a negative impact on employee creativity (Hsu & Fan, 2010). Therefore, it is recommended for the company to overcome the time barrier with specific organizational mechanisms that limit employee innovativeness. Given that the best available alternative has been chosen through a systematic approach, whose elements are theoretically validated, it is concluded that the PrOACT model is an adequate method for solving routine problems as well as complex organizational situations (Barksdale & Smith, 2014).

6 Conclusions

Starting from the set research goal, the obtained results indicate the following relevant conclusions. The results of the conducted case study show that the conceptual framework of the PrOACT model is significant for a systematic approach to innovation decision-making. Additionally, the importance of organizational culture flexibility, technology, employee expertise, and time constraints on the company's innovativeness has been identified.

In terms of overall results, certain theoretical and practical implications can be identified. The contribution of the paper is primarily methodological. It is reflected in overcoming the identified research gap related to the scarcity of research regarding application of the PrOACT model of innovation decision-making. In practical terms, the research can provide guidance to managers of small enterprises, especially teams in the IT industry. Managers of such companies should approach the decision-

making process systematically, adequately considering the perceptions and interpretations of various stakeholders, as well as the significance of each of the alternatives considered. The PrOACT model enables managers to thoughtfully and cautiously manage the innovation implementation process, which is a very stressful period for any organization as it signifies a unique transition. Only such a decision on innovations, which is thoroughly elaborated and planned beforehand, can lead to progress in the company. The PrOACT model can assist managers in quantifying the outcomes of various alternatives, enabling them to assess their value more objectively and make rational decisions. Also, ProACT model helps a decision-maker understand the degree to which he is willing to face less favorable consequences in pursuit of a better outcome. Understanding one's own readiness to accept risk can help choosing alternatives.

Limitations of the conducted research relate to the use of only a case study, which represents a qualitative method of data analysis, making the conclusions drawn in the paper non-generalizable. Similarly, the research was conducted on the example of one company, so certain implications cannot be transferred to companies with a larger number of employees or companies from other sectors. Nevertheless, guidelines for future research involve a detailed analysis of innovation decision-making factors using the PrOACT model, especially since this method encourages management to conduct a comprehensive and detailed analysis of the company's position. In this way, the definition of specific, measurable, achievable, relevant, and time-bound goals makes their realization easier. Additionally, future research could involve a multiple case study or empirical research related to the application of the PrOACT model, involving a sample of a larger number of companies.

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Nowadays' Questions of Place Marketing

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The study is based on the assumption that local governments need new guidance in the current global change context. We base our assumption on the fact that the pandemic and the subsequent economic changes have radically altered the external environment of municipalities, which present new challenges, require new marketing management perspectives, and tools to respond. The aim of our research at this stage is to identify and collect the factors and questions that are deemed important by the international researchers of place marketing to discover, identify, and answer in order to provide guidance on how to manage municipalities in the face of environmental change. Building on our preliminary literature review, we conduct a systematic literature review of the questions that have been addressed by researchers in the field of municipal marketing over the past five years. The purpose of this work is to collect, complete, and group the questions so that we can build on the systematic review to develop a model for our further research and to ground our methodological engagement in the methodology of the literature we have identified. Our results show that the focus in the field of place marketing is shifting towards broader perspectives of sustainability.

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1 Introduction

In recent years, the discourse surrounding place marketing has garnered increasing attention from scholars, policymakers, and practitioners alike. The growing significance of this topic is underscored by its intersection with various disciplines such as urban planning, economics, sociology, geography, and sustainability. Since the seminal paper published by Kavaratzis and Ashworth (2005), the concept of place marketing has evolved significantly from its initial focus on tourism promotion to a broader framework encompassing the branding, promotion, and management of places for multiple stakeholders. This evolution reflects the recognition of places not merely as geographical entities but as dynamic socio-economic and cultural spaces that compete for resources, investment, and attention on a global scale. Consequently, the imperative to effectively market and manage places has become paramount for local governments, economic development agencies, and destination management organisations.

The contemporary discourse on place marketing is characterized by a growing recognition of the complex challenges faced by municipalities in an era of the emergence of new economic, social, and environmental changes worldwide. Thus, the imperative to critically examine and re-evaluate the theoretical underpinnings, methodological approaches, and practical implications of place marketing has never been more pressing. This study seeks to contribute to this ongoing discourse by elucidating the key questions and factors deemed crucial for guiding municipalities in navigating the complexities of contemporary place marketing practice. Through a systematic examination of extant literature and empirical research, we aim to provide insights, recommendations, and directions for future inquiry in this evolving field.

2 Methodology

This study is the second phase of our research initiative, building upon the systematic literature review conducted in the initial phase. The first step of our methodology involved a comprehensive examination of scholarly literature in the field of marketing, with a specific focus on municipal marketing and place marketing (Reicher et al., 2023). Utilising prominent academic databases such as Clarivate Web of Science, Elsevier Scopus, and SAGE journals, we conducted a systematic database analysis spanning the period from 2000 to 2022. The purpose of this initial review

was to identify key themes, topics, and methodological approaches prevalent in the literature, thus enabling us to delineate keyword-based clusters and consequently a comprehensive concept map within the field of place marketing.

The findings of our preliminary review highlighted several salient trends and focal points within the realm of place marketing. We delineated the clusters of branding, destination, tourism, management, and sustainability as the main approaches to the study of place marketing. It also became clear that scholars have increasingly recognised the importance of integrating economic development initiatives with social welfare concerns fostering sustainability within municipalities, thereby shedding light on the multifaceted nature of place marketing endeavours. Additionally, the literature revealed a significant body of research pertaining to environmental sustainability, environmental awareness, and the impact of tourism on local ecosystems and communities. This underscores the growing recognition of the interplay between place marketing, environmental stewardship, and sustainable tourism practices.

The current phase of our research is a continuation of our inquiry through an analysis of the abstracts of relevant articles published between 2018 and 2022. Drawing upon our initial findings, we aim to identify and collate the most frequently researched topics within the field of place marketing during this timeframe. Specifically, we will focus on clustering the articles based on their primary thematic areas as defined earlier. By systematically examining the abstracts of recent publications, we seek to discern prevailing trends, emergent issues, and areas of scholarly inquiry that have garnered significant attention within the domain of place marketing and aim to formulate practical recommendations for the development of marketing strategies for localities.

3 Results

3.1 Terminology, Comprehensive Strategic Vision

At the outset, it is imperative to clarify the terms central to our discourse: place marketing, place branding, and place promotion. While these terms are often used interchangeably, they connote distinct yet interconnected processes in the realm of place governance. Place marketing encompasses a broad set of activities aimed at

enhancing the market position and appeal of a place focusing on the management of its image and offerings to meet the needs of its target markets (Khomenko et al., 2021). These may involve strategic planning, positioning, and communication efforts directed towards shaping the perceptions, experiences, and behaviours of stakeholders towards a place. Place branding, on the other hand, delves deeper into the creation and communication of a distinctive identity, imbuing the place with a unique character that resonates with its stakeholders fostering positive perceptions (Kumar and Panda, 2019). The systematic management of this identity crafting is fundamental, as it not only differentiates the place in a crowded market but also fosters a sense of belonging and pride among its residents. Place promotion denotes the communicative aspect of above strategies in the dissemination of information that articulates the attributes, offerings, and brand identity of the place to the outside world (Boisen et al., 2018a). It is the mechanism through which the place's brand is broadcasted, seeking to inform, persuade, and attract visitors, investment, businesses or even residents by promoting distinctive experiences.

3.2 Communicational Consistency

Distinguishing between the overarching strategy (marketing), the identity and values embodied (branding), and the communication of these elements (promotion) aligns theoretical frameworks with practical applications thus bridging gaps between academia and practice. As such, an integrated approach enables the development of a comprehensive strategic vision and communicational consistency in the holistic development of places, which is essential for the coherent development of places that are both resonant and resilient (Hospers, 2019). This, in turn, heightens the effectiveness of place-related initiatives by maximising the place's appeal and competitiveness in an increasingly globalized world (Honcharenko et al., 2018). For these ends, the communicational consistency across these strategies is vital, as it not only solidifies the image of the place in the minds of the target audience but also ensures that the messaging is clear, persuasive, and reflective of the place's brand identity (Boisen et al., 2018a).

In the digital era, utilising digital and social media in place marketing transcends traditional methods, leveraging user-generated content (UGC) to serve as dynamic conduits for word-of-mouth, empowering residents as active place-brand ambassadors and thus reshaping place marketing (Uchinaka, 2019). This paradigm

shift underscores the necessity for Destination Management Organizations (DMOs) to acknowledge and harness the power of residents' online activities, recognising their diverse roles from contributors and photographers to retweeters and hobbyists, each contributing uniquely to the place's narrative and appeal. The emotional resonance and authenticity conveyed through social media significantly impact place brand love and the intention to share place brand messages, emphasising digital narratives' role in fostering a deep connection with the place (Strandberg and Styvén, 2020). Analysis of hashtags related to place brands reveals predominantly positive associations, indicating social media's potential to amplify a place's environmental, cultural, and symbolic values and engage a broader network of stakeholders (Lima et al., 2022). Therefore, a strategic approach to digital- and social media in place marketing contributes to sustainable development and positioning of the place brand, integrating the perspectives of residents and visitors (Sulistyaningsih et al., 2022).

3.3 Stakeholder Participation

The essence of stakeholder participation in place marketing is intricately tied to the concepts of co-creation of value through participation of locals as well as authenticity and unique identity. Literature commonly recognises stakeholders as central to the creation, development, and ownership of place brands and essential co-creators and legitimisers of the brand, fostering genuine connections with target audiences (Correia and Brito, 2020). This participatory approach is vital for harnessing the authentic narratives, cultural heritage, and local stories that ensure that the place brand resonates with the intrinsic values and expectations of the community (Donner and Fort, 2018) fostering a shared identity and a sense of belonging (Eletxigerra et al., 2018). The strategic integration of stakeholder participation in place marketing, through co-creation of authentic value with the participation of locals, forms the cornerstone of effective place branding as it not only elevates the place brand in the eyes of external audiences but also strengthens the internal community's bond to the place, ensuring a sustainable and resonant branding strategy (Sadeque et al., 2020).

3.4 Sustainability, Responsible Tourism Development, and Economic Impact of Firms

Sustainability in place marketing is increasingly recognised as a pivotal component of economic impact, responsible tourism development, and attracting investment. The economic viability of cities, regions, and countries is significantly influenced by resource endowments, necessitating government policies that stimulate economic development by spurring the active participation of firms in crafting and sustaining the place brand, highlighting the essential interplay between supply-side, demand-side, and environmental strategies (Zhou et al. 2022). Responsible tourism development further underscores the importance of sustainability, with a focus on creating tourism strategies that balance economic growth with environmental conservation and cultural preservation (Pasquinelli and Vuignier 2020). The sustainable development of tourism destinations, especially in rural areas, demands a nuanced understanding of market segmentation and the promotion of community and local resource-based experiences to attract sustainable travel behaviour potentially enhancing destination loyalty (Kastenholz et al., 2018). Thus, the incorporation of sustainability into place marketing strategies necessitates a collaborative effort among all stakeholders to foster a sustainable and competitive place brand.

3.5 Monitoring and Evaluation of Marketing Efforts

Place marketing is a complex, multidisciplinary, and ambiguous milieu. This complexity is further compounded when it comes to the monitoring and evaluation of marketing efforts, where the historical reliance on qualitative research methodologies has dominated with empirical, quantitative insights significantly less explored (Kumar and Panda, 2019). Studies such as the exploration of marketing metrics in transitional economies by Melovic et al. (2021) reveal the nuanced challenges and complexities inherent in quantifying marketing efforts. Collectively, however, they mark the imperative for a paradigm shift toward a more rigorous examination of place branding and marketing efforts employing both qualitative and quantitative lenses to dissect and understand the intricacies of this field. By bridging the gap between qualitative richness and quantitative rigor, they pave the way for a more nuanced, empirical, and comprehensive understanding of the effectiveness of place branding and marketing strategies. This evolution is crucial not only for the

substantiation of theoretical frameworks but also for informing practical, strategic decision-making in the dynamic landscape of place marketing.

4 Discussion and Conclusions

Based on the analysis of the abstracts of relevant articles on place marketing published between 2018 and 2022, the five thematic focal points were terminology, comprehensive strategy, brand communication, stakeholder participation, sustainable tourism development, and monitoring and evaluation of marketing efforts. While development of a comprehensive place marketing strategy is at the forefront primarily of only branding-related papers, stakeholder participation is avidly discussed across the clusters. With sustainability rapidly gaining prominence in all but branding clusters, analyses of the measurement of place marketing success are seemingly also on the rise across clusters. The scholarly trend appears to be for management studies to focus on the economic side of the issue, branding predominantly on the social aspects, sustainability to be self-contained, while destination-related inquiries taking on an interdisciplinary nature in incorporating all aspects of the topic.

Our broad practical recommendations for the development of marketing strategies for localities in line with the above are to understand the distinction between place marketing, branding, and promotion thoroughly as this will help develop a comprehensive strategy with clear and measurable key performance indicators (KPI)s. Understanding their place's unique and authentic identity through delving into its cultural heritage and local stories with the involvement of local stakeholders ought illuminate a differentiation strategy, the institutionalisation of which is the key to effective place marketing. Boisen, et al. (2018a) appears particularly enlightening in this latter regard. Furthermore, as sustainability is gaining prominence not only in academic discussion but as an economic incentive in place development, municipalities should aim to harness the advantages of such investments along with potential collaborations with local firms or the attraction of foreign direct investment (FDI). Concerning micro-strategies for place marketing, we suggest a creative approach based on best practices from a wide range of initiatives ranging from slum projects as a social marketing initiative (Sulistyaningsih et al., 2022) through place-based loyalty scheme concepts (Rybaczewska and Sparks, 2020) to development of a local mascot. (Radomskaya and Pearce, 2021).

As evidenced by the wide dispersion of thematic clusters, themes, and ongoing debates about fundamental terminologies, place marketing is a delicately multidisciplinary and rapidly evolving field of study. In an increasingly competitive and thoroughly globalised world, where the activities of socioeconomic entities are dynamically interwoven, place marketing represents a significant opportunity for municipalities to spark engagement and solidify their social network, collaborate with local firms or effectively attract FDI for tourism development, and lay the groundwork for establishing a sustainable future for their stakeholder communities.

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Sustainability Practices in European Football: A Comparative Analysis of Top Clubs and Slovenian Counterparts

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Sport is a powerful societal force influencing behavior, values, and attitudes. Professional football clubs, as prominent sports organizations, have a responsibility to operate sustainably and contribute to global goals of environmental protection, social justice, and economic development. This article examines the sustainability practices of three European football giants: Manchester United from England, Real Madrid from Spain, and Bayern Munich from Germany. These clubs represent successful and influential leagues with a long tradition of excellence. The analysis covers the three dimensions of sustainability: environmental, social, and economic. The environmental dimension focuses on efforts to reduce ecological footprints, including energy efficiency, waste management, and resource conservation. The social dimension involves community engagement, such as education, social inclusion, and health promotion. The economic dimension addresses financial performance, governance, and transparency. The article compares and contrasts the sustainability strategies of the three clubs, highlighting their strengths, weaknesses, opportunities, and challenges. Additionally, it discusses the implications of these sustainability actions for stakeholders, including fans, sponsors, partners, staff, and players. The aim is to provide insights and recommendations for improving the sustainability performance of professional football clubs and enhancing the role of sport in creating a better world.

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1 Introduction

In the contemporary global sports landscape, football holds an unrivaled position at the heart of cultural, economic, and social life. The sport's universal influence extends beyond the boundaries of play, touching upon aspects critical to sustainable development. As the urgency for addressing sustainability challenges increases, football clubs are increasingly recognized not just as entertainment entities but as significant actors in the global sustainability agenda.

This paper suggests that football clubs, by their extensive reach and profound influence, are uniquely positioned to contribute to environmental conservation, social inclusion, economic stability, and ethical governance. The analysis of sustainability practices among professional football clubs, therefore, offers valuable insights into the mechanisms of integrating sustainable development goals (SDGs) within the sports industry.

The objective of this comparative analysis is twofold: firstly, to evaluate the extent and efficacy of sustainability initiatives undertaken by prominent European football clubs, including Manchester United, Manchester City, Real Madrid, FC Barcelona, Bayern Munich, and Borussia Dortmund; and secondly, to contrast these efforts with those of Slovenian clubs, NK Olimpija and NK Maribor, thereby revealing the multicolored landscape of sustainability in football. Through this comparison, the paper aims to uncover the span and depth of sustainability practices within the football industry, highlighting the challenges, opportunities, and requirements that shape these efforts.

2 Literature review

2.1 Environmental sustainability

Environmental sustainability has received growing attention in sports management literature. Studies such as those by Karamichas (2013) and Trendafilova (2013) have highlighted how major sporting events and football clubs contribute to environmental degradation but also how they have begun to implement strategies to moderate these impacts. For instance, the use of renewable energy, waste management programs, and sustainable infrastructure in stadiums has been

documented across European clubs. However, there is a noticeable gap in research focusing on the environmental initiatives of smaller clubs, particularly those in less economically rich regions.

2.2 Social sustainability

Social sustainability comprehends diversity, inclusion, and community engagement. Football clubs have been shown to play a significant role in promoting social inclusion and engagement through various programs (Walsh and Giulianotti, 2007; Babiak and Wolfe, 2009). These programs often target underprivileged communities, aiming to use football as a tool for social change. While extensive research exists on large European clubs' community engagement initiatives, there is less understanding of how smaller clubs integrate social sustainability into their operations and the unique challenges they face.

2.3 Economic sustainability

Economic sustainability within football clubs focuses on financial stability, revenue diversification, and responsible management. Research by Morrow (2003) and Dobson and Goddard (2011) has explored the financial management practices of football clubs, highlighting the importance of sustainable economic strategies for long-term success. Yet, there remains a shortage of literature examining the economic sustainability practices of smaller clubs, particularly in how they navigate financial challenges and opportunities for revenue generation in smaller markets.

2.4 Ethical governance

Ethical governance in football incorporates fair play, transparency, and compliance with regulations. Studies by Geeraert (2013) and Gorse and Chadwick (2010) have delved into governance issues within the football environment, including corruption, ethical breaches, and the implementation of governance reforms. While these studies have shed light on the governance practices of professional football clubs and governing bodies, there remains a gap in understanding how ethical governance is practiced and enforced among smaller clubs, especially those outside the major European leagues.

The review of the existing literature reveals significant openings that the current study aims to fill. Specifically, there is a necessity for more research on:

1. Environmental sustainability initiatives of smaller football clubs and the specific challenges they face in implementing such strategies.
2. Social sustainability practices among smaller clubs, including how they promote diversity, inclusion, and community engagement within their local contexts.
3. Economic sustainability strategies for clubs in smaller markets, focusing on innovative revenue generation and financial management practices.
4. Ethical governance in the context of smaller clubs, exploring how they navigate the complexities of ethical governance and maintain integrity and credibility.

By addressing these openings, the current study seeks to provide a comprehensive understanding of sustainability in football, encompassing clubs of varying sizes and resources. It aims to contribute to the broader discourse on sustainable development in sports, offering insights into the practices and challenges of clubs beyond the elite levels of European football.

3 Methodology

To investigate the sustainability initiatives of European professional football clubs and their Slovenian counterparts, NK Olimpija and NK Maribor, this study employs a multi-method research design. This approach allows an in-depth exploration of the practices and impacts of these initiatives, combining qualitative and quantitative data to offer a comprehensive analysis. The research methods outlined below are designed to capture the scope of sustainability efforts within the mentioned football clubs, addressing environmental, social, economic, and ethical dimensions.

3.1 Content analysis of club reports and publicly available documents

The study aims to precisely gather detailed information on the formally reported sustainability initiatives undertaken by European professional football clubs. The data for this research will be extracted from a variety of publicly accessible sources provided by the clubs themselves, including annual reports, sustainability reports,

press releases, and other relevant documents. To systematically analyze the gathered data, a content analysis methodology will be employed. This will involve the categorization of the data into predefined themes, namely environmental sustainability, social inclusion efforts, economic strategies, and governance practices, to facilitate a comprehensive understanding of the clubs' sustainability initiatives.

3.2 Media coverage analysis

The objective of this study is to explore the illustration of European professional football clubs' sustainability efforts within media narratives and public discourse. The examination will draw upon a diverse selection of data sources, including news articles, online forums, and social media posts that discuss the sustainability practices of these clubs. Employing qualitative content analysis as the primary methodological approach, the study will examine the tone, focus, and depth of media coverage surrounding these sustainability efforts. This analytical process aims to uncover public perceptions regarding the clubs' sustainability initiatives and to identify any differences between the initiatives as reported and their representation in public discourse.

3.3 Academic literature review

This research intends to situate the sustainability initiatives of football clubs within the wider scholarly conversation on sustainability in the realm of sports. To achieve this, the study will draw on academic journal articles, conference papers, and book chapters that discuss sustainability practices within football and the broader field of sports. A thematic analysis will be employed to sift through the existing academic literature, aiming to discern predominant themes, identify existing gaps, and determine how the findings of the current study correspond with or deviate from the body of established research on this topic.

3.4 Comparative analysis

The study aims to conduct a comparative analysis of the sustainability practices employed by top European football clubs and those implemented by NK Olimpija and NK Maribor, to identify the unique challenges and opportunities encountered by clubs of varying sizes and resources. The methodological approach demands

synthesizing data collected through previously mentioned methods to clarify the similarities and differences in the sustainability initiatives undertaken by these clubs. This analysis will take into account various factors, including the scale of initiatives, financial investments, community involvement, and the overall impact of these sustainability efforts.

3.5 Ethical considerations

In gathering data, ethical guidelines will be strictly followed. Any sensitive information will be handled with the utmost discretion, and data will be presented in a manner that respects contributors' privacy and the clubs' reputations.

Through this comprehensive research methodology, the study aims to provide a detailed understanding of the sustainability initiatives within professional European football clubs, with a specific focus on the comparison between top clubs and Slovenian counterparts. This approach will allow a detailed examination of the practices, challenges, and impacts of these initiatives, contributing valuable insights to the field of sports sustainability.

4 Environmental sustainability

Environmental sustainability in football exceeds simple operational efficiency, it reflects a club's commitment to playing a pivotal role in addressing global ecological challenges. European football giants have recognized this responsibility, guiding substantial resources into sustainability projects that not only minimize their environmental footprint but also set an example within the sporting world.

4.1 Case studies of European clubs

Manchester United from England has emerged as a frontrunner in environmental stewardship, with Old Trafford Stadium integrating energy-efficient lighting, water conservation systems, and comprehensive recycling programs. Similarly, Manchester City's Etihad Stadium in England stands as a model of sustainable design, utilizing rainwater harvesting and solar panels to reduce dependency on non-renewable energy sources.

Real Madrid and FC Barcelona from Spain have taken significant steps towards green energy, with initiatives to power their facilities using renewable energy sources. These efforts are complemented by comprehensive waste reduction and recycling campaigns, aimed at fans and the communities, surrounding their iconic stadium.
In Germany, Bayern Munich and Borussia Dortmund have invested in carbon offset projects and green stadium operations, notably Dortmund's Signal Iduna Park, which boasts an advanced waste management system and energy-efficient infrastructure.

4.2 Challenges and opportunities for NK Olimpija and NK Maribor

On the contrary, Slovenian clubs such as NK Olimpija and NK Maribor, while keen on embracing environmental sustainability, confront tangible barriers primarily related to financial and infrastructural limitations. However, these restraints also present unique opportunities for innovation. Small-scale, community-focused projects, such as local clean-up initiatives or promoting public transportation to games, can serve as a foundation for broader environmental strategies. Partnerships with local businesses and environmental organizations could further strengthen their impact, creating a model of sustainability that leverages community engagement and support.

5 Social sustainability

The fabric of social sustainability in football is laced with the threads of diversity, inclusion, and community engagement. Clubs that excel in this domain recognize their role as community anchors, leveraging football's universal appeal to foster social cohesion and support.

5.1 European clubs' community initiatives

Manchester United and Manchester City have established robust community outreach and youth development programs, such as Manchester City's "City in the Community" scheme, which offers educational and health-related initiatives alongside football training to underprivileged youth.

Real Madrid and FC Barcelona extend their social impact through their foundations, running projects that tackle education, health, and inclusion, thereby reinforcing their commitment to the communities that form their fanbases.

Bayern Munich and Borussia Dortmund exemplify how engagement and diversity initiatives can enhance a club's social fabric, with Dortmund's "BVB Learning Centre" providing educational programs that use football as a medium to address social issues.

5.2 NK Olimpija and NK Maribor: building social ties

For NK Olimpija and NK Maribor, the focus on social sustainability often manifests in initiatives tailored to their local contexts. Community engagement and youth development programs are essential, not only for fostering local talent but also for strengthening societal bonds and promoting inclusivity. These efforts, though smaller in scale, are crucial in sustaining the social pillars upon which these clubs stand.

6 Economic sustainability

Economic sustainability within football clubs is a delicate balance of financial stability, revenue diversification, and responsible management. It supports the ability of clubs to pursue their long-term goals, including sustainability initiatives.

6.1 Revenue strategies of top European clubs

Clubs like Manchester United and Real Madrid have harnessed their global brand appeal to maximize revenue through sponsorships, merchandise sales, and broadcasting rights. FC Barcelona and Bayern Munich underline the importance of revenue diversification, with Barcelona's "Barça Innovation Hub" serving as a testament to the club's investment in future-oriented projects.

Borussia Dortmund demonstrates a model of balancing competitiveness with financial carefulness, significantly investing in youth development to ensure a sustainable talent pipeline.

6.2 Challenges for NK Olimpija and NK Maribor

NK Olimpija and NK Maribor face distinct challenges in achieving economic sustainability, mainly due to their operation within a smaller market context. Nevertheless, these clubs can explore innovative revenue generation strategies, such as developing niche marketing campaigns, enhancing fan engagement through digital platforms, or fostering local business partnerships, to build a sustainable economic foundation.

7 Ethical governance

Ethical governance is at the heart of sustainability, encompassing transparency, compliance, and ethical conduct. For football clubs, this means obeying fair play, both on and off the pitch, and maintaining integrity in all operations.

7.1 Ethical practices in European football

European clubs are increasingly held to high standards of governance, with regulatory bodies like UEFA imposing strict compliance requirements. Clubs such as Manchester United, Real Madrid, and Bayern Munich have implemented governance structures that ensure accountability and ethical decision-making, reflecting their commitment to upholding the sport's integrity.

7.2 Slovenian football's ethical framework

For NK Olimpija and NK Maribor, navigating the landscape of ethical governance involves following both national and international regulations. While challenges continue, particularly in smaller markets where oversight may be less rigorous, these clubs recognize the importance of ethical governance in sustaining their credibility and nurturing trust among fans, stakeholders, and the wider football community.

8 Conclusion

The journey towards sustainability in football is both complex and multi-layered, surrounding environmental, social, economic, and ethical dimensions. Through this comparative analysis, it is evident that while top European clubs lead with innovative

practices and extensive investments in sustainability, Slovenian counterparts like NK Olimpija and NK Maribor face unique challenges but also possess the potential to make significant contributions within their contexts. This examination highlights the critical need for collaborative efforts across the football ecosystem to advance sustainability, ensuring the sport not only prospers but also positively impacts the planet and its people.

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Process of Digitalization as Outsourcing: Challenge for the International Companies in the Republic of North Macedonia

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Outsourcing, as a type of international trade is a relatively new phenomena in the world trade. The digitalization process has enabled companies to geographically dislocate their services and/or production processes to other locations in the world, with the best cost advantages. Although outsourcing is not sufficiently well understood in the Republic of North Macedonia, digital economy plays a vital role in the growth of this sector. The research made shown that the Republic of North Macedonia is one of the most desired destination in the South East Europe for the foreign companies, where outsourcing has sustained a higher employment growth rates and has established into a highly promising industry in the structure of the economy in the country. Through the deduction method, the research paper has a role to investigate the global trends in the outsourcing from one side and the implemented outsourcing trends and factors in the Republic of North Macedonia. The paper will identify the legal regulation of digitalization in the Republic of North Macedonia, will present the data and evidences from the relevant state institutions, as well as will analyze the economic and social benefits of the users, or so-called investors, in terms of their business efficiency.

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1 Introduction

Digitalization in the Republic of North Macedonia, has been an ongoing process aimed at lev enraging technology and digital advancements to improve various sectors of the country's economy and society. The Macedonian government has been working on developing and implementing various e-government initiatives. The goal is to streamline government services, improve efficiency, and enhance citizen engagement. There is also an Digital Infrastructure which means that Macedonia has been investing in improving its digital infrastructure to support widespread internet access and connectivity. After all promotion of the government for the digitalization we can see that the digitalization of education has been a priority in Macedonia. The government also has been fostering a favorable environment for the growth of the digital economy and supporting the development of startups. Initiatives such as the establishment of technology parks, innovation centers, and incubators aim to nurture entrepreneurship and innovation in the tech sector. Efforts have also been made to attract foreign investment in the digital industry. However, the government has been actively promoting digital transformation as a means to drive economic growth, improve public services, and enhance the overall quality of life for its citizens. Digitalization also plays a big role in Business sector, especially for the foreign companies. Outsourcing has become an increasingly popular practice in Macedonia. The country has positioned itself as an attractive outsourcing destination due to several factors, including its skilled workforce, competitive labor costs, favorable business environment, and strategic geographic location. In this paper it can be seen that Digitalization brings numerous challenging benefits to outsourcing in Macedonia. It enables faster and more streamlined processes, reducing manual intervention and minimizing errors. This efficiency translates into improved productivity and faster turnaround times for outsourced tasks. By leveraging digital technologies, outsourcing companies in Macedonia can reduce operational costs. Digitalization automates repetitive tasks, eliminating the need for extensive manual labor. This, in turn, lowers expenses related to labor, infrastructure, and maintenance. It allows outsourcing companies in Macedonia to tap into a global talent pool. They can collaborate with experts and professionals from around the world, leveraging their skills and knowledge to deliver high-quality services. Digital tools and platforms facilitate seamless collaboration between outsourcing companies and their clients, regardless of geographical boundaries. Real -time communication, file sharing, and project management software enable

efficient collaboration, ensuring smooth project execution. It can be seen that that it provides flexibility and scalability to outsourcing operations. As businesses grow, digital systems can easily accommodate increased workloads and expanding requirements. Scaling up or down becomes more manageable with digital infrastructure in place. Digitalization enables better data security measures. From the research it can be seen that Outsourcing companies can implement robust cybersecurity protocols to protect sensitive client information, reducing the risk of data breaches and ensuring compliance with data protection regulations. This kind of a tools enable detailed reporting and analytics capabilities. These analytics help identify areas for improvement and support data-driven decision-making. Adopting digitalization in outsourcing gives companies in Macedonia a competitive edge. They can provide enhanced services, faster delivery, and better customer experiences, distinguishing themselves in the market and attracting more clients. This Digital Era enables better business continuity planning. Cloud-based storage, backup systems, and remote access to data and applications ensure uninterrupted service delivery, even during unforeseen events or disruptions. It fosters innovation and enables outsourcing companies in Macedonia to adapt to evolving market demands. They can leverage emerging technologies, such as artificial intelligence, machine learning, and automation, to offer innovative solutions and stay ahead in a dynamic business landscape. In sum, digitalization brings numerous challenging benefits to outsourcing in Macedonia, ranging from improved efficiency and cost savings to increased competitiveness and access to global talent. It enables outsourcing companies to deliver high-quality services while remaining adaptable and resilient in an increasingly digital world.

2 Subject and Purpose of Research

The purpose of this research is to examine the impact of digitalization on the outsourcing industry in Macedonia. The study aims to explore the opportunities and challenges faced by outsourcing companies in the country in adopting digital technologies, understand the current state of digitalization in the outsourcing sector, and assess the future prospects for digitalization and outsourcing in Macedonia. The research aims to contribute to a deeper understanding of the digitalization landscape in the outsourcing industry in Macedonia. It seeks to provide insights that can inform strategic decision -making, policy

formulation, and best practices for outsourcing companies, industry associations, and government entities in harnessing the benefits of digitalization and fostering sustainable growth in the sector.

The research will focus on the following objectives:

1. Digitalization Landscape in Macedonia: Assessing the current state of digitalization in Macedonia's outsourcing industry, including the level of adoption of digital technologies, the extent of digital transformation, and the maturity of digital infrastructure and capabilities.
2. Opportunities for Digitalization in Outsourcing: Identifying the specific areas within the outsourcing sector in Macedonia that can benefit from digitalization, such as software development, customer support, back-office operations, and other related services. Exploring the potential advantages, such as increased efficiency, cost savings, and access to global markets, that can be derived from digitalization.
3. Challenges and Barriers to Digitalization: Investigating the challenges and barriers faced by outsourcing companies in Macedonia in adopting and implementing digital technologies. Examining factors such as lack of digital skills, inadequate digital infrastructure, data security concerns, and resistance to change that may hinder the digitalization process.
4. Government Support and Policies: Analyzing the role of the Macedonian government in promoting and supporting digitalization in the outsourcing industry. Assessing the effectiveness of existing policies, incentives, and initiatives aimed at encouraging digital transformation and attracting foreign investments in the digital outsourcing sector.
5. Future Prospects and Recommendations: Evaluating the future prospects for digitalization and outsourcing in Macedonia. Identifying emerging trends, technologies, and market dynamics that are likely to shape the industry. Providing recommendations for outsourcing companies, policymakers, and stakeholders to capitalize on the opportunities presented by digitalization and overcome the associated challenges.

3 Methodology of the study

The methodology for this research is conduct a thorough review of existing academic literature, industry reports, case studies, and relevant publications to gain insights into the digitalization trends and outsourcing landscape in Macedonia. The methodology of the study relies on a review of scholarly contributions and literature; it also uses official information sources and data from the National Statistics Institute as well as relevant country development indexes. In order to fulfil the objectives and the purpose of this research it is been rely on the secondary data acquired from different sources. Through the deduction method, the research paper has a role to investigate the global trends in the outsourcing from one side and implemented outsourcing trends and factors in the Republic of North Macedonia, from another side. The paper will identify the legal regulation of digitalization in the Republic of North Macedonia, will present the data and evidences from the relevant state institutions, as well as will analyze the economic and social benefits of the users, or so called investors, in terms of their business efficiency.

To address the challenges associated with business process outsourcing (BPO), this research methodology integrates insights from existing academic literature and industry reports. Mehta et al. (2006) underscore the significance of operational ownership in BPO arrangements, where external service providers assume operational control over specific business functions. Moreover, Barthélemy and Quélin (2006) emphasize the prevalent strategy among companies to outsource production systems to minimize operational costs and leverage the expertise of external service providers.In evaluating outsourcing decisions, Jiang and Qureshi (2006) highlight the critical role of cost assessment. They assert that firms must weigh the potential reduction in operating costs against the maintenance of competitive advantage. Conversely, Kremic et al. (2006) argue that some firms prioritize core competencies over cost reduction, opting to outsource despite potential risks such as security concerns and cultural barriers.Incorporating these insights into the methodology, the research will conduct a thorough analysis of the cost-effectiveness of outsourcing decisions within the context of the Macedonian business landscape. By examining factors such as cultural compatibility, service quality, and customer satisfaction, the study aims to provide a comprehensive understanding of the challenges and opportunities associated with BPO in Macedonia.

This methodology aligns with the research objectives of identifying key issues in BPO and evaluating the strategic implications for companies operating in Macedonia. By integrating insights from diverse academic sources, the study endeavors to offer actionable recommendations for organizations navigating the complexities of outsourcing in the digital era.

4 Literature review

Numerous researches show that digitalization brings transformations in a One of them (Macias, 2018) points out that there are several ways to transform the economic processes through the digital technology. They are related to flexibility of production (due to the processing power), availability of information (digital technologies make data more available), network effects (creating demand-side economies of scale, through social networks, software systems and digital industrial applications), and zero marginal costs (because the digital goods are non-rival and infinitely expandable). At the same time digitalization implies great transformations of the working conditions, due to the mass use of networks, internet and the available online platforms. Many studies confirm that this new way of work provides flexibility of the lifestyle, freedom of action, but also brings disadvantages associated with the sacrifice of financial security, the unpredictability of incomes, the need to learn new skills, the increase of the risk of unemployment for workers with specific qualifications. Digitalization also brings changes in labor legislation, because employment changes considerably, through the use of online platforms, through remote work etc. (Vasilescuet al., 2020). The new technological advances imply the re-skilling of the labor force and changing the world of work, including job substitution, transformation, creation, and lose. The innovation cycle is faster than the changes in the labor market and people's skills. Thus, the current economic environment requires digital knowledge for a large share of the jobs, because digitalization uses information technology infrastructure and the Internet, as technological support. As a result, the imbalances on the labor market growth are reflected in increasing the duration of unemployment, in long-term unemployment and higher structural unemployment (Cedefop, 2018). All this implies great challenges on the labor market. Digitalization is bringing change to the boardroom, imposing a need for a new type of manager. This is the eleventh hypothesis that is focusing on the role of the managers who at the same must realize efficiencies in existing business and driving the transformation toward new business models. These

managers should steer the organization, change the working processes and set an example to the staff, not just by living out a value-based management style. Digitalization also requires employers to create new forms of management, which means that it has to evolve, for instance, by providing guidelines to employees rather than trying to control all the risks. New technologies can, in fact, facilitate both the monitoring of employees and the recording of work activities, making it easier for employees to prove that certain tasks have been carried out, in both cases monitoring the outcome rather than the process (European Economic and Social Committee, 2017). Business Process Outsourcing according to Mehta et al. (2006) is that an external service provider can be given operational ownership of the company's business for one or more than one activity. Barthélemy and Quélin (2006) noted that the companies often discontinue in-house production system to minimize the operational cost including goods and services and benefit from an outside service provider which is known as outsourcing. The firms seeking a BPO strategy can also outsource back office functionalities to an outsider at relatively lower cost. Although there are number of benefits associated with offshore outsourcing have been studied by different academia and research institutes but there are also key issues of BPO , for example cultural and linguistic issue, quality of service and customer satisfactions, which will be discussed later in this section. According to Jiang and Qureshi (2006) companies going for an outsourcing decision also evaluate the cost factor and i f the reduction of the present operating cost is achievable through outsourcing then the available resources can be reinvested to gain and maintain competitive advantage. However, Kremic et al. (2006) say that many of the firms today are deciding to outsource setting aside the cost factor to focus on core competencies. Despite the potential risks of outsourcing for example, security issues, cultural problems firms hope to benefit from the lower cost. The overall corporate strategy is to minimize operating costs but it is not necessarily a mean of gaining completive advantage because marginal cost might be higher than it used to be. Expanding on the literature review, recent studies highlight the unique challenges faced by Macedonia in the context of digitalization and business process outsourcing (BPO), shedding light on the specific hurdles encountered within the Macedonian economic landscape.

Digitalization brings about transformative changes in economic processes, presenting both opportunities and challenges for countries like Macedonia. While digital technologies enhance production flexibility, information availability, and

create network effects, they also necessitate adaptations in working conditions and labor legislation (Vasilescu et al., 2020). The mass adoption of digital platforms and online work introduces flexibility but also entails risks such as financial insecurity and skill obsolescence, particularly for workers with specific qualifications.

Moreover, the rapid pace of technological innovation outstrips the ability of the labor market to adapt, leading to imbalances such as prolonged unemployment and higher structural unemployment (Cedefop, 2018). This exacerbates existing challenges in Macedonia's labor market, requiring targeted interventions to equip the workforce with digital skills and foster inclusive growth.

In addition to labor market challenges, digitalization also impacts management practices and corporate strategies. The emergence of digital technologies necessitates a new breed of managers who can navigate digital transformations while driving organizational change (European Economic and Social Committee, 2017). Furthermore, the rise of digital platforms facilitates outsourcing decisions, with firms seeking cost efficiencies and core competency focus (Jiang & Qureshi, 2006; Kremic et al., 2006). However, outsourcing entails risks such as security concerns and cultural barriers, which are particularly pertinent for countries like Macedonia.

These challenges underscore the need for targeted policies and strategic initiatives to harness the opportunities presented by digitalization while mitigating its adverse effects on Macedonia's economy and labor market.

5 Outsourcing challenges in Macedonia

While every outsourcing destination has its unique strengths, Macedonia stands out in terms of its skilled workforce, competitive costs, favorable business environment, language proficiency, strategic location, and cultural compatibility. These factors combine to position Macedonia as a strong contender and a preferred choice for outsourcing companies seeking high-quality services at a competitive price point. There are also some challenges that companies may encounter.

According to the already done researches and information of the outsourcing report 2019 (MASIT , 2019) there are in sum a few common challenges associated with outsourcing in Macedonia:

- Limited Market Size: Macedonia has a relatively small market size compared to other outsourcing destinations. This can limit the availability of specialized skills or resources for certain niche industries or projects. Companies seeking highly specialized or industry-specific services may face challenges in finding suitable outsourcing partners.
- Infrastructure and Connectivity: While Macedonia has made significant progress in improving its digital infrastructure, there may still be occasional challenges with internet connectivity, especially in remote or rural areas. This can impact the efficiency and reliability of outsourced services, particularly those that rely heavily on stable internet connections.
- Cultural and Language Differences: Despite the proficiency in English and language skills in Macedonia, cultural and linguistic differences can still present challenges. Communication and understanding may require extra effort, particularly when it comes to nuanced business requirements, cultural context, or specific terminology. Companies need to establish clear communication channels and ensure effective cross-cultural collaboration.
- Intellectual Property Protection: Intellectual property rights and protection can sometimes be a concern when outsourcing to any location, including Macedonia. It is crucial for companies to have appropriate legal agreements and safeguards in place to protect their proprietary information and ensure data security.
- Time Zone Differences: While the time zone advantage is often cited as a benefit, it can also pose challenges in terms of real-time collaboration and communication. Companies outsourcing to Macedonia may need to establish effectivcommunication practices and schedules to bridge the time zone gap and maintain seamless coordination.
- Talent Retention and Attrition: The demand for skilled IT professionals in Macedonia is high, leading to potential talent retention challenges. Experienced and talented individuals may be sought after by local and international companies, which can result in talent attrition. This can impact project continuity and require ongoing efforts to attract and retain skilled resources.
- Regulatory Environment: Like any country, Macedonia has its own regulatory environment that companies must navigate when outsourcing. Companies need to ensure compliance with local laws and regulations,

including tax and labor laws, which may differ from their home country. Understanding and addressing these legal requirements is essential for a smooth outsourcing operation.

Despite these challenges, many companies have successfully outsourced to Macedonia and achieved their business objectives. Careful planning, clear communication, and a thorough understanding of the local business environment can help mitigate these challenges and ensure a successful outsourcing engagement.

5.1 Economic and social benefits of outsourcing companies in Macedonia

It should be taken in consideration that the extent of economic and social benefits may vary depending on the specific outsourcing arrangements, the sectors involved, and the overall economic conditions. However, outsourcing has played a significant role in Macedonia's economic growth, job creation, and social development, positioning the country as an attractive destination for outsourcing services.According to the research done by the American Chamber of Commerce in North Macedonia. (2015) Outsourcing companies in Macedonia bring several economic and social benefits to the country. They create employment opportunities for the local workforce. As companies outsource their business processes or services to Macedonian firms, they require a skilled workforce to handle the outsourced tasks. This leads to the creation of jobs, reducing unemployment rates and improving living standards. This companies contribute to the overall economic growth of Macedonia. Their presence attracts foreign investment, which leads to the expansion of business activities, infrastructure development, and increased productivity. This infusion of capital and resources boosts the country's economy and stimulates various sectors, such as real estate, hospitality, and retail. Outsourcing companies often provide specialized training and skill development programs to their employees. This helps in upskilling the local workforce, enhancing their capabilities, and improving the overall talent pool in the country. Additionally, working with international clients and exposure to new technologies and practices allows knowledge transfer, which can benefit local businesses and professionals. Outsourcing companies in Macedonia primarily serve clients from abroad, allowing for the export of services. This contributes to the growth of the country's export sector and helps diversify the economy. Increased exports also lead to a positive

balance of trade, generating foreign currency inflow and strengthening the national economy. They often bring advanced technologies and infrastructure to Macedonia. This helps in the transfer of technology know -how and best practices, promoting technological advancements within the country. Access to modern technologies improves productivity and efficiency across industries, supporting overall economic development. The presence of outsourcing companies in Macedonia fosters collaboration and networking opportunities. It encourages interaction between local businesses and international companies, creating a platform for knowledge sharing, partnerships, and innovation. This can lead to the development of local entrepreneurial ecosystems and the growth of startups in the country. The economic benefits generated by outsourcing companies contribute to social development in Macedonia. The increased employment opportunities and improved living standards lead to poverty reduction, higher disposable income, and enhanced social well - being. This, in turn, positively impacts healthcare, education, and infrastructure development, benefiting the overall quality of life for citizens. (American Chamber of Commerce in North Macedonia. (2015).Outsourcing Trends : Globbaly and in Macedonia)

6 Legal regulation for digitalization in Macedonia

It's important to note that the legal framework for digitalization in North Macedonia is subject to ongoing development and updates to keep pace with technological advancements and international standards. Businesses and individuals operating in the digital sphere should stay informed about any new laws or regulations that may impact their activities. Consulting legal professionals familiar with Macedonian laws is recommended to ensure compliance and mitigate any potential legal risks. The legal regulation of digitalization in the Republic of North Macedonia is aimed at creating a supportive environment for digital technologies and ensuring the protection of rights and privacy in the digital realm. According to the Digital Development Country Profile North Macedonia (2021) as a key aspects of the legal framework governing digitalization in North Macedonia we can say that it includes several aspects. Data protection is governed by the Law on Personal Data Protection. This law regulates the processing of personal data, including its collection, storage, use, and transfer. It establishes the rights of individuals regarding their personal data and outlines obligations for data controllers and processors. The law aligns with the principles and requirements of the General Data Protection

Regulation (GDPR) of the European Union. The Law on Electronic Communications and the Law on Electronic Signature provide the legal framework for cybersecurity in North Macedonia. These laws address issues such as network and information security, electronic identification, electronic signatures, and the protection of electronic communications. They outline measures to ensure the integrity, confidentiality, and ava ilability of electronic communications and protect against cyber threats. The Law on Electronic Commerce regulates electronic transactions, electronic contracts, electronic signatures, and the legal validity and enforceability of electronic documents. It provides a legal framework for conducting business online, including electronic payments, online consumer protection, and the resolution of disputes arising from e-commerce transactions. The Law on Electronic Communications and the Law on Electronic Government promote the digitalization of government services and the use of electronic means for interaction between citizens and the government. These laws establish the legal basis for the provision of e-government services, electronic documents, and electronic signatures in administrative processes. The Law on Electronic Communications regulates the telecommunications sector, including the provision of telecommunications services, licensing, competition, and consumer protection. It aims to promote competition, ensure efficient use of resources, and protect the rights and interests of consumers in the telecommunications market.

7 Digital governmental services for businesses in Macedonia

Republic of North Macedonia has made significant progress in developing digital government services for businesses. The government has been actively promoting digitalization and e-government initiatives to enhance the efficiency, transparency, and accessibility of public services. According to the North Macedonia Digital Agenda Observatory Country Report and Roadmap for Digital Agenda (Metamorphosis Foundation 2021) there are some key digital government services available for businesses in Macedonia:

- Business Registration and Licensing: Businesses can register their company and obtain necessary licenses and permits through online platforms. The Central Register of the Republic of North Macedonia provides a digital portal where businesses can submit applications, track the status of their registration, and receive digital certificates.

- Electronic Tax Filing and Payment: The Public Revenue Office of North Macedonia offers an electronic tax filing system where businesses can submit their tax returns online. The system allows for secure electronic communication, facilitates faster processing of tax documents, and enables online payment of taxes.
- Electronic Procurement: The Public Procurement Bureau of North Macedonia has implemented an electronic procurement platform called e-Auction. It enables businesses to participate in government procurement processes electronically, submit bids online, and track the progress of procurement activities.
- Digital Customs Services: The Customs Administration of North Macedonia provides electronic customs services for businesses involved in import and export activities. This includes online customs declarations, electronic payment of customs duties and fees, and electronic submission of supporting documents.
- Online Business Reporting: Businesses can file various business reports and financial statements electronically through the Central Register of the Republic of North Macedonia. This streamlines the reporting process and improves data accuracy and efficiency.
- Access to Public Information: The Macedonian government has implemented online platforms that provide access to public information and official documents. This enables businesses to access relevant information and documents related to public tenders, regulations, legal requirements, and other government procedures.
- Digital Signature and Authentication: The use of digital signatures and authentication mechanisms is encouraged in Macedonia. Digital signatures provide secure and legally recognized authentication for online transactions, contracts, and official documents.

It is important to note that the availability and specific details of digital government services may vary, and businesses should refer to the official government websites and portals for up-to-date information and access to these services. The development and expansion of digital government services in Macedonia aim to simplify administrative processes, reduce bureaucracy, and improve the overall ease of doing business in the country. These services contribute to a more efficient and

business-friendly environment, supporting the growth and competitiveness of businesses in Macedonia.

8 Conclusion

In conclusion, outsourcing in Macedonia has brought significant economic and social benefits to the country. The presence of outsourcing companies has created job opportunities, reduced unemployment rates, and improved living standards for the local workforce. It has stimulated economic growth, attracted foreign investment, and contributed to the expansion of various sectors. Outsourcing has also led to skill development and knowledge transfer, enhancing the capabilities of the local workforce and promoting technological advancements. The collaboration and networking opportunities created by outsourcing companies have fostered innovation, entrepreneurship, and the growth of startups in Macedonia. Moreover, the export of services by outsourcing companies has bolstered the country's export sector, generating foreign currency inflow and strengthening the national economy. The economic benefits have had a positive impact on social development, including poverty reduction, improved healthcare and education, and enhanced infrastructure. While challenges exist, such as limited market size, infrastructure considerations, and regulatory compliance, Macedonia has made significant strides in creating a supportive environment for outsourcing. The government's efforts to promote digitalization, develop a skilled workforce, and provide a favorable business environment have contributed to the success of outsourcing in the country. Overall, outsourcing in Macedonia has been instrumental in driving economic growth, creating employment opportunities, and improving the overall quality of life for its citizens. With continued focus on developing the digital infrastructure, fostering innovation, and addressing challenges, Macedonia has the potential to further strengthen its position as an attractive outsourcing destination. On the other side, the Republic of North Macedonia has made significant strides in the development and implementation of digital government services for businesses. These services aim to enhance efficiency, transparency, and accessibility in various aspects of business operations. By leveraging technology and digitizing administrative processes, the government has created a more business-friendly environment that supports the growth and competitiveness of businesses in the country. From online business registration and licensing to electronic tax filing and payment, businesses in Macedonia can benefit from streamlined processes and reduced administrative

burdens. The availability of electronic procurement platforms enables businesses to participate in government procurement activities more efficiently. Digital customs services facilitate smoother import and export processes, reducing delays and improving overall efficiency. Furthermore, businesses can access public information, regulations, and official documents through online platforms, enabling them to stay informed and comply with legal requirements. The use of digital signatures and authentication mechanisms adds an extra layer of security and credibility to online transactions and contracts. The digital government services provided by the Republic of North Macedonia contribute to a more efficient and business-friendly environment. By embracing digitalization, the government has taken significant steps towards simplify ing administrative processes, reducing bureaucracy, and enhancing the ease of doing business. These efforts ultimately support the growth and competitiveness of businesses in Macedonia, fostering an environment that encourages innovation, investment, and economic development.

9 Research results

As an Results for this research there are given an explanation to all objectives which are mentioned before in the objective and research filed. The research findings shed light on the current status of digitalization, highlight specific areas for digital transformation, address obstacles hindering the adoption of digital technologies, evaluate the effectiveness of government support, and provide a forward-looking perspective on future prospects. The results of this research contribute to the knowledge base of digitalization in the outsourcing industry and offer practical guidance for outsourcing companies, policymakers, and stakeholders to navigate the digital landscape effectively.

Objective 1. Digitalization Landscape in Macedonia - The current state of digitalization in Macedonia's outsourcing industry is moderately advanced. The industry has witnessed a gradual adoption of digital technologies, with a focus on areas such as cloud computing, data analytics, and automation. However, there is room for improvement in terms of the extent of digital transformation. While some companies have embraced digitalization, many others are still in the early stages of their digital journey. The digital infrastructure and capabilities in Macedonia are developing steadily but are not yet at the level of more mature outsourcing

destinations. There is a need for further investment in digital infrastructure and the development of skilled digital workforce.

Objective 2. Opportunities for Digitalization in Outsourcing - Software development is a prime area that can greatly benefit from digitalization in Macedonia's outsourcing sector. Adopting agile development methodologies, DevOps practices, and leveraging emerging technologies like artificial intelligence and blockchain can enhance the efficiency and quality of software development processes. Customer support services can also be transformed through digitalization. Implementing chatbots, virtual assistants, and omnichannel communication platforms can improve response times, personalize customer experiences, and reduce costs. Back-office operations, such as finance and accounting, human resources, and data entry, can be streamlined through automation, digitization of documents, and integration with enterprise resource planning (ERP) systems. Other related services, such as digital marketing, cybersecurity, and data analytics, present opportunities for outsourcing companies to provide specialized digital services to global clients.

Objective 3. Challenges and Barriers to Digitalization- One of the primary challenges is the lack of digital skills among the workforce. There is a need for upskilling and reskilling programs to b ridge the digital skills gap and equip employees with the necessary competencies to leverage digital technologies effectively. Inadequate digital infrastructure, including access to high-speed internet, can hinder the widespread adoption of digital technologies. Investment in improving the digital infrastructure is essential to support digitalization efforts. Data security concerns pose a significant barrier to digitalization. Companies need to address issues related to data privacy, cybersecurity, and compliance with relevant regulations to build trust and confidence in digital solutions. Resistance to change and a conservative business culture can slow down the digitalization process. Companies need to prioritize change management, create awareness, and foster a culture of innovation to overcome resistance and drive digital transformation.

Objective 4. Government Support and Policies - The Macedonian government has recognized the importance of digitalization in the outsourcing industry and has taken initiatives to support its development. Policies and incentives are in place to attract foreign investments, encourage entrepreneurship, and promote the growth of digital

technologies. The effectiveness of existing policies and initiatives varies. Some have been successful in attracting investments and fostering innovation, while others may require fine-tuning or additional support to achieve the desired outcomes. Collaborative efforts between the government, industry associations, and educational institutions are crucial for creating an ecosystem that nurtures digital talent, promotes research and development, and supports the digitalization agenda.

Objective 5. Future Prospects and Recommendations-The future prospects for digitalization and outsourcing in Macedonia are promising. The global demand for digital services is expected to continue growing, presenting opportunities for Macedonian outsourcing companies to expand their market reach. Emerging technologies such as 5G, Internet of Things (IoT), and edge computing will shape the industry, enabling new service offerings and innovative business models. Companies should stay updated with these trends and invest in building relevant capabilities to capitalize on the opportunities presented by digitalization, outsourcing companies should prioritize investments in digital skills development, foster a culture of innovation, and embrace collaboration with technology partners and startups. Policymakers should continue to support the digitalization agenda by providing a conducive regulatory environment, investing in digital infrastructure, and facilitating public-private partnerships. Stakeholders should work together to address data security concerns, promote knowledge sharing and best practices, and actively participate in industry forums and events to stay abreast of the latest trends and developments in the digital outsourcing landscape.

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Planning the Development of Cosmetics Company by Introducing Blockchain Technology

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Our research focuses on Kozmetika Afrodita d.o.o., a leading Slovenian cosmetics company, and the impact of blockchain technology on its business environment. The cosmetics industry is increasingly emphasizing natural products and transparency, with health-conscious consumers demanding more insight into what they put on their skin. Many companies have adopted blockchain technology for transparency from ingredient sourcing to final production. We analyzed Kozmetika Afrodita internal and external environments, identifying opportunities, threats, strengths, and weaknesses. We found that digital transformation and blockchain technology would significantly benefit Kozmetika Afrodita.The new technology would enable the company to have excellent product transparency, consumer trust and competitiveness at home and abroad. Revenues would also increase. Despite some potential disadvantages, we do not perceive these as risky. Blockchain technology is a powerful tool for promoting sustainability, supporting green production processes, and enabling real-time collection and analysis of low-carbon or green data. We analysed the internal and external factors of the company using STEEP (sociocultural, technological, economic, ecological, political-legal environmental factors) and IFAS (internal factors synthesis) methods. We found that blockchain technology would have a positive effect on the company's product quality, customer loyalty, market position and revenue.

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1 Introduction

The 21st century has witnessed the emergence of a number of disruptive technologies that have had a major impact on the cosmetics industry. The cosmetics industry is poised for explosive growth. In 2020, it was worth around USD 532 billion and is growing rapidly (Kaur, 2020). The global cosmetics market is expected to reach $758.4 billion by 2025, driven by a surge in skincare and natural products (Owens, 2021). Unfortunately, although cosmetic brands seem to be booming, they are still facing various problems that limit their growth.

In the business world, the power of suppliers has long since shifted to the side of consumers. Today, consumers are far from satisfied with the old sales approaches, as they are better informed and expect more from their product providers. Consumers are increasingly demanding better insight into what their products are like and do not believe what advertisers say, as brands in the cosmetics industry have already been accused of misleadingly claiming to be more environmentally responsible than they really are. This can have a detrimental effect not only on the brand's reputation but also on consumers' health. The risks to public health posed by the lack of regulation of cosmetics production are wide-ranging. In view of these trends and the issues to be addressed, the cosmetics industry is increasingly technologically evolving (Kaur, 2020).

A number of internal and external factors directly or indirectly affect a company's performance. Some of these factors can be influenced by the enterprise, but most cannot, and the enterprise must adapt to avoid being affected by changes in these factors. Together, these two factors form the business environment (Kamble, 2021). Knowledge of a firm's external and internal environment plays a vital role in shaping a firm's strategy, but the environment in which organizations compete is increasingly dynamic and rapidly changing, requiring constant changes in strategies and activities to reflect these changing circumstances (Kennerley & Neely, 2003). Different environments, in turn, offer different development opportunities for firms, accompanied by different obstacles. Both (development opportunities and development constraints) provide a testing ground for the firm to play its development game. The players of the company have a decisive influence on the success of this game, but so do the competing teams. The firm must be able to

overcome the development obstacles, turn opportunities into development possibilities and then exploit them for its own development (Belak, 1998).

In this paper, we examine the development planning of Kozmetika Afrodita d.o.o. by introducing blockchain technology due to the problems faced by consumers already listed above. The use of blockchain technology in the company involve numerous tasks, including enhancing product transparency, combating false claims, digitizing data, protecting against counterfeiting and improving security. However, in the paper we mainly focus on a more detailed examination of the external and internal environment of the company and the impact of blockchain technology on these two environments of the company.

2 Theoretical Background

2 The Company's Business Environment

2.1.1 Examining the External Environment of the Company

The business environment is the internal and external forces of a company that influence the way the organisation operates. This may include customers, employees, stakeholders, other organisations or resources. The elements that create the business environment are important for the survival of the business. How the business improves and develops depends on these aspects. It is important that an organisation understands and examines its business environment in order to adapt to potential changes (Indeed, 2021).

The business environment is broadly divided into the external environment and the internal environment. The external environment consists of variables outside the business over which the business has no significant influence in the short term. The internal environment is represented by variables within the company. The external environment is further divided into the wider external environment and the operating environment of the firm (Jaklič, 2005, str. 1).

The external environment is very important for the company to study, as strategic planning aims to exploit opportunities from the environment with the company's strengths and to reduce threats from the environment by eliminating the company's

weaknesses or creating new strengths. Thus, the study of the environment must give us an answer to the question 'which influencing factors, given the environment and future developments in the environment present opportunities and threats for the company'. (e.g. Lombriser, Abplanalp, 2005; Hunger, Wheelen, 1993, summarised in Duh, 2015, p. 185) Environmental uncertainty is a reflection of the degree of complexity of the environment and the degree of change in the firm's external environment. "On the one hand, it is a danger for the firm because it hinders the formulation of long-term plans and strategic decision-making to maintain the firm's equilibrium with the external environment, but on the other hand, it is an opportunity because it creates new areas in which firms' innovation and creativity can be expressed" (Duh, Upravljanje podjetja in strateški management, 2015, str. 185).

There are different methods for studying the external environment of a company, such as the STEEP and PESTEL analyses (Duh, 2015, p. 209), the scenario method ((Duh, 2015, p. 219)and the EFAS table (Duh, 2015, pp. 223-224). In the empirical part, we have presented the external environment of the company Kozmetika Afrodita by means of the STEEP analysis.

2.1.2 Examining the Internal Environment of the Company

However, attention should not only be focused on the external environment, but also on the internal environment of the company, in order to identify those key strengths and weaknesses that are likely to affect the company's ability to take advantage of opportunities and avoid risks. The purpose of examining the internal environment is to identify those variables within the firm that may represent significant strengths and weaknesses for the firm, particularly in comparison with existing or potential competitors. The firm needs to have information on the interdependence, structure and mode of action of these factors in order to assess what the firm is able and capable of doing (Duh, Upravljanje podjetja in strateški management, 2015, str. 196). The internal environment of a firm can be studied in a variety of ways, taking as a starting point one of the basic strategies (Müller-Stewens, Lechner, 2005, p. 213, summarised in Duh, 2015, p. 196):

- resources/resources,
- capabilities,

- core/core capabilities.

Methods for studying the internal environment of a company include the analysis of the company's resources and/or capabilities (Duh, 2015, pp. 225-227)and the internal factors synthesis or IFAS table (Duh, 2015, pp. 227-229).

2.2 Blockchain Technology in the Cosmetics Industry

The last ten years have witnessed exponential growth in the cosmetics sector. The beauty industry is now valued at over $532 billion and is growing rapidly. By 2024, it is estimated to be worth up to $750 billion. Technology-enabled cosmetic brands will surely continue to transform the beauty world in the years to come (Kaur, 2020). Today's beauty scene has changed dramatically. With the advent of technology, mankind has brought the art of beauty closer to man. From customised skin care to personalised solutions from experts, everything is at your fingertips (Rathod, 2019). Consumers are increasingly demanding better insight into what their products look like and often do not believe what advertisers say. This is especially true as "the link between certain cosmetic ingredients and health problems is becoming more and more apparent". (CB insights, 2019, summarised in Kaur, 2020, p. 2) Transparency of product ingredients has become a top priority not only for cosmetics and personal care brands, but also for consumer packaged goods, not least for retail companies. A clean beauty movement has also emerged, driven by consumer demand for ingredient transparency - "the global natural and organic beauty market is estimated at $22 billion" (Kaur, 2020).

The Ipsos report (2019, summarised from BSN, 2021) highlighted a number of trends and challenges for the industry if it continues to grow at such an impressive pace. Three words keep cropping up in relation to the product attributes that attract cosmetics buyers to new brands: "clean", "natural" and "sustainable". The report also notes that "two thirds of consumers responded positively to the statement: 'I would be interested in trying new products from other brands if they are natural', while 59% agreed with the statement: 'I would be interested in trying new products from other brands if they are clean'." These data were derived from surveys of consumers in the US, but similar themes emerge in all major cosmetics markets (BSN, 2021).

"70% of consumers hardly believe the sustainability claims made by brands, 94% think they should be more transparent and 71% would even be willing to spend more money on brands that guarantee product traceability. This is a key problem. If blockchain becomes democratic, I think this is the future," says Maxime Finaz de Villaine, CEO of Bloomup Energie Fruit, in a recent article (Milet, 2022).

However, despite the widespread use of the terms 'natural' and 'clean', the use of cosmetics and skincare products is unregulated and therefore lacks uniform standards in the cosmetics and personal care sector. As a result, brands have been accused of making misleading claims in order to portray themselves as more environmentally responsible than they really are. This can have a detrimental effect not only on the brand's reputation but also on consumers' health, as false green advertising ("greenwashing") is misleading. Increased experimentation with blockchain technology in the consumer packaged goods and retail market is creating initiatives in the cosmetics and personal care sectors on ingredient transparency (Kaur, 2020).

The risks for public health posed by the lack of regulation of cosmetic products are wide-ranging. In view of these trends and the issues to be addressed, the cosmetics industry is increasingly developing technologically. Blockchain is a very open, incorruptible and decentralised technology, which provides a fair and trustworthy way to verify information from a brand and its supply chain to the end customer (Kaur, 2020). Blockchain can enable brands to show consumers exactly what they want to know about the products they buy (BSN, 2021).

Many foreign brands are already making use of blockchain technology in different ways. Because of its time-stamped and verified data entry, blockchain represents an innovative solution to the problem of supply chain visibility. A very common example cited in many reports and articles is Cult Beauty, an online retailer that has partnered with blockchain technology company Provenance to implement an in-store system called "proof points". Brands selling through Cult Beauty will be able to verify their product information using open information from NGOs and lab reports, for example on vegan ingredients or sustainability. This will enable consumers to make informed purchasing decisions (Owens, 2021). We would recommend such an application of blockchain technology for Kozmetika Afrodita

to further increase its competitiveness and provide greater transparency to customers.

Looking ahead, it seems likely that blockchain will play an increasing role in this sector in the coming years (BSN, 2021). Consumers can make more informed purchasing decisions, have more flexible loyalty incentives and access to a unique and personalised product offering. Cosmetic brands that engage in these developments now will be best positioned to build sustainable loyalty in the future (Owens, 2021).

So why would the introduction of blockchain technology be a game-changer for Kozmetika Afrodita? Firstly, the cosmetics industry is not yet using blockchain technology; at least not the vast majority of it. In Slovenia, Afrodita would be the first example of information verification and transparency. On the packaging or on the website, it would be possible for the consumer to check all the information behind the claims made, the ingredients. The company could then use the chosen platform to ensure transparency for customers who want to know more (Provenance).

3 Methodology

In this paper, we will use secondary sources for our research, which will be gathered from external online sources and literature, based on scientific and professional literature, relevant articles and sources. The research is static.

In the theoretical part of our study, we'll employ various research methods: the descriptive method to detail and clarify the topic; the compilation method to summarize key insights from sources; the synthesis method to integrate data into a cohesive whole; the analysis method to examine the company's external and internal environments; and the classification method to define key concepts related to enterprise development and business environment.The empirical part of the paper belongs to the case studies, because we are researching on a case. The research will be carried out on the case of the cosmetics company Kozmetika Afrodita d.o.o. The external environment of the company will be examined by means of a STEEP analysis. STEEP analysis (Duh, 2015, p. 209) aims to study and monitor development trends in the wider/social and natural environment. It includes the

study and monitoring of socio-cultural, technological, ecological, economic and politico-legal environmental factors (Duh, 2015, str. 209). We have used the chosen analysis to study the external environment of the company, focusing more on the impact of blockchain technology on this environment. In doing so, we took into account trends that are relevant to Kozmetika Afrodita.

The internal environment of the company will be examined by means of an internal factors synthesis or IFAS table (Duh, 2015, pp. 223-224). The IFAS table is designed to synthesise the internal factors, which can be used to summarise, among other things, the main insights into the internal factors that affect the performance and development of the company itself. This table is used to identify the strengths and weaknesses of a company, to analyse how management responds to these factors and how important these factors are for the company (Duh, 2015, str. 227). With this table we show the strengths and weaknesses of the company Kozmetika Afrodita.

In this paper, we tested the following hypotheses:

H1: There is an opportunity in the environment to introduce blockchain technology into the enterprise.
H2: There is an opportunity to introduce blockchain technology in an enterprise environment.
H3: The introduction of blockchain technology into a company has a greater impact on the external than the internal environment of the company.

4 Results

To analyse the company's business environment, we used two methods, the STEEP analysis to examine the external environment and the IFAS table to examine the internal environment. We have described a number of opportunities and threats, as well as strengths and weaknesses of Kozmetika Afrodita, which have been used in this chapter to analyse the impact of the introduction of blockchain technology on the external and internal environment of the selected company.

We have found that the biggest problem leading to the adoption of blockchain technology is consumer health and the distrust of empty words from cosmetic brand advertisers. The EU has much stricter laws than the US, which is why cosmetics in

Slovenia also have to go through several stages of product safety checks before a brand can even launch it on the market. Kozmetika Afrodita also adheres to strict legal regulations and expects the same from its suppliers. However, despite the strict legal regulations and the slightly increased trust in the Slovenian brand, the issue of increased transparency and consequently increased customer loyalty and possibly increased sales and competitiveness in the market still remains in the background.

The attractiveness of blockchain technology stems precisely from its ability to support transparent data exchange, optimise business processes, improve operational efficiency, reduce operating costs and develop a system that does not need to explicitly incorporate trust in its control. It also enables new ways of green production and storage of data related to activities responsible for pollution and environmental degradation, and the collection and analysis of low-carbon or green data in real time for timely decision-making (Bai, Cordeiro, & Sarkis, 2020).

Table 1: STEEP analysis for Kozmetika Afrodita.

Economic environment	Political-legal environment	Socio-cultural environment	Ecological environment	Technological environment
– GDP growth – economic growth – high inflation – low unemployment – lack of adequate human resources – increased domestic consumption	– laws on cosmetic products – consumer mistrust – uncertain liability of manufacturers	– humanitarian works – organising and supporting various events and institutions - charity work – ethical behaviour	– recycling waste – natural technological processes – introducing GMP for safer products	– research development – development of innovation – development of new technological processes

The company's external environment was analysed using STEEP analysis, where we looked at five different environments and identified opportunities and threats for each of them. Opportunities for Kozmetika Afrodita are GDP growth, economic growth, the growing boom in natural cosmetics, care for employees, the environment and consumers, a wide range of cosmetic products, social responsibility, high brand awareness and popularity, excellent technological development, especially in the field of research, and reduced energy consumption.

However, the main risks for the company are the current high inflation, the lack of adequate staff, the renewed crisis due to covid-19, the cost of training employees, possible changes in legislation, the high competition in the cosmetics market and the growing mistrust of people towards cosmetic products and the brand.

Regarding the external factors of Kozmetika Afrodita (Table 1), we found that Europe is one of the world's largest producers of cosmetic products and that the cosmetics industry is a major contributor to the European economy; the production of cosmetic products alone directly contributes around €11 billion of gross value added to the European economy each year. We have also found from our research that cosmetic products containing natural ingredients without controversial chemicals are and will continue to contribute to market growth, and that Slovenia is forecast to experience favourable economic and GDP growth in 2022. On the other hand, the company is facing competition and customer disloyalty, precisely because of the huge volume and choice of cosmetic products. The introduction of the chosen technology would represent a major opportunity for Kozmetika Afrodita both at home and abroad, as it is particularly attractive for this sector because it has the effect of increasing consumer confidence, which is an important prerequisite for the company's growth. The company would thus establish or improve transparency and, consequently, the trust of current and new consumers. It would increase revenues, improve competitive advantages in the market and raise brand awareness. Many foreign cosmetics brands such as Cult Beauty, The Ordinary, Tropic that are already using blockchain technology in their business have confirmed increased trust, loyalty and competitive advantages. With just one click or scan of a QR code, consumers can easily access all the information they may have doubted before.

The internal environment was analysed using the IFAS table, where we identified the key strengths and weaknesses of Kozmetika Afrodita. Under strengths we mentioned sustainable development, human resources management, innovation and product quality, which is one of their main strengths. Under the weaknesses we identified the business processes that the company needs to improve, digital business, which aims to optimise business and production processes and thus facilitate the introduction of blockchain technology into the company, the introduction of a completely new system into the company, which can bring various risks, and the lack of adequate human resources, which will be caused by the introduction of blockchain technology into the company. The weighted score that

we have obtained here as a final result is above average, which means that the company is responding well to the environmental factors and is at an advantage compared to the competition.

Table 2: IFAS table for Kozmetika Afrodita.

Internal factors	Weight	Assessment	Weighted assessment	Comment
Advantages				
Sustainable development	0.15	4	0.6	A great responsibility
Human resources management	0.05	5	0.25	Good
Innovation	0.10	4	0.4	Keeping up with consumer trends and needs
Product quality	0.20	4	0.8	Good quality
Disadvantages				
Business processes	0.10	3	0.3	Process improvements
Digital commerce	0.10	3	0.3	Optimisation of business and production processes
New system	0.15	2	0.3	High challenge and risks
Adequate staff	0.15	3	0.45	New system
Overall assessment	**1.00**		**3.40**	

In terms of internal company factors (Table 2), Kozmetika Afrodita is particularly concerned about sustainability, employees, quality and innovation. Every day we buy products that have an impact on people and the planet. And brands often make sustainability claims that are difficult to determine whether they are genuine or not. By adopting the chosen technology, Kozmetika Afrodita would save a lot of time and energy, as it would be able to manage a huge number of sustainability claims for its large volume of annual product launches in one place, where consumers could easily get information about the ingredients in the product, the origin of the suppliers, the composition of the packaging and the production. By obtaining this information, the company would be able to demonstrate its environmental and social responsibility and the quality of its products. We see a bigger problem in the current workforce, which is not sufficiently skilled and educated in this area. It would be necessary to recruit a completely new cadre of specialists, which is necessary for the smooth operation of the company when blockchain technology is introduced. This would mean an increase in costs for the company, but does not represent a

significant risk for the company. The purchase of a specific blockchain-enabled platform, which the company needs for this type of business, also entails an additional cost. Kozmetika Afrodita wants to improve its digital business and business processes, which will make it easier for the company to implement and understand the new technology. At the same time, we would like to improve the competences of the company's employees in the field of digitalisation through the necessary trainings and seminars. In particular, by going digital, the company will increase the transparency of its business processes and reduce its exposure to business risks, as we have already established in the previous chapter.

The final weighted assessment, which was obtained by examining the company's internal factors, is 3, 40. This score shows that Kozmetika Afrodita is above the industry average.

5 Discussion

The business environment is very diverse and dynamic. We can never fully predict how it will affect a company's growth and development, so companies need to constantly adapt and keep up with trends if they want to remain competitive in their industry. Development must lead to greater success and employee satisfaction, which is why successful development requires an examination of the company's business environment. Technology and technological processes are increasingly evolving and offer companies the opportunity to optimise their business and other processes, which makes knowing your business environment in your industry all the more important for success and further growth.

We tested three hypotheses:

H1: There is an opportunity in the environment to introduce blockchain technology into the enterprise.

Through various research, a review of foreign companies using blockchain and an analysis of the external and internal environment of Kozmetika Afrodita, we found that there is an opportunity for the company to introduce the technology into the company. We have demonstrated this by using a STEEP analysis, where we present the opportunities and threats of the company and the strengths and weaknesses

through a synthesis of internal factors or an IFAS table. Finally, based on the internal and external factors identified, we analysed the impact of introducing blockchain technology in the selected company, where we found that it would provide the company with competitiveness, consumer trust, transparency and increased revenues. However, from the analysis of the annual report of Kozmetika Afrodita, the potential higher costs of purchasing the necessary blockchain platform, hiring new people do not pose a significant risk to the company's operations.

Based on the data and analysis, we confirm hypothesis 1.

H2: There is an opportunity to introduce blockchain technology in an enterprise environment.

Foreign cosmetics companies that have implemented blockchain technology in their business processes have confirmed better and easier future operations. The use of this technology saves them a lot of time by proving their sustainability and quality. As this is still a relatively new technology in the cosmetics industry, many companies do not know or understand it. It is therefore important for a company to understand the growing importance of digital business and the development of technology that will bring it new opportunities and greater visibility. And with it, more revenue, competitiveness and customers. For Kozmetika Afrodita, the analysis of the impact of blockchain on the business environment has shown that the introduction of this technology would have a positive impact on the further growth and development of the company, as blockchain technology represents the future not only in the cosmetics industry, but also in many other industries. The selected company is aware of the importance of digital transformation, is able to analyse its business environment and therefore the introduction of blockchain technology would be the right choice for its future development.

Hypothesis 2 is confirmed from the data and analysis.

H3: The introduction of blockchain technology into a company has a greater impact on the external than the internal environment of the company.

The STEEP analysis identified opportunities and threats in Kozmetika Afrodita's external environment. The final findings identified the successful external impact of blockchain technology on the company's environment. Consumers are extremely

important to cosmetics companies, who are increasingly concerned about their health and what they put on their skin. Consumers are one of the main reasons why cosmetic companies choose blockchain, to give them transparency of their cosmetic products and to have more trust in the company. Internally, however, we perceived some more downsides that can come with the adoption of the chosen technology. Blockchain affects both environments to its extent, but it certainly has a greater impact on the external environment of Kozmetika Afrodita, as this is where the results of its use are most visible, and this can also be detected from the previous chapters in the paper.

Therefore, hypothesis 3 is confirmed from the data and analysis.

Unfortunately, we did not have enough information about blockchain technology in the cosmetics industry to further deepen and substantiate our paper. For further research, we could also have personally contacted the company Kozmetika Afrodita, which could have given us a better insight into the company's operations and their further development. We were also not able to make a concrete comparison of Kozmetika Afrodita with other companies using blockchain technology, as the data was poor or unavailable.

6 Conclusion

Blockchain technology is the technology of the future in many industries. In the cosmetics industry, too, more and more companies will start to understand the deeper meaning of natural products and their relevance to consumers. Consumer awareness of clean cosmetic products is increasing day by day. Their demands for greater transparency in product formulation will become a necessity and it is important for cosmetics companies to analyse and better understand their business environment, analyse successful competitors and listen to their consumers as soon as possible.

Blockchain would provide opportunities for Kozmetika Afrodita in the business environment, opening the door to a complete digital transformation of the company and positively impacting the growth, development, internal and external factors of the organisation. Kozmetika Afrodita would operate in a more sustainable way, with greater consumer confidence and a strong competitive position in the cosmetics

market. It can be argued that blockchain is truly a technology of the future that will change the world of beauty for the better.

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Exploring Price Unfairness in Multi-Channel Retailing and Its Impact on Complaint Behaviour

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As retail companies expand their presence across multiple channels, they face the crucial question of whether to offer uniform pricing for their products across all channels or implement some form of price differentiation strategy. While there are arguments for both approaches, there is a lack of research on how consumers perceive such pricing strategies. The present study investigates the influence of perceived price unfairness on consumer complaint behaviour and the effect of the interaction between the place of purchase and the place of the reference transaction on this relationship. We conducted a scenario-based experiment involving 190 participants with a 2 × 2 factorial design. We analysed the data using the PLS method, by applying the MIMIC approach. Our findings suggest that consumers' perception of price unfairness is not affected by the interaction of the place of purchase and the place of reference transaction. However, the context may play a role in determining whether consumers will seek sanctions against the "unfair" providers. We discuss the theoretical and managerial implications of our findings.

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1 Introduction

Multi-channel retailing is on the rise. With the advent and growth of online shopping, consumers are now faced with an additional alternative in their decision process – the choice of a shopping channel. According to Eurostat (2024), more than two-thirds of Europeans (69,4 %) made at least one purchase online in 2023 and this number has grown by almost 5 p.p. compared to 2020 (64,7 %). Consumers view online shopping as a more convenient option (Al-Debei et al., 2015) and often expect that they will be able to pay less for a certain product online, compared to traditional, physical channels (Baker et al., 2018; Fassnacht & Unterhuber, 2016). Companies, on the other hand, view online channels as an opportunity to increase their market, improve their ability to access different target groups more efficiently, build relationships with their customers and as an opportunity to maximise their profits. The latter goal often spurs a dilemma about the pricing of a company's products. Managers should decide either to apply some form of dynamic pricing, to differentiate prices between their marketing channels, or to use a uniform approach, keeping price levels the same across their channels. Studies show that companies frequently avoid differentiating their prices, as consumers may perceive this as unfair, and possibly retaliate (Wolk & Ebling, 2010). However, companies that use price differentiation often do so, by aligning the price levels to consumer expectations: keeping prices online lower, and prices in brick-and-mortar stores higher. Our study aims to investigate, whether this is necessary. In a scenario-based experiment, we varied the observed price in an online and a physical store, as well as the reference price in both contexts to assess how consumers perceive the (un)fairness of price differences. Furthermore, our additional goal was to explore whether the perceived price unfairness would lead to various forms of complaint behaviour.

2 Theoretical Background / Literature Review

Multichannel retailing refers to the practice of performing retailing activities through two or more marketing channels (Levy et al., 2019). Nowadays, companies serve their customers with various physical, online and mobile marketing channels for them to interact with the company and shop in an integrated and seamless manner (Liu et al., 2018). However, to do so effectively, managers must consider different factors that may benefit, or harm their multichannel efforts. Prices are at the

forefront of such considerations. When it comes to multichannel retailing, companies usually choose between two main pricing alternatives: uniform pricing and price differentiation. Uniform pricing means, that a company prices their products the same, no matter the channel (Bertrandie & Zielke, 2019). In contrast, price differentiation involves modifying the price level of the same product (Stole, 2007) based on factors like individuals' willingness to pay or customer market segment membership.

Researchers agree that multichannel price differentiation is an example of what Pigou (1920) classifies as a second-degree differentiation. Second-degree price differentiation allows the company to segment their customers into different groups based on their willingness to pay. These groups are self-selective, meaning that each customer can freely choose to keep or change their membership. This type of price differentiation can be achieved by modifying prices based on the quantity purchased, product characteristics or place of purchase.

Channel-based price differentiation, similar to other forms of differentiation, can lead to a perceived sense of unfairness in pricing (Bertrandie & Zielke, 2019; Schneider & Zielke, 2021).

However, past research indicates that the direction of price differences between the online and physical stores could matter significantly when it comes to price unfairness perceptions. Consumers often associate online retailing with lower costs, hence expecting lower prices online, compared to the prices in physical stores. Therefore, our first hypothesis suggests that the perceived price unfairness may not only be influenced by the actual prices paid but also by the context of the reference transaction.

H_1: The interaction between the place of purchase and the place of reference transaction significantly affects the perceived price unfairness.

Perceived price unfairness has garnered the attention of academics primarily because of its role in affecting consumer behaviour. Perceptions of price unfairness affect purchasing decisions (Xia et al., 2004), negative word of mouth (Zeelenberg & Pieters, 2004) as well as different types of vengeful behaviours (Bougie et al., 2003; Kahneman et al., 1986). Our study aims to extend these findings, by investigating a

broader set of complaint behaviours, ranging from public and private complaints to sanctions aimed at the provider.

H_2: Perceived price unfairness affects consumers' complaint behaviour.

Finally, past research has highlighted that place of purchase could also affect the nature of complaint behaviours, although the results are somewhat inconclusive. More specifically, some authors have identified a so-called "lock-in" effect, meaning that the place of purchase usually predicts the place of complaining (Lee & Cude, 2012). On the other hand, others (e.g. Miquel-Romero et al., 2020) were unable to replicate these findings. The present research investigates whether the interaction of the place of purchase and the place of reference transaction affects the complaint behaviour.

H_3: The interaction between the place of purchase and the place of reference transaction significantly affects consumers' complaint behaviour.

3 Methodology

Sample

To test our hypotheses, we used a convenience sample of 190 business and economics students. 68 % of the respondents were female, the average age was 22,6 years (SD = 3,16) and 54 % were undergraduate students. We randomly assigned each respondent to a specific experimental group, ensuring that all groups were comparable in terms of gender, age, and education.

Instruments and data collection procedure

Following our 2 x 2 between-subject experimental design, each of the four experimental groups received a specific scenario, describing a shopping experience and post-purchase interaction with a respondent's friend. Scenario example: *You are shopping for a laptop [online/in a local store]. After reviewing the offers, you choose a product, that suits you, and make a purchase (product brand and the provider are not important). You paid 899,00 € for the laptop. After your purchase, you talked with your friend, and realized, that they bought the same laptop [online/in a local store] for 629,00 €.*

After reading the scenario, we assessed respondents' perceived price unfairness with a brief price unfairness scale, developed specifically for our study which consists of three Likert-type items (e.g., *The price I paid is fair;* Cronbach a = 0,839). Additionally, to assess the probability of complaint behaviour, each respondent indicated the probability of them reacting in a certain way on a scale from 1 (Very unlikely) to 5 (Very likely). The 11 items for this scale were adapted from the taxonomy of complaint behaviour (Istanbulluoglu et al., 2017), and cover an array of behaviours applicable to the physical and online environment. Initial exploratory factor analysis revealed that the items load onto three factors, labelled private complaint behaviour (e.g., I would switch this company with another provider; Cronbach a = 0,834), direct complaint behaviour (e.g., I would notify the company about the event verbally; Cronbach a = 0,785), and public complaint behaviour (e.g., I would expose the event publicly on my own online channels; Cronbach a = 0,741).

To ensure the efficiency of experimental manipulation, we also included three manipulation checks, specifically to ensure that the respondents recognised the price difference direction, the respective place of purchase, as well as the respective place of reference transaction.

Data analysis

In our study, we performed data analysis in several stages. Firstly, we conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to check the dimensionality, validity, and reliability of our data. Secondly, we used SmartPLS 4 to test our measurement model, which allowed us to assess model fit, as well as convergent and discriminant validity. Finally, we tested the structural model to examine our hypotheses.

4 Results

To test our measurement model, we analysed the factor loadings, construct reliability, convergent validity, and discriminant validity. We present the key indicators in Table 1.

Table 1: Results of convergent validity analysis and reliability analysis

Construct	Indicator	λ	α	CR	AVE
Perceived price unfairness	PF1*	0,860	0,839	0,903	0,756
	PF2*	0,853			
	PF3*	0,894			
Private complaint behaviour	CB3	0,855	0,835	0,883	0,603
	CB7	0,763			
	CB4	0,779			
	CB5	0,769			
	CB6	0,712			
Direct complaint behaviour	CB1	0,878	0,795	0,872	0,697
	CB2	0,908			
	CB11	0,705			
Public complaint behaviour	CB8	0,797	0,761	0,843	0,646
	CB9	0,931			
	CB10	0,660			

* Reverse coding.
SRMR = 0,06; NFI = 0,82

The results of the measurement model analysis presented in Table 1 indicate that the latent variables, as measured by their respective indicators, are reliable and exhibit convergent validity. The factor loadings exceed the threshold of 0.6, and both the values of Cronbach's alpha and the CR index are above the required cut-off point of 0.7. The AVE values also exceed the threshold of 0.5. The overall model fit is acceptable, with SRMR below 0.8, while the NFI of 0.82 shows an acceptable fit, which could be improved.

Furthermore, to test the discriminant validity, we calculated the Heterotrait-monotrait ratio (HTMT). The results are available in Table 2.

Table 2: HTMT analysis to test the discriminant validity

	1.	2.	3.	4.
1. Perceived price unfairness	-			
2. Private complaint behaviour	0,469	-		
3. Direct complaint behaviour	0,138	0,269	-	
4. Public complaint behaviour	0,133	0,231	0,668	-

HTMT analysis shows that all ratios are below the threshold value of 0,85 indicating that our constructs are truly unique and cover distinct phenomena.

After establishing a well-fitting measurement model, we focused on the analysis of the structural model to test the hypothesized relationships. Due to the experimental design of our study, we applied multiple indicators, and a multiple causes approach – MIMIC (Breitsohl, 2019). According to this approach, the structural model should also include dummy variables to account for experimental conditions as well as their products and manipulation checks. Our proposed model is presented in Figure 1.

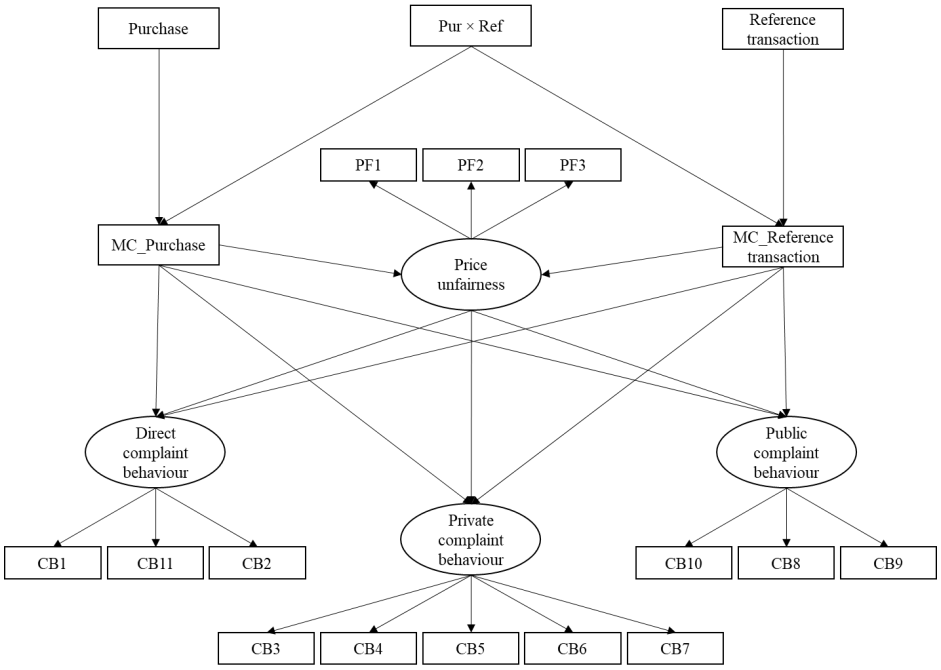

Figure 1: The proposed MIMIC structural model

We analysed our data by calculating the coefficient R^2 (Table 3). According to the values of 95 % confidence intervals, the R^2 coefficients are all significant. However, except for the construct Private complaint behaviour, which has the highest R^2 value and thus the highest share of variance explained, the rest are low. The model shows an acceptable fit (*SRMR* = 0,063; *NFI* = 0,818).

Table 3: The assessment of the model's predictive power (R^2) with confidence intervals

Construct	R^2	95 % CI
Perceived price unfairness	0,020	[0,001; 0,065]
Private complaint behaviour	0,178	[0,088; 0,282]
Direct complaint behaviour	0,054	[0,016; 0,117]
Public complaint behaviour	0,048	[0,015; 0,106]

Finally, we investigated path coefficients to test our hypothesised relationships. The results in Table 4 show only one significant positive relationship – the relationship between perceived price unfairness and private complaint behaviour ($\beta = 0{,}397$; $p < 0{,}01$). All remaining relationships were insignificant.

Table 4: Hypothesis testing with path analysis

Hypothesis	Relationship	β	t	Total effect
H_1	Purchase context → Perceived price unfairness	0,009	0,120	0,016
	Reference transaction context → Perceived price unfairness	0,006	1,235	0,163
H_2	Perceived price unfairness → Private complaint behaviour	0,397**	6,333	0,397
	Perceived price unfairness → Direct complaint behaviour.	0,120	1,451	0,120
	Perceived price unfairness → Public complaint behaviour.	0,130	1,148	0,130
H_3	Purchase context → Private complaint behaviour	0,020	0,287	0,042
	Reference transaction context → Private complaint behaviour	-0,006	0,079	-0,055
	Purchase context → Direct complaint behaviour	0,134	1,592	0,240
	Reference transaction context → Direct complaint behaviour	-0,024	0,283	0,022
	Purchase context → Public complaint behaviour.	0,055	0,665	0,095
	Reference transaction context → Public complaint behaviour.	0,068	0,835	-0,096

** $p < 0{,}01$

5 Discussion

Our research attempted to provide deeper insights into the practice of price differentiation in a multi-channel environment. Our goal was to investigate whether price differences between online and physical channels affect consumers'

perceptions of price unfairness and consumer complaint behaviour. According to our results, this is not the case. Our experimental manipulation of the place of purchase and place of reference transaction had no impact on perceived price unfairness. Hence, we rejected hypothesis 1. Consumers' expectations of price levels in different retail channels reported in previous research (Baker et al., 2018; Fassnacht & Unterhuber, 2016; Liu et al., 2018), might affect the choice of a particular place of purchase. However, when the purchase is completed, the actual price discrepancy might be the only thing that matters in price fairness perceptions. Similarly, we found no significant impact of the place of purchase and place of reference transaction on consumer complaint behaviour (H_3). We detected only a small, however statistically insignificant effect of purchase context on the probability to complain directly to the provider. Some authors (e.g., Lee & Cude, 2012; Miquel-Romero et al., 2020) investigated a so-called "lock-in" effect, reporting that the place of purchase often predicts the place of complaint behaviour. Our goal was to see, whether the place of purchase in interaction with the place of reference transaction might affect the type of consumer complaint behaviour and found no support for such claims. Finally, we were able to accept our hypothesis, that perceived price unfairness affects consumers' complaint behaviour (H_2). This was the case only when it came to private complaint behaviour, and not for direct complaining or public complaining. This is an important conclusion. Private complaint behaviour will go unnoticed by the company thwarting any chance of improvement for future interactions (Istanbulluoglu et al., 2017).

We recommend that our findings should be interpreted in light of some limitations. We used a convenience sample of business and economics students, which limits the generalisability of our findings. The use of scenarios, while practical, may lack the realism and emotional engagement of real-life situations, necessitating future field replication. Finally, our model provided a very limited explanatory power, which certainly suggests other factors should be accounted for when explaining perceptions of price unfairness and complaint behaviours in future studies.

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Work Values, Expectations and Motivation of Students as Future Employees

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Young people born within the Internet era are entering the higher education system, streaming to the transition phase for their future workplace. This generation demonstrated a unique set of work values, expectations, and motivation, which will have implications at their workplace and must be better understood to develop effective human resource management strategies. The main purpose of this conceptual paper is to emphasize the need to examine the work values, expectations, and motivation of Generation Z, which represents future employees. Due to the gap between what organizations offer and what newcomers from Generation Z want or expect, there is a need to examine the work values, expectations, and motivation of Generation Z. Knowing what Generation Z wants will enable organizations to better manage the integration of newcomers in organizational settings, as well as enable organizations to attract the best students, facilitate their integration and promote their working development.

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1 Introduction

In recent years, discussions about the entry of Generation Z into the working environment have been at the forefront of interest among academics and practitioners. The need to examine Generation Z in an organizational context is especially heightened and essential due to their differences in work-related preferences compared to previous generations (Pichler et al., 2021; Schenarts, 2020; Tang, 2021). Members of Generation Z are put at the forefront, for instance, career advancement, financial stability, and work-life balance (Gomez et al., 2020; Nedelko et al., 2022).

Literature about Generation Z offers us an insight into the characteristics of members of Generation Z (Pichler et al., 2021), their values (Nedelko et al., 2022; Tolstikova et al., 2021), work values (Bulut & Maraba, 2021; Hampton & Welsh, 2019; Maloni et al., 2019), expectations and motivation (Fratrieova & Kirchmayer, 2018; Kirchmayer & Fratričová, 2018). Despite the growing body of literature, there is still less attention dedicated to the work values of Generation Z in organizational settings. The lack of studies in this area does not allow us to fully understand the work values, expectations, and motivation of (future) employees belonging to Generation Z.

We are now in a situation where we have an influx of young people into organizational environments who have significantly different characteristics from those currently employed and those who set the tone for the operation and behavior of organizations, which mostly come from previous generations – i.e., Baby boomers, X and Y.

Therefore, in order to maintain the continuity of the organization's operation on the one hand and, on the other hand, to successfully integrate young employees into organizations so that they are satisfied at work and well-motivated, it is crucial to learn more about the work values, expectations and motivation of young employees from Generation Z. The different importance that members of generations assign to work and personal values, raises the question of the level of alignment between prevailing work values in organizations and work values' expectations of newcomers from Generation Z, which has received little attention in the literature so far.

In-depth knowledge will reduce the gap between what "organizations offer" and what "young employees expect or want from the organization." Knowledge of the gap will enable organizations to design actions that will reduce perceived differences, the continuity of the organization's operation will be ensured, and, last but not least, it will also prevent the creation or elimination of workplace conflicts resulting from inter-generational differences.

Based on the above, the central question of this paper is how members of Generation Z will fit into the organizational settings. In the context of this central research question, the contribution aims to highlight the necessity and importance of researching the work values of members of Generation Z, especially in connection with the needs of organizations, which are expressed through the declared work values of organizations.

2 Literature review

Generation Z members are born between 1996 and 2012 (Dimock, 2023). They have unique characteristics in that they have different attitudes, expectations, and behaviors and place significantly different importance on personal values than previous generations (i.e., Generation X and Y) (Mahmoud et al., 2021). We can characterize members of Generation Z as "digital natives who truly live and breathe life based on virtual connection." They favor digital media over traditional media; have a reduced capacity for sustained attention; want to get things as quickly as possible or reach their goal; have a very low tolerance for being without digital resources and technology; they have an increasing ability to "multi-task"; they are individualists and reluctant to join teamwork; they are aware of the importance of money; and are incredibly confident (Nedelko et al., 2022).

Members of Generation Z have unique characteristics that make them different from their predecessors and each generational cohort before them, as they demonstrate a unique set of values that has implications in their workplace (Bierbrier, 2022). Their different work values can influence their motivation, employee performance, job satisfaction, and organizational commitment (Bierbrier, 2022). Generation Z appreciates social values, potentially configuring their working profile and partially explaining work preferences such as employer size and salary expectations (Yusvin, 2020). Furthermore, literature has found that work values vary

across generations and national cultures, justifying localized examination (Silva & Carvalho, 2021).

Generation Z's character, mindsets, and expectations are known to be different from previous generations. Generation Z expectations differ from those of other employees (Mahmoud et al., 2021; Ozkan & Solmaz, 2015), as they value workplace flexibility, work-life balance, and career orientation differently. Generation Z workplace expectations are, therefore, different as they are defined as highly ambitious and self-confident (Pataki-Bittó & Kapusy, 2021) but still enticed by the work flexibility and a balance with their life outside the workplace (Scholtz & Rennig, 2019).

Large generational differences exist in employee motivation and behavior concerning working goals (Bińczycki et al., 2023), as motivation determines an employee's work effort (Colquitt et al., 2011). McCrindle (2014) characterizes Generation Z as the most materially endowed, technologically saturated, globally-connected, and formally educated generation than before – and the question is what motivates Generation Z at work (Kirchmayer & Fratričová, 2018). Motivation and satisfaction in work are presumed to have a significant impact on the organizational commitment of Generation Z (Nabahani & Riyanto, 2020), and still, Generation Z seems to be more motivated by finding their dream job and opportunities to expand their skills (Magano et al., 2020).

3 Generation z in organizational settings – work values viewpoint

It is undoubtedly evident that members of Generation Z bring a "breath of fresh air to organizations." Generation Z is expected to decisively reshape and lead society and organizations in the 21st century (Schroth, 2019). This opens the question of the alignment of work values of newcomers with organizational work values, considered through the relative desirability of various aspects of work and work-related outcomes for their future jobs and careers (Arieli et al., 2020; Maloni et al., 2019; Pichler et al., 2021). Outlined calls for research into how Generation Z's work values align with currently demanded work values in organizations, developed by the significant influence of previous generations that are substantially different from Generation Z (Lyons & Kuron, 2014; Mahmoud et al., 2021).

The study of persons-in-organization has a long history, as the literature has emphasized the importance of the fit of work values between individuals and their work environment (De Clercq et al., 2008; Posner, 1992; Vigoda-Gadot & Meiri, 2008). The importance of this stream of research is coming to the fore again, as today, in organizational environments, there is a daily debate about the specifics of Generation Z members, which deviate from the expected "stereotypical" profiles of employees, which are formed based on the dominant characteristics of employees who belong to previous generations. This perception of the gap between newcomers and existing organizational settings has been further deepened by digitalization, which changes the working environment into a more desirable one for Generation Z compared to current employees. We are currently at a point where we will also be able to learn about the development of work values of Generation Z, especially through the prism of their work experience, because the members of Generation Z are still in the education process, without significant work experience. At the same time, the oldest also have up to 10 years of work experience. All this reinforces the need for a deeper examination of the work values of Generation Z.

Various classifications of values have been formed for the systematic study of work values in organizations. More recent empirical studies have established four fundamental dimensions of work values, namely cognitive (intrinsic), instrumental (extrinsic), social/altruistic, and prestige, which is based on analyzing 25 work values (Arieli et al., 2020; Lyons, 2003; Lyons & Kuron, 2014; Ros et al., 1999). Scholars have developed a set of methodologies and conceptual models that enable a broader analysis of these fundamental work value dimensions at individual, group, and organizational levels. For instance, a comprehensive picture can be obtained by relying on Ros et al.'s (1999) findings and Lyons' (2003) three-dimensional models that were used and confirmed on Generation Z work values, as well as on previous generations (Lyons & Kuron, 2014).

4 Discussion

Starting from the central research question of the paper - how members of the Z Generation match the organizational environment - through the prism of work values, we can conclude that there are some important differences based on the analysis of secondary sources and authors' research findings. We can highlight the

following possible differences by comparing the selected characteristics of Generation Z and the demands of the current organizational environment.

The possibility of career advancement for individuals in organizations (Magano et al., 2020; Nedelko et al., 2022) is often limited due to the pyramid or classical organizational structures, which prevents the promotion of many employees. This can lead to frustration among Generation Z members due to their inability to advance. This could then also result in higher employee turnover.

Work-life balance is very important to members of Generation Z (Gomez et al., 2020), which, in a way, requires organizations to enable them to demarcate their private and business lives properly. This can represent a significant challenge for organizations, as it is often the practice of organizations that employees are "always available," which does not meet with much approval among members of Generation Z

Members of Generation Z want to do most things with the help of information technology and have a very low threshold of tolerance when it comes to work without the use of information technology (Tolstikova et al., 2021). This can lead to disappointment or lack of interest in performing work, as organizations cannot always ensure the use of digital technology at work since the nature of work does not allow this, or the organization has not yet implemented possible digital technology to support the organizational processes.

The problem can also arise when providing flexible work, which members of Generation Z highly appreciate. For example, when the organization has specific office hours for working with customers, the possibilities for more flexible forms of work are limited.

A challenge can also be the reluctance of members of Generation Z to work as a team, especially in the case of organizations with a strong team organizational culture or the nature of the work that requires teamwork, as Generation Z sometimes may be more individualistic-oriented (Nedelko et al., 2022).

5 Conclusions

The central starting point for further researching and discussing the work values of Generation Z in the organizational context is undoubtedly the perceived difference in the perception of work values and the expectation of work-related preferences of Generation Z members compared to previous generations.

The existence of differences between what organizations offer and what members of Generation Z want or expect from the organization stems from the fact that the characteristics of the organization and its operation were formed based on the values, attitudes, and behavior of the previous generation – mainly generation X and Y. Special attention needs to be dedicated to the motivation, as Generation Z is much more sensitive to "amotivation" than Generation X and Y (Mahmoud et al., 2021).

Another dimension to the examination of the fit between "work values of Generation Z and the prevailing working values of organizations emerges from differences in work-related preferences across different countries (Nedelko et al., 2022), and that work values vary across not only among generations, yet also national cultures (Silva & Carvalho, 2021), calling for a more localized examination of working values on Generation Z.

The examination of values, expectations, and motivation of students from Generation Z will create a knowledge base that can be used by young adults (students, members of Generation Z) to overcome various obstacles in first employment and building a career; better cooperation with colleagues from a different cultural context, age and education structures and the like; recognition of the difference in behavior, values, motivation and expectations of future colleagues in the workplace who belong to other generations (Y, X); and breaking stereotypes about others.

The cognitions will be useful also for human resource management experts in creating a strategy for attracting potential colleagues who belong to Generation Z; developing a retention model for young, highly educated people in the organization, better diversity management, understanding the expectations of employees who come from a different cultural context (e.g., due to the characteristics of the national

culture and its influence on the behavior, expectations, and motivation of individuals/employees).

Further, the findings will be useful for policymakers for: policy formulation for faster employment of young people and acquisition of first work experience; creating strategies for young people to build a career in the country; finding the answer to how to reduce the leaving of young people ("brain drain"); assistance to the economy and employers to make it easier to fill vacant positions, as the problem of a lack of qualified labor and the long-term search for employees is noticeable in almost all industries.

The findings can also be used by educational institutions, as the preferences of Generation Z, which are different from the previous generations, also call for changes in the education system. The change should take place primarily in the direction that selection will be more adapted to the needs of members of Generation Z – e.g., more inclusion of digital content, interactive work, use of virtual reality, etc.

Finally, an important area in the framework of the research on the work values of Generation Z is also the area of sustainable development. At this moment, the question can be raised whether organizations will be the bearer of sustainable development or whether this will be members of Generation Z, which is highlighted by the European Green Deal (Filipović et al., 2022; Ossewaarde & Ossewaarde-Lowtoo, 2020). This question arises mainly because concern for sustainable operation is often not at the forefront of interest among members of Generation Z (Nedelko et al., 2022).

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HEALTH-PROMOTING LEADERSHIP INTERVENTIONS

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The research aims to explore, identify, and describe employees' perceptions of health-promoting leadership (HPL) interventions within Professional Service Firms (PSFs) in Poland. This ongoing exploratory study involves full-time employees from diverse PSFs. Employing reflexive thematic analysis, the study delves into participants' beliefs and perceptions, shedding light on the nuanced landscape of HPL in PSFs. Initial analysis, based on semi-structured interviews with experienced professionals, unveils key themes: 1) activity dimensions – comprising physical activities, mental-health, and healthcare; 2) strategy object – underlying genuine commitment to employee well-being or part of marketing strategies and corporate social responsibility initiatives; 3) directions of spread – top-down and bottom-up interventions; converging into the global theme (Practice comprehensiveness). Ongoing data collection ensures a comprehensive exploration of this under-researched domain. The research findings expand knowledge on the perception of the HPL concept. The study is a starting point for capitalizing on health-promoting leadership development in the business environment in Poland. It seeks to address gaps in understanding HPL, emphasizing its context-dependent nature. By examining HPL practice, the study aims to contribute valuable insights to the broader discourse on workplace health promotion and leadership effectiveness within the unique context of PSFs in Poland.

Keywords:
health-promoting workplace, leadership, perception, professional service firms, qualitative research

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1 Introduction

Health-promoting leadership (HPL) is understood as possessing knowledge of the workers' situation and safety conditions (Skarholt et al., 2016) and is considered a means of improving employee well-being, thus counteracting a high rate of absences caused by sickness (Holstad et al., 2016). It was meant to support employees by providing goal clarity, increasing participation, being sensitive to needs, and developing competence (Eriksson et al., 2011). The aim of HPL is to change working conditions in a way that they can support employee health (Bregenzer et al., 2020). This means that leaders influence working conditions with their leadership behavior to improve resources at the workplace. When employees experience their working conditions as resourceful and supportive, they will feel that their supervisors actually care for them, increasing job satisfaction at the workplace.

HPL practices across organizations positively influence on psychosocial and physical working environment (Jiménez et al., 2017). However, according to a study conducted in Norway by Skarholt et al. (2016), HPL practices that promote health and well-being at work vary by profession. In the current study, research interests revolve around professional service firms (PSFs), which are also HPL under-researched in Poland. Reverting to the HPL concept, the one related more to organizational health interventions and the effectiveness of leadership interventions on employee health is gaining the most attention in the Nordic countries (Larsson et al., 2015). Meanwhile, one of the contemporary challenges facing national economies is maintaining sustainable development. Following the global commitments of the Sustainable Development Goals, the EUROPE (2020) strategy aims to make the EU a smart and sustainable economy. Enlightened business leaders who would understand health and well-being perceived as preconditions of sustainable development (Goals 3 & 8) could consciously contribute to the co-creation of such an economy. Given the above, the main research question is intended to answer: "What interventions do leaders of professional service firms perceive as health-promoting practices?"

2 Theoretical Background

Generally, the 'necessity of a healthy and motivated workforce' requires organizations to promote workplace health and safety actively (Macke & Genari, 2019, p. 812). In doing so, organizations benefit by better ensuring a more compliant workforce, employee retention, increased productivity, and improved innovation, profits, and growth (Abid et al., 2020; Kobayashi et al., 2018). But by what means can PSFs introduce the practice of HPL? In the study by Eriksson et al. (2012), operating managers had limited knowledge of prevention and health promotion to provide a straight answer. Chen and Wu (2023) underlined the role of the health-focused leadership communication of executive leaders. However, the research does not provide a clear answer on how to act.

The findings show that in Sweden, individual and environmental resources, both in work, such as HPL, and private lives, are associated with a work-life balance (Törnquist Agosti et al., 2017). However, routine leadership behaviors do not contribute to an organizational health culture (Gurt & Elke, 2009). In order to contribute to the perception of a supportive organizational health culture, the leader has to serve as a role model – show his/her specific engagement for health promotion, such as setting objectives, giving feedback, and recognition. Given the HPL program's focus on employee involvement in Sweden (Larsson et al., 2015), findings show that the team workshop and the action plan development are a key element and the most useful and well-functioning activity in the leadership program. The role of HPL is a facilitating, inner contextual factor in the sustainable implementation of multi-component physical activity interventions in vocational education and training (Grüne et al., 2022). Another study found that leaders' explicit engagement in employee health is negatively related to employee emotional exhaustion and positively associated with employee work engagement (Kaluza et al., 2018). Moreover, leaders' health mindset and health-promoting leadership are found to be a cognitive and behavioral link that mediates the influence of health climate on employee health. According to the World Health Organization (2022), mental health training for managers and supervisors includes stress management training using mindfulness-based or cognitive-behavioral approaches and strategies to promote leisure-based physical activity.

3 Methodology

The presented study retrieves raw data from the project "Health-promoting leadership: Antecedents, praxis, outcomes." The analysis is based on interview transcripts from 23 semi-structured interviews with highly qualified professionals (including 13 women) from 16 consulting companies. The interviewees come from offices in four cities. The youngest interviewee was 21 years old, and the oldest was 59. They all hold managerial positions. The research is ongoing – the interview collection started in July 2023. To ensure the anonymity and confidentiality of the participants, the interviews were conducted at their convenience. Each recorded one-on-one interview, which lasted about an hour, underwent naturalized transcription and encoding via Atlas.ti 7.5.18.

The interviewees were selected for a specific purpose, where the criteria included full-time employees who manage people in large PSFs. Reflexive thematic analysis (Braun et al., 2019) was the most appropriate method for analyzing the interview transcripts. In the line-by-line coding phase, code generation moved to a more detailed and systematic engagement with the data based on the research question.

4 Findings

The perceived activities that fit into the HPL concept are aimed at physical activities, mental-health, and healthcare. Physical activities comprise yoga, biking, skiing, wakeboarding, football, triathlon, and gym. They are fully supported by companies or partially funded. It can be organized onsite or offsite, depending on the activity type. Mental health training is associated with meetings with coaches and psychotherapists and events that allow one to relax, such as visits to theaters. It typically covers communication with employees, including providing feedback, building a climate open to asking questions and participating in discussions, and allowing for a sense of freedom. To this end, ice-breakers, songs on YouTube, and tools to support the exchange of ideas, such as whiteboards, are used. Job satisfaction involves, for example, an employee being aware that weekends are days off or that there is enough time to answer emails. Healthcare is associated with company benefits. These include healthcare subscriptions to a private network of healthcare providers, promotion of medical checkups, and information campaigns on diseases like depression, such as fruit days, to improve intestinal peristalsis.

Health promotion can go unnoticed by other companies, where activities are directed at employees, keeping them well is considered a priority, or marketing activities. Then, it is seen as actions to brag about on various social networks, directed at raising money to donate to an institution or, for example, planting mangroves. Participation in actions is sometimes included in an employee's individual development plan; other times, it is reflected in a promotion or may not affect the job evaluation. Such incentives (in-vivo) and marketing actions are embedded in market trends. Exemplary events include business run, "runmageddon", go green, suits on bikes, and running in heels. While in the last 2 examples, their health-promoting effect can be easily questioned.

The initiative can spread in different directions. Top-down initiatives include webinars on stress management, massage therapists in the workplace, and doctor-intern writing prescriptions in one of the office rooms. It happened that employees worked shorter hours on Fridays or received a paid day off for medical examinations. One company negotiated discounts for employees to buy sports equipment, like treadmills, for their homes. Meanwhile, talks by psychologists in company meetings are common, but so are individual meetings with a psychologist to discuss problems in the team and try to diagnose them. Events organized from the bottom up include knowledge circles, culture clubs, and group excursions. Employees meet remotely, using platforms for communication, where they discuss topics such as selecting bicycle accessories or stationary to ride bikes together to get rid of accumulated stress.

5 Discussion

Preliminary findings indicate that most of the interviewees, despite being aware that there are numerous activities to improve their health, first do not consider them in terms of HPL unless it is a medical package offered by the company or an email reminding them to do medical checkups. Additionally, management-imposed activities are seen as marketing, conducive to building the company's image. In other contexts, they are seen as an activity that supports well-being or work-life balance.

The explanation for these findings is threefold. First, the identified interventions lacked adequate comprehensiveness of the program content. In addition, many times, they were one-off events. Meanwhile, a study conducted in Gothenburg,

Sweden (Eriksson et al., 2010) shows that leadership intervention programs need to be context-based and require the integration of the program with other health-promoting activities in the daily work of managers. Second, programs should be tailored to the managerial context and culture, with a more structured and coordinated approach to organizational standards and functions (Ely et al., 2011; Milner et al., 2018; Sims et al., 2021; Stead, 2014; Swensen et al., 2016), based on the functions that leaders need to perform and their specific business context, the firm's purpose, and strategy (Canals, 2014). In the interviewees' statements, organizational culture was not originally identified as promoting health. Rarely was health also identified as an organizational value. Instead, there was a resounding perception of health-promoting interventions as a fad, a trend. Third, the variety of ad-hoc initiatives actively supported financially by companies is substandard but promoted because of the attempt to maximize the impact of the initiatives on the organization. Instead, all that is required is the support of top management and their agreement to provide the resources that would enable the development process (May et al., 2003).

6 Conclusions

The study's findings expand understanding of HPL practice, and the study responds to calls for maintaining good health and well-being. However, this study was exploratory in nature and was limited to the perspectives of the employees of large PSFs. The use of individual interviews deprived the study of interaction within a group and the co-creation of meaning. This choice allows for further exploration of shared understanding. Next, the qualitative approach provides information on the underlying cognitive processes but cannot test the cognitive underpinnings against company performance. Therefore, developing a measurement tool related to perceptions of the effectiveness of health promotion interventions would further influence conscious development. The potential cannot be fully realized as long as the leader operates unconsciously to promote health. As for the future research direction, in the context of the leader's role as a change agent in building a culture of health, this can be considered a hitherto untapped opportunity.

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Sustainability and Development of an Organisation – Case Example

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The paper discusses the dynamics and development phases of the University of Maribor, the second-largest public university in Slovenia. Founded in 1975, the University has evolved by merging several higher education institutions. The aim of this paper is to analyse the university's life cycle, crises, and development phases using the theoretical frameworks proposed by Wheelen et al. (2017), Pümpin and Prange (1995), and Kropfberger (1999). The paper uses a case study methodology to present the institution's governance dynamics, crisis management strategies, and measures to increase its dynamism. The paper also proposes recommendations to enhance the dynamism of the university, including normative policies, strategic management initiatives, and operational measures.

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1 Introduction

The global environment presents challenges organisations must address and adapt their operations to meet. In a rapidly evolving society, companies need to adapt their operations to maintain competitive advantages continuously. According to Duh and Štrukelj (2023), in today's complex business environment, integrating sustainability into strategic decision-making is of paramount importance to maintain competitive advantage. According to Teece (2007), dynamic capabilities are competence advantages in situations defined by rapid and unpredictable change. The dynamic capabilities of an organisation thus represent a potential tool for achieving sustainable business development. In this paper, we will relate the theoretical findings to a case study of the University of Maribor as a public, academic institution, where we will analyse the situation of the organisation's life cycle, the presence of crises and the organisation's dynamism.

We have developed the following research thesis.

(T1): The dynamic capabilities of organisations can positively impact sustainable development in organisations.

The paper is structured according to the IMRaD structure. In the following, we provide a literature review (Section 2), followed by the methodology (Section 3), then we present the research results (Section 4), and we conclude the paper by presenting the discussion and conclusions (sections 5 and 6).

2 Literature review

Wiggins and Ruefli (2005) explain that over the years, the average time for firms to sustain their competitive advantages has declined significantly. Barreto (2011) explains that companies must be adequately managed and governed to sustain advantages (even if temporary) and respond appropriately to rapid environmental change. According to Teece (2007), we can understand that dynamic capabilities are competence advantages in situations defined by rapid and unpredictable change.

Duh and Štrukelj (2023) state that a sustainability-oriented organisation is concerned with its sustainable development, and if sustainability is required in the governance and management processes, it should also be reflected in the underlying implementation process (i.e. the core business). They explain that management should lay the foundations for leadership in the governance and management process.

Pümpin and Prange (1995) explain that a dynamic organisation retains a combination of pioneering and growing firms' characteristics. Achieving success in the field of institutional dynamization requires tremendous effort from management. Kajzer (1998) argues that in turbulent situations, companies need to be able to undertake comprehensive renewal and dynamization, which he calls a leap into a continuous process of change.

So far, dynamic capabilities have not been understood to achieve sustainable development of organisations. To date, dynamic capabilities have enabled companies to operate in a changing business environment. Bari et al. (2024) note that if dynamic capabilities are sustainability-oriented, they become sustainable, dynamic capabilities that can increase sustainability and provide a firm with sustainable competitive advantages.

The mission of universities, therefore, encompasses three key aspects: teaching, research, and societal benefit (Hanieh et al., 2015). To achieve all three and operate successfully in all areas, universities need to be dynamic and move beyond the characteristics that constrain them from achieving dynamism – there, the need for our research is grounded.

3 Methodology

For the research, we conducted a literature analysis, looking at data in the field of dynamic capabilities of organisations, as well as sustainable strategic management of organisations. In the empirical part, we used a survey and analysis of the central literature under study, where we researched the case of an academic organisation of the University of Maribor. We performed a comparative analysis and assessed the crisis state of the organisation according to Pümpin and Prange (1995) and then Kropfberger (1999). The findings of both analyses were combined through

synthesis. We then compiled the findings and analysed the deviations of the actual state of the firm from the target state of dynamism in different areas. Finally, we proposed measures to dynamize the company.

4 Research

Founded in 1975, the University of Maribor is Slovenia's second-largest higher education institution, with roots in merging various higher education institutions in Maribor. Over the years, it has established itself as a key factor in academic, research and social development in the region and beyond.

In this paper, we examine the dynamics of the University of Maribor, explore its organisational life cycle and crisis and make proposals to enhance its dynamism. The research was based on the following information: Univerza v Mariboru (2021), Statut Univerze v Mariboru (2021), UM (2022a) and UM (2022b). We used established theoretical frameworks of strategic management and organisational development, and the paper aims to provide insights into the University's operating mechanisms, strategic initiatives, and the challenges it faces in its pursuit of sustainable relevance and excellence. The paper also seeks to outline the importance of sustainable organisational performance, where the prerequisite is that the organisation is free from acute and hidden crises and can manage potential crises appropriately.

The research on the life/development cycle was based on data obtained from publicly available sources or from the authors' own experience of working in an organisation, and the authors caution that the data may differ from the actual situation in the organisation. The Pümpin and Prange (1995) lists of pioneering, growth, maturity, and turnaround criteria were used to assess how the University of Maribor organisation fits into the cycle's different phases. We found that the organisation mainly does not exhibit the characteristics of a pioneering organisation, as its size and rigid system make it limited and difficult to act quickly, agile, and innovatively. Nevertheless, some elements of pioneering are present, such as the search for new business opportunities and the promotion of entrepreneurship and knowledge transfer. Based on the growth criteria, we observed that the University of Maribor shows some signs of a growing organisation, especially in the predominance of communication through formal structures and medium radical innovation. However, the formalisation of processes makes making decisions

quickly and adapting to change difficult. According to the maturity criteria, most of the elements in the company are related to a mature organisation, which is understandable due to its age and high formalisation. This can lead to lengthy decision-making processes, mistrust among employees and politicisation of business decisions. Finally, in the analysis of the elements of turnaround, we found that most of these elements do not apply to the organisation, but there are signs of solid power groups and the departure of good staff, which require attention and adjustments in the organisation's management.

The organisation is dominated by elements of maturity, with some signs of growth and turnaround, which is to be expected as it is an older organisation with several faculties operating with similar, long-standing and rigidly structured systems. Nevertheless, the organisation remains competitive in the market through the introduction of new programmes, innovation, and close cooperation with industry. Although managers do not have close contact with lower organisation levels, they regularly carry out quality reviews and quality improvement measures at all levels. Using Kropfberger's (1999) method, the analysis of the organisation's crisis, carried out using different models, has been carried out. It shows the overlap between the stages of the development of a crisis in the company and the stages of the organisation's life cycle, in which we have identified the crises of the maturity period that are typical for the university under study.

We can identify a corporate identity crisis as a potential crisis. The symptoms are there, but the university manages them successfully in line with its control and self-evaluation mechanisms.

Elements of the succession crisis manifest themselves in the organisation as a potential crisis, which the university manages relatively well. However, there are also elements of a crisis of power and bureaucracy, which are the most prevalent of the three crises at the university and the most difficult for the organisation to manage.
In the initial phase of the research, it was found that the organisation has most of the characteristics of the growth and maturity phases, with most of the elements and characteristics belonging to the maturity phase. The assessment of the organisation's crisis was foreseen for the maturity phase, characterised by identity, power and bureaucracy, and succession crises. Successful management of a maturity crisis requires a strategic approach involving analysing the organisation's situation and

opportunities, exploring new solutions, adapting business processes and culture, and effective communication with key stakeholders.

5 Discussion

The University of Maribor is committed to improving the future, and the quality of the study programmes it offers on the market. Accordingly, it invests in and develops new study programmes that are in line with the needs of the market, implements new projects to improve the quality of study programmes and recruits appropriate staff.

The University (and its members) has proactive management, which is most active in ensuring that crises do not occur or are exacerbated by various activities. It checks risks and situations for crises through self-evaluation reports and regular reporting. Crises arise where the University must react when faculties do not communicate with the University, and problems arise that the University is aware of. This is when the company must take a reactive management approach.

To maintain the quality and development of the company, the University of Maribor has adopted a strategy based on becoming more competitive in the national and global field. The University is also constantly seeking synergies with the economy, aligning the needs of the labour market and the content of educational programmes and connecting students with the economy.

The University is doing all this through an action plan that is in line with the strategy and is based on improving the quality of the University's study programmes and the quality of its work while at the same time preventing new crises through the achievement of its objectives. The University also monitors and rewards the performance of its staff.

Based on the management assessment, the University is aware that any crisis is preventable and takes appropriate measures and mechanisms. In a crisis, the university's reactive management ensures that the appropriate response is taken to resolve the crisis.

6 Conclusions

In this paper, we use the case of an academic institution, the University of Maribor, as a case study to analyse the life cycle of an organisation according to Pümpin and Prange (1995) and to assess the crisis state of an organisation according to Kropfberger (1999).

We found that the researched organisation has normative and policy measures in place, including searching for new business opportunities in local and international markets and promoting entrepreneurial activity within the university. We also suggest a multiplication of systems and processes within the organisation, which could include more frequent encouragement of suggestions and ideas from staff and students and an improvement of the entrepreneurial culture among staff. We also note the importance of flexible adaptation of the organisation's structure and processes and a human-centred approach, including appropriately motivating employees to participate and rewarding innovation. In the area of operational management, we suggest transferring good practices between faculties and promoting the development of a culture based on the values of understanding, professionalism, innovation, and sustainability. Identifying individuals who could be promoters of dynamism and standardising systems and processes at the strategic level is also vital. The reward system and identifying individual inhibitors of dynamism are also important aspects of dynamizing a company, along with time orientation and assessing employee productivity to assign tasks more efficiently. Following the conducted research, we can confirm the thesis put forward at the beginning of the research that the dynamic capabilities of organisations can positively impact sustainable development in organisations. The theoretical starting points and the analysed practical case proved this. For this reason, we also suggest to other organisations that they should deliberately develop their dynamic capabilities (Bari et al., 2024; Teece, 2007) and that they should include sustainable orientations in their governance and management, thus development and core business (Belak, 2010; Duh and Štrukelj, 2023; Wheelen and Hunger, 2014).

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Assessment of the Fiscal Sustainability in Africa Using the Panel Unit Root and Cointegration Tests

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One of the approaches to examine fiscal sustainability is to test the intertemporal budget constraint, which involves testing the stationarity of government revenues and expenditures, the primary budget balance, and the first differences of public debt. Part of this approach includes testing cointegration and causality among different pairs of variables. This paper focuses on assessing the fiscal sustainability of African group of countries in the period between 1995 and 2021. It has been found that fiscal sustainability is present, but in a weak form. Fiscal sustainability was confirmed when considering a constant and trend in calculations, while deviations were observed among first- and second-generation unit roots tests, and considered different pairs of fiscal variables. The study serves as a starting point for a more extensive analysis of fiscal sustainability. For more accurate findings, it would be necessary to categorize countries into smaller and economically more homogeneous groups and analyze them using other fiscal sustainability methods as well.

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1 Introduction

Recurring periods of increasing public debt and its persistence at relatively high levels raise concerns about the fiscal sustainability of countries. When examining the issue of fiscal sustainability, both the negative effects of public borrowing and the causes leading to unbalanced public finances are identified (Brady & Magazzino, 2018). Fiscal sustainability is focused on two key public finance variables, namely the primary budget balance and public debt. The definition of fiscal sustainability, which represents the equalization of the present value of future budget surpluses with the current level of public debt, can be derived in the context of the intertemporal budget constraint. When the conditions of the intertemporal budget constraint are met, the government has the ability to manage its public debt, since the debt rollover does not cause excessive accumulation and does not pose a risk of insolvency (Krejdl, 2006). If a country meets the conditions of fiscal sustainability, it can reflect favorable conditions for investing in its government bonds, since there is a relatively small probability of sovereign risk or state bankruptcy (Chen, 2014).

The definition of fiscal sustainability outlines the government's ability to maintain credible public finances and the ability to provide public services in the long term. Ensuring long-term fiscal sustainability and appropriate budget planning requires strategic monitoring and forecasting of future revenues and liabilities, environmental factors, and other socio-economic trends (OECD, 2013).

In this study, we examined the fiscal sustainability of African group of countries. We first reviewed the theory and empirical evidence that allowed us to determine the appropriate methodological approach and select the data set. In the results chapter, we first presented descriptive statistics, then proceeded to present the first generation unit root tests and Pesaran's second-generation unit root test. After verifying the stationarity of the fiscal variables in question, we conducted cointegration testing on various pairs of variables using Pedroni's test.

2 Theoretical background / literature review

The theoretical basis for studying the fiscal sustainability of countries is provided by the arithmetic of the budget balance, which demonstrates the connections between key fiscal variables. The budget deficit represents a negative balance of the budget

and affects the accumulation of public debt, as budget deficits are financed through the issuance of government bonds, and the sum of budget deficits over time represents the accumulated public debt (Case et al., 2012, p. 179). In studying fiscal sustainability, focus is often placed on the primary budget balance and public debt, which define the fiscal conditions in a country (Croce & Juan-Ramón, 2003). If the primary budget balance is in deficit, or if the surplus of the primary budget balance is smaller than the real interest repayments on public debt, the country will find itself in a budget deficit. The reasons for a deficit in the primary budget balance can vary. The most common reasons are the need for countercyclical fiscal policy, wars and natural disasters, structural reforms of the economy, delays in public financial consolidation, external shocks, and various economic-psychological factors (Guellec & Wunsch-Vincent, 2009; Döring & Oehmke, 2019).

Chen (2014) analyzed the fiscal sustainability of the G7 group of countries and selected European countries using quarterly data from the first quarter of 1980 to the fourth quarter of 2012. By testing for the presence of a unit root in the public debt-to-GDP ratio variable, the author found that a unit root is present in the sample under study, indicating a violation of the solvency condition. The public debt-to-GDP ratio shows time series stationarity for Canada, Germany, the USA, and Italy when calculations take into account a nonlinear trend in the long term and asymmetric data adjustment. Brady and Magazzino (2019) investigated the stationarity and cointegration of budget revenues and expenditures in the case of Italy, examining the long-term characteristics of both fiscal variables between 1862 and 2013. It was found that a unit root is present throughout the entire period, which rejects the condition of fiscal sustainability, although weak cointegration can be detected, suggesting the weak presence of fiscal sustainability. The authors divided the entire observed period into different sub-periods and found that fiscal sustainability can be confirmed for the sub-period between 1862 and 1913, while fiscal sustainability cannot be confirmed for the period 1947-2013.

Nzimande and Ngalava (2019) studied a group of 13 countries of the Southern African Development Community for the period 1980-2014, testing for the presence of a unit root with Pesaran's test and cointegration with Westerlund's test on the variables of budget expenditures and revenues. The authors did not reject the null hypothesis of the presence of a unit root, as the variables of budget expenditures and revenues are integrated of order one. Nevertheless, cointegration between the

two fiscal variables could be confirmed, hence Nzimande and Ngalava (2019) confirmed the presence of fiscal sustainability in the countries under study.

In their study of 19 European Union countries between 1996 and 2020, Afonso and Coelho (2022) also confirmed the solvency condition, as the first difference of the stock of real public debt showed stationarity using Pesaran's unit root test. Long-term cointegration links between budget revenues and expenditures, the primary budget balance as a percentage of GDP, public debt as a percentage of GDP, and public debt as a percentage of GDP with the primary budget balance as a percentage of GDP lagged by one time unit were also confirmed. The authors confirmed fiscal sustainability of the countries under study with the fiscal reaction function test. They also found that fiscal rules and the overall budget as a percentage of GDP positively influence fiscal sustainability, while trade openness as a percentage of GDP, the current account balance as a percentage of GDP, and government efficiency negatively affect the primary budget balance.

3 Methodology and description of the dataset

The field of research on the fiscal sustainability of countries is related to the solvency of the public budget, which refers to meeting the intertemporal budget constraint. The fundamental variables studied in fiscal sustainability are public debt and primary budget balance (Bohn, 2007). The empirical literature distinguishes two standard approaches for verifying the solvency of the public budget. The first approach focuses on examining the characteristics of time series of fiscal and macroeconomic variables. This approach involves testing the stationarity and cointegration of various fiscal variables. However, this verification does not allow for firm conclusions about fiscal sustainability due to assumptions about the characteristics of fiscal variable time series. Therefore, a second approach emerged in the empirical literature, established by Bohn (1998; 2005; 2007) for testing the solvency of the public budget by estimating the fiscal reaction function. Bohn's method of testing fiscal sustainability involves estimating the marginal responsiveness of the budget surplus to various fiscal, macroeconomic, and other variables. With this approach, fiscal sustainability can be confirmed based on the positive marginal responsiveness of the budget balance to changes in public debt and other studied variables (Cho & Lee, 2022).

In this research, we will limit ourselves to the approach of testing the stationarity and cointegration of various fiscal variables. This approach follows the intertemporal budget constraint, which condition is met, when government revenues and expenditures are integrated of order zero. This state would indicate the presence of fiscal sustainability. Different orders of integration between government revenues and expenditures would indicate that there is no fiscal sustainability in the covered group of countries. If the both main studied fiscal variables are integrated of order one it is necessary to test the cointegration between government revenues and expenditures (Afonso, 2005). The approach of assessing the fiscal sustainability with panel unit root tests and cointegration has the important limitation only indicates the presence of fiscal sustainability and does not identify the factors of fiscal sustainability (Can, 2023).

In line with the research of Afonso and Coelho (2022) and other studies presented in the literature review, data were collected for budget revenues, budget expenditures, the primary budget balance, and public debt. All the variables under study are expressed as a percentage of GDP. Annual data has been retrieved from the IMF database (2023), designed by Mauro et al. (2015). The selection of African countries was based on the availability of data for the period between 1995 and 2021, which represents our study period. We have investigated the fiscal sustainability in a group of 32 African countries[1], which represents 864 observations. All estimates were conducted in econometrical program EViews 13.

4 Results

In this chapter, we first present results of the first-generation unit root tests of Levin, Lin & Chu (LLC), and Im, Pesaran & Shin (IPS), which we used to test the stationarity of budget revenues and expenditures, the primary budget balance, and the first difference of public debt. We then checked for the presence of a unit root on the same variables using Pesaran's test, as this second-generation unit root test accounts for cross-sectional dependence. Conclusions about the presence of fiscal

[1] Covered African countries in the study were: Algeria, Benin, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Comoros, Congo, Djibouti, Equatorial Guinea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Morocco, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Tanzania, Togo, and Tunisia.

sustainability in the group of countries under study were made after conducting Pedroni's cointegration test.

4.1 Panel Unit Root Tests

First-generation unit root tests that account for cross-sectional independence are the first step in verifying fiscal sustainability. The rejection of a unit root in the first difference of public debt would verify the solvency condition. The selected first-generation panel unit root tests are Levin, Lin & Chu test and Im, Pesaran & Shin test, which both assumes the heterogeneity and cross-sectional independence. The main difference between tests is assumption in the unit root process, as LLC test assumes a common unit root process, while IPS tests assumes an individual unit root process. The calculations included automatic lag selection based on the Schwarz Information Criterion, and spectral estimation was based on the Newey-West selection of bandwidth using Bartlett's kernel, assuming asymptotically normal distribution. Under the null hypothesis of both tests we would test the presence of unit root (Afonso & Rault, 2010).

Table 1: Estimates of the Levin, Lin & Chu and Im, Pesaran & Shin panel unit root tests

	Levin, Lin & Chu panel unit root test		Im, Pesaran & Shin panel unit root test	
	Statistic	p-value	Statistic	p-value
Constant				
Government revenue (% of GDP)	-4.02057	0.0000	-2.25532	0.0121
Government expenditure (% of GDP)	-3.21325	0.0000	-2.53763	0.0056
Primary budget balance (% of GDP)	-9.35805	0.0000	-6.48067	0.0000
First Difference of the Public debt (% of GDP)	-16.3197	0.0000	-16.2201	0.0000
Constant and trend				
Government revenue (% of GDP)	-4.47286	0.0000	-4.30719	0.0000
Government expenditure (% of GDP)	-5.46798	0.0000	-3.87034	0.0001
Primary budget balance (% of GDP)	-11.3642	0.0000	-6.21848	0.0000
First Difference of the Public debt (% of GDP)	-12.5220	0.0000	-13.8185	0.0000

Authors' calculation

In Table 2 are presented the estimates of LLC and IPS tests. All considered fiscal variables are integrated of order zero at 1% significance when looking at LLC test. Similarly, the presence of unit root is rejected with IPS test at 1% significance for all fiscal variables expect government revenue, which are stationary with considered

constant at 5% significance. With both LLC and IPS tests the solvency condition is met, as the first difference of public debt is stationary.

Table 2: Estimates of the Pesaran's second-generation panel unit root test

	CIPS statistic	
Constant		*Critical values of CIPS statistic*
Government revenue (% of GDP)	-2,07310*	*1 % = -2,30*
Government expenditure (% of GDP)	-2,01572	*5 % = -2,15*
Primary budget balance (% of GDP)	-2,73163***	*10 % = -2,07*
First Difference of the Public debt (% of GDP)	-3,72472***	
Constant and trend		
Government revenue (% of GDP)	-2,98306***	*1 % = -2,81*
Government expenditure (% of GDP)	-2,62638*	*5 % = -2,66*
Primary budget balance (% of GDP)	-3,18237***	*10 % = -2,58*
First Difference of the Public debt (% of GDP)	-4,05814***	

Authors' calculation
Notes: ***statistically significant at 1% significance level, ** statistically significant at 5% significance level.

However, the empirical literature points out the importance of taking into account the cross-dependence, therefore the second-generation panel unit root tests were considered (Afonso & Coelho, 2022). In line with characteristic, we have also assessed the fiscal sustainability using the Pesaran's second-generation unit root test that assumes the cross-dependence. In Table 3 are presented the estimates of the Pesaran's panel unit root test, which lead us to different conclusions than both first-generation unit root tests. The first difference of public debt is statistically significantly stationary at less than 1% risk of rejecting the existence of a unit root process with both a constant and a constant and trend. For government revenues, the null hypothesis of a unit root process can be rejected at a 10% statistical significance level when considering a constant, while this variable is statistically significant at less than 1% with both a constant and trend. Government expenditures in African countries are stationary only at a 10% statistical significance level when considering both a constant and trend, which cannot be claimed when considering only a constant, as the null hypothesis of the presence of a unit root process cannot be rejected. On the other hand, the primary budget balance is stationary both with a constant and with a constant and trend. Pesaran's unit root test provided completely different results in assessing fiscal sustainability compared to first-generation unit root tests. Considering a constant in Pesaran's unit root test, it can be stated at a 5% significance level that African countries are fiscally unsustainable. However, considering both a constant and trend in the second-generation unit root test, at a

10% significance, we can accept the first-order integration for government expenditures and revenues. These findings also had to be verified with cointegration tests of fiscal variables.

4.2 Pedroni Cointegration Test

We have proceeded testing the fiscal sustainability with employing the Pedroni Cointegration Test. Following Afonso & Coelho (2022) approach, we have tested the cointegration of the following pairs of fiscal variables: government revenue and government expenditure, primary budget balance and lagged public debt, and public debt and lagged primary budget balance. In the calculations of the Pedroni test, spectral estimation was based on Newey-West bandwidth selection using the Bartlett kernel, while assuming one lag.

Table 3: Pedroni's cointegration test

Relation	Revenues and expenditures		Primary balance and lagged debt		Debt and lagged primary balance	
	No trend	Trend	No trend	Trend	No trend	Trend
Within-dimension						
Panel *v*	10,5484***	4,9245***	4,1592***	-0,3197	5,3668***	0,5598
Panel *rho*	-17,081***	-14,1906***	-7,1144***	-4,8442***	-13,461***	-11,2900***
Panel PP	-24,133***	-22,891***	-7,6486***	-8,0184***	-13,867***	-16,098***
Panel *ADF*	-4,1920***	-2,1541***	-3,8303***	-3,4768***	-4,4789***	-4,9332***
Between-dimension						
Group *rho*	-5,0910***	-2,5941***	-4,8307***	-2,8620***	-5,9721***	-4,4017***
Group *PP*	-7,7680***	-7,3456***	-8,0491***	-8,9015***	-9,3700***	-13,4063***
Group *ADF*	-3,6312***	-3,7432***	-5,0920***	-6,3710***	-5,0074***	-7,1234***

Authors' calculation
Notes: ***statistically significant at 1% significance level, ** statistically significant at 5% significance level.

Using the Pesaran's unit root test, we found that government revenue is integrated of order zero at a 10% level of statistical significance, while we failed to reject the null hypothesis of a unit root process for government expenditure when constant is considered. Given these results of the unit root test at a 10% level of significance, further testing of fiscal sustainability with only taking constant into account is

precluded as the same order of integration was not confirmed. The Pedroni Cointegration Test for the group of African countries can only be continued at a lower level of statistical significance and considering only the estimates with constant and trend. In Table 4, displaying the results of the Pedroni Cointegration Test for African group of countries, we can infer that there is cointegration among all examined pairs of fiscal variables when the constant term is considered. Based on these estimates, fiscal sustainability can be confirmed in the studied group of African countries, but these estimates are not representative as there is different order of integration of considered fiscal variables. However, considering both the constant and trend, cointegration among the examined pairs of fiscal variables cannot be confirmed due to differing results of the test statistics, as all cases of the panel v - statistics are statistically insignificant. Along with these estimates, we can conclude that there is are presence of weak fiscal sustainability, as there is, however, some indication of cointegration from other test statistics.

6 Conclusions

We examined fiscal sustainability in the African group of countries over the period 1995-2021. The panel data of African countries consisted of fiscal variables such as government revenue, government expenditure, primary budget balance, and public debt, with all analyzed variables expressed as a percentage of GDP. The methodology for examining fiscal sustainability followed the procedure of Afonso and Rault (2010) and Afonso and Coelho (2022). We have confirmed the solvency condition for the considered group of countries, as the first difference of public debt is estimated to be stationary with all three panel unit root tests that were considered. However, there was some discrepancy between first and second-generation unit root tests. IPS and LLC tests rejected the unit root in at least 5% significance for government revenues and expenditures, while both variables were integrated of the order zero. Oppositely, Pesaran's unit root test have only rejected the unit root process for both government revenues and government expenditures at 10% significance considering constant and trend. Therefore, further cointegration and casualty estimates were considered only for constant and trend when assessing the fiscal sustainability of African countries. Pedroni Cointegration Test estimates rejected the cointegration between considered pairs of fiscal variables considering constant and trend, as there were different conclusions from test statistics. These estimates lead to the conclusion that there is a weak fiscal sustainability for African

countries in the covered period. These estimates can not be compared with the studies covered in the literature review, as we have conducted a research on the wider group of countries. A reasonable extension of the research would be the estimation of the fiscal reaction function, which would enable to identify the determinants of fiscal sustainability. Furthermore, the further studies should be conducted on the smaller and more homogeneous group of countries. This research represents a starting point for the further analysis of the fiscal sustainability in different group of countries.

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NAVIGATING GREEN CONSUMER BEHAVIOR: INSIGHTS FROM SLOVENIAN CONSUMERS ON ENVIRONMENTALLY SUSTAINABLE PRODUCT PURCHASE INTENTION

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Utilizing the theory of planned behavior, our study focuses on environmental concern, environmental knowledge, attitude toward environmentally sustainable products, subjective norms, and perceived behavioral control as predictors of environmentally sustainable product purchase intention among Slovenian consumers. Previous studies have consistently demonstrated the theory's effectiveness in predicting and explaining voluntary behavior variances. Data were collected through an online questionnaire, and analyses were conducted using scales adopted from prior studies. Confirmatory factor analysis and covariance-based SEM (CB-SEM) were deployed to assess construct validity and reliability, and to test proposed hypotheses. Results indicate that environmental knowledge, attitude toward environmentally sustainable products, subjective norms, and perceived behavioral control positively influence environmentally sustainable product purchase intention. Notably, subjective norms exert the strongest influence, followed by environmental knowledge, perceived behavioral control, and attitude, with environmental concern having no impact. The study's implications lie in offering actionable recommendations for marketing managers to develop effective strategies for environmentally sustainable products. By addressing factors influencing environmentally sustainable product purchase intention, marketers can expedite environmentally sustainable consumerism, contributing to the resolution of environmental issues. Overall, the findings provide valuable insights to guide marketing strategies promoting sustainable practices.

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1 Introduction

Rapid economic growth and excessive consumption have led to environmental degradation worldwide, raising concerns about consumption-related issues (Taufique & Vaithianathan, 2018). Environmentally sustainable consumption is therefore crucial for sustainable development, as it involves using products and services that meet basic needs while minimizing resource consumption and pollution throughout their entire life cycle (Maichum et al., 2016; Wu & Chen, 2014). However, the adoption, purchase, and consumption of environmentally sustainable products remains low, with even established products having limited market share (Bonini & Oppenheim, 2008; Lim et al., 2013). Consumers typically prioritize product features that enhance their immediate utility, while environmentally sustainable products bring long-term benefits to society as a whole (Gan et al., 2008; Kim & Choi, 2005). Addressing environmental degradation, therefore, requires a better understanding of the factors influencing the decision to purchase environmentally sustainable products (Taufique & Vaithianathan, 2018). Thus, this research aims to enhance knowledge of consumer values that can improve the effectiveness of environmentally sustainable marketing strategies (Lee, 2017).

2 Literature review

Theory of Planned Behavior

Our research is based on the Theory of Planned Behavior, commonly employed in studies of environmentally sustainable behavior (Lee, 2017), as it effectively predicts and explains voluntary behavior and examines the relationships between values, beliefs, attitudes, intentions, and actions (Chekima et al., 2016). The Theory of Planned Behavior suggests that behavioral intention, influenced by attitude, subjective norms, and perceived behavioral control, is the primary predictor of human behavior (Ajzen, 1991; Sreen et al., 2018). While the theory acknowledges these three aforementioned factors, it suggests enhancing its predictive power by integrating new constructs, which Yadav and Pathak (2016) have proved by incorporating environmental knowledge and concern in the model. Similarly, Mostafa (2006) found that including environmental factors increases the explanatory power of intention to purchase environmentally sustainable products. Therefore,

environmental knowledge and environmental concern were incorporated in our research.

Environmental concern

Environmental concern refers to an individual's awareness of environmental issues, support for addressing them, and willingness to contribute personally to them (Paul et al., 2016). Khaola et al. (2014) define it as the recognition that environmental degradation results from resource overexploitation and human pollution. Lasuin and Ng (2014) discovered a significant, direct link between environmental concerns among Malaysian university students and their intention to buy environmentally sustainable products. Mostafa (2006) reported similar findings in Egypt, and Maichum et al. (2016) in Thailand, while Kim and Choi (2005) observed a direct positive impact of environmental concern on sustainable purchasing behavior. Yadav and Pathak (2016) concluded that environmental concern has the greatest influence on intention. According to that we hypothesize:

H1: Environmental concern positively influences the intention to purchase environmentally sustainable products.

Environmental knowledge

Environmental knowledge encompasses an individual's familiarity with environmental issues and their knowledge of facts, concepts, and relationships concerning the natural environment and its ecosystems (Mostafa, 2006). Mei et al. (2012) define it as the level of knowledge that significantly influences decision-making processes. Chan and Lau's (2000) study of Chinese consumers revealed a positive correlation between environmental knowledge and the intention to purchase environmentally sustainable products, a result corroborated by Lee (2017) in a study among Korean and Chinese consumers. Further studies also suggest that environmental knowledge positively influences the intention to buy sustainable products among Egyptian and Malaysian consumers (Mei et al., 2012; Mostafa, 2006). Hence, we set H2:

H2: Environmental knowledge positively influences the intention to purchase environmentally sustainable products.

Attitude toward environmentally sustainable products

Attitude toward purchasing environmentally sustainable products reflects an individual's favorable or unfavorable evaluation of that behavior (Ajzen, 1991). It's shaped by behavioral beliefs about the consequences of the behavior in question and the individual's positive or negative assessment of those consequences (Yadav & Pathak, 2017). Several authors found that consumer attitudes toward purchasing environmentally sustainable products positively influence their intention to buy them (Chan, 2001; Mostafa, 2006; Naalchi Kashi, 2020). Kumar et al. (2021) identified a positive attitude among Indian consumers toward environmentally sustainable clothing as a key factor driving purchase intentions. Anvar and Venter (2014) also noted a positive link between attitude and purchase behavior in South Africa, suggesting that consumers with more positive attitudes are more likely to buy environmentally sustainable products than those with negative attitudes. According to that, we propose the following:

H3: Attitude toward environmentally sustainable products positively influences the intention to purchase environmentally sustainable products.

Subjective norms

Subjective norms reflect the opinions of people who are important to the individual and how they influence their decision-making processes (Yadav & Pathak, 2016). Normative beliefs, or perceptions of others' expectations, and motivation for compliance, or an individual's desire to align with the opinions of others drive subjective norms (Yadav & Pathak, 2017). Kumar and Ghodeswar (2015) and Kumar et al. (2021) found a significant positive impact of subjective norms on environmentally sustainable purchasing behavior. Mei et al. (2012) noted that peer pressure or guilt from not conforming to others' actions can lead to behavioral shifts and intentions to purchase sustainable products. However, Paul et al. (2016) found subjective norms to be the weakest link in the intention-to-purchase model. According to that, we propose:

H4: Subjective norms positively influence the intention to purchase environmentally sustainable products.

Perceived behavioral control

Perceived behavioral control refers to an individual's perception of the ease or difficulty of performing a specific behavior (Ajzen, 1991). Control beliefs, rooted in past experiences, shape perceived control power, which evaluates the impact of facilitating or hindering factors on behavior (Wu & Chen, 2014; Yadav & Pathak, 2017). Paul et al. (2016), Ruangkanjanases et al. (2020), and Mostafa (2006) found that perceived behavioral control positively influences consumers' intentions to purchase environmentally sustainable products. Taufique and Vaithianathan (2018) explored perceived consumer effectiveness among young consumers, finding it to be the most significant influencing factor on environmentally sustainable behavior, with both direct and indirect effects. Additionally, Ellen et al. (1991) identified perceived consumer effectiveness as a significant predictor of environmentally sustainable behaviors such as purchasing, recycling, and supporting environmental groups. Hence, we hypothesize:

H5: Perceived behavioral control positively influences the intention to purchase environmentally sustainable products.

3 Methodology

We adapted the scales for measuring selected factors based on previous research studies. Environmental knowledge and environmental concern were assessed using adapted scales deployed by Mostafa (2006), Chen and Chai (2010), Maichum et al. (2016), and Lee (2017). Attitude toward environmentally sustainable products, subjective norms, perceived behavioral control, and purchase intention were measured using scales adopted from the research of Straughan and Roberts (1999), Mostafa (2006), Wu and Chen (2014), Couto et al. (2016), Maichum et al. (2016), Arli et al. (2018) and Sreen et al. (2018). Five-point Likert scale type scales from 1 – completely disagree to 5 – completely agree were used to measure the response.

Data collection and sample

An online survey questionnaire was developed, and distributed via Facebook. Data was collected on a final convenient sample of 216 respondents.

Among the respondents, 34% were male and 66% were female. The majority of respondents fell into the 18 to 26 age group (58.8%), followed by 27 to 35 (15.7%), 46 to 55 (12.5%), 36 to 45 (6.5%), and 56 and above (6.5%). Regarding education level, 47.2% had completed a higher vocational or university program, while 35.2% had secondary education. Additionally, 8.3% had lower or middle vocational education, and the same percentage held a master's or doctoral degree. Only 0.9% had primary or incomplete primary education.

Validity and reliability of the scales

Covariance-based SEM with AMOS 29.0 was used to assess the validity and reliability of the scales and to test the proposed hypotheses. During the validation of the measurement model, certain items were excluded from the analysis to address concerns related to convergent and discriminant validity. As a result, the final model comprised 19 indicators distributed across seven latent variables. According to the results of the confirmatory factor analysis, environmental concern was conceptualized as a two-factor construct, namely environmental concern and environmental unconcern.

The evaluation of the measurement model encompassed various indices, including the chi-square statistic (χ^2), root mean square error of approximation (RMSEA), goodness of fit index (GFI), comparative fit index (CFI), normed fit index (NFI), and Tucker-Lewis index (TLI). Adhering to established criteria suggested by influential researchers in the field (Byrne, 1994; Hu & Bentler, 1999; MacCallum et al., 1996), the model's adequacy was assessed against specific cutoff values: RMSEA below 0.08, GFI exceeding 0.90, CFI surpassing 0.90, TLI exceeding 0.90, and IFI surpassing 0.90. Although χ^2 was non-significant, which is quite common with such a low sample size (Bollen, 1989), a χ^2/df ratio of 1.55 shows an appropriate fit. Also, other fit indices were within suggested boundaries: GFI = .917, CFI = .959, TLI = .946, IFI = .959, RMSEA = .051.

The indicator loadings ranged from .559 to .926, with all but one item surpassing the recommended threshold of 0.6. Average variance extracted (AVE) values, ranging between .426 and .698, were close to the proposed threshold of 0.5. Only subjective norms and environmental attitude AVEs were slightly below 0.5. Still, composite reliabilities of these constructs were higher than 0.6, meaning that we could establish

convergent validity across all constructs (Fornell & Larcker, 1981). Composite reliabilities, spanning from .652 to .902, fell within the suggested intervals (above 0.6), confirming the reliability of the scales.

Table 1: Composite reliabilities (CR), average variance extracted, correlations between latent variables, and Fornell and Larcker's test

	CR	AVE	1	2	3	4	5	6	7
1. Environmental knowledge	0,850	0,660	**0,812**						
2. Perceived behavioral control	0,737	0,603	0,279**	**0,777**					
3. Subjective norms	0,689	0,426	0,353***	0,291**	**0,653**				
4. Attitude toward environmentally sustainable products	0,652	0,486	0,412***	0,429**	0,570***	**0,697**			
5. Environmental concern	0,856	0,666	0,319***	0,073	0,309**	0,341***	**0,816**		
6. Environmental unconcern	0,660	0,493	-0,131	-0,138	-0,021	-0,183†	-0,459***	**0,702**	
7. Purchase intention	0,902	0,698	0,530***	0,472***	0,605***	0,601***	0,315***	-0,245**	**0,835**

*Significance of correlations: † $p < 0.100$, * $p < 0.050$, ** $p < 0.010$, *** $p < 0.001$*

4 Results

The fit indices of the structural model, constructed in accordance with proposed hypotheses, yielded appropriate results, suggesting a satisfactory alignment between the hypothesized model and the observed data. The chi-square test (χ^2) value of 204.23 with 131 degrees of freedom reflects a significant but potentially acceptable discrepancy given the sensitivity of this index to sample size. The GFI index reached .917, while the NFI and IFI both were close to or over the .90 threshold at .894 and .959, respectively. Additionally, the TLI and CFI indices achieved values of .946 and .959, demonstrating substantial improvement over null and baseline models. The RMSEA was notably low at 0.051, confirming the model's adequacy in representing the observed data.

Table X: Hypotheses and impacts

Hypotheses and impacts	Path coefficients	Significance
H1: Environmental concern -> Purchase intention	-.027	n.s.
H1: Environmental unconcern -> Purchase intention	-.154	p<.1
H2: Environmental knowledge -> Purchase intention	.261	p<.001
H3: Attitude toward environmentally sustainable products -> Purchase intention	.189	p<.1
H4: Subjective norms -> Purchase intention	.353	p<.001
H5: Perceived behavioral control -> Purchase intention	.196	p<.01

Environmental concern does not statistically impact purchase intention in this model, while environmental unconcern exhibits a negative and significant impact of -.154 ($p < 0.1$). The result suggests that individuals less concerned about environmental issues are more likely to have reduced intentions to make environmentally sustainable purchases, therefore H1 could not be supported.

Environmental knowledge has a significantly positive path coefficient of 0.261 ($p < 0.001$), suggesting that as individuals' environmental knowledge increases, their purchase intention also tends to rise. Attitude toward environmentally sustainable products demonstrates a positive path coefficient of .189 ($p < 0.1$). While the relationship is statistically significant at a lower level of probability, it still suggests that purchase intention increases as individuals' environmental attitude improves. Subjective norms play a notable role in shaping purchase intention, as evidenced by a positive and significant path coefficient of .353 ($p < 0.001$). Perceived behavioral control exhibits a similar pattern with a significant positive path coefficient of .196 ($p < 0.01$). This indicates that an increase in an individual's perceived behavioral control is associated with a higher purchase intention. These findings suggest that we can confirm hypotheses H2, H3, H4, and H5.

5 Discussion

The lack of a significant impact of environmental concern on environmentally sustainable product purchase intention may be surprising given the common assumption that individuals with higher environmental concern are more likely to engage in eco-friendly behaviors, including purchasing environmentally sustainable products. However, environmental unconcern may present a psychological distance between consumers and environmental issues. This distance can diminish the

perceived relevance and importance of making environmentally sustainable choices, leading to a lower intention to purchase environmentally sustainable products.

The results of our study show that environmental knowledge is an important factor in the entire process of environmentally sustainable purchasing decisions, and the lack thereof often constitutes a barrier as early as in the initial phase of purchasing. Our findings further confirm the critical importance of raising awareness among consumers about environmentally sustainable products, their benefits, and environmentally sustainable alternatives available in every domain, as each choice significantly impacts the environment.

Our study suggests that consumers with a more positive attitude toward environmentally sustainable products will express a greater intention to purchase them. More insight into the desires and needs of consumers in this area will enable the development of products that meet environmental sustainability criteria and satisfy consumers' demands for quality, as they are unwilling to compromise in this area. The result also shows the importance of enhancing the reputation of environmentally sustainable products as solutions that genuinely contribute to addressing environmental issues.

The impact of subjective norms on purchase intention is the strongest in the model. This suggests that individuals may be more inclined to conform to these norms if there is a prevailing positive attitude toward purchasing environmentally sustainable products within one's social network. In the context of environmentally sustainable product purchases, individuals may feel compelled to align their behavior with what is socially expected or approved within their community or peer group. This desire for social approval and conformity can strongly influence their purchase intentions. Additionally, the desire to contribute to a more sustainable and responsible society can strongly influence the intention to choose environmentally sustainable products.

Perceived control over the behavior of purchasing environmentally sustainable products does not strongly influence the intention to make such purchases. This could be due to external barriers, lack of awareness, or other priorities that overshadow perceived control in the decision-making process. Respondents in our study perceive a reasonably strong control over implementing environmentally

sustainable behavior. It seems their behavior is more significantly influenced by subjective norms.

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8TH FEB INTERNATIONAL SCIENTIFIC CONFERENCE:

CHALLENGES IN THE TURBULENT ECONOMIC ENVIRONMENT AND ORGANIZATIONS' SUSTAINABLE DEVELOPMENT

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The proceedings of the 8th scientific conference, organized by the Faculty of Economics and Business, University of Maribor, titled "Challenges in the turbulent economic environment and organizations' sustainable development," present research and findings on the challenges that companies as well as other organizations face in unpredictable economic environments and efforts towards sustainable development. Various distinguished European authors address the impacts of global economic fluctuations on business operations and emphasize the importance of adaptability and innovation in tackling these challenges. Additionally, they underscore the significance of sustainable development as a crucial factor for the long-term success of companies and present strategies for its effective implementation. Through analyses and case studies, authors reveal key factors influencing the success of organizations in turbulent economic environments and offer guidelines for designing responsive and sustainability-focused business models.

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