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Circular Economy – The Way to Survive in a Post-pandemic Situation

Beka Baiashvili

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Abstract The crisis caused by coronavirus has hit the world economy and business sector particularly hard. The recovery process after this crisis will not be easy. The circular economy has become one of the most crucial discussion topics globally. It can help countries overcome the emerging economic problem caused by the coronavirus pandemic. The circular economy is a production and consumption model which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible, thus extending the lifecycle of products. According to preliminary estimates, the circular economy could create 700,000 jobs in the EU by 2030 and increase GDP by billions of dollars. In order to implement the circular economy, the joint involvement of the private and public sectors is vital to achieving a positive synergistic effect. This paper discusses why the circular economy is essential because it is facing global climate change and what steps should be implemented. At the same time, it can create the opportunity for rapid economic recovery in the post-crisis period. Additionally, how can this approach contribute to economic recovery and business revival in a post-pandemic situation, and what role do political decision-makers play in implementing the circular economy.

Keywords:
circular economy, sustainable development, economy, post-pandemic, coronavirus

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1 Introduction

The crisis caused by coronavirus has hit the world economy and business sector particularly hard. The recovery process after this crisis will not be easy. According to preliminary estimates, the circular economy could create 700,000 jobs in the EU by 2030 and increase GDP by billions of dollars (eurocities.eu, 2020). The circular economy is an excellent way to escape the crisis caused by coronavirus. The circular economy can affect the economy in two main ways: it boosts economic growth and also creates new jobs. How this will happen is discussed below. In addition to this positive effect, it will contribute to sustainable development and help the world achieve climate-neutral business processes.

Worldwide resource extraction is set to nearly double by 2060, driven by demographic and economic progress (OECD, 2018). However, only 8.6% of our economy is circular, while over 90% of raw materials are not returned to circulation (Dhawan & Beckmann, 2018). In a crisis, when there is a way to achieve economic growth without harming the environment, which can be achieved through a circular economy, this opportunity must be used.

In order to implement a circular economy, the joint involvement of the private and public sectors is essential in achieving a positive synergistic effect. This paper discusses why the circular economy is critical and what steps have been taken to implement it. In addition, the author address the issue of how this approach can contribute to economic recovery and business revival in a post-pandemic situation, and what role political decision-makers play in implementing the circular economy.

2 What is a Circular Economy and why IT IS important

To begin, let's explain what a circular economy is and why it is such an important topic. What is being done to implement it, and how much of a priority is it for the world?

According to the European Parliament, the circular economy is a production and consumption model which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible, thus extending the lifecycle of products (European Parliament, 2021).

Over the past few years, the circular economy has become one of the critical issues on the table for politicians. The EU has adopted a circular economy action plan that is still actively implemented. This topic is actively discussed in the EU and throughout the world. Following the example of the European Union, it is planned that the following steps will be addressed in 2021-2022:

- Legislative proposal for substantiating green claims made by companies
- Legislative proposal empowering consumers in the green transition
- EU strategy for sustainable textiles
- A sustainable products policy initiative, including a revision of the Eco-design Directive
- Review of requirements on packaging and packaging waste in the EU
- Update of EU rules on industrial emissions

When entering the term 'circular economy' into Google Scholar and filtering the results in the different time ranges, the results are as follows:

Table 1: 'Circular economy' search results in Google Scholar

Time Range	Search results number
1991-1995	20,500
1995-2000	34,900
2001-2005	68,900
2006-2010	82,600
2011-2015	107,000
2016-2020	139,000

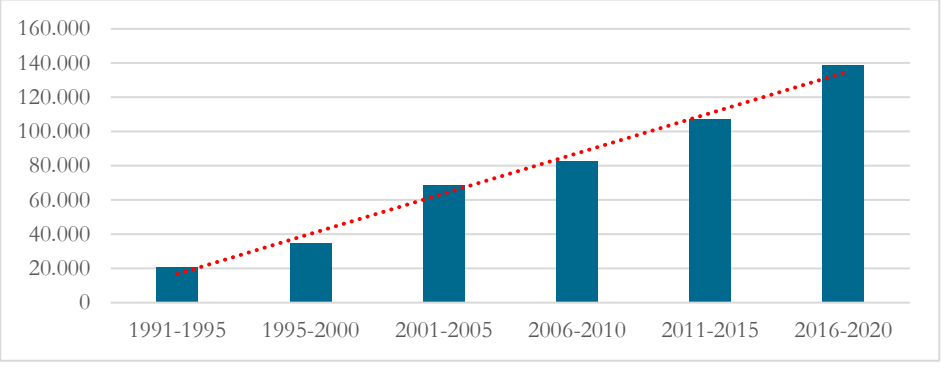

Figure 1: Graph of the search results for 'Circular economy' in Google Scholar

Source: own

As can be seen in Table 1 and Figure 1, the number of scientific papers published on the circular economy has been growing steadily over the last three decades, divided into 5-year periods. This fact suggests that the circular economy is becoming an increasingly popular topic.

Every detail shows that the circular economy is noteworthy and needs more research and support. In the next chapter, the author has considered how the circular economy can significantly contribute to the recovery of a pandemic-affected economy.

3 THE Circular Economy and THE post-pandemic economic recovery process

How can a circular economy improve a pandemic-weakened economy? There are two directions in play: boosting the economy and creating more and better jobs.

3.1 Boosting the economy

It is foreseen that the circular economy can produce USD 4.5 trillion of extra-economic production by 2030, concurring with research by Accenture that recognises circular business models that will assist in decoupling economic growth and the consumption of natural resources while driving greater competitiveness (Accenture, 2015). This is made possible by reducing waste, stimulating innovation and creating employment. Circular business models focused on reuse, repair, remanufacturing and sharing models offer significant innovation opportunities (McGinty, 2021).

For example, a circular economy for plastics offers considerable economic benefits. Less plastic waste in the ocean would benefit industries such as fishing and tourism, as plastic pollution currently leads to USD 13 billion in costs and financial losses per year (UNEP, 2014). Reducing the pollution and toxic emissions from the open burning of plastic waste would lower healthcare costs, while reducing fossil fuel use for plastic production would help mitigate climate change and its associated costs (McGinty, 2021).

These effects will be achieved in the long run. It is essential that public thinking becomes long-term to achieve sustainable development and the transition to a circular economy.

3.2 Creating jobs

Six million jobs can be created by transitioning towards a circular economy that includes activities such as recycling, repair, rent and remanufacture, replacing the usual liner economic model of 'extracting, creation, using and disposing of' (ILO, 2018).

Jobs may be lost in more linear businesses, but new jobs will be created in fields such as recycling, repair and rental services. These new jobs cannot be considered direct replacements, as they may be in different locations and require different abilities. For instance, it is necessary to consider the millions of garment labourers – mostly women – whose employment depends on the continuation of the fast fashion industry. Investing in a just transition via social dialogue, social protection and reskilling programmes is the basis (McGinty, 2021).

New jobs will be a prerequisite for economic growth. In addition, less waste of resources will lead to lower costs. By minimising costs, it is possible to increase economic well-being.

4 Political support for the transition to a circular economy

In general, policy in any field, including implementing a circular economy, involves several components in decision-making: an appropriate policy approach, adequate framework conditions, specific tools, and the design elements that make up those tools. These components must be permanent and consider the policy objectives and the environment in which the new approach is to be introduced. Each part is interconnected, therefore neglecting any of them will stop and slow down the effective implementation of the circular economy policy.

First, prior to implementing any policy, decision-makers must embrace the vision of a circular economy.

Initially, the focus should be on policy barriers and stimulus factors in the circular economy. These factors are not independent; they are closely related and often give complex, synergistic results.

Stimulating and barrier factors can be the level of business education, financial resources, physical resources, motivation, networking, etc. Customer readiness, the functioning of sustainable financial institutions, etc., are also essential.

To introduce a vision of a circular economy in politics, the private and public sectors must work together. Less bureaucratic coordination mechanisms should be established to ensure the cooperation of any legal entity or individual in the community. Several non-governmental initiative groups globally, especially in developing countries, are trying to raise public awareness. However, their scale is still small and, in fact, due to a lack of interest from the state and business sectors, none of them can coordinate. In such cases, it is probably advisable to introduce such groups to the public through state bodies and to assist in the initial coordination (del Río, Kiefer, Carrillo-Hermosilla, & Könnölä, 2021).

When developing policies at state level, it is essential to consider issues important to the circular economy. There are two fundamentally critical areas: goals and political stability.

In the case of the introduction and development of the circular economy, the role of external factors is significantly more significant. Let's consider some essential external factors:

- Regulations

Public policy, especially regulations related to the environment, is often considered the most substantial compelling factor for introducing environmental innovation in business. The same effect will be felt if the circular economy business models are to be used. The effectiveness of public policy-making is related to the problem of so-called triple externalism, which implies the difficulty of reconciling economic, social and environmental directions. Environmental policies usually accompany this difficulty, and a circular economy is no exception (del Río, P, 2004) (Rennings, 2000). There are two main types of environmental policy. The first is called the 'command

and control' method, which involves setting technological and ecological standards and creating a control mechanism. The second type is the 'market-based' method, quoting taxes, subsidies, grants or emissions. The success of regulatory policies requires a level of specific tools and an already existing framework policy framework (long-term goals and political stability).

- Users

Environmentally educated consumers have the opportunity to help introduce a circular economy model. This effect is possible by increasing consumers' demand for the product and service created in the circular economy model conditions. There is still a significant dispute over the strength of the user effect (del Río, P, 2016).

- Other stakeholders (financial institutions, insurance companies, etc.)

Financial institutions increasingly require an excellent environmental track record for the firms to whom they lend money. This encourages the uptake of environmentally friendly practices in those firms, including circular economy innovations.

When implementing a circular economy, decision-makers can use tools such as:

- Command and control mechanisms: regulations and standards
- Increasing business and consumer awareness
- Interference in trade policy with fiscal instruments (taxes, etc.)
- Ensuring coordination (networking) of any legal or physical member of the community
- Funding research in the field of circular economy
- Direct financial and technical assistance to companies
- Eliminating bureaucratic difficulties for circular businesses (del Río, Kiefer, Carrillo-Hermosilla, & Könnölä, 2021).

5 Conclusions

The circular economy has become one of the most critical discussion topics globally. It can help countries overcome the emerging economic crisis caused by the coronavirus pandemic.

To support a circular economy, decision-makers must address a variety of policy instruments and work in coordination with the rest of society to achieve synergistic and positive effects and sustainable development.

Finally, at the macro and national economy levels, it should be considered that circular eco-innovations take place in a broader institutional context, hence financing for eco-innovation development or adoption is crucial. Policymakers could definitively assure a constant and stable supply of finance for those eco-innovative activities through, e.g. soft loans. Taxation can shift economic activity away from linear and circular economy movements. Funding of large-scale RD&D programmes and public procurement at the national level also plays an essential role. Data on national economy levels for all crucial activities and sectors should be collected. The development of indicators allows the progress being made to be checked in relation to specific targets.

Overall corresponding suggestions can also be provided. First, at the level of framework conditions, aims should be connected with strategic plans and policy action, leading to a policy package that is consistent as a whole. Second, it is essential to use prices at the level of instruments to encourage circular practices, both by producers and consumers. Consistent and stable price signals can spur innovation by all stakeholders and economic agents. Third, constant monitoring and measurement of status and progress are required. Finally, adjustments should be made where necessary within a stable legal framework.

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THE NUMEROUS CHALLENGES OF THE POST-COVID ECONOMY

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Abstract The COVID-19 pandemic has caused unprecedented health and economic crises around the world. It has amplified preexisting inequalities and exclusions, both within and between countries and communities. Moreover, the global pandemic has added to the challenges of the digital era, such as emerging and declining jobs, remote working, necessary reskilling and upskilling. Consequently, the number of interrelated problems has doubled. As countries continue to grapple with COVID-19 and navigate the economic fallout, well-designed green stimulus packages can support near-term recovery and enable longer-term power system resilience against future threats. Such a 'green' recovery is often defined in opposition to 'grey' and 'colourless' recovery policies. As over one third of the world's population lives within 100 kilometres of an ocean, the notion of a 'blue' recovery is equally important. In a world driven by uncertainty and change, it is essential to find tools that can mitigate potential challenges and help apply new opportunities. The author of this paper discusses these issues alongside the modern challenges of the education system. Therefore, this paper also covers the role of universities, which need to respond quickly to both current and future challenges.

Keywords: COVID-19, fourth industrial revolution, green recovery, blue recovery, education

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1 Introduction

The modern economy is facing two major challenges: the Fourth Industrial Revolution and the global pandemic. Many international organisations and researchers have published forecasts and assumptions relating to the post-COVID recovery of the economy. In scientific literature, several key features also reveal the greater picture of future economic recovery, with 'green', 'blue', 'grey' and 'colourless' recovery policies all being actively discussed. Notably, these significant changes cannot be achieved without digitalisation. Moreover, this process will lead to substantial adaptations in the labour market, where numerous jobs will disappear and many new opportunities will emerge. Thus, it will be necessary to update skills and provide extensive training for various jobs. which, within existing scientific literature, is referred to as the 'reskilling and upskilling revolution'.

During research on this topic, the author of this paper reviewed the relevant literature and studied reports and reviews from international organisations and established research centres, such as the UN, the World Economic Forum, McKinsey Global Institute, D2L, Partnership for Action on Green Economy (PAGE), World Resources Institute, Cambridge Econometrics, and the World Conservation Monitoring Centre, among others. In addition, synthesis and analogy, as well as descriptive and correlative methods were employed.

Within this study, the author discusses the main directions of the post-COVID economic recovery, the challenges for Higher Education Institutions (HEIs), as well as certain issues relating to the future of jobs. The paper ends will a number of brief conclusions.

2 The main direction of the post-COVID economic recovery

International research organisations and scientists have been actively discussing the main direction of economic recovery in the post-COVID era. As Vesperi and Gagnidze (2021) highlight, the global pandemic has added to the challenges of the digital era, namely: remote working and fluctuations on the labour market; the creation of new jobs and a decline in other forms of employment; reskilling and upskilling requirements; changes in transportation; and urbanisation. As a result, the number of interconnected problems has doubled. In terms of the post-COVID recovery and the digitalisation process, researchers argue that 'data mining

techniques show enormous potential when it comes to decision support in context of post-COVID-19.' (Petrovich et al., 2021, p.32).

One significant concept is the notion of an Inclusive Green Economy (IGE) – a thriving economy that delivers interlinked economic, social and environmental outcomes, those sought by the Sustainable Development Goals (SDGs) and the Paris Agreement. In 2020, the partners for an IGE discussed 'COVID-19: 10 priority options for a Just, Green & Transformative Recovery'. In this document, they argue that 'the green economy principles of wellbeing, justice, sufficiency and efficiency, planetary boundaries and good governance should guide recovery plans and actions.' (Jung & Murphy, 2020, p.1) Importantly, Jung and Murphy (2020) also suggest that 'governments are presented with a choice: use this moment to build a stronger economy that is cleaner, fairer and more resilient, or further entrench an old-fashioned economy driven by fossil-fuels and debt-laden consumption.' (WEF & JLL, 2021, p.3).

The World Economic Forum has introduced its 10 Green Building Principles, which outline the key steps a company requires for the delivery of a net zero carbon commitment (Jung & Murphy, 2020). As one McKinsey and Company report indicates, 'achieving net zero would mean a fundamental transformation of the world economy, as it would require significant changes to the seven energy and land-use systems that produce the world's emissions: power, industry, mobility, buildings, agriculture, forestry and other land use, and waste.' (McKinsey Global Institute, 2022, p.2). From a geographic perspective, the report thoroughly analyses effects from 69 countries, those which comprise around 95% of global GDP. Furthermore, six characteristics have been formulated for the net zero transition that have emerged from a scenario-based analysis.

In general, 'the green policies that meet a range of positive social, economic, and environmental benefits include:

- support for investment in renewable electricity generation, and in grid flexibility measures needed to improve energy security as a larger share of generation capacity is made up of intermittent, non-dispatchable renewable sources

- support for investment to improve the energy efficiency of buildings and appliances
- car scrappage schemes and public transport investment to promote uptake of zero emission vehicles
- support for nature-based solutions, such as climate-friendly agriculture or ecosystem restoration and reforestation.' (Lewney et al., 2021, p.3).

Such a 'green' recovery is at times defined in opposition to 'grey' and 'colourless' policies. Dafnomilis et al. (2020) and Hepburn et al. (2020) define 'colourless' policies as having a neutral effect on the status quo, whereas 'grey' measures are defined as those that directly contribute to further environmental harm (Dafnomilis et al., 2020). Over one third of the world's population lives within 100 kilometres of an ocean, therefore the notion of a 'blue' recovery is equally important. The ocean economy may subsequently also become a notable victim of the impacts of COVID-19. Investment in a 'blue' recovery and stimulus packages, along with policy reform, can immediately create jobs. 'This policy includes proposes a set of five priorities:

- ✓ Investing in coastal and marine ecosystem restoration and protection
- ✓ Investing in sewerage and wastewater infrastructure for coastal communities
- ✓ Investing in sustainable community-led non-fed marine aquaculture (mariculture), e.g., shellfish and seaweed
- ✓ Incentivising zero-emission marine transport
- ✓ Incentivising sustainable ocean-based renewable energy.' (Northrop et al., 2020, p.1).

Thus, it can be concluded that the directions for the post-COVID-19 economic recovery are marked by the need to protect the environment.

3 The future of jobs and the role of education

Based on the factors previously identified, it can be outlined that both the 'green' and 'blue' recovery, and their respective changes, can act as a leapfrog development. Accordingly, alongside other spheres, they will have a notable impact on the labour market.

Many organisations anticipate these changes on the labour market, alongside the need to upgrade certain skills – the scale of which is quite impressive. For example, one 'study by McKinsey & Company suggest that by 2030, up to 375 million workers will need to switch occupational categories due to automation and all workers will need to adapt to co-exist alongside increasingly capable machines. A 2017 McKinsey Global Institute survey reported that 62% of business executives believe that more than a quarter of their staff will need to be retrained in part because of automation and digital technologies.' (D2L, 2019, p.2). According to another study, '14% of existing jobs could disappear as a result of automation in the next 15-20 years, and another 32% are likely to change radically as individual tasks are automated.' (OECD, 2019, p.3). 'While the majority of the workforce cannot work remotely, up to one quarter in advanced economies can do so three to five days a week.' At present, over 'half the workforce, however, has little or no opportunity for remote work. Some of their jobs require collaborating with others or using specialised machinery.' (Lund et al., 2020, p.2, 4-9). Others believe that the future of work is not solely influenced by digitalisation. Their model 'includes an analysis of the following key trends to determine the bigger picture of work: environmental sustainability, urbanisation, increasing inequality, political uncertainty, technological change, globalisation and demographic change.' (Bakhshi et al., 2017, p.12).

When comparing the forecasts made before and after the pandemic, it is possible to conclude that the initial stage largely focused on the upskilling and reskilling of the workforce. Concurrently, certain jobs will disappear due to automation and other career paths will emerge, for instance, in technological fields. Therefore, these challenges on the labour market require appropriate changes in the education system, with alterations needed in both secondary schools and higher education systems. These formats have different missions, thereby secondary education has more time, relatively, to respond. However, the higher education system must correspondingly deal with both the short- and long-term challenges.

In 2016, a World Economic Forum (WEF) report mentioned that present primary school pupils are expected to enter a labour market that has been modified by 65% of its current activity (WEF, 2016). The same organisation selected the best 16 schools on a global scale that met the requirements for the Fourth Industrial Revolution. It has additionally established eight key skills necessary for Education 4.0 (WEF, 2020).

The challenges that HEIs face can be divided into two parts: 1) those due to the almost complete transition to distance teaching as a result of the pandemic; and 2) an adequate response to upskilling and reskilling by increasing the scale of remote work. Prior to the pandemic, many researchers noted the significant role of universities, particularly entrepreneurial universities, in the development of local economies – as with the case of Cambridge University and its spin-offs (Gagnidze 2018a; Lekashvili & Bitsadze, 2021; Seturidze & Topuria, 2021; Subic, 2021). Within entrepreneurial universities, there is space for an effective dialogue between various educational, scientific, business and public authorities. Moreover, these authorities can quickly commercialise research, introduce the results to the market, and retrain fully qualified specialists. Due to their relevance, below a few key factors have been identified that contribute to the efficient functioning of entrepreneurial universities, namely: the creation of an 'entrepreneurial environment, entrepreneurial staff as well as entrepreneurial teaching and learning; a strong entrepreneurial vision and the presence of leaders; the need for an aware environment to support spin-off creation; identifying factors that determine continuous organisational success.' (Dominici & Gagnidze, 2021, p.24).

It can thus be concluded that the labour market and the education system will each face notable challenges in the post-COVID period. A transformation in education is therefore required in order to deliver Fourth Industrial Revolution professionals onto the labour market. With a requirement for quick results, governments should pay particular attention to their educational policies.

4 Conclusion

The paper concentrates on several post-COVID challenges, namely: the approaches of the 'green' and 'blue' recovery, the future of jobs, and complexities within the education system. Due to climate change, the present focus should be on the 'green' and 'blue' recovery, digitalisation, and the intensity of scientific research (Črešnar et al., 2020; Gogorishvili, 2018; Jamagidze, 2020; Sepashvili, 2019; Sobolieva et al., 2021; Sobolieva & Harashchenko, 2020; Petrović et al., 2021). The transition towards remote work will also increase the scale of the impact of the pandemic on the economy and affected urban economies, transportation and consumer spending. Such post-pandemic influences will thus have a large-scale impact on the labour market, and upskilling and reskilling for a large part of the workforce will become necessary. Special importance should equally be placed on the education system,

particularly on higher education and the formation of entrepreneurial universities, as such universities notably introduce scientific research to the market at minimal cost and high-quality. Similarly, the existing lifelong learning system in universities should provide the necessary upskilling and reskilling for a transformed labour market.

Given the scope of this paper, which represents limited desk research, it proves difficult to analyse the multifaceted picture of the post-COVID economy. However, it can confidently be stated that the economy will be categorically different in the wake of the Fourth Industrial Revolution. It has become clear that the simultaneous development of the aforementioned directions ('green' and 'blue' recovery, digitalisation, reskilling and upskilling, appropriate education, among others) will place a more systemic approach on the agenda (Mulej et al., 2017; Gagnidze, 2018b). The author of this paper is of the belief that swiftly rebuilding the post-COVID economy is possible in the clusters, since they are better-organised networks and systems. This particular theme will be further developed in our future studies.

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THE CHALLENGES OF GEORGIA'S ECONOMIC POLICY IN ACHIEVING SUSTAINABLE DEVELOPMENT GOAL 9 IN THE COVID-19 PANDEMIC PERIOD

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Abstract The increased number of financial crises and ecological catastrophes, as well as expanding inequality in the context of globalisation, have raised questions on the assumptions of mainstream economic theory and its fairness. In the context of the COVID-19 pandemic, national economies have had to face up to the new reality, which has placed great importance on the context of economic stability, security and sustainable development policies. This paper analyses the issues that need to be considered by national economic bodies in the process of achieving Sustainable Development Goal 9 (SDG 9) and transforming the economy. These issues are based on the experience gained during the COVID-19 pandemic. It is advisable to transform the economy in a way that focuses on the development of the manufacturing industry, including high-tech industries. However, these sectors should be mainly export-oriented. The development of export production should not only be based on the natural comparative advantage, but also, for the sake of expediency, on the acquired comparative advantage.

Keywords:
economic policy,
Georgia,
SDG 9,
COVID-19,
development

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1 Introduction

The increased number of financial crises and ecological catastrophes, as well as expanding inequality in the context of globalisation, have raised questions in relation to the assumptions of economic theory and its fairness. However, it was very difficult to escape the influence of mainstream economic views and the prevailing theoretical economic recipes based on the Washington Consensus, although this process was clearly accelerated by the outbreak of the COVID-19 pandemic in late 2019. The results of the pandemic showed that non-economic factors can have a primary impact on economic processes and policies, and can completely change the content of the economic model. As a result, countries are facing a complex new reality in the context of economic stability, security and sustainable development policies. The purpose of the paper is to analyse the issues that need to be considered by national economic bodies in the process of achieving Sustainable Development Goal 9 (SDG 9) and transforming the economy. The recommendations are based on the experience gained during the COVID-19 pandemic.

The comparative analysis and analytical methods were used in this paper. While researching the issues, as primary sources, the author analysed Georgia's economic policy documents (Social-Economic Strategy of Georgia 2020; SDG Report 2020;), scholarly papers (Gvelesiani, 2015; Lukas & Kyughoon, 2021; Soboleva & Lazarenko, 2019; Lekashvili, 2020; Lekashvili & Bitsadze, 2021; Vasperi & Gagnidze, 2020; William & Gaurav, 2017; Sjoholm, 2021; and etc.), and other publications. The study examines and summarises scientific papers and reports by international organisations, both in Georgia and further afield (Council of Competitiveness, 2020, 2021; General Principles of EU Industrial Policy, 2021; Taxonomy of Industrial Policy, 2015; European Round Table for Industry, 2020) relating to the impact of the pandemic impact on national economies.

2 Impact of the COVID-19 pandemic on national economies

The conditions resulting from the COVID-19 pandemic have once again exposed the face of the globalised world economy, and the list of difficulties that national economies face that cannot be solved within a mainstream agenda. The market mechanism crashed as national economies were closed. The pandemic dealt a severe blow to the manufacturing and transportation industries, causing disruptions in

global value chains and product deliveries, as well as reduced working hours and job losses in these sectors.

According to the Sustainable Development Goals Report (2020), the effects of COVID-19 were so destabilising that it threatened the achievement process of the Sustainable Development Goals (SDGs), including Goal 9 (building sustainable infrastructure, promoting inclusive and sustainable industrialisation, and developing innovation). In the first quarter of 2020, global industrial output growth fell sharply (by 6%) due to the shutting down of national economies. During the same period in China, i.e., the world's largest industrial country, COVID-19 led to an unprecedented drop of 14.1% in industrial production. The manufacturing industry is considered as a driving force of overall economic growth, hence the recent global COVID-19 crisis has had a serious impact on the world economy's industrial production.

Moreover, the air transport industry, which has been the driving force of economic development in recent years, experienced the sharpest decline in its history (SDG Report, 2020). The COVID-19 pandemic has had devastating consequences for the aviation industry. By April 2020, severe travel restrictions imposed by governments led to a 90% suspension of air travel, with travel demand falling to zero. In the first five months of 2020, the number of passengers decreased by 51.1% compared to the same period in 2019. The International Civil Aviation Organization (ICAO) estimated that the pandemic could cause a reduction of 2.29 billion to 3.06 billion passengers, which equates to USD 302 to USD 400 billion in annual gross operating income for airlines (Sustainable Development Report, 2020). Patents, trademarks, copyrights, brands, research and software have thus become the leading assets in corporate and government portfolios. COVID-19 further accelerated this trend (GFCC, 2021).

As for the Georgian economy, according to the Statistics Service of Georgia, for the opening phase of the economy, based on data from 20 May 2021, the unemployment rate in Georgia reached 21.9%, which is 3.7% higher than in the previous quarter. However, unemployment growth is higher in urban areas (40.1%) than in rural areas (34.7%). In 2020, real GDP growth was -6.8%, which is 12.3% less than the previous year.

In May 2021, the annual inflation rate was 7.7%. The groups with the largest contributions are: transport, housing, water, electricity, gas, healthcare (in April), food and non-alcoholic beverages (basic products and services). In February 2021, the industrial price index increased by 16.9% compared to the same period of the previous year. The export price index was 16.9%, while the import price index was 19.4%.

The Georgian economy has historically been service-based, with the services sector accounting for around 70% of gross domestic product (GDP) in 2019 and absorbing 47% of the labour. The industrial sector (including mining and quarrying and manufacturing) was the second source of income generation, with a 14% share of GDP, followed by construction (8.6%) (UNECE, p.48).

The Industrial Production Index for Georgia (see Chart 1) shows real output in the manufacturing, mining, electric and gas industries relative to 2015. During the COVID-19 pandemic period, the supply of electricity, gas, steam and air conditioning increased rapidly. In addition, water supply, sewerage and waste management activities were essential in terms of the curfew. These data show that during the pandemic, it became essential for humans to produce the basic products that are essential to their lives and health. The industrial price index with seasonal adjustment compared to the base year 2015 (Figure 1) shows the sectors that experienced sharp ups and downs during the closure of the economy caused by the pandemic. It is clear that the changes relate to the modified structure of gross demand.

During the pandemic, it became clear that the government's non-interference policy in the economy had failed and there was a need for the state to take responsibility for managing the crisis situation. It has been proven once again that market forces are ineffective, especially in developing long-term opportunities. This has not only become vital as a simple response to the crisis and what the market dictates, but also how the government will manage such an unpredictable situation.

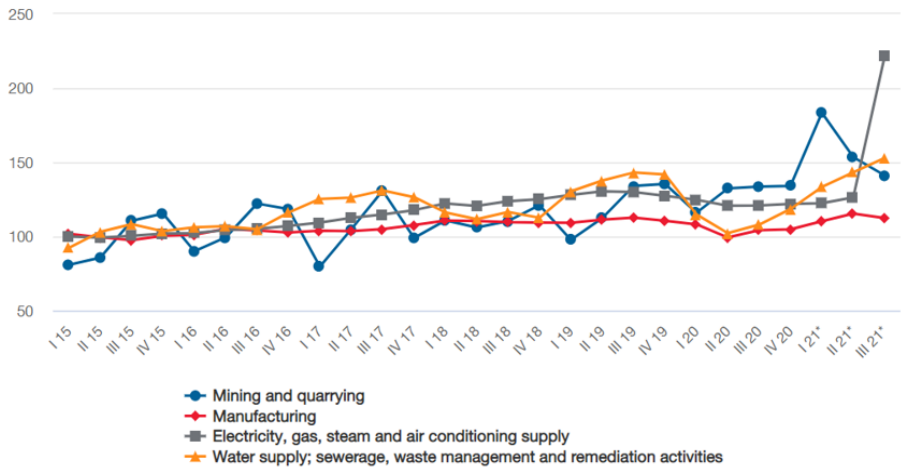

Chart 1: Industrial Production Index with Seasonal Adjustments, 2015=100
Source: https://www.geostat.ge/ka/modules/categories/23/mtliani-shida-produkti-mshp (Accessed 3.12 2022)

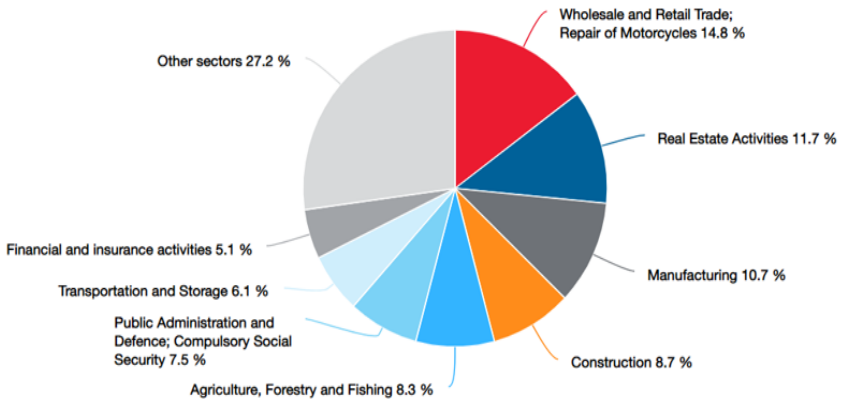

Figure 1: Percentage of the GDP structure of the current process, 2020
Source: https://www.geostat.ge/ka/modules/categories/23/mtliani-shida-produkti-mshp (Accessed 3.12 2022)

The pandemic has demonstrated that the situation has increasingly complicated the terms of administration and management as it has become impossible to plan and define development strategies. The uncertainties have added to the complexity of developing and implementing a sustainable development strategy, which led from

the global spread of the virus to its unmanageable situations. This indicates that people who are responsible for economic policy are required to have high qualifications and competencies that lead to crisis management and the development and implementation of effective policies by the government. At the same time, the model of development should be based on the common spirit and consent of society and the government, which will ensure the reduction of obstacles and unforeseen risks.

Many economists-scientists have started studying issues related to the impact of the pandemic on the world economy as well as national economies. This paper summarises some of the general findings, which, of course, also apply to Georgia.

It is noteworthy that the pandemic dealt a major blow to small industrial enterprises, which are the main source of employment in both developed and developing economies. They play an important role in income generation and poverty alleviation and will play a crucial role in the further recovery of the global economy. However, due to their small size and resources, small industrial enterprises are vulnerable to these types of challenges, as they do not have the ability to cope with sudden shocks, even the pandemic crisis, without the help of governments.

Access to credit is especially important for small firms to increase their competitiveness and integrate them into local and global value chains. According to the Sustainable Development Report (2020), 34.7% of small businesses in developing countries benefit from loans or credit lines. Providing fiscal stimulus and access to financial services to assist small- and medium-sized enterprises (SMEs) is essential for their survival and development during and after the crisis. UNECE recommended that the Georgia government address emergency and capacity-building requirements for structural transformation and the achievement of the 2030 sustainable development goals (SDGs) (p.40).

Dealing with COVID-19 is unthinkable without extending investment in research and development (R&D). More investment is needed in the pharmaceutical industry and in the latest technologies, such as artificial intelligence, which can facilitate the development of drugs and vaccines and the management of related services and resources.

In the conditions of the modern technological revolution, the development of mobile communications plays an important role, however, half of the global population – mostly in low-income countries – is offline. COVID-19 has forced people to work, study, seek healthcare and socialise at, or from, home. Digital technologies and the internet have never been such a major part of everyday life as during the pandemic. However, there has been a major setback in this area, the main reason being the cost of using the internet and the lack of necessary skills.

The pandemic has clearly shown that the existence of resistant infrastructure is extremely important, not only for the functioning of economic but also social and ecological systems. Roads, railways, pipelines, electricity, gas and water supply, communication lines and bridges – paralysis of these systems could have caused information technology, the internet, software and platforms to malfunction as the entire world was forced to move to a mixed form of remote operation (GFCC, 2021). Much work needs to be done in this direction, especially in developing countries.

Developed countries agree to finance and implement innovative projects in infrastructure. Among them is the issue of proper use of water resources, especially in the use of drinking water, self-healing materials and the capacity of hydrogen.

The following types of problems have emerged as research issues in scientific circles: the task of maintaining the sustainability of the healthcare system; unemployment; assisting businesses in crisis-stricken businesses; reduction of budget funds due to reduction of tax contributions; reduction of aggregate supply and aggregate demand; problems in foreign trade related to the ban on food exports by importing countries; problems in the supply chain; transaction costs and uncertainties associated with switching to remote work; uncertain expectations about the duration of the pandemic, etc.

The conditions of the pandemic have raised many questions for Georgian economists, such as:

- Is it necessary to restructure the Georgian economy in the context of the new industrial policy?
- How safe is economic and food security?

- Which industries won and which lost?
- Which sectors should be mobilised for the development of resources and why?
- Why is job creation still a key issue and which industries should carry out this function?
- What is the role of Georgia in absorbing the results of the Fourth Industrial Revolution?
- Why are the views of mainstream economists being re-examined?
- What flaws appeared in the Georgian economy during the COVID-19 pandemic?

Georgia, like other countries, faced difficult problems in the tourism-related, aviation, transport, trade, entertainment and entertainment, etc. industries. The situation particularly affected the self-employed, those employed via informal or non-formal contracts (the homeless, debtors, the service sector, especially those employed in the tourism sector).

This crisis has allowed a rethink of the system of capitalism. It requires the transformation of the political, social and economic spheres. It is becoming increasingly necessary to create a model of economic structure that will be primarily responsible for a safe life as well as sustainable and inclusive development. A shared economy model should be put in place in all possible segments.

In the terms of a small market, it is not possible to bypass the world market, but the reliance must be significantly lower in subsistence and safety products and services, defence and healthcare. Therefore, attention should be paid to the recapitalisation of the healthcare and epidemiological system, the development of medical equipment manufacturing, pharmaceuticals, biotechnology products, the agriculture and food industry, hygiene products, and the energy, telecommunications and housing sectors. However, coordination of research and development within these fields is crucial.

Of secondary importance is the development of delivery service, digital manufacturing (which should be ensured by cyber security), digital equipment manufacturing, online education, sales, consulting, furniture manufacturing, and the creative industry.

The pandemic has led to the requirement for changes in manufacturing technologies and the need has arisen for the transition of labour and organisational issues due to informational management technologies. This will, of course, reduce the cost of labour, construction and other running costs, but will also increase the cost of digitising production, wherever possible.

3 Conclusions and Recommendations

As demonstrated by COVID-19, political, economic and social security issues become a priority during a pandemic, which poses a great challenge to governments. The lessons of the history of the world economy teach us that during and after the Great Depression, crises and wars, countries often resorted to protectionist policies to protect domestic production and create a favourable environment for rapid economic development. However, these strategies were based on the model of economic openness and the goal was to further integrate countries' economies into the world market (Gvelesiani 2015; Lekashvili, 2020).

The pandemic conditions have shown the need to develop an order, model and strategy different from the current one, as humanity faces the threat of a recurrence of similar pandemics. At the same time, increasing spending on healthcare means reducing spending on other areas of the economy and social life in the face of limited resources.

Continuing to invest in the promotion of inclusive and sustainable industries, as well as in material infrastructure, innovation and research, is vital for long-term economic development. To achieve these goals, it is important to develop advanced forward-looking curricula and programmes within higher-education institutions, which tailor both the content and approaches to industry needs. In addition, a national skills-matching strategy (or sectoral/field-specific matching strategies) should be established to guide the above. (UNECE, p.44)

Better access to financial services for small industries is urgently needed to resuscitate the global economy. It is advisable to transform the economy in a way that focuses on the development of the processing industry in order to ensure income growth and economic development, including high-tech industries. However, these sectors should be mainly export-oriented. However, the development of export production is necessary, which should not only be based on the natural relative advantage but, due to expediency, is also necessary for the state to take care of the acquired relative advantage.

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A Comparative Study of Metamorphic Malware Detection Techniques

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Abstract Malware is a major threat in the evolving global cyber space. The different detection techniques that currently exist are insufficient at detecting metamorphic malware, as they can change the internal structure of their code, thus keeping the flow of the programme equivalent to the virus. Commercial antivirus software depends on signature detection algorithms to identify viruses, however, code obfuscation techniques can successfully circumvent these algorithms. The objective of this research is to analyse the various detection techniques of such metamorphic malware used over the years and to unearth the strengths, weaknesses and advance research directions possible in the field of the detection of metamorphic malware.

Keywords: metamorphic malware, detection techniques, comparative analysis, antivirus, algorithms

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1 Introduction

Malware is an evolving and ever-growing threat for global cyber space. The number of different types of malware detected each year is constantly increasing as is their ability to circumvent detection techniques. New forms of morphic malware are emerging that are capable of changing their signatures and evading detection by signature-based algorithms.

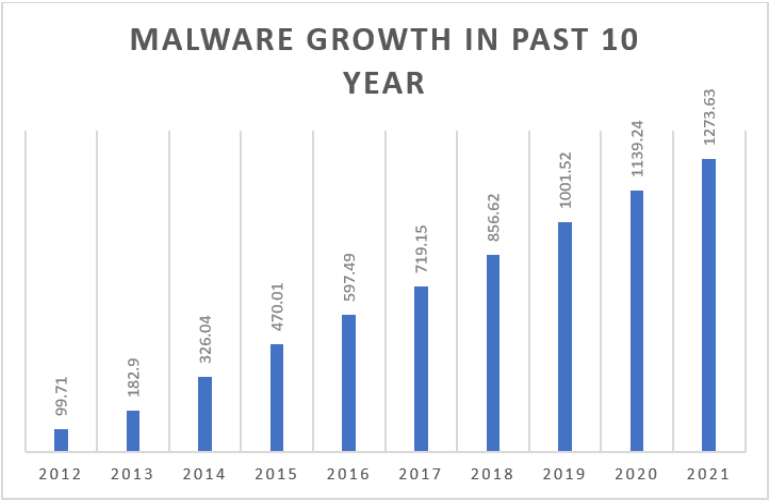

Figure 1: Overall development of new malware programmes over the last 10 years
Source: own.

Figure 1 highlights the constant growth in the production of malware over the past decade. While in 2020 the number of cases of malware reported were 1,273 million (Andreopoulos, 2021), the number of 'never-before-seen' types of malware were only 268,000 (Malware, 2021) and the total number of cases of new malware was around 146 million (Andreopoulos, 2021). Research by Camponi et al. (Campion, 2021) also reveals that over 66% of the types of malware are morphed from previously known threats. This highlights the fact that the maximum number of different types of malware in circulation are either old versions or morphed versions of existing ones. While there are techniques to easily detect the older variants using signature-based mechanisms, as well as some newer ones that use emulators or DFA-based techniques, the morphed variants are the most troublesome of all due to their 'evasive' nature.

Furthermore, research carried out by the Ponemon Institute (Ponemon Institute, 2018) into the state of endpoint security risk concluded that at least 76% of organisations are totally dependent on commercial antivirus programmes that use signature detection techniques to detect any intrusions or vulnerability. This, in turn, makes organisations vulnerable to metamorphic malware and makes a compelling argument for research and development in the detection of such malware. These types of malware have a mutation engine that takes in the code as input and returns a morphed version of the code in each iteration. The morphing is done on the basis of semantic preservation techniques, which ensures that while the code signature changes, while the effect of the code essentially remains the same. In other words, in metamorphic viruses, the physical appearance of the source code is morphed, while the logical flow remains the same. This in turn changes the hash of the signature code of the code, hence it is difficult to detect these metamorphic viruses using signature detection algorithms.

2 Background

Campion et al. (Campion, 2021) proposed an analysis on the schema and working of metamorphic malware by attempting to develop a framework that can produce the original variant of the malware by analysing different samples of the same malware and detecting the semantic preserving transformation rules applied to obtain the original malware code. This exercise also helps bring insights into the metamorphic malware engine or the mutation engine. The research reveals that, on average, over 90% of the code in the metamorphic malware is that of the engine itself. The engine is served the entire code as its input, and a morphed version is thrown as output, using various transformations, which essentially keeps the semantics the same. The engine also has a definite structure with various parts:

1. Disssembler - converts code to assembly instructions
2. Code Transformer - applies code obfuscation techniques
3. Assembler - converts mutated code to binary instructions

Various techniques have been found for the detection of malware. Some of the major ones are:

2.1 Signature Detection Techniques:

The most commonly used technique is signature-based algorithms, which is used by most of the commercially available antivirus software. Signature-based algorithms use the physical structure of malware to distinguish the type of malware. The algorithms use a database of malware signatures to detect potential malware. Metamorphic malware can change its physical structure while retaining the same control flow, thereby making it difficult to detect using signature-based techniques. Some other techniques for detection are:

2.2 Behavioural Detection:

This detection method uses the dynamic nature of the malware rather than the conventional static method of signature detection. The extraction of dynamic behaviour is carried out by executing a malware file in isolated surroundings (Kakisim, 2020). The main advantage of behavioural detection is when a computer virus looks similar to a benign programme but its functional aspect recognises it as harmful programme. In such cases, the above technique along with machine learning algorithms can be used to classify a record as harmful malware or a normal programme. Research by Desai and Stamp concludes that a metamorphic malware code can have an almost 93% similarity to a benign application, thus making it far more akin to benign files than malware (Desai, 2010).

2.3 Anomaly Detection Technique:

Anomaly detection chips away at the methodology of identifying if the document present follows a typical behavioural aspect. It beats the restrictions created by signature-based detection algorithms by utilising heuristic-based ways to deal with recognising ordinary behaviour. If a file is not classified as normal, then it is classified as harmful malware. In such cases, the notion of the anomalous and normal behaviour is expounded by the user, hence an accurate classification is not provided. A malware detection emulator has been created to distinguish the input programmes into different classes based on the appearance of the record. Once the classification is done then a review is made of whether it is harmful malware or an exceptional false positive case of being malware. In this research, the authors have attempted to morph malware codes and later create a classifier using machine learning algorithms

to detect these morphed malware files. They also go on to discuss various morphing techniques that can be employed to bypass detection and analyse the accuracy rate for such techniques. The subsequent sections deal with existing work and a literature review, followed by a proposed novel methodology for detecting metamorphic malware.

2.4 Newer Methodologies

Opcode Frequency: Research by Kakisim et. al. (Kakisim, 2020) revolves around generating a framework for the detection of metamorphic malware using automata principles. It establishes that every version of metamorphic malware is different from all the others, and the possible number of versions is so huge that a database cannot be maintained, thereby removing the possibility of using commercial anti-virus software or any pattern matching algorithms. Therefore, the authors suggested that the control flow of the programme is used rather than the code itself. They attempt to develop an opcode (instruction machine code) graph and then superimpose different versions of it to detect the similarities between different types of malware to find the engine code. They use the assumption that different variants formed of the same malware will have a common engine-specific pattern. The problem observed with this methodology was that it was necessary to have multiple samples of the same malware variants in order to be able to predict whether the malware had the same engine-specific variants. The possibility of detecting a totally new variant does not prevail in this research.

Hidden Markov Models: The use of Hidden Markov Models (HMM) for detecting malware has evolved as a popular research domain. This is due to the fact that any computer programme can be represented as a sequence of instructions, thereby treating a programme as a time series – an ideal condition for the use of HMMs (Stamp, 2004). Annachhatre et. al. (Annachhatre, 2015) applied HMMs and cluster analysis to detect unknown variants of malware by analysing the control flow of the programme. The HMM is trained on the basis of given observation sequences. The HMM is initially trained for a variety of compilers and generators of malware – training involves both, forward and backward algorithms and scoring is done by the forward algorithm. Finally, clustering is carried out using K-means.

Toderici et.al. (Toderici, 2013) showed that metamorphic malware can evade detection by HMM in the event that it uses morphing with instructions from benign files.

William B. Andreopoulos (Andreopoulos, 2021) used the assumption that a programme is basically a set of instructions that are executed in a sequence, therefore he proposed the use of sequence-based machine learning to derive insights to detect malware. The author also proposed a framework that would work in cases of morphic malware, i.e. polymorphic and metamorphic malware, and also used HMM principles and Long Short-Term Memory (LSTM) networks.

Genetic Algorithm: Javaheri et al. (Javaheri, 2021) proposed a novel approach to using a genetic algorithm for detecting future variants of targeted and metamorphic malware. The researchers extracted a sequence of system API calls using various filters. The authors unpacked and executed the files and opted for a sophisticated behavioural analysis to ascertain the classification of the file as harmful or benign. Dynamic unpacking is performed based on kernel-level memory dumping. Once unpacked, the malware features were extracted through parsing in order to find the relevant sequence flow to model the malware behaviour. The malware is further executed in a sandboxed environment and its activity is tracked and recorded. Finally, a genetic algorithm (GA) is employed, taking in each behaviour pattern as a chromosome and each system call mapped to a gene. Linear regression was used to model the formation of both behaviour and chromosomes.

Support Vector Machine: Devendra et. al. (Mahawer, 2014) presented a detection technique for metamorphic malware using machine learning techniques. The authors proposed the use of a support vector machine (SVM) as a tool to detect such variants of malware, using a specialised kernel for the model, called the histogram intersection kernel.

K. Kancherla et. al (Kancherla, 2013) also proposed the use of SVM for the classification of malware. They used the malware executable to be transformed into an image called the bytecode image, and then intensity-based and texture-based features are extracted to predict the code signature. SVM is then employed for bifurcation of dataset into benign and malware signatures. An accuracy of 95% is

reported in the paper. Code obfuscation and morphing was not incorporated, therefore limiting its applicability for the detection of metamorphic malware.

2.5 Comparative Analysis Based on Literature Survey

In this section, the authors of this study provide an analysis table of the various detection techniques for metamorphic malware.

Table 1: Comparative Study of Reviewed Papers

Sl.No.	Researchers	Technique	Approach	Advantages	Shortcomings	Dataset size
1	Elhadi et al. (2013)	API calls	An API call graph was developed by integrating an API call and system resources.	Accurate graph generation through sequence profiling data dependen-cies.	Lower efficiency on polymorphic malware. The time complexity of the API graph does not make it viable..	514
2	Javahe ri et al. (2021)	API calls and geneti c algorit hm	Unpacks files and studies the API calls made in a behavioural analysis to ascertain benign or corrupt files. Later, a genetic algorithm is applied with behaviour as a chromosome and a system call as the gene.	The behavioural approach allows the detection of never-before-seen malware. The API call sequencing allows the detection of various types of web-based content.	2 samples or more are required to generate variants and perform crossovers. Recent metamorphic malware can hide behaviour in a controlled environment.	NA
3	Campi on et al. (2021)	Base malwa re	The proposed algorithm assumes there is a base malware code.	Provides an-indepth insight into obfuscation techniques and helps in understanding the working of the mutation engine.	Only works if the base malware is recognised and cannot function for never-before-seen malware.	NA

Sl.No.	Researchers	Technique	Approach	Advantages	Shortcomings	Dataset size
4	Kancherla et. al (2013)	Bytecode Image and SVM	Converted malware executable into a bytecode image and then used SVM to classify	Reported accuracy of an average of 95%..	Uses a supervised algorithm and generic kernel function. Can malfunction in the event of high obfuscation in code. The dataset used is inaccurate.	NA
5	Agrawal et al. (2012)	CFG	Works to eliminate the graph comparison problem. Uses normalised edit distance technique.	Attempts control-flow analysis (semantic) that can detect newer viruses.	Fails against non-assembly malware. Tested on a very small dataset.	18
6	Eskandari and Hashmi (2011)	CFG + API Calls	Detects metamorphic malware by making use of a control-flow graph (CFG) and an API call graph.	Able to detect obfuscation in files.	Provides poor results with non-assembly malware. Computation speed is very slow.	4445
7	Martins et al. (2014)	Dependency Graph	Forms a dependency graph of an executable file. Based on this dependency graph, it identifies the closely related nodes.	Eliminates the impact with very high accuracy.	Identification on closely related nodes and events should be based on the statistical inference technique.	63
8	Todorici et.al. (2013)	HMM	Uses HMM in conjunction with a chi-square distance calculation.	Capable of detecting malware even if benign files are used to obfuscate code.	The method is not useful for real-time detection.	NA
9	Annachhatre et. al. (2015)	HMM and Cluster Analysis	HMMs and cluster analysis have been applied to detect known variants of malware by	HMM is trained on the basis of the given observation sequences.	Uses a straightforward scoring system on a forward algorithm. A more specific	NA

Sl.No.	Researchers	Technique	Approach	Advantages	Shortcomings	Dataset size
			analysing the control flow of the programme. Clustering is done based on KNN.	HMM is trained for a variety of producers and generators of malware.	scoring system can be produced to increase accuracy.	
10	Andreopoulos (2021)	HMM and LSTM	Assumes that a programme is essentially a sequential instruction set, therefore a sequence-based ML approach is provided.	Can provide real-time detection in conjunction with antivirus software. Potential to detect both polymorphic and metamorphic variants.	Uses simple kernel functions for HMMs, which affects accuracy. High false positives when code is obfuscated with benign samples.	NA
11	Van Nhuong et al. (2014)	Hybrid	Uses a hybrid method formed from two known methods. Developed a detection system for detecting malware, which consists of the advantages of both the base methods.	Removes malware obfuscation by extracting automation of semantic sets. Detection rate of almost 100%.	Very high processing time. No support for real time detection.	186
12	Mahawer and Nagaraju (2014)	Opcode	This method is derived from the most frequently occurring histograms of opcodes in disassembled files.	Very efficient at detecting the insertion of dead code, registry renaming and code reordering.	Unable to detect malware that can self-obfuscate, thus leading to a very high rate of FNs.	2121
13	Kakisim et. al. (2020)	Opcode	Generates an opcode graph for different iterations on the same malware then superimposes the image to find	Can effectively detect morphed versions of a malware family.	Based on the assumption of an identical engine for all interations. Multiple samples of the same malware	NA

Sl.No.	Researchers	Technique	Approach	Advantages	Shortcomings	Dataset size
			commonalities to deduce the malware engine.		are required to detect malware of the same family.	
14	Alam et al. (2015)	Opcode	This method first computes the weight of the mail pattern and control flow.	Does not depend on any platforms. Supports automated analysis by making use of an intermediate language.	Very high complexity for a large dataset. Opcode frequency could be affected if any optimisations are made in the compiler. Highly vulnerable to code obfuscation.	1251

3 Conclusion

The aim of this research was to learn about the detection of metamorphic malware and to analyse the existing techniques for such malware. The analysis shows that HMM, opcode-based analysis, and control flow graph-based analysis are the major advancing areas. The major issue spanning all areas in this regard is that to date there has been no testing and validation of these approaches on standard databases with ample data points for testing. Most of the research does not specify the testing criterion, and the ones that do, have an insufficient database to ensure its production readiness. There is a need to propose research in this domain using a larger dataset.

In addition, another very important factor that comes into play is the kind of obfuscation techniques that have been used to morph malware. The better the morphing, the closer it is to a real-life detector, and many of the works reviewed in this regard were not as dedicated to obfuscation as they were to detection. Based on this study, it can also be established that there is still future scope for research by instilling some specific approaches in the areas of HMM with different scoring systems, or by using a genetic algorithm or even by using the unpredictability of mutation to be detected through the use of fuzzy neural networks (FNN).

4 Future scope

Based on a review of the different methods for the detection of metamorphic malware, the authors of this study have identified some of the major research domains where research is ongoing:

1. Hidden Markov Model
2. Support Vector Machine
3. Genetic Algorithm
4. Emulator-based approach

All of the domains suffer from some kind of deficiency. A wholesome framework is required that can potentially detect never-before-seen variants of malware with lower complexity and higher efficacy.

To this end, machine learning algorithms could be a solution, however, existing studies into their use have not be very promising, other than in terms of SVM. Additionally, the detection of malware is predominantly a classification problem, which also uses the attributes of pattern recognition. The use case of a FNN also revolves around these two pillars, thereby making it a possible alternative approach.

In view of the lack of studies into FNNs for the detection of malware and its unsupervised nature, it could be a potential future research topic. Fuzzy neural networks have been widely used for pattern recognition, on which the opcode frequency histogram approach also relies. These networks have also been used in detecting variants of COVID, where COVID-like metamorphic malware is also an 'evasive' variant, i.e. it morphs into new forms. Similar learnings can also be applied to the base malware identification approach.

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Unified Theory of Acceptance and Use of Technology: Adoption of the Microsoft Teams Mobile Application Among Economic and Business Students

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Abstract The use of mobile applications is rising every year and becoming increasingly important throughout the world. During the COVID-19 pandemic, the whole educational process in almost every university in the world was carried out through the internet. Some of the universities used the Microsoft Teams Platform (hereinafter: MS Teams). The aim of this study is to test a model of the acceptance and use of the mobile version of the MS Teams application among students from the University of Maribor, Faculty of Economic and Business (FEB). One of newer acceptance models, named the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, was used. The UTAUT is a technology acceptance model, which aims to explain user intentions to use an information system. This study explored the behavioural intention to use the MS Teams mobile application from the perspective of students. The UTAUT model was used to evaluate the influences of technology-related factors on its adoption. For this research, a questionnaire was created and given to students who used mobile devices and MS Teams for their study materials and communication. The findings provide a practical reference for educational institutions and decision-makers involved in designing and using this application.

Keywords:
Microsoft Teams, UTAUT framework, mobile application, technology acceptance model, mobile devices

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1 Introduction

The continuous development of today's information society includes the use of the internet and online services in almost all business processes. It increasingly also includes the use of mobile applications. The prevalence and use of smartphones open up new opportunities for companies and users and allow them to integrate modern technologies into their businesses. Mobile business is based on the internet and electronic business, however, it is necessary to consider the fact that through mobile devices, users only want to access the key information they need at a particular moment (Camponovo in Pigneur, 2003). In addition, the use of mobile devices and applications is also increasing in the educational process due to online teaching and learning, which started in almost every university in the world due to the coronavirus pandemic (COVID-19). Online education is defined as a type of distance learning, without attending a physical institution, in which students and teachers interact over the internet (Farmer, 2018). Online education has many names and terms, including computer-based training, web-based training, internet-based training, online training, e-learning (electronic learning), m-learning (mobile learning), computer-aided distance education, etc. (Saranya, 2020). E-learning is defined as an information and communications technology (ICT) to enhance and support the teaching-learning process (Yusuf, 2005).

Effective implementation of any information technology (IT) and information system (IS) depends on user acceptance (Davis, 1989). Therefore, the aim of this study is to test a model of the adoption of the mobile version of the MS Teams application among the students from the University of Maribor, Faculty of Economic and Business (FEB). During the COVID-19 pandemic, the whole educational process in the faculty was carried out through the internet, more specifically through the MS Teams Platform. According to the results from STATISTA (2022), the number of daily active users of MS Teams have almost doubled in the past year, increasing from 75 million users in April 2020 to 145 million as of April 2021 (worldwide). This has also been influenced by the COVID-19 pandemic and the growing practices of social distancing and working from home. MS Teams is part of Microsoft 365, a set of collaboration applications and services launched in July 2017, which can be accessed through desktops, websites or mobile devices. MS Teams was used for online teaching during the COVID-19 pandemic

at the FEB. Some features were used such as online lectures, chats, announcements, different groups for each subject, assignments, maps and files sharing, online exams, calendar, meetings, different calls (phone calls or video calls), online discussion hours for students, etc. For the purposes of this study, the authors used one of the newer acceptance models named the framework of Unified Theory of Acceptance and Use of Technology (UTAUT) and investigated the acceptance of the MS Teams mobile app among the students. The UTAUT model is a technology acceptance model formulated by Venkatesh and others (2003), which aims to explain user intentions to use an information system and subsequent usage behaviour. The theory holds that there are four key constructs: 1) performance expectancy (PE), 2) effort expectancy (EE), 3) social influence (SI), and 4) facilitating conditions (FC). This model provides a framework that not only explains the acceptance of information technology (IT) and information systems (IS), but also elucidates the actual use of such technologies and systems (Chao, 2019). Therefore, this study used the UTAUT model as the theoretical background to evaluate the influences of technology-related factors on the adoption of the MS Teams mobile app. The following is a description of the model used for this study.

2 UTAUT model

Several technology acceptance models and theories were used by Venkatesh et al. (2003) to define and describe the new model – the UTAUT model, including the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), the Theory of Planned Behaviour (TPB) (Ajzen 1991), the Technology Acceptance Model (TAM) (Davis 1989), the Combined-TAM-TPB (Taylor and Todd 1995), the Model of PC Utilization (MPCU) (Thompson et al. 1991), the Motivational Model (MM) (Davis et al., 1992), the Social Cognitive Theory (SCT) (Bandura 1986) and the Innovation Diffusion Theory (IDT) (Rogers 1995). The UTAUT model is defined by four constructs shown and described in Table 1 (Venkatesh et al., 2003).

The four constructs of the UTAUT also have a significant influence and impact on the behavioural intention (BI) to accept and use the new system by the users (Oye & Iahad, 2014). This study focused on measuring whether these four constructs (PE, EE, SI and FC) significantly influence the BI of the students at FEB to accept and use the Microsoft Teams mobile app for their educational process.

Table 1: Description of UTAUT constructs

Performance Expectancy (PE)	The degree to which an individual believes that using the system will help them to attain gains in job performance.
Effort Expectancy (EE)	The degree of ease associated with the use of the system.
Social Influence (SI)	The degree to which an individual perceives that other important people believe they should use the new systems.
Facilitating Conditions (FC)	The degree to which an individual believes that organisational and technical infrastructure exists to support the use of the system.

3 Research methodology

The case study in this research is based on a survey of students from the FEB at the University of Maribor, Slovenia. Data was collected using a questionnaire designed in Microsoft Forms (as an online survey) and divided into two parts. In the first part, a five-point Likert scale was used with the ranges from (1) to (5), representing (1) – Strongly disagree, (2) – Disagree, (3) - Neither Agree or Disagree, (4) - Agree and (5) – Strongly agree. The second part of the questionnaire was designed to gather demographic information from the students, which are illustrated in Table 2. A total of 158 questionnaires were collected. Twelve of the respondents said that they were not using the MS Teams mobile app (7.6 %), therefore this research is based on the 146 completely filled-in questionnaires (N=146). The statistical tools used to collect and analyse data from the questionnaires were SPSS 27 and Microsoft Excel.

Table 2 shows the demographic information of the respondents – 39.7% of them were male, and 60.3% were female. In terms of age, 93.8% of the respondents are aged 19-25 years. Of the 146 students, 16.4% said they use the MS Teams mobile app less than once a day, while 42.5% – the highest percentage – said they use it once to twice a day. In addition, 19.9% of the students use it once a week, while 2.7% said they use it once a month for learning. These results show that FEB students frequently use the MS Teams mobile app. As a result, the authors of this study concluded that the students are aware of the positive aspects of using this application for the educational process in the faculty and that they considered it useful.

Table 2: Demographic data of the respondents (N=146)

Variables		Frequency	Relative frequency (in %)
Gender	Male	58	39.7
	Female	88	60.3
Age	Under 19 years	0	0
	19-25 years	137	93.8
	25 years and over	9	6.2
Usage of Microsoft Teams mobile app	less than once a day	24	16.4
	once to twice a day	62	42.5
	three or more times a day	27	18.5
	once a week	29	19.9
	once a month	4	2.7

The authors analysed the influence of the constructs of the UTAUT model on the students' behavioural intention towards the usage and acceptance of the MS Teams mobile app for online teaching and learning, using regression analysis.

As shown in Table 3, a reliability analysis was conducted for the 34 items (constructs from the UTAUT model) using Cronbach's Alpha. The UTAUT constructs appear to have a good degree of reliability with values above 0.8. Values greater than 0.6 are considered acceptable in different technology acceptance literature (Zhang et al., 2006).

Table 3: Reliability Statistics

Cronbach's Alpha	N of Items
0.822	34

4 Results

The influence of all four constructs (PE, EE, SI and FC) on the BI to accept and use the Microsoft Teams mobile app by students measured with regression analysis is shown in Table 4. For every independent variable, the authors measured how it influences the dependent variable, in this case, BI. In the UTAUT model, the BI is defined by five different items (BI1-BI5). The results show the influence of Performance Expectancy with 10 items (PE1-PE10), Effort Expectancy with 8 items

(EE1-EE8), Social Influence with 6 items (SI1-SI6), Facilitating Conditions with 5 items (FC1-FC5), and Behavioural Intention 5 items (BI1-BI5).

Table 4: Model summary

Rows	Independent Variables	Dependent Variables	R	R^2	Significant
1	PE 1-10	(BI1)	.489	.239	.000
2	**PE 1-10**	**(BI2)**	**.315**	**.099**	**.151**
3	PE 1-10	(BI3)	.586	.343	.000
4	PE 1-10	(BI4)	.624	.390	.000
5	PE 1-10	(BI5)	.626	.392	.000
6	EE 1-8	(BI1)	.515	.265	.000
7	**EE 1-8**	**(BI2)**	**.280**	**.079**	**.178**
8	EE 1-8	(BI3)	.509	.259	.000
9	EE 1-8	(BI4)	.507	.257	.000
10	EE 1-8	(BI5)	.487	.237	.000
11	SI 1-6	(BI1)	.341	.116	.008
12	**SI 1-6**	**(BI2)**	**.262**	**.069**	**.122**
13	SI 1-6	(BI3)	.438	.192	.000
14	SI 1-6	(BI4)	.454	.206	.000
15	SI 1-6	(BI5)	.426	.182	.000
16	FC 1-5	(BI1)	.397	.157	.000
17	FC 1-5	(BI2)	.276	.076	.047
18	FC 1-5	(BI3)	.533	.284	.000
19	FC 1-5	(BI4)	.546	.298	.000
20	FC 1-5	(BI5)	.576	.332	.000

From Table 4 it can be seen that rows 2, 7 and 12 (bolded text in the rows) are the only ones that are not significant, with a $p>0.05$ value. In the second row (2), items PE 1-10 contributed only 9.9 % of the total variation observed in the students' behavioural intention to accept and use the MS Teams mobile app. The R^2 is 0.099 and the correlation is 0.315. Therefore, it can be concluded that independent variables have little influence on the BI2 dependent variable. The regression equation is not significant, with a 0.151 p-value. None of the independent variables are significant. Therefore, we conclude that the independent variables have no positive influence on item BI2, which refers to the perceived use of the MS Teams mobile app as involuntary.

In row 7, the model summary shows that items EE 1-8 contributed only 7.9 % of the total variation observed in the students' behavioural intention to accept and use the MS Teams mobile app. The correlation and R^2 are 0.280 and 0.079 respectively. The regression equation is not significant, with a 0.178 p-value. None of the independent variables are significant on BI2. The authors concluded that items EE 1-8 have no positive influence on item BI2 (refers to the perceived use of the MS Teams mobile app as involuntary) of the students to accept and use the mobile app.

In row 12, the model summary shows that items SI 1-6 contributed 6.9 % of the total variation observed in the behavioural intention to accept and use the MS Teams mobile app by the students. The correlation and R^2 are 0.262 and 0.069 respectively. The regression equation is not significant, with a 0.122 p-value. None of the independent SI1-6 variable are significant. The authors concluded that items SI1-6 have not influenced a positive change in item BI2 of the students acceptance and use of the MS Teams mobile app.

Performance expectancy is defined as the degree to which an individual believes that using the system will help them to attain gains in job performance – in this case, the degree to which students believe that using the MS Teams mobile app will help them improve their student work (tasks, assignments, projects, seminar papers, etc.). Effort expectancy is defined as the degree of ease associated with the use of the system – in this case, the degree to which students believe that the MS Teams mobile app is easy to use. Social influence is defined as the degree to which an individual perceives that other people who are important to them believe they should use the new systems. This means that people who influence the behaviour of the students and are important to them think that they should use the MS Teams mobile app. Facilitating conditions are defined as the degree to which an individual believes that organisational and technical infrastructure exists to support the use of the system – in this case the degree to which students believe that they have knowledge and resources but also technical support from the faculty when using the MS Teams mobile app.

In this study, the UTAUT model aims to explain students' intentions to use the MS Teams mobile app and explain their behavioural intention to use the application. As previously mentioned, the UTAUT model explains that four key constructs – PE, EE, SI and FC – are direct determinants of usage intention and behaviour (Venkatesh et al., 2003). From the regression analysis used to test the model, performance expectancy (items PE5, PE7 and PE10) is significant with a <0.05 p-value. The effort expectancy (items EE4, EE6 and EE7) is significant with a <0.05 p-value. The social influence (items SI1, SI2 and SI4) is significant with a <0.05 p-value, and the facilitating condition (items FC3 and FC5) is significant with a <0.05 p-value. A detailed analysis of the research is available from the authors of the article. According to these results, it can be concluded that each of the four constructs of the UTAUT model have a positive influence on the behavioural intention of the students to accept and use the MS Teams mobile app for their educational process (teaching and learning).

4 Conclusion

This study presents the UTAUT technology acceptance model, which was used to investigate the acceptance of the MS Teams mobile app among the students from the FEB at the University of Maribor, Slovenia. Using regression analysis in SPSS, the authors presented the influence of all four constructs (PE, EE, SI and FC) on the BI to accept and use the MS Teams mobile app by students. The authors found that all four key constructs of the UTAUT model have a positive impact on the acceptance and usage of the MS Teams mobile app by the students. The results show that the decision to use this mobile app is influenced by various factors, such as an understanding that using this app would make it easier for them to do their student work (tasks, assignments, projects, seminar papers, etc.). They also consider that using the MS Teams mobile app would cause their colleagues to perceive them as competent, and they agree that using the mobile app would be useful for teaching and learning. The intention to use the MS Teams mobile app is also determined by their perception that the app is very flexible to interact with and easy to use. The results also show that students' behaviour to accept and using the MS Teams mobile app is influenced by the people who are important to them as well as by the professors from the faculty who are very supportive of the use of the mobile app for their lectures. The authors concluded that all four constructs positively impact

the acceptance and usage of the MS Teams mobile app by the students of the FEB, and the results of this research confirm the validity of the UTAUT model.

Future research could focus on the following methodological aspects. The constructs in the model could be further analysed by conducting the reliability analysis separately for independent and dependent constructs, followed by the factor analysis. All four multiple regression models presented in this paper could be replaced by a single one (if factor analysis for the dependent construct leads to a single-factor solution), with constructs instead of measured variables both as independent variables as well as the dependent variable.

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THE INTERVAL EFFECT DURING THE COVID-19 PANDEMIC – THE CASE OF THE WARSAW STOCK EXCHANGE

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Abstract One of the difficulties in the process of estimating beta coefficients (β) is indicating the interval for measuring the return necessary to calculate it. Using various time intervals to calculate β, significant differences in estimates were noticed. The occurrence of these differences is called the interval effect. The aim of this study is to determine whether the occurrence of the interval effect also occurred among shares in the Warsaw Stock Exchange Index during the COVID-19 pandemic. The significant destabilisation of economic conditions has led to strong turmoil in capital markets. This situation creates research motives that can be used to discover new dependencies in capital markets. The aim of this paper is to check whether in years of spread of the COVID-19 pandemic, it was possible to observe other levels of β among companies on the WIG in the situation of a different approach to estimating returns on their shares). Therefore, in the period analysed, the interval effect can be noticed on the WSE. Interestingly, among the detailed relationships analysed, it was noticed that along with the extension of the time interval of returns, the β increased for companies with higher capitalisation.

Keywords:
interval effect, beta coefficient, COVID-19, Warsaw Stock Exchange, shares

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1 Introduction

Risk is one of the fundamental criteria taken into account by investors in the process of making decisions. For many years, investors have been prompted to look for increasingly effective methods of measuring risk. Among the many methodological proposals, the single-index model proposed by William Sharpe (1963) is very popular. It makes the volatility of the returns of companies' shares dependent on one factor, which is considered to be the market index.

One of the parameters of the Sharpe model is the beta coefficient (β). It reflects the non-diversifiable part of the volatility of rates of return. The process of its estimation is associated with numerous decision-making difficulties (Feder-Sempach, 2017, pp.20-21). Among them, the author indicates: the selection of the appropriate length of the research sample, the need to specify the stock exchange index that adequately represents the market for the companies selected for the sample, or the indication of the interval for measuring the return necessary to calculate it. The latter is often mentioned in scientific studies in which authors discuss what the most appropriate interval is for measuring returns that will later be used to estimate beta coefficients.

When using different time intervals (from daily to several years) to calculate beta coefficients, significant differences in estimates were noticed. The occurrence of these differences in the values of the β coefficients depends on the adopted period of the used share quotations of companies, which is called the interval effect or the intervaling effect.

The purpose of this article is to determine whether the occurrence of the interval beta coefficient effect also occurred among companies grouped in the Warsaw Stock Exchange Index (WIG) during the COVID-19 pandemic. The significant destabilisation of economic conditions led to strong turmoil on the capital markets, which was particularly observed in the first half of 2020. According to some researchers, the increase in price volatility on the stock market during the current turmoil is higher than in the periods of the previous great crises of 1930, 1987 and 2008 (Thakur, 2020; Zhang et al., 2020). This situation creates research motives that can be used to discover new dependencies in capital markets. These undoubtedly include the attempt to verify the occurrence in the present reality of the interval effect noticed in the 1970s. To achieve the main goal is necessary to formulate the

main hypothesis, which is following: The explosion and spread of the COVID-19 pandemic have resulted in different beta levels depending on the time horizon used to calculate returns. In connection with the above, the occurrence of the so-called interval effect can be observed.

The aim of this paper is to check whether in the year of the spread of the COVID-19 pandemic (i.e. 2020) and in the next year of its duration (i.e. 2021) it was possible to observe other levels of the beta coefficient of companies listed in the WIG index on the Warsaw Stock Exchange in a situation of differentiated approaches to estimating the returns on their shares (daily, weekly, biweekly or monthly respectively). The author's research on the occurrence of the interval effect in the time of the COVID-19 pandemic on the WSE will allow a deepening of knowledge of capital market participants in the scope of the possibility of using the beta coefficient to measure systematic risk in times of instability on the capital markets.

2 Review of interval effect literature

Choosing the right timeframe to measure returns was of interest to researchers as early as the 1970s. The first empirical study showing the differences in beta coefficient estimates depending on the change in the length of the interval for estimating returns was carried out by Gerald Pogue and Bruno Solnik (1974). They analysed the aforementioned parameters on the American market and seven European markets (Belgium, France, the Netherlands, Germany, Switzerland, Great Britain, Italy). In their study, Pogue and Solnik diagnosed the occurrence of a range effect (measured by the quotient of the monthly and daily beta value) for the above-mentioned markets. Importantly, it was noticeable to a much greater extent on the then less developed Belgian and Dutch stock exchanges. The survey results could indicate a link between the occurrence of the interval effect and the degree of development of the capital market in a given country. In another study on the selection of the appropriate time horizon for the calculation of the beta coefficient, the authors noticed that errors in the coefficient forecast resulting from the adopted different time intervals can be reduced by applying the coefficient correction proposed by Marshall Blume (1975), thus increasing the number of companies in the portfolio or extending the estimation period (Eubank, Zumwalt, 1979).

The authors of subsequent studies came to interesting conclusions. Gabriel Hawawini (1983) and Puneet Handa, S.P. Kothari and Charles Wasley (1989) noticed the differentiation of the beta interval effect depending on the capitalisation of companies. In the first of the above, the beta coefficient was supposed to increase along with the shortening of the interval for measuring returns. However, this dependence was to apply only to companies with higher-than-average capitalisation and trading volumes. This relationship was confirmed by the second of the 1989 articles quoted above. The researchers noticed a decrease in the value of the beta coefficient with the extension of the interval of returns for companies with higher capitalisation, while the relationship was opposite for companies with capitalisation below the average level.

The interval effect was also tested in non-US markets. When examining companies listed on the Brussels Stock Exchange, it was noticed that the values of beta coefficients converge to their asymptotic values and depend on the day adopted for the first day of verification of the interval effect (Corhay, 1992). The same author also noticed that the existence of the interval effect is inversely proportional to the market value of the companies. The observations relating to the occurrence of the interval effect were confirmed in the Australian market (Brailsford, Josev, 1997). These researchers built two equity portfolios, the first of which comprised companies with the lowest capitalisation, and the second with the highest capitalisation. In their study, Brailsford and Josev noticed that the beta coefficient of companies with the highest (lowest) capitalisation decreased (increased) along with the extension of the time horizon adopted for its estimation. They also showed that the determination coefficient increases simultaneously with the extension of the interval for measuring returns for both of these portfolios.

Based on the methodology used in the Australian market, a similar study was conducted on the Greek capital market (Diacogannis, Makri, 2008). However, the authors noticed that the mean of estimated beta coefficients increases for both small and large capitalisation companies in the case of extending the range of estimating return rates from daily to fortnightly.

The interval effect was also confirmed on the Bucharest Stock Exchange (Oprea, 2015). Using the standard market model, the aforementioned article found that beta estimates for the same stocks vary significantly when using daily and monthly returns. Furthermore, using a linear regression model, the article shows that the differences between monthly and daily beta estimates are negatively related to some stock characteristics such as market capitalisation and transaction intensity.

The Polish capital market was also subject to research on the interval effect. In terms of the WSE, there have also been some really interesting publications on the interval effect. Among the first were the studies by Janusz Brzeszczyński, Jerzy Gajdka and Tomasz Schabek (2010, 2011). The authors estimated the effect of the interval for 1-, 5-, 10-, and 21-day returns on stocks. The estimation was performed with the use of heteroscedastic ARCH autoregressive models. In the analysis of the 2005-2008 period, they noticed the existence of the convergence effect of beta coefficients in consecutive sub-periods. However, this convergence was conditioned, inter alia, by the interval for defining rates of return or the selection of the stock index used for calculations. The comparative analysis of the interval effect on the example of shares of companies from the WIG20 index and the German DAX (Feder-Sempach, 2017) or the one carried out for the 33 largest companies listed on the Warsaw Stock Exchange (Dębski, Feder-Sempach, 2015) is also interesting.

In recent years, the emergence of new conclusions about the interval effect has been noticeable. Among them, it should first be pointed out that the occurrence of the interval effect is related to the autocorrelation of rates of return on securities (Hong, 2016). The degree of autocorrelation of returns on securities with the market return determines the occurrence and direction of the interval effect. This effect disappears as the time horizon used to calculate returns increases. Verifying the existence of the interval effect on the exchange-traded fund (ETF) market (Milonas, Rompotis, 2013) was a revealing issue. When examining 40 ETFs listed on the NASDAQ Stock Exchange, the authors found that the average beta ratio increased as the time horizon of returns increased. The differences between the daily, weekly and monthly returns were statistically significant. Moreover, the authors used various methods to estimate the beta coefficient, noting significant differences between them.

3 Estimated beta parameters of WIG index companies during the COVID-19 pandemic

As mentioned in the introduction, the main goal of this study is to obtain knowledge about the beta interval effect of shares of companies listed in the WIG index during the time of the COVID-19 pandemic. The author's aim was to verify whether the uncertainty of the economic situation, which caused an increase in the volatility of the market valuation of issuers, is reflected in the levels of the aforementioned coefficient when it is calculated on the basis of returns that differ in the period of their estimation (daily, weekly, biweekly and monthly).

The interval effect has been verified by calculating the beta systematic risk factors for shares of selected issuers from the WIG index. For this purpose, the author of this paper decided to narrow the research sample to the 140 largest companies grouped in the three main WSE indices: WIG20, mWIG40 and sWIG80. These indices include, in turn, 20 companies with the highest market capitalisation, 40 medium-sized companies and 80 small companies. For consistency with the date of the outbreak of the COVID-19 pandemic, the author decided to use the historical portfolios of these indices as of the first quarter of 2020 (WSE, 2020), which was a period of the significant spread of the pandemic, and thus an increase in volatility in financial markets.

The beta coefficients have been calculated using the OLS method for the daily, weekly, biweekly and monthly returns. The WIG broad market index has been used to indicate the market rate of return. The period of analysis coincides with the years of the outbreak and duration of the COVID-19 pandemic, i.e. 2020-2021. The quotations of shares of the indicated entities taken from the stooq.com quotation database (2022) were used to calculate the beat coefficients.

In order to better compare the calculated beta coefficients for different intervals of measuring the returns, the author decided to estimate the value of the R^2 coefficient of determination for each of the results. Its value informs what part of the volatility of returns was explained by the calculated beta coefficients (Kornacki, Wesołowska-Janczarek, 2008). R^2 indications closer to one indicate a higher definition of a company's risk of systematic risk. Consequently, beta coefficients characterised by a

higher level of determination should be considered as carrying a greater information value.

The averaged values of the beta coefficients calculated during the COVID-19 pandemic in the aforementioned time horizons of returns for the companies grouped in the WIG20, mWIG40 and sWIG80 indices are shown in Table 1 below. It also includes the R^2 determination coefficients and descriptive statistics of the coefficients (mean and standard deviation).

Table 1: Values of beta coefficients for a varied horizon, estimated returns for selected WSE companies for the years 2020-2021 (128 cases)

Return interval	Average Beta	Average R^2	SD of Beta	Highest R^2 (number of cases)	Lowest Beta (number of cases)	Highest Beta (number of cases)
Daily	0.873*	0.204	0.387	5	54	19
Weekly	0.958	0.289	0.479	31	23	26
Biweekly	1.013*	0.325	0.557	29	17	23
Monthly	1.015*	0.360	0.701	63	34	60
Total number of companies:				128	128	128

*Statistically significant differences of means at $p<0.05$ (U Mann-Whitney Test).
Source: author's own calculation

From the entities grouped from the three main indices of the WSE, 128 qualified for the final research sample. Due to their withdrawal from the stock exchange in the analysed period, it was necessary to omit 12 entities (1 company from WIG20, 1 from mWIG40 and 10 from sWIG80).

It can be observed that the averaged values of beta coefficients were characterised by the highest value for monthly returns. Moreover, also in this case, the highest value of the R^2 coefficient of determination was recorded, which in the case of monthly returns is 36% (the beta coefficient explains 36% of their volatility). These results are consistent with those of previous researchers verifying the existence of the interval effect on the WSE (Olbryś, 2014; Feder-Sempach, 2017). Unfortunately, in the case of monthly returns, the standard deviation of beta coefficients is also the highest, which proves their greatest volatility in relation to other returns horizons. The increase in errors in estimating β along with the extension of the time horizon of returns has already been reflected in existing literature on the subject (Podgórski,

2019). Interestingly, the averaged values of the beta coefficients for daily and weekly returns would suggest to qualify companies to group of defensive ($\beta < 1$) issuers, which react less well than the market. However, when looking at the values of the coefficients with the use of two-week and monthly returns, the aggressive ($\beta > 1$) character of the analysed companies can be concluded.

It is worth noting that in almost half of the analysed cases (60 out of 128), the beta coefficient was the highest at the time of using monthly returns for its estimation. Moreover, the lowest values (54 out of 128 cases) were those beta coefficients estimated on the basis of daily returns. It can be said with a high degree of probability that the COVID-19 pandemic did not disturb the existence of the interval effect. This is evidenced by the statistical significance of the mean values for the beta coefficient calculated using the Mann-Whitney U test (at level $p<0.05$). When observing the quantification of beta coefficients for 140 (ultimately 128) of the largest WSE companies in 2020-2021, different levels can be observed depending on the adopted time horizon of returns. However, based on previous discoveries exploring this issue, the previously noticeable tendency to decrease the value of beta coefficients along with the extension of the time horizon of returns (e.g. Hawawini, 1983; Corhay, 1992; Brailsford, Josev, 1997) in the case of companies with higher capitalisation has not been observed on the WSE during the COVID-19 pandemic. Moreover, a slight increase was noticeable.

4 Conclusions

The main purpose of this article was to indicate whether the beta interval effect also occurred during the COVID-19 pandemic. To verify this research goal, the author decided to calculate the beta coefficients of WSE companies listed in the WIG20, mWIG40 and sWIG80 indices in the years 2020-2021. Using daily, weekly, biweekly and monthly returns, differences in averaged values of beta coefficients were observed. Moreover, these differences made it impossible to explicitly classify the analysed companies to the group of defensive (reacting weaker than the market) and aggressive (reacting stronger than the market) issuers. Moreover, it was noticed that the beta coefficients based on monthly returns had the highest values and were characterised by the highest R^2 coefficient of determination. Therefore, it seems justified to confirm the research hypothesis set out in the introduction of this study,

which indicated the occurrence of an interval effect during the COVID-19 pandemic.

The obtained research results shed new light on the shaping of the interval effect in comparison to the previously conducted research on this issue. There have not been any decreases in the value of beta coefficients for companies with high capitalisation along with the extension of the time horizon of returns, which has been repeatedly confirmed by researchers dealing with this subject. These results are an original contribution to the current area of capital market research during the COVID-19 pandemic. This provides the basis for further scientific research on the search for more detailed relationships characterising the interval effect during the increased volatility in financial markets caused by the COVID-19 pandemic.

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THE CHANGING ROLE OF THE STATE IN POST-COVID ECONOMIC LIFE

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Abstract During the pandemic – similarly to crises of other nature – the role of the state became more important in many economies. However, there is a question over whether this increased importance will be sustainable. In this paper, the author examines one of the most important fields related to this question – the development of public finances. The analysis focuses on the member states of the European Union (EU). The preliminary conclusion is that in many EU member states, there is more acceptance (and even more claim) for stronger public action (and related public finances), however, the picture is far from monochromatic. The specific issue of supranational (EU) public action is also tackled. The steps induced by the pandemic look promising (and in some aspects, even revolutionary), however, for the time being, the direction and speed of the new processes (potentially leading to more EU-level public action) remain unclear in the long run. Both member state-level and EU-level changes are important in shaping the future of European integration.

Keywords:
European Union, Lisbon strategy, Europe 2020 strategy, COVID-19, Next Generation EU

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1 Introduction

The role of the state is one of the aspects most often analysed by researchers aiming to understand the functioning of today's economic mechanisms.[1] In times of crisis, changes in this role can be observed, which may not only have short-terms effects, but also potentially long-term. The 1929-1933 world economic crisis brought – among many other effects – substantial novelties in economic analysis as well as in the definition of the (potential) role of the state. Since then, the world has changed much – as has the world economy – however, the debate between the different approaches (schools) has remained.

In the 21st century to date, two major events have added new input to this debate – the 2008 world financial and economic crisis and, more than a decade later, the COVID-19 pandemic.[2] In this study, the author discusses the effects of these two events on government finances in European Union (EU) member states and on the finances of the EU. In both cases, the public finances of EU member states have shown a considerable expansion that may (at least partially) also persist in the long run. In terms of EU finances, there have been some structural changes as a reaction to the 2008 crisis, however the pandemic caused a big leap ahead – the historic decision to pursue joint borrowing of the member states. The study ends with concluding remarks related to potential future developments relating to the role of the state in the EU.

2 The effects of the crises on public spending in EU member states

The 2008 world financial crisis and the COVID-19 pandemic marked substantial breaking points in the economic development of most countries in the world. Though for different reasons (and also following a different pattern in the two cases), economic activity has relented and the decline in GDP has caused deep economic and resulting social problems. These effects could be identified (even if not exactly quantified) from the beginning of the crises, therefore the reaction of the state was a logical step, particularly as it was clearly expected by the public.

[1] The development of the role of public finance has been a very complex process, however, due to space limitations, this paper is not able to cover this area in detail. A compact but thorough analysis (Tanzi, 2008) presents the main elements of this development during the 20th century, also outlining scenarios (with related key issues) for the future.
[2] Currently, it is impossible to estimate the effects of the war launched by Russia on 24 February 2022 in Ukraine in this respect. However, it is very likely that it will have an effect on public spending (as a result of potentially higher defence expenditure in many countries).

Figure 1 illustrates the share of government spending in GDP in the European Union from 1997 to 2020. While the bars present averages, the trends are clear: the consequences of the 2008 world financial and economic crisis, as well as those of the COVID-19 pandemic, are reflected in an increase in the share of government spending. In both cases, a relatively long downward trend has been interrupted. For the first crisis, a decrease of the share after the shock can be seen, while for the second, it is not possible to be certain about future trends (the event is still very recent and its effects are still being felt). It must be noted that in March 2022, the consequences of the war launched by Russia in Ukraine may add a new factor of uncertainty, leading to, among others, a further potential increase of the share of government spending in GDP.

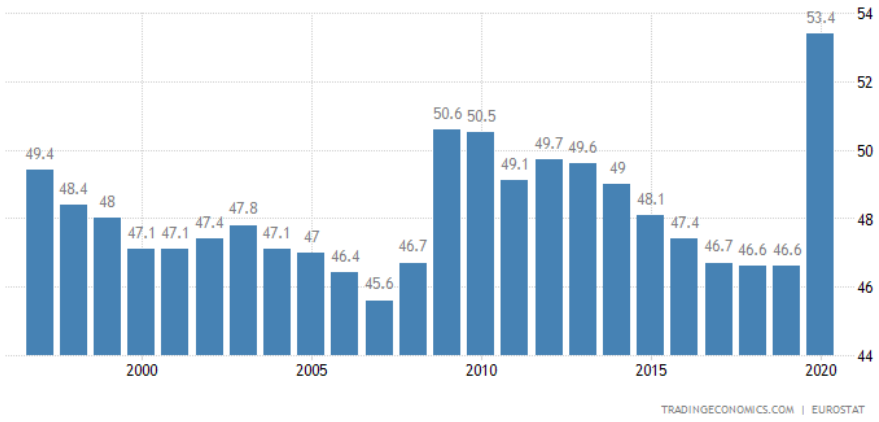

Figure 1: The share of government spending in GDP in the EU, 1997-2020 (%)
Source: https://tradingeconomics.com/european-union/government-spending-to-gdp

The effects of both crises on government finances can also be clearly seen in the increase in the share of public deficits. Figure 2 illustrates the development of the government deficit/GDP ratio between 1997 and 2020. Extremely high values of deficit can be seen in 2009 and 2010 (when the effects of the 2008 crisis had to be handled) and in 2020 when measures had to be taken to deal with the COVID-19 shock. In both cases, the need for extra finances arose at a time when GDP had contracted, meaning that there was no growth that could have created additional financial resources – in fact, it was the complete opposite.

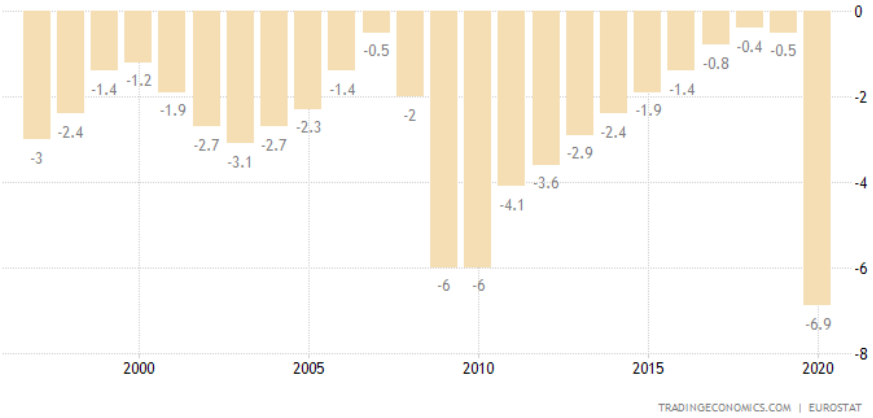

Figure 2: The share of government deficit in GDP in the EU, 1997-2020 (%)
Source: https://tradingeconomics.com/european-union/government-budget

It is important to emphasise that Figure 2 (as well as the other Figures in this paper) show averages in the EU. Beyond the averages, there are considerable differences between the developments of the indicators of the individual member states. These differences are most striking in the case of government deficit and its share in GDP. In the case of the 2008 world financial and economic crisis (and the Eurozone crisis that followed – see Scheinert, 2016 for links between the 2008 crisis and the Eurozone crisis), Ireland was the extreme case, with a 32.1% ratio in 2010 (following an already extremely high 13.9% ratio in 2009), as a result of the spending necessary to stabilise the banking system.[3] Greece was another specific case, and there have been many member states that have shown more or less important deviations from the trend shown by the development of the average value.

The need for an increased role of the state – in partly different fields during the different crises – together with a decline in economic performance during the crises has logically resulted in increasing public debt. Figure 3 shows the development of government debt in the EU between 2000 and 2020. The long-lasting effects of the 2008 world financial and economic crisis are evident: after stabilisation of the public debt/GDP ratios in the 1990s and maintaining the ratio at a manageable level (also

[3] The government spending/GDP ratio in Ireland was 65.1% in 2010. The Irish case is also interesting because the country had a relatively low (30-35%) government spending/GDP ratio prior to 2008 and its values changed to even lower levels (below 30%) after the costly but successful management of consolidation of the financial sector (all data in the text and the footnotes are Eurostat data via tradingeconomics.com).

to be in line with the related Maastricht criterion), the financing of the needs of the crisis led to substantially higher debt/GDP ratios (for a detailed analysis, see Szczepanski, 2019).

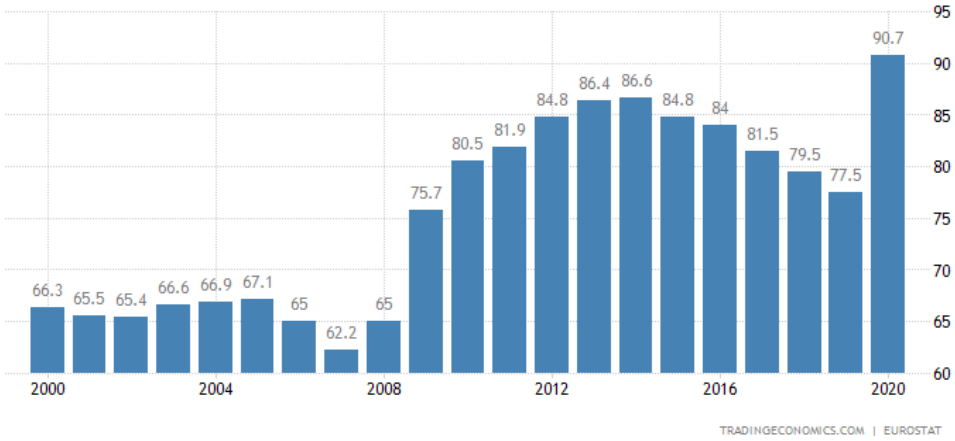

Figure 3: The share of government debt in GDP in the EU, 2000-2020 (%)
Source: https://tradingeconomics.com/european-union/government-debt-to-gdp

It is important to note that after the shock of the 2008 world financial and economic crisis (as well as the Eurozone crisis), while the increasing trend of the ratio reverted after 2014, the values did not return to the levels experienced before 2009. While in 2008, the EU average government debt/GDP ratio was 65%, in 2019 (the year before COVID-19), it was 77.5 %. It is from this 'increased basis' that the value increased abruptly in 2020 as a result of the pandemic and the measures taken (and financed) by the states.

3 Effects on the EU budget

Both crises have had an effect on EU-level public spending.[4] As for the 2014-2020 multiannual financial framework (MFF), strengthening the competitiveness of the European Economy has been a central element from the outset of its planning (European Commission, 2011). Competitiveness was not a new element at that time,

[4] The EU budget differs in many ways from national budgets. It has far more limited resources; its resources are different form the ones that are available for national budgets. Regarding spending, the EU budget is aimed at contributing to the realisation of selected EU policies. The changes described in the paper have to be judged bearing these limitations in mind.

as it had already gained an important place in the 2007-2013 MFF, which meant a change in the focus of managing traditional common policies and enlargement in the previous (2000-2006) period. The new component in the 2014-2020 MFF was that it also tried to react to the experiences of the crises (the world financial and economic crisis and the Eurozone crisis). Of course, this was only possible to a very limited extent as a result of the limited size of the EU budget. As has been demonstrated, public finances in the member states expanded in this period; from the EU side, it is the framework (the regulatory setup of the Economic and Monetary Union, the deepening of the content of economic policy coordination) that has reacted the most tangibly. While such changes have also shown signs in the EU budget, without extra financing, these changes remain more demonstrative than decisive.

In the case of the COVID-19 pandemic, the crisis hit in the middle of the planning process of the 2021-2027 MFF. The initial proposal of the European Commission (European Commission, 2018) contained several reform elements, however, of course, it was not able to foresee the additional huge task that arrived with the pandemic. Therefore, a specific arrangement was needed, which was agreed upon by the leaders of the member states in July 2020 (European Council, 2020). This agreement – including the Next Generation EU instrument – formed part of the final agreement on EU finances for the 2021-2027 period, agreed upon in December 2020 (Council of the European Union, 2020).

The Next Generation EU instrument (a EUR 750 billion (2018 prices) package of external financing of loans and expenditure)) includes an important novelty: long-term joint borrowing of the member states. Joint borrowing was inconceivable in the past, while 'long-term' really is long: repayment is due by the end of 2058 at the latest. (European Council, 2020).

As can be seen, both the member states and the EU have reacted to both crises. In the second of the two, the EU's reaction is also incorporated in finances (unlike in the first one). While this may have an importance for the future of EU financing and of the integration itself (will the EU develop towards fiscal federalism, or, more generally, towards federalism?), due to the amounts at stake, changes in member state budgets can bring far deeper changes.

4 Concluding remarks

The changes discussed above can have substantial effects on the economies of EU member states and the EU itself. Recent trends suggest an increasing role of public action, both in the member states and at the level of their integration.

With an increasing role of public finances, several questions arise:

- How will these potentially larger public finances be used? What will be the main areas at the member state level? Will we see new common policies emerging at the EU level?

- Will the stability criteria rules of the Economic and Monetary Union (EMU) change, and if so, how? How will eventual changes influence the future of the EMU?

- How will the eventual changes in the role of public finances influence the competitiveness of the EU and its member states – depending, of course, on changes in other countries and areas of the world?

- Will the EU develop towards a federation (as a result of – not only – a potentially larger EU budget and potential new forms of joint financing efforts)?

The above questions are of key importance and are currently open, hence it is impossible to answer them with certainty. The history of the European integration process, however, gives ground to certain optimism: it has always been that case that in critical situations, the integration has been able to produce something new that was able to further the integration from a previous deadlock. Today, Europe is facing unprecedented challenges, however, if history repeats, then it will be able to overcome these challenges and become stronger than before.

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REGULATION OF THE DIGITAL MARKET IN POST-COVID TIMES

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Abstract During the COVID-19 pandemic, the importance of e-business and the digital economy came to the fore. It is certain that the growth of the digital economy will continue in post-COVID times. This raises many questions and challenges, one of which is especially important – the tendency of monopolisation in the digital market and possible regulation related to it. In this paper, the authors have dealt with this topic by presenting it as paradox: digital giants or 'Big Tech', created as start-ups on the waves of a competitive market of equal opportunities, have grown with the general support of consumers because their platforms offer connectivity and a more comfortable and interesting life full of creativity. In the meantime, they have become unstoppable monopolists making users/consumers dependent and subordinate with their privacy endangered. In the paper, the authors reveal the reasons for the monopolisation of the digital market as well as related problems faced by regulators. In addition, they analysed some of the approaches that individual countries are trying to apply, and suggest a possible scenario for how to reach quality and stable solutions for regulation at the global level.

Keywords:
digital market,
digital platforms,
management of data,
COVID-19,
e-business

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1 Introduction

Paradox: *Digital giants, or 'Big Tech', created as start-ups on the waves of a competitive market of equal opportunities, have grown with the general support of consumers because their platforms offer connectivity and a more comfortable and interesting life full of creativity. In the meantime, they have become unstoppable monopolists making users/consumers dependent and subordinate with their privacy endangered.*

The key question: *Why does the digital market tend towards monopolisation and how can the regulatory authorities successfully prevail upon digital giants?*

Digital giants tend to be **monopolies**. They **have** become too big and their desire **for profit** and their size jeopardises the normal functioning of the market. Is there a limit and can the market explode? These companies are **more powerful** than the state and institutions. For the first time in the history of human civilization, there are now companies whose market capitalisation is more than USD 1,000 billion (Amazon and Apple). Therefore, there are two points to consider: 1) these companies continue to grow; thus, during the time of the COVID-19 crisis, they continued to record growth. Some of them recorded even higher growth than they had prior to the pandemic; 2) these companies have achieved success and their position in just a few years. **What does economic science say and does it offer any answers?**

By dealing with the two dimensions of this paradox, the authors of this study tried to examine what kind of answers are offered by economics and whether they are adequate. They begin by analysing how participants behave in the digital market and why it is prone to monopolisation, and how and why digital giants are spreading uncontrollably. The authors then elaborate and discuss the dominant problems in regulation, and in the guidelines and recommendations section, make suggestions on what to supplement and how in terms of competitiveness and consumer protection.

2 Why does the digital market tend towards monopolisation?

The digital market has the resources to be an ideal market, at least in the sense that it was envisioned in the assumptions in the traditional analysis. Unfortunately, this is not the case in practice. Paradoxically, the companies that were supposed to make the world a better place by means of all the benefits they were to bring, are starting to seriously threaten the market, so accusations are being made that their power is causing damage, and there are an increasing number of warnings to this effect. These companies are markets in themselves, because they are infrastructure providers – platforms for the digital economy, and at the same time they are sellers in those markets. Many of their services are free of charge. At the same time, the estimate that digital giants will increase their power by up to three-fold in the next 10 years (Economist, 2018) gives rise to additional concerns. The network produces its effect, size creates size. As previously emphasised, divisible digital products and the economics of their creation, distribution and consumption impose a different nature of the market, where the relationship between supply and demand is no longer important and the price policy does not arise from that relationship. In this sense, Mason (2015) especially emphasises Romer's (1990) position, confirming that as soon as the economy begins to consist of divisible IT goods, imperfect competition becomes the norm and the IT market does not strive for perfect competition but rather monopolisation, **in which monopolies are not just smart tactics to increase profits: this is the only way the industry can function**.

There is no doubt that the DE has completely reset the theory of competition. Cost and optimisation in production costs are not a significant factor of competitiveness in the 'economy of free things', as the DE is often called. Although the internet is expected to bring positive trends in terms of competitiveness – it expands the size of the market and improves the position of products compared to standard substitutes – most trends are negative according to Wang and Zang (2015). These findings suggest that, instead of increasing industry competitiveness, use of the internet results in less competitive industry structures. So, instead of competition, the internet creates a system of winning companies. The 'winner-takes-all' theory implies that the internet helps the big companies to take everything to the detriment of small and weaker competitors, and this leads to a less competitive market. In the initial phase of using the internet, the competition can be fierce with a large number

of participants, but later several large ones, or only one, crystallise and the market space for others narrows dramatically.

Shapiro and Varian (1999) singled out factors – recommendations that generate competitive strength in the digital market. They emphasise that there is a sense that the world is getting smaller and that new technologies are expanding dramatically. Entrepreneurs capable of attracting an unprecedented amount of business are building huge empires; governments are urging and appealing for these new monopolists to be held accountable under antitrust laws. In order to survive in such an environment, they recommend several principles that would apply in the long run. In essence, they advise that the economic benefits of the system of closed technologies (lock-in) should be exhausted, i.e. the building of such a powerful and technologically complete product that it does not pay for customers to switch to competitors. Additionally, standards should be created and efforts should be made to make them global, while at the same time protecting intellectual property rights. Shapiro and Varian advise that competitors should be perceived as partners/collaborators on open-platform projects, but at the same time they should be innovative and fast to make changes, thereby promoting network externalities, i.e. expand into neighbouring markets if users gain additional benefits from doing so.

Although these principles were known to some extent earlier in competition theory, they gained their enormous power in the digital environment in the form of elaborated and complementary strategies to which the successful adhered. The behaviour of the digital giants and the strategies they apply show that even in the almost 20 years since these golden rules of Shapiro and Varian were formulated, not much has changed. It can be said that these recommendations were in fact instructions for acquiring and maintaining a monopoly.

What do all digital giants have in common? Following the history of the development and business activity of digital giants: Google, Amazon, Apple, FB, Microsoft and Alibaba, it can be seen that they strictly adhered to the recommendations given to them by Shapiro and Varian back in 1999. These companies ***were created as start-ups***. Additionally, in almost every case, it is stated that a garage was an incubator for the development of a business idea. Although it was not always the case, the statement "We started in a garage" became a cult

expression of the 'business romanticism' of the modern age. ***The role and proximity of universities*** is an indispensable part of these success stories. The companies ***had their ups and downs***, and almost by definition were offered up for sale after their initial success. The ***vision, perseverance and initiative*** of the founders and owners gave them special strength and guaranteed long-term growth. Almost all of them, after the affirmation and market expansion of capital ideas and solutions, had ***a phase of expansion through upgrading, inclusion of similar services, products and solutions.*** When they succeed and become big, ***they strive for a monopoly, they buy up potential competition, other start-ups***, all ideas, initiatives and businesses that aspire to success (car production, retail, food, entertainment, etc.) (Lazović & Djuričković, 2018).

Similar stories are recorded by eBay, Netflix, and others. The fact that these companies are growing uncontrollably, according to the 'winner-takes-all' principle becomes a danger to the market structure and competition rules, not only in the sphere of the DE. How can companies – winners who take everything – be prevented from monopolising the market, especially if consumers are satisfied? To make a final judgment and obtain a possible answer, a few more observations on this topic will be helpful.

1. The aggressive strategy of these companies in terms of purchasing start-up solutions is very noticeable. They do this for two reasons: a) to expand and increase their business and power; and b) to prevent future competition, i.e. to save themselves from so-called disruptive innovation. What is alarming is that by buying all the small companies, successful, digital giants are stopping Schumpeter's 'creative destruction'. This is only valid at a low level; large companies deal with the problem of disruptive technology. Given their size and power, no one can creatively destroy large companies. Except, perhaps, themselves?

2. The question for discussion is: where is the limit and can this bubble burst, as happened with the dot.com bubble in 1999? It is sufficient for only one of the giants to give up and everyone will fall, because the belief is more in the business pattern itself than in the company. And what is a company here but a business pattern? Can this business pattern survive then, or rather will it be allowed to survive? The business pattern coded by Shapiro and Varian in 1999, which was explained earlier in this study, proved insufficient despite the success its application provided to the

digital giants. The practice and challenges of online business also required new flexible strategies on a daily basis.

Nevertheless, there is a real danger that digital monopolies will collapse, because their growth and expansion – based on the neoliberal model – must have their limits (Foroohar, 2019). Have they overdone their expansion and power? Yes, they have! However, their possible collapse is not a matter for rejoice because, given their size, the bankruptcies would cause tsunamis on the global economic scene. Due to the specificity of the product (or service), the old mechanisms of regulation and protection of competitiveness cannot be effective. The alarm bells are already sounding.

3. Contrary to what was expected, as previously stated in the paradox, these companies are becoming BAADD, which means: Big, Anti-competitive, Addictive, and Destructive to Democracy. Their size and impact are becoming a problem for the functioning of the market (Smith, 2018).

3 How to introduce regulation of digital giants – will (and can) the 'empire strike back'?

With the growth in the DE, the regulation of the digital market is becoming an increasingly open and complex issue from year to year. The issue particularly escalated in 2018 and 2019 through the opening of a whole series of disputes both at state and global levels, with many unknowns present.

In the function of elaborating this paradox, below the authors have opened up a discussion, introducing problems in the regulation of the digital market (especially giants/digital platforms), and conclude by describing possible solutions and a set of recommendations. The authors turned to reference papers on this topic – EU regulation and individual country regulations (the USA, the UK, France, and Germany) – as well as analyses of five current reports, on which the authors focus in addressing the main issues of future policy in this area (Gunnar, 2019).

Frequent attempts have been made to reduce the issue of digital market regulation in terms of the problems of the prevention of new acquisitions, data transferability and interoperability. However, as previously mentioned, there is a much broader range of challenges and issues related to this topic. In this study, the authors conditionally and roughly grouped these challenges and issue into four categories, as follows: 1. Relevant market (concept and boundaries), concentration and assessment of the market power of companies; 2. Access to and management of data as a key market resource; 3. The (mis)use of technology to the detriment of competitiveness; and 4. The status, position and influence of regulators.

Although the topics and answers to these questions are intertwined due to their complexity, in order to point out the essence, the authors have conditionally differentiated them in this analysis.

3.1 The relevant market (concept and boundaries) and the concentration and assessment of the market power of companies

The problem of determining the relevant market stems from the fact that digital platforms are intertwined, interconnected, multi-layered markets that change rapidly with powerful network effects. Therefore, it is **complicated to define** the market and analyse market power, which means that it is quite difficult to determine the intervention thresholds and the right policy to prevent anti-competitive behaviour. Another problem is that the main platforms are **constantly revising the boundaries** of their activities and trying to enter related areas. Rapid platform mutation and the multiplication of platforms by major operators reduce the validity of the static platform typology and require the combined effects of different platforms to be taken into account (Strowel & Wergote, 2018).

In this context, it is necessary to bear in mind that digital companies maintain their powerful platforms, services and applications as technologies that are closed to others, and although they allow entry, it is under the condition that their competitiveness cannot be questioned. In this context, the expression of interaction between markets is important for the regulation of monopolies (Coyle, 2017). One of the main concerns is that the characteristics of digital markets mean that major players enjoy **lasting market power** (Gunnar, 2019) because they exhibit strong

network effects, provide users with free services and mediation, and rely on big data as a key raw material to supply their algorithms.

Thus, formal evidence that a firm has market power based on traditional instruments for defining the relevant market is disputable in the context of digital services from a practical and an economic point of view, … even attempts to modify and supplement some standard models require huge amounts of data, which is often unfeasible. Traditional market power assessment mechanisms, such as market shares, often do not provide sufficient evidence in digital markets because they are characterised by strong tendencies towards concentration due to direct and indirect network effects (Krämer & Wohlfarth, 2018).

How, then, can market power be estimated in the new conditions, so that its abuse can be assessed on that basis and so that it is possible to assess which economic theory to apply in the damage assessment. Practice shows that regulators very often lose disputes precisely because they cannot substantiate all accusations, because this issue is very demanding and complex[1]. Competitiveness and consumer protection should be the essence of digital market regulation policy, i.e. the two main dilemmas that regulators need to check are: 1) Is competitiveness threatened by expansion and enormous growth (right of equal opportunities)? and 2) Is harm done to the consumer?

Regulatory practice shows that when protecting competitiveness (in the case of a merger go-ahead), it is better to rely on the assessment of the value rather than on the revenues of the companies being acquired. Additionally, in some cases, regulators rely on the doctrine of potential competitiveness, i.e. an assessment of the effects of competitiveness over a period of at least five years. Experiences are different and vary from country to country and from regulator to regulator. Regardless of which strategy has been applied, these strategies have proved to be useful, albeit also incomplete and vague.

How do regulators protect consumers and how is consumer benefit measured – is it only through price, quality, and choice, or there are additional mechanisms?

[1] Example of the German Federal Cartel Office vs. Facebook lawsuit, February 2019, which the German Court of Appeal rejected as unfounded (Lomas, 2019).

All of this requires the **power and speed of data accumulation on network platforms** to be better taken into account. Strowel and Vergote (2018) point out that competition authorities still neglect the market power of companies that collect data in exchange for free services or that earn huge revenues from one side of the market (e.g. from advertisers) to subsidise users' free access to online content on the other side of the market.

The previous elaboration shows us that concentration assessments in the digital market require new tools, analyses, mechanisms and instruments of regulation. Economics is expected to offer (as quickly as possible) adequate answers to these challenges.

3.2 Access and management of data as a key resource of the digital market

As previously stated, the market power and strength of the network consist of user data that enable the personalisation of offers and targeted marketing. Users are bound by the data and depend on the companies/bidders, and the 'ownership of this data' (or the right to manage it) also leads these companies into anti-competitive waters. Have these companies really permanently 'captured the market'? The solution is seemingly simple – they need to be forced to share data with competitors, while users must be able to transfer their data to others. This is a fundamental issue of ensuring competitiveness through a level playing field for new entrants to digital markets. Their successful entry according to this formula implies that the new manufacturer immediately has access to user data created by the dominant manufacturer/platform on the market. Is this feasible, and how can the conditions for this be provided?

The quality of the solution/ideas (products and services) is no guarantee of safe entry and success, because there are two limitations: 1) The big companies have already covered everything, so even if someone dares to enter the market, the question is how to return high investments (fixed investments) because all the profits have already been squeezed out of consumers, and the price to be offered for products and services must be zero for it to be competitive; 2) a company that dominates the market and that has already collected data is reluctant to share it with others. The question is: who owns the data? If it is the users, then they should have

some compensation because their data can be used, but their bargaining power as individuals is weak (Coyle, 2017).

The possession of personal and commercial data is a major force in the digital marketplace, and the basic issue of competitiveness is how to enable others to use this and under which conditions to allow data migration and mobility when users choose to switch to another platform.

Within the EU, there has been an active policy on this issue for a long time. However, everything has to be done much faster. Strowel and Vergote (2018) conclude that it is important for the European authorities to intervene before too many different provisions on access or data protection are enacted at the national level, which makes it even more difficult to move around this complex field. In addition, it seems vital that the European Commission should establish a steering committee to monitor competition and possibly different initiatives around which very different data problems arise (occurring in the areas of privacy, intellectual property, competition, telecommunications, international trade, etc.), which are dealt with by various authorities and directorates-general within the European Commission (the DGs for growth, competition, integration, trade, etc.).

3.3 The (mis)use of technologies – network effects – to the detriment of competition

Thanks to innovations and technological solutions, participants in the digital market frequently come up with improved business patterns, which ultimately result in anti-competitive behaviour. The authors of this study have listed some of these cases as problems with which regulators deal. Although aware that there are, and will be, many more problems, below are just a few of them to highlight the problems of regulation of this phenomenon as well as the fact that due to their diversity, a single regulation matrix cannot be defined.

Self-preferencing is a model that emerged based on the philosophy of preferred technologies now in the context of a platform vertically tied to preferred users and all to the detriment of third parties using the same on the platform. In this case, regulators deal with the big problem of how to prove a potential exclusion.

Increased competition through partner platforms. By connecting and global cooperation, these platforms close the space for local competition, except for their partners, which also distorts equal market competition (Strowel & Vergote, 2018). Regulators, albeit with a delay, subsequently notice a whole set of abuses/restrictions that can only happen online.

3.4 Status and positioning of regulators

The issue of the status and positioning of regulators focuses on dilemmas such as: should there be regulators at the national or international/global level, and should they be special bodies only in charge of regulating the digital market? The search for the best solution is mainly determined by two dimensions of conflicting interests. The first dimension of the conflict is in the relationship between creativity/innovativeness and bureaucracy (digital platform vs. the regulator). It is quite clear why the second always follows late after the first, which is testified to in terms of the damages incurred. The second dimension is the conflict between the political/economic concept, liberalism, i.e. globalisation on the one hand and interventionism and protectionism on the other (global platforms vs. national regulatory bodies).

Unique institutional solutions in terms of harmonised regulation within countries and at the global level have not yet been crystallised. For now, the dominant regulation is at the level of country states or part of economic associations (the EU). Different approaches at the state level may result in the risk of having different judgments in relation to the same dispute with digital giants (global platforms), even in neighbouring countries.

Additionally, regardless of the specifics that the DE brings on its own, the dominant solutions are still for the bodies in charge of regulating the traditional market to also be responsible for the digital market. Practice shows that these solutions are not sufficient to meet this challenge.

In the institutional/normative context, the question of the efficiency of regulatory timing deserves special attention – whether it is more purposeful to act ex-ante or ex-post. This topic seems particularly interesting because premature regulation could hamper innovation and prevent the development and implementation of solutions of general benefit.

4 Guidelines and recommendations

Using the previous analysis and discussion, relevant papers on this topic and the solutions offered by expert teams from individual countries, the authors have proposed guidelines for the key directions of the transformation and reorganisation of regulatory policy at the national and global levels.

a) The relevant market, market power and concentration – due to the specifics of the network marketing, defining the relevant market in the DE is a complex requirement and ultimately results in an unreliable regulatory framework. Therefore, the dominant focus should be on determining market power, with the relevant instrument showing estimates of: a) whether the currently dominant firm can establish and make available **a superior database** in the medium and long term (Krämer & Wohlfarth, 2018); and b) the value, market dispersiveness, and the consumer's/ user's benefit from business expansion or a company merger.

The author are also of the opinion that one significant step forward in quality regulation in procedural terms is the introduction of interim measures to prevent damage to competition during the settlement and the seeking of a solution to antitrust investigations, as well as **changes in the standards for appeals** (Furman, 2019) because otherwise, as practice shows, many things can lead to absurdities.

b) Access and data management as a key resource in the digital marketplace – the main guidelines of regulatory policy in this segment should read: 'The user is the owner of their data and all their network interactions, and they are able to transfer, dispose of and trade using them.'

There is already expert agreement on the assessment that data mobility and interoperability are the main tools for combating the dominance of digital platforms. Dominant platforms must be required to enable users to transfer and use their data in real time and in an interoperable data format and to ensure interoperability with complementary services. (Gunnar, 2019; Furman, 2019; Stigler Center for the Study of the Economy and the State, 2019).

c) **Technology preferences and abuse** – the easiest way to solve the problem of self-preference seems to be by putting the burden of proof on the side of the operators/digital platforms, because it is difficult for the existing regulatory framework, which is conservative in nature, to track possible abuse based on variations in innovation that arise from the nature of the business pattern of digital platforms. Therefore, the authors believe that it is best to focus on the solution whereby the person who is responsible must bear the burden of proof in order to show that their actions are competitive (Gunnar, 2019).

d) **Status and positioning of the regulator** – all analyses and experiences show that it is necessary to move towards the establishment of special bodies for the regulation of the digital market. This approach has already been affirmed in a number of countries (in the United Kingdom the government supported the proposal of Furman's report (Furman, 2019) on the creation of the new DMU – 'digital markets unit', while in France a special unit for digital market regulation is in the process of being established, and in the US, Stigler's report (Stigler Center for the Study of the Economy and the State, 2019) suggests the need to form a special agency specifically tasked with regulating the digital market).

The authors of this study believe that the wider implementation of this approach should also result in the formation of a body – a global alliance – that would regulate strategic platforms (digital giants) at a global level.

The very nature of the problem of digital giant regulation opens up a huge space for a great deal of new research. The authors thus recommend two directions for such research:

1. The identification and functional analysis of normative, institutional and ethical control mechanisms in the monitoring of strategic platforms, which are involved in the development of regulatory rules, so that this exclusivity is not misused in their favour.

2. Testing the purposefulness and justification of the idea (the social benefits or risks arising from it) that, instead of general competition laws, special laws should be adopted that would refer exclusively to competition in the digital market, as well as the idea that different types of digital platforms should be treated differently in terms of regulation.

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The Contribution of Social Media on the Post-pandemic Recovery of Aviation and Tourism

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Abstract After almost two years of the global pandemic, it is time to understand how the aviation and tourism sectors are recovering. The context of this post-pandemic period could result in being one of the most complex scenarios in terms of attracting customers, hence it is a huge challenge. Therefore, the authors of this paper seek to discover whether the internet can help business to return to normal, and, if so, how social media can have an influence. The aim of this paper is thus to study whether – and if so, how – airlines are using social media to engage with customers to promote tourism. The methodologies used are a content analysis of Facebook and Instagram over a period of six months together with analyses of the posts. Only airlines that engaged with these two types of social media were considered in the study. Additionally, the authors analysed the monthly traffic reports during the same period to check the eventual influence of social media. In addition, the authors made a comparison between the post results and the air traffic evolution in order to understand whether there are any relationships between them

Keywords:
tourism,
aviation,
communication,
social media,
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1 Introduction

In December 2019 the first cases of coronavirus (COVID-19) in humans were reported in China. On 11 March 2020, the World Health Organization (WHO) declared that the world was facing a global pandemic, with more than 1,301,021 reported as having died from COVID-19 and more than 53,281,350 reported cases in more than 219 countries throughout the world (Giantari *et al*, 2022). Various restrictions were implemented to try to minimise the impact of the pandemic. The aviation and tourism sectors were particularly affected. In fact, according to a report published in June 2020 by the International Air Transport Association (IATA), 32 million jobs supported by aviation, which includes tourism, were at risk. In the report, it is clear that airlines had negative income and 2020 was considered the worst year in airline history. It is therefore important to understand whether airline companies are using social media to promote business to recover from the pandemic, in particular by considering the Portuguese context, namely Lisbon Airport.

In terms of organisation, this paper contains a literature review introducing a brief overview of COVID-19 in order to conceptualise what was happening worldwide. Some literature on social media, mostly its use during the pandemic, is also included. The authors also illustrate some literature review in relation to social media in the context of aviation and tourism.

The paper continues with an explanation of the methodology, followed by the main results and conclusions, the limitation of the research, and suggestions for future research.

2 LITERATURE REVIEW

2.1 The Portuguese COVID-19 context and social media

Statically speaking, the use of the internet and social media increased during the pandemic, most likely due to people working at home. In fact, according to Datareportal statistics, at the beginning of 2022, 85% of the Portuguese population had access to the internet, which represents an increase of 2.9% compared to 2021. The figure for 2022 indicates that today 83.7% of the population of Portugal use

social media, which is 9% more than in 2021. In 2020, 69% of the country's population were social media users.

COVID-19 can be considered as a crisis. During a crisis, social media can help in various ways. Social media can be used as a communication tool but can also be a way to collect information about the public (Arora et al, 2022).

2.2 The role of social media in aviation and tourism in times of crises

According to Pasquinelli et al. (2022), post-pandemic city branding must consider and intensify communication, mostly about brand values. This communication also implies social media. In the tourism sector, Li et al. (2022) proved that during a public health crisis, social media is an important tool in creating positive consumer emotions. Chung et al. (2020) reinforce that using big data collected from social media can be important in the context of crisis management.

Videos on social media are important in helping to sustain relationships between tourists and places and to create destination branding (Moin et al., 2020; Kim & Youn, 2017; Lund et al., 2020; Alegro & Turnsek, 2020; Li & Liu, 2020).

The concept of engagement is also important in the context of social media. This was researched by Dijkmans et al. (2015), who defined engagement as a certain familiarity and relationship between customers and companies' social media activities during a certain period, which implies emotion and expression of interest in some way – whether online or through interaction and/or participation. Airlines must view social media as a way of potentially attracting passengers as well as a way of advertising. In addition, social media can be used to minimise damages in a crisis context through effective online relationship management with users (Bartos & Badánik, 2019).

Tussyadiah (2016) found that tourists who use technology are more open to recommendations and are more influenced during the decision-making process, thus making them an effective marketing audience to consider. This suggests that tourism product managers should focus their efforts on the online environment.

When there are online comments, Liang and Li (2019) argue that companies should respond to them. However, their study proved that tourists who receive a response have high expectations in terms of the content of the response. Managers must therefore be aware of the importance of improving the quality of their answers, which must be informative and personalised rather than standard answers which, as a rule, are the same for all customers.

3 Methodology

In terms of methodology, a mixed approach was taken – a quantitative approach with a post count and a qualitative approach with an analysis of Facebook and Instagram content over a six-month period from May to October 2021. This timeline allows the analysis of summer data, as this is usually the busiest time of the year for tourism and aviation, and the authors of this paper have access to traffic reports from these months. The authors began by making a selective and balanced triage, in which – considering all the airlines operating in Lisbon (the major airport in Portugal) – they excluded those that do not have at least one of the types of social media under consideration. Thereafter, only those airlines were considered that have a minimum of 100 posts on the two types of social media considered during the timeline for the content analysis. The authors finally cross-checked the data with traffic reports to understand if there was a relationship between the online behaviour and the results in a post-pandemic environment.

4 Results

The authors initially identified 45 airlines, however, only 31 of them use Facebook and Instagram. After the Facebook post count, five airlines were excluded from the sample because they only posted one or twice (or not all all) during the considered period or because they used a foreign language in addition to English or Portuguese. Thereafter, the authors did a count of the Instagram posts of the remaining 26 airlines, in which it was found that one of them had not posted since 2015 and another posts in a foreign language. This, therefore, left 24 airlines for the final sample. As can be seen in the results of the final count in Table 1, some of the airlines did not have a considerable number of online posts. Therefore, for the content analysis, the authors only considered those airlines with a minimum of 100

post on both forms of social media. The 13 airlines considered for this analysis are underlined in blue in Table 1.

From the 13 airline companies, the authors counted the posts directely related to the pandemic, considering terms such as: 'EU COVID Digital Certificate', 'COVID-19', 'pandemic', 'safe/safety', 'PCR-test', 'vaccination', 'isolation/lockdown', 'travel health regulation/rules', 'hygiene', 'prevention', 'opening again/frontiers/reopening', 'reunite/reunion', 'restarting', 'social distancing', 'quarantine', 'virus', 'restrictions', 'coronavirus', 'masks' and 'freedom'. The results can be seen in Table 2.

Table 1: Post count (Authors' own elaboration)

Considered Months: may to ocotber, 2021								
Airline Company	*Facebook*				*Instagram*			
	Followers	Total posts	Videos	Videos %	Followers	Total posts	Videos	Videos %
Aegean Airlines	726	39	8	20.5	122,000	35	7	20.0
Air Baltic Corp.	439	195	87	44.6	85,900	114	19	16.7
Air Europa	674	105	27	25.7	247,000	127	32	25.2
Air Hamburg	5,266	103	0	0.0	6,901	85	0	0.0
Azores Airlines	132	224	65	29.0	25,500	118	30	25.4
Azul Linhas Aereas	4.049,633	108	36	33.3	976,000	153	38	24.8
Blue Air	584	302	6	2.0	39,800	165	4	2.4
British Airways	3.319,303	114	32	28.1	1.100,000	119	34	28.6
Brussels Airlines	454	42	13	31.0	104,000	30	3	10.0
Emirates	11.048,832	153	52	34.0	6.000,000	142	45	31.7
Euro Atlantic	10,575	39	2	5.1	2,934	32	0	0.0
Eurowings	979,182	124	20	16.1	323,000	119	12	10.1
HI FLY	20,724	23	2	8.7	27,900	22	3	13.6
Iberia	1.864,558	120	34	28.3	536,000	63	24	38.1
Lufthansa	3.947,512	145	31	21.4	1.400,000	116	36	31.0
Luxair	113,463	117	12	10.3	32,200	54	2	3.7
Ryanair	5.101,530	369	43	11.7	817,000	337	71	21.1
Star Air	18,802	119	4	3.4	16,200	116	2	1.7
TAAG	18,900	14	3	21.4	29,100	35	2	5.7
TAP Portugal	1.430,420	90	14	15.6	563,000	73	12	16.4
Turkish Airlines	10.712,642	143	110	76.9	1.900,000	105	86	81.9
VistaJet	37,328	120	17	14.2	84,700	73	15	20.5
vueling	1.265,549	70	35	50.0	213,000	99	30	30.3
Wizz Air	3.369,008	300	21	7.0	428,000	282	10	3.5

Table 2: Count of COVID-19-related posts (Authors' own elaboration)

Airline Company	*Facebook*			*Instagram*		
	Total posts	Posts COVID -19 related	%	Total posts	Posts COVID -19 related	%
Air Baltic Corp.	195	**14**	7.2	114	**4**	3.5
Air Europa	105	**11**	10.5	127	**3**	2.4
Azores Airlines	224	**10**	4.5	118	**5**	4.2
Azul Linhas Aereas	108	**28**	25.9	153	**32**	20.9
Blue Air	302	**20**	6.6	165	**8**	4.8
British Airways	114	**27**	23.7	119	**21**	17.6
Emirates	153	**28**	18.3	142	**23**	16.2
Eurowings	124	**20**	16.1	119	**9**	7.6
Lufthansa	145	**22**	15.2	116	**13**	11.2
Ryanair	369	**19**	5.1	337	**16**	4.7
Star Air	119	**13**	10.9	116	**8**	6.9
Turkish Airlines	143	**14**	9.8	105	**6**	5.7
Wizz Air	300	**13**	4.3	282	**10**	3.5
		Media	**12.2**		**Media**	**8.4**

5 Conclusion

By analysing the results, the authors conclude that all the companies considered publish less on Instagram than on Facebook and also have less Instagram than Facebook followers. This leads to the conclusion that Instagram is perhaps underused given the growing number of users.

In terms of the content analysis, taking in account the type of publication, it can also be concluded that the percentage of videos is lower than the publication of text. In addition, it can be concluded that the aim of posts and videos on Facebook and Instagram is to promote the destinations where the airlines operate, as well as to promote new services and to offer customers insights into the destinations they fly to by encouraging crew members to post photos.

The authors can verify that all the airlines are careful to respond to user comments, which is a positive way of working in the online environment.

In terms of content, most of the posts are repeated on companies' Facebook and Instagram profiles. Airlines do not refer too much to the topic of COVID-19, other than reminders and updates of the preventative measures, while the other posts had content relating to the promotion of destinations. COVID-19 related posts only accounted for 12.2% of the posts on Facebook during the period under consideration, while this figure is 8.4% for Instagram. This result shows that the focus of social media is to promote destinations and the recovery of aviation and tourism by posting positive messages that are appealing to travellers and that showcase the best of each destination.

The analysis of the monthly traffic reports during the same period led to a number of conclusions, because a relationship can be established between the performance of social media and an increase in the number of passengers when comparing online behaviour and traffic reports. The reports contain a list of TOP 40 airlines whose performance was considered in terms of the number of passengers by comparing the year 2021 to 2020. During May and June 2021, just one of the 13 airlines considered that had a positive online performance also had a positive performance in the reports in the same months. In July, August and September, four airlines from the 13 considered appear in the traffic reports with positive results considering the number of passengers in these months. The October report does not include this part, therefore no conclusions can be reached about that month. From these numbers, it can be concluded that there is a lot to do in terms of social media. While there is clearly a relationship between online behaviour and economic results, the truth is that this relationship is not very solid. There is still a long way to go, and the authors of this paper consider that social media was not used well by most airlines during the considered period.

For future research, the authors propose the same study but in a future context, without the pandemic, to understand if airlines use social media to engage with their customers and if doing so influences traffic. It would also be useful to conduct studies separately; not including Facebook and Instagram in the same study could help to reach some interesting conclusions. In terms of limitations, the authors acknowledge that the number of airlines and the fact that just two forms of two social media were analysed are limits of this research.

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A Comparative Analysis of User Experience of the Microsoft Teams, Google Meet and Moodle E-Learning Platforms

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Abstract Lately, user experience (UX) has become an important and frequently used approach to determine the perception of digital products and services. UX measures what users feel and sense directly while getting to know and using these products and services regularly. In this study, which was conducted in Slovenia and in Bulgaria, we have researched the UX of students related to the Microsoft Teams (MS Teams), Google Meet and Moodle e-learning platforms. We used a standard and freely available User Experience Questionnaire (UEQ) that was developed to measure the UX of interactive products and services. The preliminary research showed that the MS Teams obtained the highest score among all the measured UX scales. Google Meet had slightly lower values, while Moodle had the lowest average values. The data also show that in terms of pragmatic quality, MS Teams was rated the best followed by Moodle and Google Meet. The students find Google Meet the weakest in terms of the quality of its task-related aspects. The hedonic quality data shows MS Teams first, followed by Google Meet and Moodle. The results of the research have been analysed and discussed, and future research suggestions have been defined.

Keywords: UX (user experience), Google Meet, Moodle, Microsoft Teams, students

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1 Introduction

Collaboration platforms have become very important in recent years, more so due to the worldwide pandemic, which fundamentally influenced all aspects of our lives. Vendors and solution providers are regularly launching new IT solutions and applications on the market, and organisations are looking for innovation and sources of competitive advantage, as well as more efficient ways of performing business processes and communicating. One branch of these platforms is e-learning solutions, whether stand-alone applications such as Moodle, or collaborative applications with e-learning support such as Microsoft Teams (MS Teams) or Google Meet. Typical e-learning platforms must offer support for study material sharing and videoconferencing for lectures. Moreover, modern collaboration functionalities also include announcements, links, online quizzes, online contact hours via chat, assigning and collecting assignments. With new versions, upgrades and more frequent use, users have started to use collaboration platforms at different, usually more advanced, levels. This affects users' attitudes toward collaboration platforms and how they, as users of these platforms, perceive new technology. Acceptance of platforms and applications can be researched using user experience (UX) concepts. UX covers all aspects of digital products and services that users feel and sense directly while getting to know and regularly using these products and services (Hassenzahl, 2010).

In this research paper, an explanation is given of e-learning collaboration platforms. An overview of the characteristics and functionality features of MS Teams, Google Meet and Moodle is provided. Based on a standard and freely available UEQ questionnaire, we have analysed the user experience of MS Teams, Google Meet and Moodle. UEQ questionnaires are used to measure the user experience of interactive products and services (Laugwitz et al., 2008). The scales of the questionnaire cover a comprehensive impression of user experience. Both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (originality, stimulation) are measured. This paper provides a comparative analysis of MS Teams, Google Meet and Moodle user experience by students of economics and business from Slovenia and Bulgaria. The aim of the research is to identify the factors that influence students' user experience when using the aforementioned e-learning collaboration platforms during their study during the COVID-19 pandemic. The

survey was conducted among students from Slovenia and Bulgaria. We have described and analysed the findings, discussed the results and defined future research options.

2 E-learning collaboration platforms

The range of collaboration tools and solutions has increased since the start of the pandemic. When referring to collaboration, this is meant in the broadest meaning of the word, i.e. considering internal collaboration among employees and external collaboration with partners across the whole value chain (Barratt, 2004). Collaboration platforms for e-learning are one of the important use areas that are being used for distant learning support on different education levels. These platforms are crucial for uninterrupted pedagogical work as they facilitate e-learning in various forms. The reality is that different applications need to be used to cover all aspects of work, as no universal application or software can cover all business scenarios. For the education sector, this means that universities and schools are still using other applications to fully support the study process, for example, proprietary exam systems, e-mail systems, web portals, etc. Developers of collaboration tools and solutions are using past experiences to provide elevated functionalities for different use scenarios, some of which are more universal, for example MS Teams and Google Meet, while others less so, e.g. Moodle. Regardless of the vendor, collaboration tools must be in line with business needs (Eisenhauer, 2021).

Some authors (Eisenhauer, 2021) have pointed out that the pandemic led to collaboration tools becoming the main facilitator for any kind of communication – from business, education, public sector, healthcare, to even personal use as an additional way of staying connected with family and friends in times of limited movement or quarantine. As the frequency of use increases, users are starting to use collaboration platforms on different, usually more advanced, levels. This affects users' attitudes toward collaboration platforms and how they, as users of these platforms, perceive new technology.

In its latest magic quadrant for the MS Teams application, Gartner (Microsoft, 2021) recognised Microsoft as a leader for both meetings solutions and unified communications as a service. Microsoft was positioned highest among all vendors for its ability to execute both reports. MS Teams is a hub for teamwork where people – whether internal and external – can connect and collaborate synchronously. People can hold meetings or make calls one-on-one with fully integrated voice and video, informal chats, co-authoring a document, or work together in other apps and services. MS Teams offers a shared workspace for people to iterate quickly on a project, work together with team files and collaborate on shared deliverables. Every new team creates a new Microsoft 365 group, a Sharepoint online site, a document library, an Exchange online with a shared mailbox and calendar, and a Onenote notebook, and ties into other Microsoft 365 and Office 365 apps such as Planner and Power BI (Microsoft, 2021). Microsoft has added almost 100 capabilities to its Teams app to streamline work and automate processes to help users before, during, and after a meeting. In education, MS Teams has been the platform of choice in many cases, as full spread online courses were being offered due to the pandemic restrictions. MS Teams also has several education-specific functionalities and is adding new ones almost every month, such as assignment support and grading, insights for interaction analytics, forms integrations for polling, etc.

Google Meet is an easy-to-use video conferencing application, suitable for business and education. Google Meet is available free with limited functionalities, and also offers a wide variety of features in paid service plans, tailored for business and education. The free education edition supports (Google, 2022):

- Joining calls from anywhere, on different devices (no plugins or downloads needed)
- High-quality video and audio across multiple operating systems and devices
- Integration with Classroom and other Google Workspace for Education products
- Multiple co-hosts

The paid editions also offer the option to save recorded meetings to Google Drive, sharing, tracking attendance with analytical reporting, and many more functions. Google Meet is a pure video conferencing solution. Meeting organisers can set up using Google Calendar, meeting link URLs or codes, dial-in by phone numbers, and through proprietary Google Meet hardware such as Chromebox and Chromebase for meetings devices. Due to its wide adoption in business as well as education, it features robust security and encryption (Sevilla, 2020).

The Moodle (Modular Object-Oriented Dynamic Learning Environment) learning management system is a secure web-based environment used for the development and delivery of course activities and resources. Moodle allows teachers to organise and store course content in a secure web-based environment, which their students can access from anywhere at any time. Teachers can post, collect and grade assignments, administer quizzes, host online discussions, share resources, and more. It is present in various sectors ranging from K-12 schools, higher education and vocational training to workplace environments. With over 300 million users in over 240 countries, it is the leading learning management system worldwide (Moodle, 2022a). Moodle offers a modern interface and offers communication and collaboration features (including real-time chat, discussion and sharing of files) for students and teachers. In a comparative analysis of several open-source learning management systems, the authors found that Moodle has the best communication tools with user-friendly interfaces (Cavus and Zabadi, 2014). As Moodle is open source, it is constantly expanding its features and functionalities. The community is also developing numerous plugin features that help keep the environment up to date. Moodle plugins are components that can be installed on a user's Moodle platform to add a specific feature, functionality or even appearance to their Moodle site. More than 1,500 open-source plugins have been developed to date and are available in the Moodle Plugins directory for download (Moodle, 2022b).

3 User Experience (UX)

The evaluation of software applications can be done using quantitative aspects, however, it is often down to the user's subjective opinion. One characteristic often used is User eXperience (UX), which relates to the end users' actual experience with the software. ISO/IEC 9241 (ISO, 2010) defines UX as "a consequence of the

presentation, functionality, system performance, interactive behaviour and assistive capabilities of an interactive system, both hardware, and software. It is also a consequence of the user's prior experience, attitudes, skills, habits and personality." It is restricted to products and whole systems and services with everything that belongs to the user journey creating a user experience before using a product or system (Van de Sand et al., 2020). A good UX contributes to higher work motivation and performance and can also affect the well-being of users and is crucial to maintain or gain market shares (Hassenzahl, 2010; Nass et al., 2012). The service around a product and the whole system of a product impacts users' perceptions as well (Van de Sand et al., 2020).

When designing products to ensure a positive user experience, the designers' goal is that the character of the intended product creates appeal, pleasure and satisfaction. From an user perspective, qualities are perceived, evaluated and experienced in the context of use, which ideally leads to appeal, pleasure and satisfaction. However, this can be only achieved by a certain level of pragmatic and hedonic qualities. The content and functionality of a product need to be reasonable and useful. Interactions need to be easy to understand and smooth. The presentation has to be appealing, pleasurable and in coherence with the brand personality system (Van de Sand et al., 2020).

There are a variety of methods specifically developed to measure and study UX-related constructs. For this research study, we have used a standard and freely available UEQ questionnaire used to measure the UX of interactive products and services (Laugwitz et al., 2008) which is described in the following section.

4 Methodology and research

To examine the usability of a system, it is necessary to study how efficient, effective and satisfactory a product is. In addition to this, it is important to address a specified context of use by a specified user with a specified goal. The authors of the UEQ developed a questionnaire that allows a quick assessment covering a comprehensive impression of user experience. It was designed to allow users to express the feelings, impressions and attitudes that arise when experiencing the product in question in a very simple and immediate way (Laugwitz et al., 2008). The UEQ contains six scales

with 26 items. The scales are attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. While attractiveness is a pure valence dimension; perspicuity, efficiency and dependability are pragmatic quality aspects (goal-directed), and stimulation and novelty are hedonic quality aspects (not goal-directed).

We have conducted a comparative analysis of MS Teams, Google Meet and Moodle user experience among students of economics and business from Slovenia and Bulgaria. The data were collected in autumn 2021 at the Faculty of Economics and Business Maribor (FEB), Slovenia, and at the University of Economics (UoE), Varna, Bulgaria. Both universities use multiple applications to support the study process. In Slovenia, MS Teams and Moodle are used, while in Bulgaria, Google Meet and Moodle are used. This fact influenced the number of responses collected, as the cumulative sample consists of 247 responses for MS Teams, 335 responses for Moodle, and 129 responses for Google Meet. All the responses were collected using electronic questionnaires. The results were transferred to Microsoft Excel for further analysis using predefined UEQ tools.

All students at the FEB use Moodle as a primary e-learning solution (mainly study material sharing) and MS Teams as a go-to application for videoconferencing for courses and exercises. Similarly for UoE in Varna, a combination of Moodle and Google Meet was used for study process support.

Table 1 and Figure 1 illustrate that the means of the values of the scales for MS Teams have the highest values of all the scales measured. Slightly lower mean values were observed for Google Meet, while Moodle had the lowest average values. When analysing individual scales, it can be seen that MS Teams leads on all the scales, while there are some differences with Google Meet and Moodle – Google Meet has higher values in terms of attractiveness, perspicuity, stimulation and novelty, while Moodle has higher values in terms of efficiency and dependability.

Table 1: UEQ Means of the Scales

UEQ Means of the Scales			
	MS Teams	Moodle	Google Meet
	N=247	N=335	N=129
Attractiveness	1,754	1,047	1,267
Perspicuity	1,725	1,378	1,419
Efficiency	1,595	1,339	1,295
Dependability	1,662	1,339	0,965
Stimulation	0,892	0,546	0,814
Novelty	1,111	0,369	0,533

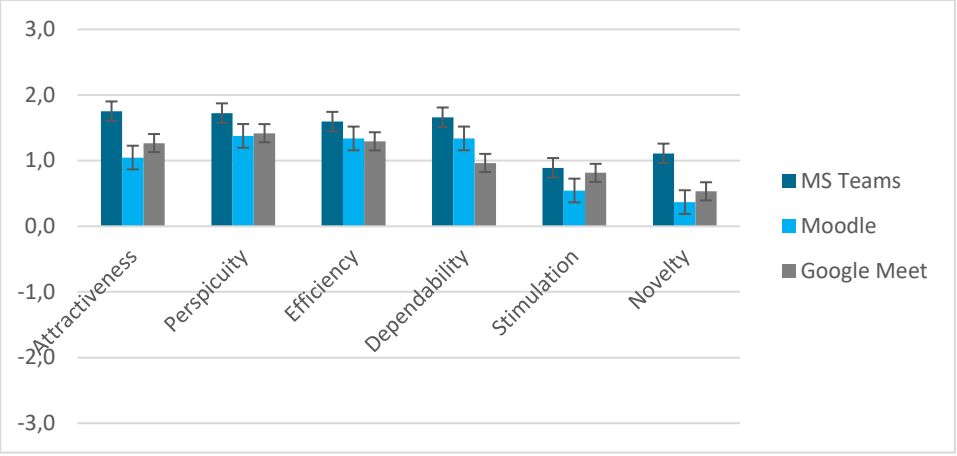

Figure 2: UEQ Means of the Scales

Source: own.

As can be seen from the comparison of all three compared applications above, the lowest values were observed for stimulation and novelty scales. It could be argued that this is due to the circumstances of the application use, as for a majority of the time the students were forced to switch to e-learning, which can affect their motivation and stimulation. In terms of novelty, it can be seen that the difference in means of the scale is substantial and in favour of MS Teams as opposed to Moodle or even Google Meet. It seems that the students find MS Teams the most modern application, which is also explained by the fact that Microsoft is constantly

innovating and introducing new features to the platform, which tends to affect user perception.

The scales of the UEQ can be grouped into pragmatic quality (perspicuity, efficiency, dependability) and hedonic quality (stimulation, originality). Pragmatic quality describes task-related quality aspects, while hedonic quality the non-task related quality aspects. A similar picture can be seen when analysing the values in Table 2. The MS Teams application has the highest mean values of the three compared applications. In terms of the pragmatic quality, it can be seen that MS Teams is rated the highest followed by Moodle and then Google Meet. Therefore, the students find Google Meet the weakest for task-related quality aspects. In terms ofh hedonic quality, the order of the applications is MS Teams followed by Google Meet and Moodle. Therefore, the results show that the students find Moodle the weakest in terms of stimulation and originality scales.

Table 2: Pragmatic and Hedonic Quality

Pragmatic and Hedonic Quality			
	MS Teams	**Moodle**	**Google Meet**
	N=247	N=335	N=129
Attractiveness	1,75	1,05	1,27
Pragmatic Quality	1,66	1,35	1,23
Hedonic Quality	1,00	0,46	0,67

5 Discussion and conclusion

The pandemic has brought challenges in all areas of our lives. One of the areas that has been most impacted is the way we teach, work and do business. We interact with each other all the time, and technology has facilitated new ways of collaboration that were not possible in the past. The Cloud infrastructure from leading Cloud providers such as Microsoft and Google has supported and enabled different forms of e-collaboration.

The challenges of the pandemic have also been substantial in the field of education, as the majority of organised education had to switch to distant learning. Traditional e-learning platforms such as Moodle have been in place for years, but were used for basic tasks such as file sharing and were not suitable for full-scale video conferencing. Alternatives such as MS Teams and Google Meet were already in place and seemed like a logical choice. As the study process was conducted online only, more functionality started to be utilised.

We have begun research into the UX of collaboration platforms, as it influences the way users perceive applications and products. UX research is quite popular, and there are a lot of methods in use. In this research, a UEQ questionnaire was chosen, which measures the impression of user experience. Analysis has shown that the UX experience for MS Teams was assessed the highest for all the UX aspects measured. Slightly lower values were observed for Google Meet, while Moodle had the lowest average values. The data also show that when looking at pragmatic quality, MS Teams was rated the highest followed by Moodle and Google Meet following. The students find Google Meet the weakest for task-related quality aspects. Hedonic quality data shows a slightly different order of the applications, namely MS Teams followed by Google Meet, and Moodle. These results must also be interpreted in the context of the functionalities of each application. There are differences in the applications compared, the most obvious being the fact that Google Meet does not offer such a wide feature set as both the other tools, since its main purpose is videoconferencing support. It lacks other features that both Moodle and MS Teams have, such as messaging, file sharing, etc.

It is for this reason that we see a lot of potential for future research. It must be emphasised that this is preliminary research with some limitations. As described in previous sections, we combined the samples of students from both universities using the Moodle application, so the differences in the perceived UX could be analysed between the students of the two universities. For future research, more data should also be gathered with bigger sample sizes, and a more in-depth analysis could be carried out, including reliability analysis and factor analysis. Additionally, since the UX changes with time, the data gathering process and analysis could be repeated and the results compared. Another area of future research could be to research the UX of e-learning platforms from teachers' viewpoints.

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Ranking of the Sustainability Goals (SDGs) Based on Individual Preferences

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Abstract Aligned with the three pillars of the sustainability model (social, economic and environmental aspects), the United Nations has declared 17 Sustainable Development Goals to promote sustainability development steps by all countries. These goals are for everyone; our environment requires active voluntary action from all of us. These sound like extremely important, crucial and urgent world-changing issues that will require cooperation among governments, international organisations and world leaders. It might seem impossible that the average person can make an effort or have any impact, especially in these extraordinary pandemic times. This study aims to discover subjects' opinions and preferences on the SDG. Additionally, time and budget allocations are observed among the goals. The results provide a deeper insight into individual can-do attitudes. While voluntary and environment-friendly measures are also considered as core values. However, the question is whether economics or the environment will be underlined. This paper focuses on individual actions and beliefs. The aim of the research is to discover how and what people are ready to do for a better environment in the post-COVID era. Based on the results, an action plan can be stated that supports the achievement of as many of the SDGs as possible.

Keywords:
sustainability, sustainable development goals, preference order, time allocation, money allocation

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"Steps were taken in the hope of a better future that does not have a harmful effect on our environment and our economy."
(Answer No.16.)

1 Introduction

According to Purvis et al., the first prominent appearance of the expression 'sustainable development' was published in 1980 in mainstream literature (Purvis et al., 2019). Hence, the history of this issue is widely studied in their paper. This aim of this paper is to investigate the Sustainable Development Goals (SDGs) that were adopted by all the members of the United Nations in 2015 as an essential part and guideline of the 2030 Agenda for Sustainable Development, which set out a 15-year-long plan to achieve the goals. Due to globalisation, these goals not only focus on the perspectives of developing countries but also on developed countries, because environmental considerations have become increasingly prominent everywhere. The 17 SDGs cover 169 sub-targets, to which 231 indicators have been assigned in order to measure how countries and the world are approaching the targets. However, at the global level, the 17 SDGs and 169 targets of the new agenda can be monitored and reviewed through global indicators.

Regardless of the statistically proven and measured indicators, as well as the broadly studied and published reports, the goals are universal and available to all. However, this does not mean that these goals are widely or fully known by everyone. For the purposes of this research, a survey was carried out in which subjects' rankings and individual allocations of voluntary time and monetary donations for SDGs were investigated.

Each goal calls for action and targets a very important field of sustainability. The SDGs can be listed as follows.

- Goal 1 – End poverty in all its forms everywhere (with a further 7 sub-targets)
- Goal 2 – End hunger, achieve food security and improve nutrition and promote sustainable agriculture (with a further 8 sub-targets)

- Goal 3 – Ensure healthy lives and promote well-being for all at all ages (with a further 13 sub-targets)
- Goal 4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (with a further 10 sub-targets)
- Goal 5 – Achieve gender equality and empower all women and girls (with a further 9 sub-targets)
- Goal 6 – Ensure availability and sustainable management of water and sanitation for all (with a further 5 sub-targets)
- Goal 7 – Ensure access to affordable, reliable, sustainable and modern energy for all (with a further 8 sub-targets)
- Goal 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (with a further 12 sub-targets)
- Goal 9 – Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation (with a further 8 sub-targets)
- Goal 10 – Reduce inequality within and among countries (with a further 10 sub-targets)
- Goal 11 – Make cities and human settlements inclusive, safe, resilient and sustainable (with a further 10 sub-targets)
- Goal 12 – Ensure sustainable consumption and production patterns (with a further 11 sub-targets)
- Goal 13 – Take urgent action to combat climate change and its impacts (with a further 5 sub-targets)
- Goal 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development (with a further 10 sub-targets)
- Goal 15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss (with a further 12 sub-targets)
- Goal 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (with a further 12 sub-targets)

– Goal 17 – Strengthen the means of implementation and revitalise the global partnership for sustainable development (with a further 19 sub-targets)

The SDGs target local, global and individual people's actions. There are no importance rankings among the goals or targets. However, as the authors of this research discovered, extraordinary political situations (such as the Ukrainian war) or unexpected healthcare issues (caused by pandemics) highlight the importance of various goals.

2 Empirical research

2.1 Research questions and methodology

Broader literature has already covered the importance of SDGs, a lot of which have focused on stakeholders' preferences (see Yamane & Kanoke, 2022). The aim of this research is to discover how ordinary people are considering the SDGs. Indeed, the younger generation (Yamane & Kanoke, 2021) is often described as more socially conscious and promoters of sustainability, however, less evidence of this is provided in scientific literature. The authors also focused on the younger generation, even though the sample spreads between Generation Z and Generation X.

At a corporate level, dealing with SDGs can be handled as a key part of corporate social responsibility (CSR) (Sardana et al. 2020; ElAlfy et al, 2020), while on an individual level, it may be associated with volunteerism (Devereux et al, 2017). Therefore, the authors asked for a definition of sustainable development. Thereafter, preference orders, ranking, time and monetary allocations were investigated. Consequently, an online questionnaire was designed for part-time BSc students at the Budapest Business School studying Research Methodology. The survey was shared among 265 students via the Moodle platform. Out of this number, 160 responses were received and 125 participants gave their permission for their answers to be evaluated. The participants' demography can be characterised by the following: 33% of the respondents were male and 67% female, the average age is 27 (between 21 and 49), and 89% of the respondents have a full-time job.

2.2 Results

This section provides a preliminary descriptive evaluation of the results, wherein further inferential statistics have not yet been calculated. The authors used descriptive techniques to describe the basic features of the data and provide a simple summary of the measured responses. This is a preliminary step, which allows further hypotheses to be defined. A univariate analysis was obtained, which refers to the analysis of one variable at a time; only frequency tables and graphs were performed in order to have a better understanding of the 17 SDGs. More investigations and calculations are required in this area of study, as reinforced by this paper.

The authors' first question was an open-ended gap-fill question about how the respondents define 'sustainable development' without pre-emptive biases. Simple text mining (without deeper data cleaning or text analysis) showed the most frequently used expressions. The text is in Hungarian, and the numbers within the brackets reflect the frequency of each phrase in Figure 2.

Figure 2: A simple word cloud that show how the respondents defined 'sustainable development'

Source: Own elaboration using wordclouds.com

After brief exploration and analysis of the content, the following interesting facts can be stated:

- Synonyms were frequently used such as increase, evolve or skills. "*What first came to my mind about sustainable development is that the world should evolve to the extent that the environment can evolve.*" (Answer No.71)
- Many sentences were related to the environmental protection, protecting the Earth. "*To prevent further exploitation of the Earth, all we take from it as much as we can give it back.*" (Answer No.7)
- In terms of the timeline, mainly referring to the future was typical, for example, next-generation, timeline, etc. "*A development process that focuses on the future and places great emphasis on it.*" (Answer No.47) or "*I think it's an advancement in any area of life that needs to, and can, be followed by the next generation.*" (Answer No.73)
- Importance or urgent action was also highlighted. "*This is an endeavour we may have been late with. We should move forward by using objects and tools that are already obsolete, thereby reducing waste and changing people's attitudes in the long run.*" (Answer No.92)
- Some solutions were also suggested, such as recycling, renewable energy, avoiding plastic waste, electric cars, etc. "*Environmental protection, recycling, replacement of toxic substances with natural ones.*" (Answer No.6.) or "*Paying attention to our environment, for example, using less paper because we don't grow as many trees or planting as many trees to keep our balance will cut out much more than can be regrown. Or, say, replacing plastic straws and glasses in catering; they are made from recycled, processed products rather than plastic, which never breaks down. According to the current position, I would even list the switch to electric cars here, but... my personal opinion is that this is not a good direction; it will not be sustainable or environmentally friendly in the long run. I live right next to a battery factory like this, with high carbon emissions, polluting the water, making the city uninhabitable and not touching it, but how many batteries will have to be made if everyone switched to electric cars? The battery will have to be replaced, it will not be usable for 20 years, so due to the constant replacement, due to the more production, we will end up in the same place ....*" (Answer No.52) or "*Renewable energy sources, recycling, environmentally conscious lifestyle, low- or zero-waste lifestyle, green energy, reusable products, etc.*" (Answer No.14)

- Meanwhile, the respondents do not want to shorten their current needs and desires. "*It satisfies the needs of the present and lays the foundation for the future.*" (Answer No.93)
- Some answers were linked to economics and economic issues. "*The principle of sustainable development is that it takes into account the expectations of environmental issues, the needs of society and the needs of economic development in a complex approach.*" (Answer No.57)

Finally, we used an automatic text summarizer which is an online tool that wraps up a text to a specified short length. In our case, the main text was reduced by 98% and the one-sentence long summary of the text sounds as follows: "*For me, sustainable development would mean that any area that serves the interests of the people would only develop and expand in a way that adapts to the environment and nature, and even supports / helps, but in any case protects and sustains it.*".

Secondly, two statements were adapted from the World Value Survey Wave 7, from the chapter on Economic Values (Haerpfer et al. 2022), see Figure 3. The official Hungarian translation from the original survey was used.

Q111. Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view? (*Read out and code one answer*):

1 Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs.
2 Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent.
3 Other answer (*code if volunteered only!*).

Figure 3: Economic Values
(WVS, 2021)

Obviously, almost 81% of the participants voted for option 1. This distribution might be determined by the topic of this survey.

The questionnaire then moved on to the SDGs. According to the participants, the top five most urgent and vital goals are:

1. Clean Water and Sanitation
2. Good Health and Well-being
3. Zero Hunger
4. Quality Education
5. Responsible Consumption and Production

They thought that the most burning global problem is 'Peace, Justice and Strong Institutions'. Meanwhile, the most crucial goal in Hungary should be 'Decent Work and Economic Growth'.

Finally, the authors were interested in how the respondents would volunteer their time and donate money for each goal. The participants were asked to allocate a total of USD 1,000 (per USD 100, a fraction of USD 100 was not allowed) and ten days (per day, sharing one day was not allowed) among the goals. The donations summarised are listed in Table 1.

Table 1: Money and time allocations among the SDGs

SDG 17	The total amount of donations (USD)	The total amount of voluntary days (days)
End poverty in all its forms	11600	112
Zero Hunger	14100	148
Health	13900	126
Education	*14700*	*160*
Gender equality and women's empowerment	2400	50
Water and Sanitation	12700	120
Energy	6500	56
Economic Growth	5200	53
Infrastructure, industrialization	5600	34
Inequality	5100	54
Cities	5400	63
Sustainable consumption and production	9200	120
Climate actions	12100	108
Oceans	9100	112
Biodiversity, Forest, Desertification	7800	107
Peace, justice and strong institutions	9300	94
Partnership	3100	51
Total	**147800**	**1568**

As the total amounts prove, there are some discrepancies in the table – participants spent more time (1,568 days compared to 1,250 days) and money (USD 147,800 instead of the USD 125,000 allowed) than requested. Surprisingly, the participants said they would be willing to donate and volunteer the most for a better, improved education.

3 Discussion

According to the United Nations Report (2021), COVID-19 rewrote, and had a devastating impact on, the implementation of the SDG last year. It is difficult to obtain a detailed and accurate picture of progress towards the SDGs in real-time. The authors of this study identified several areas that require urgent and coordinated action in relation to the answers obtained in the sample.

However, these areas are also dependent on everyday occurrences and events. People are concerned about various global issues. Based on the preliminary evaluations of this study, the authors have drawn up guidelines for further research, since a greater focus is needed on how everyday events and occurrences influence participants' opinions and the importance of the SDGs in their lives. In addition, more rigorous statistical analysis may result in a deeper insight into players' ways of thinking, habits and motivation. Therefore, in terms of future research, it should be taken into account that the World Value Survey Wave 7 (WVS7) was extended with values that are identical to the SDGs. Evaluating the WVS7 results and comparing them with all the 231 indicators that have been assigned to the 169 targets of the SDG, the authors' forthcoming paper may provide a deeper understanding of the country and cultural preferences in relation to these issues. Carrying out a broad international comparison based on statistical datasets may provide an extended comparison. One limitation of this study may be the misleading translations (the authors used the translation provided by the Hungarian Statistical Office) of each goal. A better, more appropriate 'mirror' translation might be more understandable for everyone. Another problem could be that participants only relied on the leading lines (titles) without having a deeper understanding of each target.

The first data was collected from the middle of February 2022 to the middle of March 2022, and a lot happened during this one month. The results clearly reflected the Hungarian political and social situation. In March, the respondents were more concerned about health issues due to the pandemic, then, as a result of the teachers' strike, education became a hotter topic. As the Ukrainian and Russian conflict has intensified, the survey participants have begun to worry about peaceful and inclusive societies.

It can therefore be said that people do seem to care about sustainability. The authors also asked the respondents to choose goals where they, as ordinary people, can or could take proper action. The findings show that 25% of the respondents support 'Responsible consumption and production', followed by 'Climate action' at 11%. In contrast, the respondents felt no or less control over the goals of 'Poverty' and 'Affordable and Clean Energy'. This may be partly explained by volunteer tourism and preferred destinations in those countries where, aside from poverty and needs, the natural environment would not be accessible to the volunteers (Lockstone-Binney & Ong, 2021).

The SDGs are a crucial, world-changing purpose that requires strong collaboration among governments, international organisations and associations. The question, however, is whether the average person can make an impact. The UN produced a branch of recommendations for citizens called 'The Lazy Persons Guide to Saving the World' (UN Take Actions, 2022).

According to these recommendations, there are four levels with four scenes where people can try to do their best:

- Level 1 is for 'Sofa Superstars' – things people can do from their couch at home. It relates to environmentally friendly thinking, such as saving electricity or taking action against online bullying.
- Level 2 is for 'Household Heroes' – things people can do at home. This covers further clever lifestyle management and diet recommendations in order to have a more conscious home and lifestyle.
- Level 3 is for 'Neighbourhood Nice Guys' – things people can do outside their home. This includes suggestions about how to be concerned about and take care of the local environment and society.
- Level 4 is for 'Exceptional Employees' – things people can do at work. This level is about gender equivalence, volunteering and kindness in the workplace.

The manual seems somewhat fragmented, unstructured and indefinite (for example, goals are not assigned to the advice), perhaps because the authors wanted to cram all the important detail from the 169 targets into 17 goals. The initiative is commendable, however, further elaboration is required.

As Purvis et al. (2019, p.692) underlined, 'Although the targets and indicators associated with the UN SDGs are encouraging, there is a lack of detail on which to ground the transparent, rigorous and theoretical foundation and the value judgements that have been made along the way.'

4 Conclusion

Education has always been an essential part of the sustainable development agenda, while it is also important that the concept of sustainable development is implemented in education. Prior to the pandemic, the global higher education sector had begun to radically focus its efforts on creating sustainable institutions and aligning with the UN SDGs. Due to the pandemic (Crawford & Cifuentes-Faura, 2022), it slowed down and higher education had to turn its attention to surviving and recovering from the first shocks caused by the restrictions.

This aim of this paper is two-fold. Firstly, it is an attempt to educate future graduates about sustainable practices in order to enable future delivery of sustainability goals in the workplace (Leite, 2021). Secondly, this study provides a better understanding of the preference ranking of SDGs and sheds light on how university students would allocate their budget and time among the goals.

The definition of 'sustainable development' given by the respondents reflects the official definition suggested by the UN. In line with the UN's recommendations, the authors found similarities and identical expressions in the participants' definitions compared to those of the UN. The latter reads that sustainable development 'meets the needs of the present without compromising the ability of future generations to meet their own needs.' (https://www.un.org/sustainabledevelopment/development-agenda/). Although the intention and perception of the SDGs have gone through a demanding and continuous transition, they have never lost their main aim and importance (Caballero, 2019).

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Corporate Governance in the COVID-19-Era Through the Prism of Non-Financial Reporting

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Abstract Non-financial reporting is undoubtedly an essential institutional measure aimed at socially responsible corporate governance and thus at the sustainable development of corporations and society in general. Large corporations were required to disclose information on non-financial performance in their 2017 financial report for the first time. The COVID-19 pandemic has caused socio-economic damage, exposed workers' vulnerability, and highlighted the fragility of supply chains. In this paper, the authors have analysed the practice of selected Slovenian corporations in non-financial reporting by observing the companies' disclosed non-financial data during the 2020 epidemic. The aim of this study is to consider how well corporations have adapted to the challenges of the COVID-19 epidemic. The results of the case study will show how the selected Slovenian corporations are striving to consider the interests of workers in their governance in times of emergencies such as the COVID-19 epidemic. Moreover, in light of the new Corporate Sustainability Reporting Directive (CSRD), these results will provide a good starting point for future research into whether the selected Slovenian corporations are on the right path towards sustainable corporate governance and/or what they need to change in this area to achieve their goals.

Keywords: Non-financial reporting, sustainability reporting, sustainable corporate governance, Directive 2014/95/EU, CSRD proposal

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1 Introduction

This paper focuses on introducing non-financial reporting by large corporations, which is the first legal step on the path toward corporate social responsibility. Its origins lie in the global economic crisis that occurred in the USA in 2008 and then spread to Europe. Non-financial reporting was established by Directive 2014/95/EU (NFRD) and has been implemented in practice since 2018. In addition to an overview of the development of this institution in the EU and Slovenia and its further evolution, the authors of this study have also provided a more detailed overview of its substantive requirements. A case study was undertaken to examine the non-financial reports of selected corporations in Slovenia. The main research area will thus be the content of non-financial statements of the observed companies for the period of the COVID-19 epidemic.

The answers will be used to conclude whether the existing non-financial reporting model is adequate to respond to situations such as those caused by the COVID-19 epidemic and to what extent (or how) the interests of workers as important internal stakeholders of corporations are considered in such risks. Moreover, these results will provide a good starting point for future research in relation to the new CSRD Directive. Whether or not the announced changes go in the right direction to achieve sustainable corporate governance for workers will be of particular importance. The case study results of Slovenian corporations will also be of interest to researchers of this type of issue in the other EU Member States. Since the legislation regarding non-financial reporting is harmonised, it should not cause too much divergence in practice.

2 Legal framework of non-financial reporting

The requirements introduced by the EU through Directive 2006/46/ES can be identified as a precursor to non-financial reporting. The Directive enacted measures to restore the confidence of the capital market and the general public in annual accounts and company reports following serious economic shocks and scandals (Tico, Enron, Parmalat). Enhanced and consistent specific disclosures and publication of information about company performance should contribute to improved transparency of companies' financial management. Moreover, this Directive sets out the liability of management bodies for drawing up and adopting

annual reports, including their obligation to approve them with their signature. One of the central requirements of the Directive is the corporate governance statement.

The non-financial reporting obligation was introduced by Directive 2014/95/EU for certain large undertakings and groups. The main objective of this Directive is to improve social responsibility. To this end, companies should also consider social and environmental issues in managing their business operations and adapting their strategy. The transparency of the so-called 'non-financial information' may help companies better manage their non-financial risks and opportunities, thus allowing them to improve their non-financial performance and providing an important source of information for potential investors as well as for civil society when assessing the effects and risks related to the company's performance (Primec, Belak, 2017).

According to the directive, non-financial reporting consists of two parts. The first, the so-called 'diversity policy', was included in the corporate governance statement. At the same time, the other part contains an obligation for large public-interest entities to disclose non-financial information.

3 The content of non-financial reporting

3.1 Diversity policy

The demand to disclose diversity policies is seen as a renewed attempt to establish female quotas, however, this time in an autonomous act of corporate decision-making (soft law). In contrast, the effort to enforce the Directive on improving the gender balance among non-executive directors of companies listed on stock exchanges (Commission, 2012) failed.

In the EU and elsewhere in the world, there have been many studies and research into the impact of women in corporate governance structures. The main lines of enquiry are the impact of gender diversity on the governance body itself. The second line of enquiry focuses on the impact on a company's external and internal stakeholders. Furthermore, women's participation is examined from different perspectives, such as how the participation of female directors affects the effectiveness of management, the independence of the management body, and the professionalism of decision-making.

Individual studies have also addressed women's participation in strengthening corporate social responsibility, which has quickly become a subject of policy debate (Kang et al., 2007) or even global discussion (Rao, Tilt, 2016). Most authors studying gender diversity have found apparent differences in values and thinking between men and women. Traits such as assertiveness, aggressiveness, independence, self-confidence and competitiveness are generally present in men, while a sense of caring, shared interests, helpfulness, resignation and receptivity predominate in women (Eagly, Johannesen, Van Ensen, 2003). Women tend to occupy positions in softer management areas, such as human resources management, corporate social responsibility and marketing (Zelechowski, Bilimoria, 2006).

However, the widespread political aspirations for fair, balanced and sustainable development of the global economy, which can be achieved through socially responsible governance, convincingly demonstrate that the political capital of women's quotas cannot be doubted.

3.2 Non-financial statement

To enhance the consistency and comparability of non-financial information disclosed throughout the Union, a non-financial statement should contain information relating to, at the minimum, environmental matters, social and employee-related issues, respect for human rights, anti-corruption and bribery. Such a statement should include a description of the policies, outcomes and risks related to those matters and should be contained in the management report of the undertaking concerned. The non-financial statement should also include information on the due diligence processes implemented by the undertaking, including, where relevant and proportionate, its supply and subcontracting chains to identify, prevent and mitigate existing and potential adverse impacts (NFRD, point 6 of the Introduction).

The information listed above relates to the previous financial year. If the company does not apply any of the above policies, it must provide a clear and reasoned explanation in the statement of non-financial performance. The disclosure of non-financial information relies on the 'comply or explain' principle.

3.3 Non-financial reporting de lege ferenda

Since its harmonisation efforts do not cover integrated reporting and third-party assurance, the Directive falls short in facilitating comparability and reliability, and thus reporting utility. The main weaknesses of the Directive can be divided into two categories: (i) lack of harmonisation in terms of integrated reporting and assurance and (ii) an excess of possibilities for companies to deviate from reporting requirements (De Roo, 2015). To prevent non-financial reporting from becoming a self-serving exercise, two elements are crucial: i) the assessment of materiality needs to follow a robust process, in which the methodology to define which non-financial information is material becomes critical; and ii) the disclosure of non-financial information should be perceived as beneficial by companies (Commission, 2020).

In addition, there is a growing demand for more comprehensive and contextual information. Investors need to know what risks they can expect, in particular due to the requirements of the new legislation, including Regulation (EU) 2019/2088 (Sustainable Finance Disclosure Regulation) and Regulation (EU) 2020/852 (Taxonomy Regulation).

The Commission has proposed a new legislative act – Corporate Sustainability Reporting Directive – to safeguard these interests (CSRD, Commission, 2021). The CSRD extends the scope to all large companies and companies listed on regulated markets (except listed micro-enterprises) established within the EU or outside the EU, but with the subsidiaries listed on an EU regulated market. Since the NFRD did not specify any standards on how information should be disclosed, the CSRD prescribes the standard for non-information disclosure. The information must be disclosed in the annual report, in the same place as the financial information. The sustainability information should be verified by external auditors. The Commission will adopt delegated acts to provide for sustainability reporting standards.

4 Research carried out and an overview of the results and findings

Eleven companies were examined during the course of this case study research. The main data source for this study involved a predesigned methodology, which was applied during the examination of the annual reports of the 11 companies, all of which are listed on the Slovenian stock exchange. The case study took place in March

2022, observing the annual reports of the examined companies for the year 2020 in Slovenia.

In the first part of the presented research, the authors examined the diversity policy, following the legal frame and legal obligations of diversity policy reporting. After examining the diversity policy, all the companies were examined in the context of the non-financial statement. Again, tjos study followed the legal reporting requirements for companies' non-financial statements.

Table 1 illustrates the research results on the diversity policy of the examined companies.

Table 1: Diversity policy

1.	Does the company have a defined diversity policy?
	YES: 11 NO: 0
2.	Does the company ensure diversity in its management and supervisory bodies?
-	Gender: YES: 9 NO: 2
-	Age: YES: 9 NO: 2
-	Education: YES: 11 NO: 0
3.	Does the declaration on diversity policy contain all the information required (i.e. it is adequate, partially adequate, inadequate), describing it in words and illustrating it with concrete examples (see questions 2, 3, 4 for details)?
	a) CONSISTENT: 5
	b) PARTIALLY CONSISTENT: 5
	c) INCONSISTENT: 1
4.	Is the diversity policy implemented in the observed company? YES: 11 NO: 0

Observing the table above, it can be stated that all 11 observed companies have a clearly defined diversity policy, while nine companies ensure such diversity in their management and supervisory bodies based upon gender and age, and all 11 companies ensure diversity in their management supervisory bodies as well as in terms of educational matter. However, the research showed that two companies do not apply such diversity in their management and supervisory bodies based upon gender or age.

Observing the consistency of the examined diversity policies with the required information (based on the legislation), this research showed that out of 11 examined companies, only five diversity policies of the examined companies were consistent with the legislative requirements, whereas five diversity policies were partially consistent and one policy was inconsistent with the legislative requirements, while all 11 diversity policies – as they were developed – were also implemented in the observed companies.

Table 2 shows the research results on the non-financial statement of the observed companies.

Table 2: Non-financial statement

1.	Does the company have a non-financial statement?
	YES:10 NO: 1
2.	Does the company's non-financial statement contain all the required information (see answers to questions 3 to 9)?
a) b) c)	CONSISTENT: 9 PARTIALLY CONSISTENT: 1 INCONSISTENT: 1
3.	Does the company's non-financial statement disclose information on:
	a) Environmental matters YES: 11 NO: 0 b) Social matters YES: 11 NO: 0 c) Human resource matters YES: 11 NO: 0 d) Respect for human rights YES: 10 NO: 1 e) Anti-corruption and anti-bribery matters YES: 9 NO: 2
4.	Does the company's non-financial statement include a brief description of the existing business model?
	YES: 8 NO: 3
5.	Does the company's non-financial statement include a description of the company's policies on the matters referred to in question 3 (environmental, social, human resources, etc.)?
	YES: 11 NO: 0
6.	Does the company's non-financial statement include a description of implementing the company's due diligence procedures concerning the above policies?
	YES: 10 NO: 1
7.	Does the company's non-financial statement include a description of:
	a) the results of those policies YES: 11 NO:0 b) the principal risks concerning those matters associated with the company's activities

	YES: 9 NO: 2 c) including, where appropriate and proportionate, the company's business relationships, products or services that could cause serious adverse effects in those areas YES: 7 NO: 4 d) how the company manages the above risks YES: 10 NO: 1
8.	Does the company's non-financial statement include key non-financial performance indicators relevant to individual activities?
	YES: 9 NO: 2
9.	If the company under review does not apply any of the above policies, it must provide a clear and reasoned explanation in the company's non-financial statement.
	YES: 5 NO: 6
10.	Does the audited company refer to the accounting part of the annual report in its non-financial statement?
	YES: 3 NO: 8

Observing the table above, it can be state that 10 of the observed companies have a non-financial statement, whereas one company does not follow the legislative requirements.

Observing the consistency of the examined non-financial statements with the required information (based on the legislation), this research showed that out of 11 companies examined, nine of the non-financial statements were consistent with the legislative requirements, while one non-financial statement was partially consistent and one non-financial statement was inconsistent with the legislative requirements. Furthermore, this research showed that all 11 of the observed non-financial statements disclose information on environmental, social and human resource matters, while only 10 companies disclose information on respect for human rights and the disclosure of information on anti-corruption and anti-bribery matters is only present in nine of the observed non-financial statements.

This research showed that only eight of observed non-financial statements include a brief description of the existing business model. All 11 of the observed non-financial statements include a description of the company's environmental, social, human resources policies, etc. Furthermore, only one non-financial statement does not include a description of implementing the company's due diligence procedures concerning the above policies.

The above table shows that all 11 of the observed non-financial statements also include the results of the policies mentioned above, while only nine statements define the principal risks concerning those matters associated with the company's activities. Furthermore, only seven non-financial statements include information on the company's business relationships, products or services that could cause serious adverse effects in the aforementioned areas, and 10 observed statements include how the company manages such risks.

Furthermore, the research showed that nine of the observed non-financial statements also include key non-financial performance indicators relevant to certain activities of the company, whereas six of the observed non-financial statements do not provide a clear and reasoned explanation for not applying the aforementioned policies. Furthermore, it can be observed that only three of the observed non-financial statements refer to the accounting part of the companies' annual reports.

5 Conclusions

The case study research showed that the state of the companies examined in terms of non-financial reporting is, in general, good. However, the research highlighted some deficiencies in the companies' non-financial reporting.

In the context of diversity policy, it can be observed that there are some deficiencies in companies' desire and preparedness to implement gender and age diversity. The research also showed that companies that do not ensure age and gender diversity do not explain the main reasons for such a condition. This results in partially consistent or inconsistent content of such diversity policies.

This research showed a similar condition in terms of the non-financial statement of the examined companies. The non-financial statement is mainly present and reported by all companies. However, the lack of substantive reporting to explain the reasons for the non-presence of a certain policy is worrying. The research showed a lack of disclosed information on respect for human rights and anti-corruption and anti-bribery matters. Surprisingly, this study showed that some of the enterprises examined do not explain their risk policies and mainly did not refer to their non-financial statements with the accounting part of their annual reports, which diminishes the transparency of the companies' non-financial projects and activities.

Considering the above, it can be argued that due to the lack of substantive reporting, the quality and usefulness of such reporting is diminished. It does not deliver holistic information to all stakeholders to enable them to assess the quality of corporate governance in a certain company. This is also why, unfortunately, it is not possible to draw any firm conclusions on the influence of the COVID pandemic on the corporate governance of the observed companies, which was also one of the focuses of this research.

The above clearly shows that companies have not yet qualitatively approached non-financial reporting, however, they are still striving to 'tick the box' and ad hoc reporting. This makes the new CSRD with the prescribed standards on non-financial information of great importance for Slovenian companies. In addition to disclosing more valuable non-financial information for stakeholders, it will force companies to disclose data based on the increasingly challenging requirements established with other legal acts, such as the Sustainable Finance Disclosure Regulation and the Taxonomy Regulation. These legal obligations would also lead to planning, organising, managing and controlling the 'non-financial' activities and projects on the path to a socially responsible and sustainable company. This can be understood as a step forward to sustainable corporative governance and management.

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THE IMPACT OF THE COVID-19 PANDEMIC ON TEAM MANAGEMENT

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Abstract The COVID-19 pandemic caused organisational changes and forced greater flexibility in terms of jobs and the digitalisation of business processes, which has also affected team management in a business environment. The aim of this paper is to investigate and systematically show what changes in team management have occurred due to the COVID-19 pandemic in small and medium-sized enterprises (SMEs) engaged in computer programming. For this purpose, the authors conducted in-depth interviews with team leaders in a sample of companies from Varaždin County in Croatia. The research results reveal how SMEs responded to the challenges posed by the COVID-19 pandemic. These include, among others, reorganising team roles and responsibilities, ensuring timely and transparent communication, adapting employees to new ways of working, and strengthening organisational culture to preserve fundamental corporate values. The research also showed what the observed companies have done to put in place measures to resolve future crises and the fundamental positive changes in team management caused by the pandemic. Therefore, in addition to the scientific contribution, this paper can be of practical help to those facing the challenge of leading teams during challenging times, such as that of COVID-19.

Keywords:
team management,
COVID-19,
computer programming,
organisational change,
team management challenges

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1 Introduction

Technology has a significant impact on all spheres of life and completely changed companies' business environments and behavioural procedures. During the COVID-19 pandemic, technology came into focus due to the need to organise work through virtual meetings, virtual teams and working from home. Today, virtual teams have become commonplace both because of the COVID-19 pandemic and the benefits they provide. During the pandemic, organisations worldwide were forced to move their businesses to a virtual environment. For many, working in a virtual environment was no longer a choice but an obligation. This situation also affected team management, which faced daily challenges.

There are many previous studies on team management, however, the majority of these studies were based on team management in 'normal' rather than extraordinary circumstances. With the advent of the COVID-19 pandemic, researchers began to address the changes and strategies in team management due to the new business circumstances. Stoker et al. (2019) state that crises can cause changes in leadership styles, Kaul et al. (2020) selected and summarised numerous characteristics and practices that effective leaders embody during a time of crisis, while Newman and Ford (2021) described five strategies that can benefit all organisations in the COVID-19 pandemic. The aim of this paper is to analyse how small- and medium-sized enterprises (SMEs) engaged in computer programming responded to the challenges posed by the COVID-19 pandemic, and show what the observed companies have done to put in place measures to resolve future crises.

2 Team management in a contemporary business environment

Today, team management is an indispensable way of working globally. One of the reasons for this is that organisations increasingly recognise the importance of team management and its practical impact on organisational performance, thus ensuring 'the perfect running of the organisation' (Hasan and Hassan, 2021:56). Team management refers to the ability of a person or company to manage and coordinate a group of people performing specific tasks and includes collaboration, communication, goal setting and performance appraisal. In other words, team management represents the ability to spot problems and resolve conflicts in a team (Soni, 2020).

Team members communicate on important issues and ensure that an organisation's processes and units are coordinated and operate effectively. Effective team management positively contributes to creating value for the organisation, i.e. it creates added value in terms of what could not be achieved if managers acted as isolated individuals (Zamanov, 2020). In contrast, Natale et al. (1998) state that successful team management depends on the ability of a team leader to understand their team as a set of individuals dedicated to achieving a single goal.

2.1 Impact of business processes digitalisation on teamwork

The digitalisation of business processes in teamwork is changing the nature of collaboration in ways that have important implications for leadership. Research shows that the absence of traditional physical signs of dominance and status in virtual environments can foster more participatory relationships and that quality team management can also function remotely (Antonakis and Atwater, 2002). Technology has made it possible to start working from home, but for a long time, team leaders viewed such an opportunity with scepticism due to the inability to control the productivity of their employees at home (Faulds and Raju, 2021).

Through a review of previous research, Larson and DeChurch (2020) described four ways of using technology and what each of them means for team management: (1) technology as context – this view means that technology has fixed features and is separated from the team when they use it for interaction; (2) technology as sociomaterial – technology and teamwork are dependent: the team's intentions of doing something combine with the features of the technology features, thus enabling them to perform their tasks; (3) technology as a creation medium – means that teams can form within and outside of formal organisations and enable new opportunities for team management opportunities; (4) technology as a teammate – explores the ways that digital technologies can advance the point of fulfilling a distinct role on the team.

2.2 The challenges of leading virtual teams in terms of achieving organisational goals

The business transition to a virtual environment opens up new opportunities for organisations. One of the essential concepts when discussing doing business in a virtual environment is virtual teams, which provide specific benefits for both employees and employers (Maruping and Agarwal, 2004). Gibbs et al. (2008) state that employees can enjoy the flexibility of doing their work from home, which facilitates the balance of private and business life and potentially increases their job satisfaction. In contrast, employers can hire professionals from all over the world. Further increases can be expected in the use of virtual teams due to cost reductions, increased global integration and large-scale knowledge sharing (Zander et al., 2013).

Newman et al. (2020) explored how virtual team members' perceptions of their leaders practical communication tools and techniques affect the outcomes of team performance. The results of their research showed, among others, the following: (1) when team members believe that their team leader uses communication techniques and tools effectively, then they perceive the tremendous success of teamwork; (2) when there is a higher level of trust in the team leader, then the success of the team itself is higher; (3) the existence of a gap between the perception of team leader efficiency, their perception of team performance outcomes, and the performance organisations (Newman et al., 2020).

Analysing strategies for building an efficient virtual team, Ford et al. (2017) state that in order to strengthen trust in a team leader, it is crucial to acquire and strengthen skills related to team goal setting, rewarding team members, communication, team building, conflict resolution, acquiring team collaboration skills and ensuring that none of the team members feel isolated. Similarly, Lukić et al. (2020) state that some of the critical problems of virtual teams are the establishment of a new model of functioning and communication, initial misunderstandings between team members, lack of equipment needed for effective team functioning, communication problems, uncertainty, anxiety, fear, nervousness and panic. As virtual teams have become commonplace today, companies are facing various virtual team challenges.

2.3 Changes in team management due to the COVID-19 pandemic

The COVID-19 pandemic has made it possible to reinvent the future of work and create opportunities for companies to look at things differently. This crisis also greatly affected team management, which faces various daily changes. Through a review of previous research, Stoker et al. (2019) state that crises can cause changes in leadership styles, therefore companies can expect to be better prepared if they invest adequately in professional development. Depending on employees' skills and previous experience, some companies faced challenges, and it took them a long time to adapt their business to the online environment (Stoker et al., 2019). Hasan et al. (2021) state that the key to a company's survival during a pandemic is proper training and upgrading workers' skills.

Additionally, Kaul et al. (2020) described the essential principles of leadership during a crisis: communication, a realistic view of the current situation and an optimistic view of the future, a focus on mission and corporate values, decision-making in an unstable environment, long-term and short-term planning, participation with purpose and humility, levelling the leadership structure, and openness. They state that it is crucial to communicate clearly and consistently with the team about the current crisis and provide assurance that they have all the necessary resources to deal with everyday threats (Kaul et al., 2020). Furthermore, a good team leader should: (1) be flexible and change their decisions according to the new information that has arrived, (2) make difficult decisions focusing on achieving long-term goals, (3) collect feedback from associates for better decision-making, and (4) cultivate a sense of community and be given the freedom to query questions and listen to the different opinions of its members (Kaul et al., 2020).

Researchers began to suggest strategies for changes in team management. Newman and Ford (2021) introduced five strategies that can benefit all organisations currently facing the challenge of team leadership due to the COVID-19 pandemic: establish and explain the new reality, sustain the corporate culture and strengthen the perception of leader trustworthiness, upgrade leadership communication practices and techniques to inform virtual employees better, encourage shared leadership among team members, and create and periodically perform alignment audits to ensure virtual employees are aligned with the organisation's cultural values, including its commitment to mission. Their five strategies are just one of several opportunities

available to team leaders in times of the pandemic and crisis and the current business circumstances.

3 How small companies from the computer programming field adapted their teams in the COVID-19 era: evidence from Croatia

3.1 Research methodology

The aim of this research is to determine what changes in team management have occurred due to the COVID-19 pandemic in SMEs engaged in computer programming in Varaždin County in Croatia. In-depth, half-structured interviews with team leaders in four purposely chosen small companies were held.

3.2 Research results and discussion

The research results showed no significant job changes or needs for reorganisation for most companies due to the nature of work in the industry – they have been working remotely for years. There was a reorganisation at the vertical and horizontal level of the organisation – team leaders take care of their team development and level of education (horizontal) and communicate with HR if they notice less motivation or problems with employees (vertical). Everyone has a role to play in communicating with other people, and short meetings are held daily at the vertical and horizontal levels. There is a lot of help among employees.

Some of the typical problems faced by team management in the analysed companies during the COVID-19 pandemic are as follows:

- a lower level of correspondence with team members when working from home
- timely and transparent communication, especially when some team members are working from home while some are in the company office
- complex maintenance of well-established ways of working and organisational culture in general
- employee alienation and a kind of de-socialisation
- more complex and often untimely giving of feedback to employees

- technical problems and coordination of information transfer that required more time
- difficult access to more withdrawn team members
- fewer employees use the opportunity to present their initiatives and proposals, and the most common reasons are fear and thinking that they have nothing to contribute

When comparing team leaders' answers, there are many similarities since they are in the same business industry. Differences appeared in how they communicate with their teams, the measures they implemented to facilitate adaptation to remote work, and the initiatives implemented for a feeling of purpose. Thus, below the differences are elaborated through the respondents' answers.

The method of communication – The first team leader said they use *Slack* and *Google Meet* for communication purposes and do not panic when someone does not answer immediately. The second team leader said they communicate using *Microsoft Teams* and have daily meetings with their team members. In addition, they send out weekly newsletters so employees are kept up to date on the strategic decisions and other company matters. The third team leader confirmed the use of different collaboration tools for virtual meetings. The last team leader explained their ticketing system, with clearly dedicated tasks among different team members. They also communicate their location statuses, so everyone is informed about the whereabouts of each team member, and use e-mail, *Skype* and *Zoom*. Finally, all companies educated employees about the use of remote working tools, and employees received all the necessary equipment to enable them to working from home that they may not have had prior to the pandemic, and companies were equipped with the necessary equipment for conducting remote meetings.

The measures implemented for facilitating adaptation to the remote work – The first team leader explained that they did not implement any new measures since they worked remotely prior to the pandemic. The second team leader said they started to care a lot more about the mental state of employees, so they implemented regular informal calls whereby employees could discuss their concerns and have the support they needed for all the work they were assigned. The third team leader

pointed out that they only implemented the government's suggested measures and not anything else. The last team leader explained how they enabled greater flexibility so team members could choose their workplace and ease the adjustment to new ways of working.

The initiatives are implemented for a greater sense of purpose in work – The first team leader elaborated on how they use a monthly newsletter to transparently explain the tasks solved, the state of the progress, and what employees can expect in the upcoming period. The second team leader elaborated on the career opportunities available to employees, and they implemented career planning, regular feedback and soft skills workshops. The third team leader explained how they think employees feel a sense of purpose in their work by completing their tasks, and they implemented a new scheme whereby 'employee of the month' is chosen. The last team leader said they implemented employee appraisals, which leads to inner satisfaction if the review is positive. Additionally, they enabled flexible work hours and higher salaries.

4 Conclusion

This paper focused on the issues that COVID-19 caused for team management – reorganising team roles and responsibilities, ensuring timely and transparent communication, adapting employees to new ways of working and strengthening organisational culture to preserve their values. In order to discover the aforementioned issues, in-depth interviews were conducted with team leaders. The interviewees were from SMEs engaged in computer programming from Varaždin County in Croatia.

The research results showed which issues arose in the business area when team leaders managed their members remotely, even prior to the COVID-19 era. The authors of this paper described some ideas that managers can use to better manage their team members. Since COVID-19 has had numerous consequences on mental health, team leaders are responsible for noticing changes in their employees' behaviour, thus daily or weekly meetings have been implemented to keep team members in the loop. Additionally, team leaders can use specific collaboration tools and offer their employees greater flexibility in their work schedules (either by enabling them to work remotely or allowing them to work when it is convenient).

They can start sending newsletters to strengthen the relationship with their employees.

The biggest drawback of the research is the small sample. For any future research conducted in the area of team management, researchers should consider including some other business areas (for example, clothes manufacturing or commerce). There is a possibility that other changes occurred in team management, therefore there is room for more outstanding scientific contributions. This paper can help team managers implement some new ideas into their teams.

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SUSTAINABILITY ACCOUNTING AND REPORTING IN THE POST-COVID TIMES

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Abstract Sustainability is a complex framework for companies to meet environmental, social and governance (ESG) goals together. The focus should be on achieving medium- and long-term goals, and the environmental and social impacts of corporate operations should also be examined. Sustainable accounting and green controlling are the support of the management of a sustainably managed company, which means the accountability of the management on the one hand, and the applicable asset system and reporting on the other. Following and reporting on sustainability goals is no longer a voluntary commitment for companies, rather it is compulsory for them to adapt. With effect from 2024, the EU standard on 'non-financial reporting standards' will come into force. The development of this EU investment classification system, known as the 'taxonomy', is being monitored by investors worldwide. The taxonomy, standards and implementation will certainly generate controversy. In this study, the author describes the importance, essence and content of sustainability accounting and green controlling, as well as the reporting obligation and its tools. The author also clarifies which parameters define the mandatory reporting framework and which are the most important elements.

Keywords:
sustainability,
ESG,
green controlling,
report,
taxonomy

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1 Introduction

Pollution, climate change, the impact of increasing demand for raw materials on the environment, and the transition from a linear economy to a circular economy are all challenging issues and tasks (Koloszár, 2021). After the Industrial Revolution, an increasing number of global problems arose in terms of sustainability, although there were researchers who paralleled the pursuit of sustainability as the opposite of development. In addition, the undeniable ecological and economic crisis of the late 20th century has led to people rethinking their ideas about growth (Mitcham, 1995, Gácsér, Szóka, 2021).

Linking the concept of sustainability and development has been widespread since the 1980s. The term 'sustainable development' was first used by the International Union for Conservation of Nature in its World Conservation Strategy. The work of the World Commission on Environment and Development, better known as the Brundtland Commission, was a real milestone. The Commission presented its report in 1987 titled 'Our Common Future', in which it stated: 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' (World Commission on Environment and Development, 1987).

The concept interprets sustainable economic, ecological and social development in unity. The definition of sustainability used today is a complex framework for companies to meet the goals of the economy, environmental awareness and social justice at the same time. During the operation of a company, its focus should be placed on the realisation of medium- and long-term goals instead of short-term, and the environmental and social impacts of the company's operation should also be examined. Based on this, companies must now meet the needs of all their internal and external stakeholders without compromising the satisfaction of future needs. However, in the interests of sustainability, the goal is to achieve excellent social, environmental and economic (financial) performance, which is not easily measurable, as financial targets are linked to measurable short-term metrics, while sustainability metrics look at long-term data sets.

Pankotay et al. (2020) highlight the lifecycle characteristics of IT assets as one of the factors of sustainability. They address the issues of development contra e-waste and the issues of long-lifecycle contra work efficiency. Unlike the lifecycle analysis of a marketing-type product, the 'green' aspect also appears in the lifecycle in addition to the preparation, production, sales and use phases, which is also required by the EU (Directive 2014/24 / EU) (Pankotay, et al. 2020).

Today, the ESG is a reporting framework, although originally it was only designed for investors, with the original purpose of evaluating the sustainability information published by listed stock exchange issuers. Its meaning has expanded and it no longer just satisfies the curiosity of investors. ESG stands for Environmental, Social and Governance. Within the ESG framework reports should cover these areas or pillars (more in the continuation). The goal of the ESG is to monitor the non-financial risks and opportunities inherent in the day-to-day operations of companies. Today, governments, citizens and companies alike are increasingly interested in sustainability issues. Customers and employees are increasingly looking at what products and services they buy and they prefer both the product and the company to be 'green'.

Let us take a brief look at what these three pillars contain. 'E', i.e. Environmental, is the most complex pillar as it contains several criteria, e.g. greenhouse gases, air, water and soil pollution, i.e. emissions and their polluting effects. These include resource-use issues; the use of virgin or recycled material in production, or the economical treatment of water, energy, forest (timber), and the size of the ecological footprint. Using fewer resources obviously reduces the cost of producing a product and makes the organisation more competitive. Proactivity appears here, for example, if an investment is already planned to be environmentally neutral and/or it uses climate-friendly technology. This in itself can be a long-term competitive advantage. In order to compare companies, it is not enough to use indicators, instead it is necessary to look at the relative indicators for comparability (for example, by dividing the amount of water used by the number of products) and it is also necessary to know the absolute value (larger companies can retain more harmful substances in tonnes). It is even better to compare the indicators to a benchmark, such as an industry average (Herremans, 2020). In the 'S' i.e. Social pillar, companies report on how they take care of the development of their employees, the number of injuries (accidents), the number of training hours, the number of breaches of codes of conduct, the number of minorities in senior management positions, and their

personnel practices. This issue has wide labour market boundaries, which are also closely intertwined with the Fourth Industrial Revolution and digitalisation (Szabó et al. 2021). The 'G' i.e. Governance pillar is about shareholder rights, board diversity and management compensation. It is a question of the extent to which the intentions of owners and management are in line with sustainability goals. What does this mean in corporate governance? The work of management, and thus of finance, accounting and controlling, is also changing, as instead of focusing on short-term financial results, sustainability aspects must be integrated into analysis and corporate governance in the future (Deloitte, 2021).

2 The importance and content of sustainability accounting and Green Controlling

The definition of sustainability accounting is still undefined; it is an inhomogeneous, multidisciplinary and constantly evolving and current field of research. Implementing the need for sustainability has become a common and popular research topic since the 1990s, with the creation of an accounting system for this purpose. The results of sustainability accounting include a range of regulatory frameworks, philosophical trends, training programmes and empirical research that have expanded the literature. Sustainability accounting is really a framework whose primary purpose is to measure organisational performance in terms of sustainability. This performance measurement means that, based on data, the accounting framework must also report on organisational performance from an ecological, social and economic perspective. The primary purpose of the sustainability accounting framework is to define the principles that guide the recording and reporting of accounting information from a sustainability perspective (Lamberton, 2005).

Based on the research of Gácsér and Szóka (2021), sustainable accounting consists of two parts. It is primarily used to measure, analyse and report on the social and environmental impacts and economic sustainability of companies' activities, and secondly, it is a set of principles and guidelines (standards) for the implementation the sustainability from an economic point of view. As part of this, companies must prepare a report on how they have used social and environmental resources and what impact this has/will have on society and the economy (Szóka, Gácsér, 2021).

Sustainability and sustainable accounting have developed partly under legal (political) pressure and partly under social pressure. The European Union has developed a system that lists economic activities that are classified as sustainable, this is a taxonomy. The environmental objectives of the EU taxonomy include climate protection and adaptation to climate change, ensuring sustainable resource management, reducing pollution and maintaining biodiversity. However, in addition to the environmental aspects, it also examines social and governance aspects (non-corruption, compliance with the law, etc.).

Thus, it can already be seen that the aim is to provide EU funding to companies which meet the standards for sustainability goals (and, of course, those that compiled the reports). Compliance with sustainability will be demonstrated by supplementing traditional calculations with a risk and scenario analysis (that impacts and consequences that have an impact on the environment, the climate, and how the company can influence them must also be addressed). It is recommended that companies include the expected negative effects of climate change on the company in the assessments. If these happen, the company will have to adapt.

The purpose of the method called 'Green Controlling' in German and 'Environmental Management Accounting' in Anglo-Saxon literature is somewhat different. The aim is to provide comprehensive support for sustainability management, i.e. the development and implementation of a corporate policy that encompasses the areas of the environment, the economy and society. Strategically relevant tools are the eco-oriented analysis of opportunities and challenges, activity-based costing, lifecycle calculations, the system of eco-accounts in the operational (supply) area, collection of environmental costs (waste, CO_2 emissions), ecological footprint analysis, ecological sensitivity testing, etc. The latter is actually a scenario analysis that considers the opportunities and risks. It is important that economic calculations cover an appropriate period and do not only focus on short-term data and factors. Thus, with relevant data, the analyses already support environmentally conscious decision-making through a variety of cost allocation, investment economy, and performance evaluation tools and methods, hence sustainability will be part of the corporate strategy (Szóka, 2022; Főfai et al. 2021).

3 Reporting obligations and tools

The purpose of the ESG is to analyse the environmental, social and economic aspects of the non-financial opportunities and risks inherent in companies' activities. What exactly does this mean? The answer is not so simple because the ESG reporting obligation is still unclear in many jurisdictions and there are several standards (e.g. GRI, IIRC and SASB[1]). The Value Reporting Foundation will soon be consolidated with the ISSB. Furthermore, the complexity of this is daunting for small and medium-sized enterprises (SMEs). This is supported by the fact that the small business sector contains strongly heterogeneous enterprises. Within this, the purpose of companies operating in the micro-enterprise category is radically different from the financial and economic theory, therefore their evaluation should be treated separately (Koroseczné et. al. 2015). Nevertheless, it is expected that standards will be developed for these companies and that the SMEs that prepare the report will receive EU funding.

The EU Taxonomy defining the ESG is a sustainability criteria system applicable from 2022, and the CSRD (Corporate Sustainability Reporting Directive – sustainability-reporting framework) will be applicable from 2024 onwards.

Let us first take a look at which companies this applies to. From 2022, larger listed companies that have more than 500 employees and/or whose balance sheets total more than EUR 20 million or have sales revenue of over EUR 40 million will be required to report. From 2024, instead of the top 11,700 large companies, 49,000 companies will have to follow detailed EU sustainability reporting standards, as this will also apply to SMEs trading in their securities on regulated markets. The development of standards will be the responsibility of the European Financial Reporting Advisory Group (EFRAG), and the proposed directive proposes that these standards will be developed by October 2022 and October 2023 respectively (first for large enterprises and then for SMEs).

What does the report contain? It first covers the 'eligible' part of the revenue and costs of large companies. The next step is to carry out a detailed screening of the activities considered relevant to see if they can actually be considered sustainable according to the EU Taxonomy criteria system; this is called 'alignment'. This is true

[1] GRI: Global Reporting Initiative, IIRC: International Integrated Reporting Council, SASB: Sustainability Accounting Standards Board, ISSB: International Sustainability Standards Board.

if it contributes significantly to the achievement of at least one environmental objective, does not violate other environmental objectives and complies with occupational safety and human rights conditions (EUR LEX, 2020).

Of course, not all ESG factors apply equally to companies. For example, for a bank, greenhouse gas emissions are not as important as for a manufacturing company. Differences in involvement between sectors are called materiality. Of course, every company reports on its material factors. Since measured data is required, material factors are determined based on financial materiality, i.e. ESG factors that may affect a company's financial performance should be considered material. It can be expressed financially, e.g. unexpected additional costs were incurred, penalties were paid, and brand value or sales decreased, etc. There may be several reasons for this. On the one hand the most important aspect is that in terms of investors and buyers, we are no longer green enough, i.e. our activity is no longer sustainable, while on the other, plain materiality is not enough; 'double materiality' is prevalent. This means that in addition to the factors that are considered financially significant, the factors that are considered socially significant should also be considered in the reporting (Deloitte, 2021a). The latter is more characterised by the GRI, whereas the SASB is limited to financial materiality. The Alliance for Corporate Transparency 2020 survey showed that companies in Central and South-Eastern Europe prefer to consider the GRI framework when publishing their reports (70%) (Alliance for Corporate Transparency, 2020, p.12).

As previously mentioned, there is not yet a standard ESG framework – only the main areas have been identified. Companies decide what the report contains based on the standards of the sustainability report they choose. The framework chosen for the report and the materiality matrix determine what data needs to be collected, of course, these need to be collected in order to produce the report. This is not always easy, as different indicators may have different reporting boundaries. A good example of this is the use of office energy, heating and electricity. When considering energy consumption, both can be Scope 1 or Scope 2[2] greenhouse gas emissions, depending on whether the energy is produced in-house (an on-site boiler) or sourced from a service provider (district heating) Deloitte (2021b). Leaving aside this example, it will still be difficult to obtain data, especially at the start, therefore it is

[2] Scope 1: greenhouse gas emissions from business units controlled or owned by the company. Scope 2: Emissions from the production of heat, electricity, cooling or steam purchased by the company.

necessary to find and identify the data sources or the persons or departments responsible for them.

A coordinate system is thus created. On one axis of the matrix is the question: 'How important is it to stakeholders?' (Importance to Stakeholders), while the other axis has the question: 'How much does it affect business success?' (Influence on Business success), and ESG KPIs are placed in this coordinate system. There is no single list of KPIs, as it depends on the standard and the activity, of course, and one will be examined by a producing company and the other by a bank.

Without claiming completeness, let us take a look at a couple of indicators. An economic indicator can be, for example, sales revenue, its growth or the amount of taxes paid. Environmental indicators, e.g. the amount of CO2 emissions, amount of waste, kilowatts of energy used. Social indicators, e.g. staff turnover, number of injuries (accidents), or the number of training hours. Once these have been considered, it is necessary to determine their place in the matrix, their impact on the value of the company, the planned value and the initiative or project with which the planned value is to be achieved. The standard helps to define reporting practices and explains how impacts can be identified and evaluated together with their significance[3]. (Priorities need to be set, not all indicators need to be reported.)

This is no small task, and companies that have it need to define (fix) the data collection process in a document (talk about the data generated or an estimate of where, from whom it came, who is the data owner, etc.). As in all areas, it is important that the opportunities offered by digitalisation are used in the preparation of ESG reports. According to Hegedűs and Benyó (2020), all programmes that support audit work prioritise Cloud applications, and by applying the workflow, the process becomes more transparent and better organised. Of course, this no longer only applies to the audit area, but to almost every area of our lives, as the existence of Cloud storage increases efficiency, helps the home office, and overcomes geographic distance. Digitisation has several additional benefits in addition to the use of Cloud storage, which can also facilitate compliance with ESG, such as digital signatures and authentication (Hegedűs, Benyó; 2020).

[3] The GRI classifies standards into the groups, general, sector-specific and topic-specific.

4 Summary

Defining and analysing indicators and preparing a report is a huge task which requires a good team and knowledge. Knowledge can be acquired through various courses, diligence and research, however, nowadays IT knowledge is essential for these. The lack of a skilled IT workforce greatly hinders the stable operation of the economy (Hegedűs, 2021). The corporate team (accounting, analysis, controlling, auditing) must also have knowledge, hence it is important to prepare. It is necessary to understand what ESG is, what standards exist, which standard imposes which requirements on the company and what aspects are relevant. Those responsible must be assigned (data owner) and the appropriate information provided. It will soon be possible to say that ESG – compliance with it – will be part of everyday life, however, it will only work if the appropriate resources are available (people, knowledge, hardware, software).

The control environment for the ESG reporting process needs to be developed and, of course, it have to be analysed and monitored. Consideration of sustainability in business operations will be achieved when the mindset changes of management and owners. Revenue, profit and cash are important, however, work can only be sustainable if a sustainable medium- and long-term perspective emerges instead of short-term profit maximisation. In addition to the economic aspects, the environmental and social impacts of corporate operations must also be analysed. This will reduce the business risk and may make an organization more attractive to investors and other stakeholders. This, however, is easy to say, but much harder to implement. Taxonomy and clarification of detailed regulation will take time and is sure to generate controversy. Companies want less stringent regulations and longer application deadlines, and legislators are pushing for stricter regulation. It is also a political tool and an issue. In the author's view, compiling sustainability reports is seen by companies as a nuisance and not an option – even in the European Union. It will be a few more years before EU uniform standards are established and operational, and even then it is unlikely to be worldwide.

Note

JEL codes: Q56, L10, F60, M42

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Development Of Managers' Emotional Skills in the Context of Post-COVID Times: Lithuanian Case

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Abstract The emotional skills of managers and emotional environment suitable for productive results during the lockdown in organizations of Lithuania will be discussed in the paper. It is significant to raise managers' emotional capacity, to gain special skills and knowledge for successful collaboration and efficient results in online work during pandemic situation and post-COVID times. The goal of the paper is to explore managers and other employees' emotions. For this reason, it is very important that managers envisage how to develop their emotional skills, to motivate themselves and others in the context of online working during pandemic situation and post-COVID times. Research problem – managers lack sufficient knowledge and skills about the importance of emotional skills for communication during online working in the context of post-COVID times. Research methods – scientific literature analysis, quantitative (questionnaire) study, and descriptive analysis. The findings of the pilot study demonstrate that managers do not have enough understanding about the importance of their own and other peoples' emotional skills during online working and in the post-COVID times. What is more, the findings of the pilot study demonstrate that managers have deficiency of emotional intelligence and there are some challenges for its development.

Keywords:
managers,
communication,
emotions,
skills,
post-COVID
times

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1 Introduction

Navigating the world of necessary skills and careers has never been more bewildering in the digital age as it is in the 21st century. This issue is emphasized by researchers such as Susskind (2015), Mayfield (2014), Frey & Osborne (2017), and others. Of course, the economic, financial, political, cultural and other contexts in the world also have a profound impact on managerial work. Such an environment is not only important for current managers, but also for those of the future. According to the requirements of Industry 4.0, managers' skills are related to communication, management, leadership, creativity, flexibility, responsibility, inspiration, motivation, informatics and digital competence (Burtless, 2015; Oliver, 2020). Managers' skills are the ability to do what they are doing well, using their physical, mental, emotional and professional understanding, knowledge, and ways of problem-solving and decision-making (Hawksworth, Chan, 2015). Managers' skills are influenced by individual differences, emotional intelligence and individual personality traits.

The global pandemic (2019-2022) led to a new approach to the digital and responsive working environment. People became more sensitive and temperamental. Managers, therefore, should change their attitudes towards employees and pay more attention to their own and co-workers' needs and expectations.

The object of this paper is managers' emotional skills in the context of post-COVID times.

The aim of the paper is to identify the criteria of managers' emotional skills in the context of post-COVID times.

The problem of the paper: managers do not make ample use of emotional skills for effective organizational development in the context of post-COVID times.

Managers' skills for organizations' requirements are investigated using a scientific literature analysis and a quantitive study.

2 Managers' work and emotional skills in post-COVID times

The 2021 analysis of the World Development Report (WDR) showed that anxiety about the sweeping impact of technology on employment is, on balance, unfounded. Rapid technological change, the pandemic, and the war environment create a new and sensitive work environment. Managers' traditional skills also require a new approach to organizational development in post-COVID times. Managers have to create a working environment based on trust and safety. It is important to structure managers' careers so that their work will be in demand in post-COVID times. There are some transfers poised to modify the nature of work itself after the pandemic in which new managers' skills become important. *The main skills of managers include communication, management (delegation, responsibility, time management, problem-solving, decision-making, teamwork), leadership, trustworthiness, motivation, inspiration, creativity, emotional sensitivity, intuition, critical thinking, and others.* All the aforementioned managers' skills are important, however, after the lockdowns managers found themselves having to develop their communication and emotional skills.

Managers' communication skills play a key role in organizational development. For a better psychological climate in the working environment, managers have to create a sensitive and non-intimidating atmosphere. Managers should motivate employees in order to increase their sense of well-being, thus leading to better productivity. The WDR 2021 notes that: '*The case of COVID-19 shows that boosting one can often have positive implications for the other...". (T*he 2021 World Development Report).

For most employees it is essential that they are able to use their talents and abilities in the workplace in the post-COVID times. It is also an opportunity to improve, grow, take on new responsibilities, increase one's power to take independent decisions after the lengthy lockdowns, and feel a sense of satisfaction. Employees have a clear understanding of this purpose and are enlightened by management as to how their roles help to achieve the company's mission (Joseph C., 2014).

The psychological climate in an organization is one that treats every employee fairly. It is important to create a good relationship between colleagues, employees, and their managers, in order to develop teamwork in the post-COVID times. All this is based on respect for employees as well as clear communication (subordinates should know what is expected of them, what requirements they have to meet, and according to

which criteria their work is to be assessed). Employees want to feel involved in the company, understand what the situation is, to participate in the planning and decision-making.

When managers communicate with employees, they gain valuable insights into the working atmosphere, such as learning about small problems before they can escalate.

Interpersonal communication reflects the interaction of managers' emotional capacity with employee behavior. Managers' communication skills are part of the chain of factors related to their emotional capacity. People's emotional capacity often determines the effectiveness with which they are able to making rational decisions. Managers may have full intellectual command of the principles of total quality management, yet still be emotionally incapable of allowing a subordinate to do things their own way (Argyris, 1964). Therefore, managers as good communicators are in charge of building up productive interpersonal communication and are responsible for the content of each message. Hence, they need a perfect combination of cognitive skills: speaking, active listening, writing, reading comprehension and critical thinking. Managers must delegate tasks and share information in different forms, such as written, spoken, and visual. For this reason, managers need to develop their competence of technical content creation. Thus, the competence of the digital creation of content has become very important. Moreover, managers need a high level of critical thinking and adaptability to fast changes and must possess the skills to not act as usual, but rather according to the situation 'here and now'.

Communication is extremely important for the delegation of different tasks and explanations about various activities. These actions are at the forefront in terms of managerial skills. The main managerial skills are problem-solving, delegation, responsibility, time management, and teamwork. In the post-COVID times, problem-solving has become a huge part of career development for managers. Career specialists help managers to grow their personalities via problem-solving and making informed decisions (Dislere, Vronska, 2020). The authors mentioned that during the pandemic, it would be good to help managers cope with a new situation, not lose focus and solve problems in a 'win-win' way. Nowadays, managers have to take into account that the world is changing and these processes are explicit in their and others' daily lives and work.

One of the main activities of managers is to create professional relations with employees in post-COVID times. Managers need to discover what each employee enjoys doing most. Managers should ask themselves if they offer praise and positive feedback, create harmony, listen, motivate, reserve judgment, and treat everyone fairly and on the basis of merit. Managers' main responsibilities are clearly communicating tasks to employees, selecting the right person for each task, proactivity, and looking for opportunities not for problems. In the workplace, managers offer frequent and constructive feedback to employees. The purpose of the feedback is to help employees identify and understand areas where improvements are required as opposed to chastising them for mistakes (Joseph, 2014). Moreover, it is important that managers keep up their certainty level,- while guaranteeing everybody that accidents can happen and the imperative thing is to concentrate on the bigger work objectives. Moreover, the discovery of what each employee most enjoys doing will demonstrate that the manager trusts and has confidence in them, and will free employees up to concentrate on the most pressing assignments. Therefore, managers' trust in their colleagues is an indication of quality rather than a shortcoming. Assigning tasks to the appropriate divisions is one of the most imperative standout skills that managers can leverage for the effectiveness of the organization.

When talking about workplace attitude in contexts of uncertainty, it is important to understand the value of workplace relationships and communication between managers and employees as well as between managers themselves (Harrell, 2009). Most of the understanding of cultural and social surroundings comes from communication, and in order to ensure proper communication, employees must form amicable workplace relationships with their colleagues and employers. A certain level of understanding is required among employees and managers, not only to create a pleasant atmosphere but also for productive work. A lot of miscommunication can lead to an uncertain workplace environment, hence communication and relationships are extremely valuable attributes. Leading organizations practice strong core values based on integrity. These values need to be more than words in a human resources manual; management personnel should practice these values in daily functions and require all employees to do the same (Joseph, 2014; Makkar & Basu, 2019). The value system has become particularly significant in post-COVID times.

It is vital for managers to figure out how to conceive brand new ideas, make the most appropriate decisions, and steer their employees in the correct direction. Moreover, by having the capacity to allow employees to concentrate on the future objectives, managers need to ensure employees remain stimulated while maintaining their resourcefulness and vitality. It is essential that managers maintain the workplace mindset in harmony with the achievements of the organization (Iguodala-Cole, H. I. 2021). Managers must demonstrate positive emotional skills in post-COVID times. Empathy is a significant dimension of good relationships in the workplace and is an important part of emotional intelligence (Goleman, 1998, 2020). Employees' high self-esteem and awareness are an internal reference for managers, who should ensure that employees' defenses are minimized, they do not feel anxious in the workplace and are not afraid to ask questions, while also being open to communication. Managers could demonstrate high interpersonal competence and interactions dominated by positive regard, inquiry, acceptance of feelings, commitment to process, authenticity, honesty, desire for feedback, flexibility, appropriate assertiveness, and mutual trust. Managers have to understand the expression of feelings as valid communication and an emotional connection to actions. Managers' contact with others could be as recognition of inherent values of people and processes as well as the attainment of goals. Practice and open acknowledgment of ethics, integrity and positive regard could be the main agents in managers' work in post-COVID times.

3 Methodology

In order to analyze managers' emotional skills, a pilot quantitative study (questionnaire) was designed by the authors. Ninety-six managers from different types of organizations took part in the pilot research and answered the questionnaire expressing their opinions about the criterion of managers' emotional skills. The results were amended using MS Excel and descriptive analysis.

A quantitative research method enables information to be collected about managers' emotional skills and helps original facts to be discovered that are useful for interpretation and discussion. In the scientific field (DeFranzo, 2011; McLeod, 2017) there are mentions of some methods of quantitative information gathering: various forms of surveys (internet, paper, phone conversations, discussions, and others); systematic observations (DeFranzo, 2011); experimental methods (McLeod,

2017). DeFranzo (2011) emphasizes that a quantitative method of data collection is more structured than a qualitative method because the former is related to numbers, logic, and an objective attitude. This method is applied to construe a phenomenon, to understand problems, and reveal causes, and at the same time is used for scientific discussion. The quantitative method (questionnaire) of the study was applied to find out about respondents' necessary emotional skills during the post-pandemic situation. To investigate respondents' attitudes toward the main criterion of managers' emotional skills necessary during the post-pandemic situation, a questionnaire containing ten questions was designed. The respondents were asked to answer the open and closed questions as well as some statements expressing their opinions of what emotional skills are the most important during the post-pandemic situation in Lithuania. The questionnaires were anonymous, the answers were marked by indicating numbers on a Likert scale (from 5 to 1, where: 5 – very favorable and 1 – not favorable).

4 Study results

In order to find out respondents' opinions about managers' emotional skills, they were asked to evaluate (from 5 to 1) which of the given emotional abilities are important for managers' work. The results revealed the fact that the respondents think that the biggest influence is managers' empathy to keep good relationships in the workplace (the average of the evaluation is 2.7) (Table 1).

Table 1: The results of the study into managers' emotional skills

Criterion	Number of Respondents (N)	Average (M)
Managers' ability to create psychological wellness in the workplace	96	1.5
Managers' sensitive and polite emotional tone	95	1.95
Managers' ability to control their emotions	96	1.84
Managers' ability to understand the mood and emotions of employees	96	2.31
Business communication demonstrates managers' respect for employees	96	1.62
Managers' empathy is a significant ability to maintain good relationships in the workplace	96	2.7

They also agree that it is very important to understand the mood and emotions of employees (2.31) as well as managers' sensitive and polite emotional tone (1.95) (Table 1).

The managers were asked to express their opinions about understanding employees' emotions and feelings. The results are shown in Table 2.

Table 2: Do you understand employees' emotions?

	No. of respondents	Percent
Yes	46	47.5
Partly	26	27.5
No	24	35.0

Among the respondents, 47.5 % stated that they understand their colleagues' and employees' emotions and can communicate with them in an appropriate way. However, 35.0% (Table 1) of the respondents said that they do not understand other people's emotions and do not consider it important. The findings reveal that managers lack emotional intelligence skills. Therefore, it can be stated that managers need emotional intelligence training so that they can be more sensitive with their colleagues. Some researchers, e.g. Makkar & Basu (2019) and Oliver (2020), support the importance of emotional intelligence development in the workplace.

5 Conclusion

The pilot study showed that there is room for the development of managers' skills and emotional capacity in the workplace. The pilot study on managers' emotional skills revealed which emotional abilities are important for their work. The study showed the fact that, according to respondents' opinions, the biggest influences are: *managers' empathy to maintain good relationships in the workplace* (the average of the evaluation is 2.7), *understanding of the mood and emotions of employees* (2.31), and *managers' sensitive and polite emotional tone* (1.95). Furthermore, it could be stated that managers' emotional skills and components such as empathy, a sensitive and polite emotional tone, and warm collaboration can be the main features of the development of managers' competence.

The study has demonstrated that managers in Lithuania are not sufficiently prepared for the new post-COVID work environment and need to develop their emotional sensitivity. Based on the study findings there are some recommendations. First, by eliminating the use of unfamiliar and threatening communication in order to provide a trustworthy and user-friendly emotional framework. Second, building emotional capacity is a developmental issue. Third, looking at managers' and employees' emotional power as a source of human potential. Fourth, it would be useful if organizations start talking about encouraging emotional readiness throughout the company as opposed to curing the defensive practices of a troublesome few. If humanity had devoted even one-millionth of the resources we have used to develop rational technology to the development of emotional power instead, we would not now be faced with such grievous conditions of social and economic distress in the post-COVID times. Therefore, it is crucial to comprehend and accept that human technological and rational abilities far outstrip their emotional sensitivity to use wisely. Thus, organizations must be more willing to invest in the development of employees' emotional power in these post-COVID times.

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DEFINING AND EVALUATING THE INFORMATION CONTENT OF SUSTAINABILITY REPORTS

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Abstract Environmental, Social and Governance (ESG) is a company framework that focuses on environmental, social and corporate governance sustainability. Incorporating ESG into company operations plays a significant role in investment decision-making and can provide a significant advantage over competitors. The challenge is that the ESG does not yet have uniform standards, but several international initiatives have been launched to develop these standards. The European Union's ESG reporting framework is already being developed and is expected to enter into force in 2023. The purpose of reporting is to show how the company fits into its global sustainability goals. The number and depth of ESG topics is significant. The chosen framework will determine which topics are relevant to the company. The aim of our study is to identify and examine financial, economic information and possibilities and methods from which the objectives set out in the Sustainability Report can be verified for both internal and external stakeholders; in this paper we deal with the private sector only. It is important to note that the preparation of a sustainability report will be data-intensive and successful reporting will depend on existing, well-designed reporting systems.

Keywords: sustainability, ESG, sustainability report, EU, reporting framework

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1 Introduction

Recent years have shown that global demand for resources is greater than what the Earth can provide. In order for companies to move to net zero emissions cost-effectively, close collaboration with the latest technological innovations is needed. In doing so, companies can protect both their competitiveness and the environment.

By optimising the use of renewable resources, increasing (maximising) the life of products and the use of waste, the benefits of a circular economy[1] can be increased. However, the transition to a circular model often requires a transformation of the business model – one factor of which is digitalisation. For digitalisation to be effective and new technologies to work well, challenges must be overcome that involve the use of digital solutions. The level of investment costs and return on investment must be taken into account from the very outset. In addition to creating other conditions for digitalisation, it is also necessary to think about whether workers are competent enough to use new technologies and, if not, a decision has to be made whether to spend money on further training or to look for new employees. These are all factors that require careful consideration and are essential to staying ahead of the competition. Digitisation has different effects in all areas, thus it also affects accounting and taxation systems (Hegedűs, 2019a).

The ESG is a company framework that focuses on environmental, social and corporate governance sustainability. However, integrating ESG into company operations is not just for branding goals. The integration of sustainability objectives also plays a significant role in investment decision-making. On the investor side, an increasing amount of capital can be seen flowing into the so-called green investments (Máté, 2022). The challenge is that there are not yet any uniform standards of measuring ESG, however, several international initiatives have been launched to develop standards. The introduction of standards will play a major role in making companies more comparable in terms of sustainability, thanks to a common methodology. Thus, if standards are created, the risk of a company communicating about its sustainability more or differently than it actually makes is reduced.

[1] The circular economy is closely linked to the concept of sustainable development: the process meets the needs of the present without reducing the ability of future generations to meet their own needs.

The operating framework of a sustainable company also means that the organisation actively manages and understands the environmental, social and governance impacts, and ensures that the business model remains viable in the future. Companies face a variety of challenges and issues in their transformation of ESG. The introduction of ESG must take into account the dynamics of the industry, the company's strategy, existing and changing regulations. A company-specific sustainability strategy needs to be developed to implement the ideas. By providing management support, there is a need to intervene in operational processes and involve the green perspective of investors in value creation. This schedule then needs to be incorporated into the workflow and company culture. In order for sustainability to be integrated into the performance management system, it will be necessary to build appropriate measurement and incentive systems.

2 Sustainability accounting and its features

In addition to maximising profit, companies need to pay increasing attention to environmental impacts, thus expressing their environmental responsibility through accounting tools. For example, the unreasonable use of resources and the emission of pollutants must also be examined emphatically. Today, strategic management must deal with the protection of the natural environment as well as the well-being of people. Sustainable strategic management enables companies to use strategic tools and methods to link social, environmental and company management and strategies, and integrates social and environmental information with company governance information and sustainability reports (Fülöp, Hódi Hernádi, 2014).

A wealth of information is required to assess the use of resources and their impact on the environment and society. The source of the information and the data owners must be sought, and the process must be documented. However, the collection of information is not enough, as this data needs to be systematised and analysed. The biggest challenge, in addition to collecting data, is to define units of measure that can be used to quantify the extent to which each event has had an impact on the environment.

According to Schaltegger and Burrit (2010), sustainability accounting is the pinnacle of accounting because it examines a company's operations along environmental, social and economic lines (Schaltegger, Burritt, 2010). The purpose of a sustainability accounting system is to measure a company's performance from an economic, social, and environmental perspective. Within the company, it is particularly important how the business interprets sustainability, what strategy it follows and how it can make its related goals measurable. It reflects the financial consequences of the environment and society for the company and vice versa – the effects of company activity on the environment and society – and examines the interactions and relationships between the three dimensions of sustainability (Fülöp, Hódi Hernádi, 2014). The information used in the analyses should be understandable and clear to both external and internal users. This allows external stakeholders to assess the impact of the company's economic activity on society and the natural environment, or they can compare the results with those of a similar organisation. For internal stakeholders, sustainability accounting also plays an important role in governance, as it helps in making decisions and provides a basis for preparing for a possible intervention. The results of the measures taken to achieve the sustainability objectives can be assessed using the results of the accounting.

Figure 1 shows the process with the five components of the sustainability accounting framework. Point 4 (Reports) is discussed in the next section.

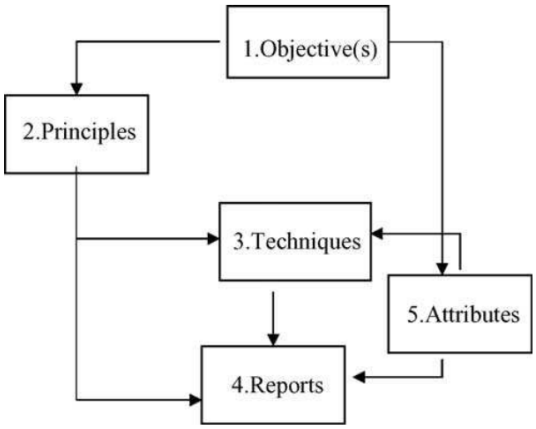

Figure 1: Components of the sustainability accounting framework
Source: Lamberton, 2005, p.16

3 The Sustainability Report

In the European Union, Directive 2014/95/EU of the European Parliament and of the European Council requires that large companies that are public interest entities and exceed the criterion of an average of 500 employees during the financial year (the balance sheet date) must also include a non-financial statement in their management report, which includes the information necessary to understand the financial year. The aim of the directive is for companies to develop methods that promote the integration of non-financial information, taking into account existing frameworks. These include, for example, the development, performance, position and impact of the business – at least in relation to environmental, social and employment issues – respect for human rights, anti-corruption and bribery (PricewaterhouseCoopers, 2022). Disclosure of non-financial information helps to monitor and manage the measurement of business performance and its impact on society.

However, reporting practices need to be greatly improved as companies do not report to a uniform standard and use different methodologies, making comparisons impossible within and outside the sector, regionally and at the company level. The International Business Council (IBC) and the World Economic Forum (WEF) have proposed the development of a methodology that includes both general, financial and quantitative metrics (Ransom, 2021, 2021). This would make it easy to integrate into the sustainability framework used by companies, thus making different reports comparable. These methods have been developed by professional organisations such as the GRI[2] and the CDP (Carbon Disclosure Project). As the application of standards was not widely mandatory, there have been harmonisation efforts in the past, however, full convergence and standardisation have not yet been achieved. As a result, the reports were not complete, factual, reliable and comparable, and lacked an investor approach.

[2] The GRI can be seen as a framework that can be applied to any organisation in the world – large or small. The principles of GRI reporting can be divided into two groups – the principles of the content of the report, and the principles of the quality of the report (GRI, 2015). The methodology of the framework is constantly evolving, although many companies report according to the previous methodology (e.g. GRI G3 or G3.1), GRI G4 was replaced in July 2018 by GRI Standards (Szennay, Szigeti, 2019).

4 Methods for data collection, measurement, recording and control of data

One of the biggest current challenges in the joint effort for sustainability is the availability of reliable data. At present, it is still not mandatory to report in Hungary according to an international standard (e.g. Global Reporting Initiative), however, the recommendations of the Budapest Stock Exchange ESG already contain specific requirements for issuers (Becsei et al., 2021). However, European Union regulations could make a difference in this respect, therefore an objective, common and equally measurable system of indicators would be a major step forward.

One of the most popular reporting standards in the international market is the Global Reporting Initiative (GRI), whose comprehensive framework includes various indicators. The explicit principle of the standard is that reports should be prepared taking into account materiality considerations.

If a company is unable to comply with this, the presentation of the information must be substantiated taking into account the timeliness of the data. Thus, the authors of this paper are convinced that the GRI-based sustainability report, as well as the annual report and the business report regulated by the Hungarian accounting act (Act C of 2000), are suitable representatives of Corporate Social Responsibility (CSR), however, the picture obtained from the documents of the two sets of rules may differ.

There are a number of ways to collect and record data, although it is worth pursuing the cost-benefit considerations. The economic, social and environmental data collected can be used to measure a company's sustainability performance, however, this requires a variety of performance indicators as well as evaluation methods. For example, the most complete tool for strategic management is the Sustainability Balanced Scorecard (SBSC), an integrated system of indicators for assessing a company's performance, which is used to inform Indicators and monitor the achievement of goals. The SBSC also includes Key Performance Indicators (KPIs) and perspectives on sustainability, i.e. the idea of sustainability is integrated into the framework of the SBSC. This can be achieved in several ways, for example, by supplementing the indicators of the perspectives with the topic of sustainability, or

the framework containing not four but five perspectives, with sustainability as the fifth (Szóka 2022).

One of the main documents of the sustainability accounting system is the company's balance sheet, which presents a company's assets, equities and liabilities. Based on the general ledger statement (accounts), the values that can be related to environmental protection and sustainability should be highlighted from these data. Let us look at a few specific examples. In the case of tangible assets, environmental protection devices (such as an electric car instead of the old petrol engine) or CO_2 quotas in stocks can be displayed as a separate item. The ratio of a company's tangible assets to environmental protection can easily be determined in relation to all tangible assets, as well as their development, opening value, change in stock and depreciation. Also on the asset side, the proportion of carbon dioxide in stocks or how much it received free of charge from the state in relation to total inventory values should be examined. Among the liabilities and equities, it is important to define a provision for environmental liabilities or one to cover the emission quota. In the case of a provision, reserves for environmental liabilities, soil and groundwater remediation tasks and follow-up processes must be shown. This may be among the short-term liabilities, for example, a loan from an organisation to cover a CO_2 emission quota. In the case of accruals, the amount of the emission quota or other performance incentive received free of charge must be shown as a separate item.

In the Income Statement, the authors of this paper recommend that items related to environment protection and social activity are highlighted up to the level of operating profit. Companies required to report on sustainability must provide details of revenue, costs and expenses for audit purposes. Let us look at some examples of this, too. From the net sales revenue, for example, the revenue from the sale of CO_2 quotas can be highlighted. From other incomes, for example the provision for CO2 quotas or other environmental protection can be highlighted. Among the material-type expenses, the costs for environmental protection, waste recovery and disposal can be highlighted, or the amount of the CO_2 quota (the amount for the CO_2 quota was purchased), the cost of education or the cost of healthcare from the purchase value of the goods sold. If the general ledger statement (accounts) is compiled in sufficient detail during the business year, the accounts for these costs can be immediately recorded in the appropriate general ledger account and the year-end Income Statement can be easily compiled. It is expedient to show as a separate item

the depreciation of tangible assets acquired for environmental protection in the given business year compared to the total amount of depreciation. Other expenses include those related to the CO_2 quota, impairments, the total sum of provisions for environmental protection, specific subsidies and benefits (Fülöp, Hódi Hernádi, 2014).

5 Discussion

The authors of this paper are of the opinion that performance data should be included in the annual reports in an integrated manner. By defining this information, an effective planning, decision-making process and control system can be implemented. In this case, efficiency means that this can be ensured in a timely manner, with the right quality and within a defined budget. If the reports are standardised for all companies, then shareholders, customers, business partners and institutions dealing with sustainable development issues will receive comparable information about the company's results and performance.

The transformation and gradual modification of an existing accounting system does not cause as drastic a change in the operation of a company as it would if the company had to introduce an entirely new system. In the authors' view, for companies in which a transformation of the accounting system is not possible, a new stand-alone information system is needed in order to prepare sustainability reports. It is necessary to clarify the information content of sustainability reports and the method of their evaluation. The SBSC is a recommended tool and, of course, the parts of the annual accounting report should be linked to sustainability. In addition to defining financial ratios, the employment of well-trained, creative and motivated employees, a quality and innovative approach to the operation of the business, a commitment to safety, health and the natural environment, and a lasting and fair business relationship are important and fundamental values.

In today's fast-paced, changing world, to meet the need for change, companies are taking advantage of the opportunities offered by digitalisation. Digital development also contributes to the efficiency of companies and significantly reduces the use of paper, among other things, thus placing protection of the environment at the forefront (Hegedűs, 2019b). Unfortunately, due to archiving and administration, in

practice, electronic invoices are printed on paper. These invoices should only be stored electronically.

There are several initiatives in the European Union. The non-financial reporting ecosystem is changing at an accelerated pace. The European Financial Reporting Advisory Group (EFRAG) and the International Sustainability Standards Board (ISSB) have both already issued first drafts of the sustainability reporting standards. The EU Taxonomy Regulation provides guidance to both funders and companies; its first supplementary regulations were implemented in 2021 (International Federation of Accountants, 2021). The draft EU standard for non-financial reporting is expected to enter into force by 2024. In November 2021, the issuer of International Financial Reporting Standards announced the establishment of a new standard-setting body – the International Sustainability Standards Board (ISSB). The Board aims to establish a comprehensive agreed framework, taking into account Central Securities Depositories Regulations (CSDR), which provides internationally accepted, relevant and comparable information to investors and capital market participants. Greenwashing has become a real risk in recent years, which shows that companies have recognised that taking action on climate or social issues is important for their stakeholders. One of the problems these days is that companies can make findings that no one can really verify. This makes it extremely difficult for stakeholders to make effective capital allocation decisions.

High quality global standards for the disclosure of sustainability information can help in this, thus significantly reducing the risk of greenwashing. If a company's accounting system links social and environmental issues to financial opportunities and controls it, it can preserve and increase the company's economic opportunities.

This study addresses the private sector. This limits the organisations analysed in the study, as it only covered for-profit companies. However, sustainability reports should be compiled by all institutions, as they have an impact on their social, economic and economic environment in the course of their activities. The fact is that private sector companies are more willing and flexible to produce such reports. The authors of this paper are of the opinion that non-profit organisations are not yet prepared to compile such reports. It would be useful for all organisations to produce a sustainability report in the future.

6 Conclusions

The aim is to develop a management accounting model that supports the definition of environmental, financial and social indicators and the integration of these indicators into practice. With the tools and methods of management accounting, this model can emerge in company information systems, providing an opportunity to integrate sustainability practices and company strategy. Thus, company social responsibility and sustainability become supportable through management accounting. The biggest challenge is to develop appropriate measurement systems that can be used to quantify the extent to which certain environmental impacts have changed the company's financial and financial position. Displaying these costs is also a problem for businesses, as in most cases environmental costs are treated along with overheads. The development of a reliable indicator system is essential for accurate, detailed measurement and comparison of environmental, social and sustainability performance.

KPIs should be defined through regular reporting, which should be continuously developed, and the circular system should be integrated into sustainability reports. The reliability of the data requires a wide range of expertise from both institutional, investor and audit perspectives. In most cases, the prudential assessment of the non-financial risk of businesses is assessed with the help of rating agencies. This is because non-financial reports provide a wide range of information and because the reports are very different in terms of both form and content.

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UNDERSTANDING SOCIETY 5.0 JOBS FOR IMPROVING EDUCATION 4.0 – AN ANALYSIS IN PYTHON

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Abstract Developments in science and industry have a direct impact on human life by contributing to development of societies throughout human history. Developments in information, internet technologies and Industry 4.0 accelerated the digital transformation of the industry. As a result, factories have been equipped with 'smart' technologies and new skills are needed to use these smart technologies. These skills have changed job descriptions and new graduates now start to work in jobs that never existed in the past. After the transformation from an industrial society to an information society with Industry 4.0, the aim is to reach Society 5.0 as a new level of social development. Therefore, graduates will need to have new skills to adjust to Society 5.0. In this study, International Standard Classification of Education 2020 data were analysed according to gender, age and educational level using machine learning in Python. The types of jobs that are most in demand were identified. Consequently, the sector and job preferences of new graduates were determined according to their educational levels. This study fills a gap in existing literature by analysing the trendiest positions in the industry so universities can prepare their students for these positions within the Education 4.0 framework.

Keywords:
Education 4.0, University 4.0, Society 5.0, digital transformation, data analysis

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1 Introduction

Industry 4.0 is a period of knowledge and innovation. The term 'Industry 4.0' was first used in Germany in 2011 during Hannover Messe, the world's largest industry fair (Mosconi, 2015; Aybek, 2017). The German government initiated the project, which was based on high-technology strategies. The internet of things, the internet of services, cyber-physical systems, and smart factories were used to usher in the fourth industrial revolution in industry. This revolution was also positioned as a new level of product lifecycle value chain organisation and management.

Despite the fact that efforts to adopt the concept of Industry 4.0, which was born in Germany in 2011, and continuing criticism of the subject worldwide, Shinzo Abe, the Prime Minister of Japan, one of the leading countries in technology development, mentioned the concept of 'Society 5.0' at the CeBIT 2017 Computer Expo. "Technology should not be viewed as a threat, but rather as a help," urged Shinzo Abe. However, it was earlier reported that Society 5.0 was born out of a strategy plan in the sphere of science and technology in Japan (Saracel & Aksoy, 2020; Develi, 2017; Keidanren, 2016).

The goal of Society 5.0 is to improve people's welfare and, as a result, society's welfare by adapting technology to social life. As a result, rather than a society that fears and hesitates to embrace technology, the goal is to develop one that uses, assimilates and benefits from it (Saracel & Aksoy, 2020; Gokten, 2018). Another goal of the Society 5.0 proposal is to make society ready for and compatible with the Industry 4.0 process, which will inevitably lead to digital transformation. Thus, at the expected social welfare level, everyone will have a safe and harmonious living environment in which they can produce value, regardless of time and place, following the hunter society, agricultural society, industrial society, and information society (Sahin, 2021).

Industry 4.0, along with Society 5.0, will have an impact on the required skills and knowledge of human capital (Puncreobutr, 2016; Aybek, 2017). Individual skill sets and understanding must be updated to meet the demands of the evolving digital world (Sinlarat, 2016; Weber, 2015). In contrast to past periods, a higher level of competence will be required (Bonekamp & Sure, 2015). This means 'people skills, good oral communication and persuasion abilities, critical thinking, coordinating

with others, emotional intelligence, judgement, service orientation, bargaining, and cognitive flexibility,' according to the World Economic Forum (2016). As a result, in order to provide youngsters with all of these new abilities, higher education institutions and universities must undergo a metamorphosis. This brings us to the concept of Education 4.0.

The knowledge economy and Education 4.0 jobs require less and less of what individuals know (concepts and theories) and more and more of how people use digital skills, information and technologies in an interoperable manner. Education 4.0 is promoting a new educational paradigm focused on the use of applicable skills and the need to upgrade and requalify, unlearn and relearn (Hong & Ma, 2020).

According to the OECD (2018b), students will be required to use their knowledge in new conditions in a world that is rapidly evolving, and they will require a diverse combination of cognitive, social, emotional, practical and physical skills to do so. The World Economic Forum's Future of Jobs 2020 Report (WEF, 2020b) also notes that the COVID-19 pandemic and the resulting worldwide economic collapse hastened the advent of the future of work. According to the World Economic Forum (WEF, 2016b, 2020a), 65% of 21st century pupils will work in occupations that do not yet exist when they start school, and they will also require digital skills to satisfy the demands of the new Fourth Industrial Revolution jobs. Industrial revolutions have historically not only influenced production but also education (Azmi et al., 2018).

The training of teachers and the organisation of educational institutions must be considered as part of Education 4.0. According to Goh and Abdul-Wahab (2020), teachers are at the forefront of student education, and they must be trained in new teaching approaches for digital students in a digitalised environment. Educational institutions, on the other hand, must move away from traditional methods of knowledge transmission and give instructors autonomy, as well as experiment with new pedagogies for students and allow them to set their own learning pace, all with the aid of technology. Overall, universities must prepare students for jobs and technology that have yet to be invented, as well as for solving issues that have yet to be anticipated (OECD, 2018b).

The goal of this study is to compare the education and working areas of university graduates according to the business lines that are required for Industry 4.0, according to the results of a survey conducted among 16,755 people with a bachelor's degree as a minimum. International Standard Classification of Education 2020 data was used for this study. By analysing these data, the types of jobs demanded by Society 5.0 can be forecast. Thus, in line with Education 4.0, universities can transform themselves to prepare their students for these jobs. This study adds to existing literature by analysing the jobs of recent graduates and, as a result, identifying the future jobs required by corporations. Therefore, by looking at the results of these analyses, higher institutions can adjust their curriculum and prepare their graduates to achieve the skills that are essential for Society 5.0.

2 Methods and analysis

For the purposes of this study, an analysis was carried out in Python using the International Standard Classification of Education 2020 data using machine learning. The demographic factors such as age, gender and educational level are classified. In addition, the jobs that the graduates are currently doing are distributed according to their age and educational level. The jobs based on Industry 4.0 are shown in Table 1 below.

Table 1: Industry 4.0 Jobs

Autonomous robots
Cybersecurty
Big data
Augmented reality
Cloud Computing
System integration
Internet of things
Simulation
Additive manufacturing

The data set was visualised using Python software and data visualisation libraries according to the educational status of the graduates, as shown in Figure 1.

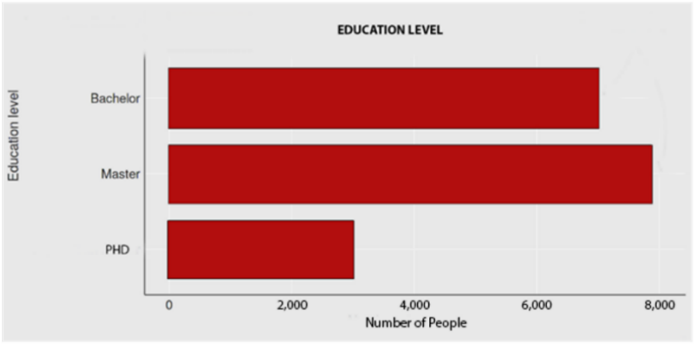

Figure 1: Number of graduates by educational level
Source: own.

Figure 2 shows that university graduates are classified by gender and education. The level of education is very similar for both genders in all the levels. The point worth mentioning in Figure 2 is that the proportion of graduates at the doctoral level is low compared to those who achieved bachelor's and master's degrees.

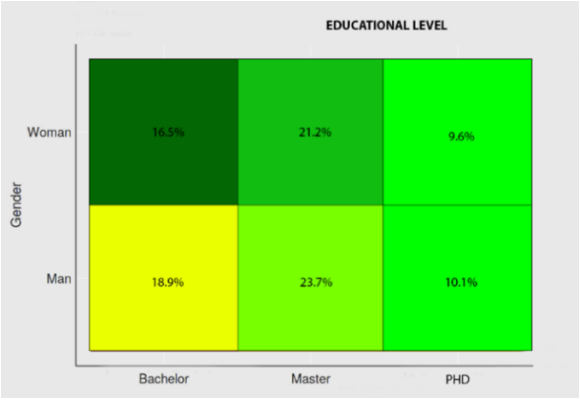

Figure 2: Distribution of graduates' educational status by gender
Source: own.

As shown in Figure 3, it is necessary to be of a certain age to reach a certain level of education. People with a bachelor's degree are mostly between the ages of 18-29, while those with a master's degree are usually between the ages of 35-39. Those at the PhD level, which is the highest form of education, are mostly in the age range of 30-50 and above.

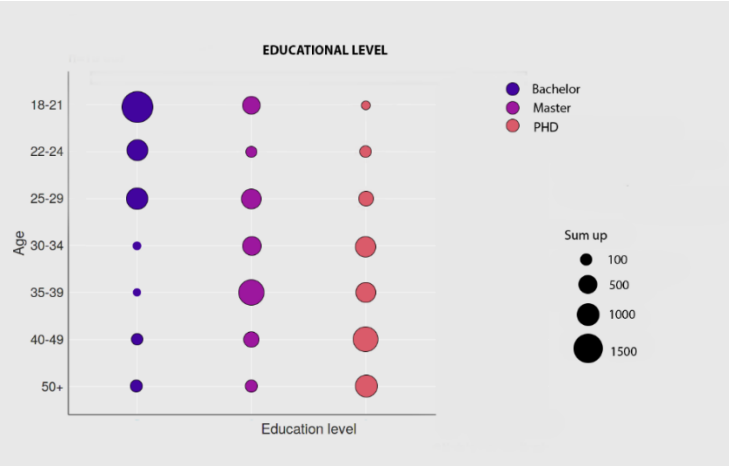

Figure 3: Distribution of graduates' educational status by age
Source: own.

3 Results and discussion

According to an analysis of the results of the data set shown in Figure 4, the distribution results of the graduates' age status according to the sectors in which they work after graduation show that the sector preferences of those graduates with a bachelor's degree are mostly on system integration and Cloud-based systems. As can be seen in Figure 4, the sector preferences show that master's graduates prefer to work in the fields of cybersecurity, big data, additive manufacturing and the internet of things. Doctoral graduates, meanwhile, mostly work on virtual reality and autonomous systems.

As a result, according to the International Standard Classification of Education 2020 data, the general preference of graduates in the sector after COVID-19 is virtual reality and Cloud-based remote working systems, as well as application areas that lead to living in isolation such as the internet of things.

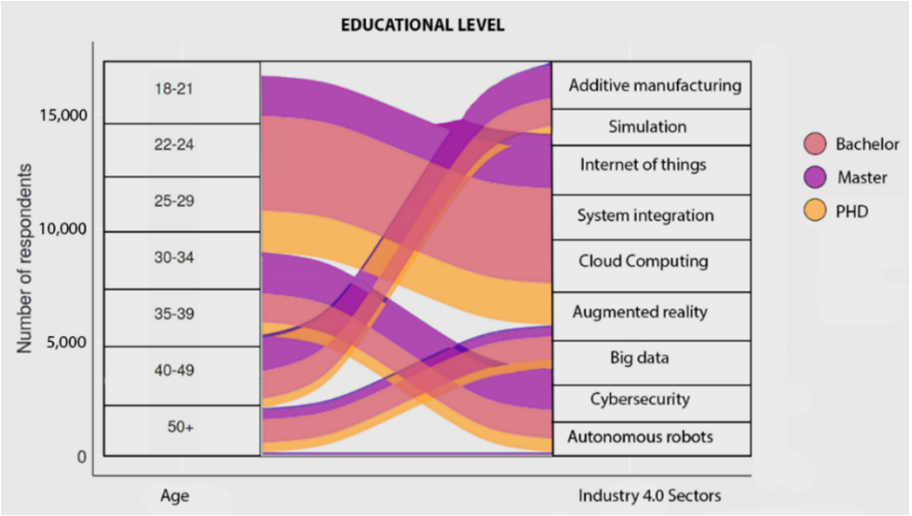

Figure 4: Distribution of the age of graduates according to the sectors in which they work
Source: own.

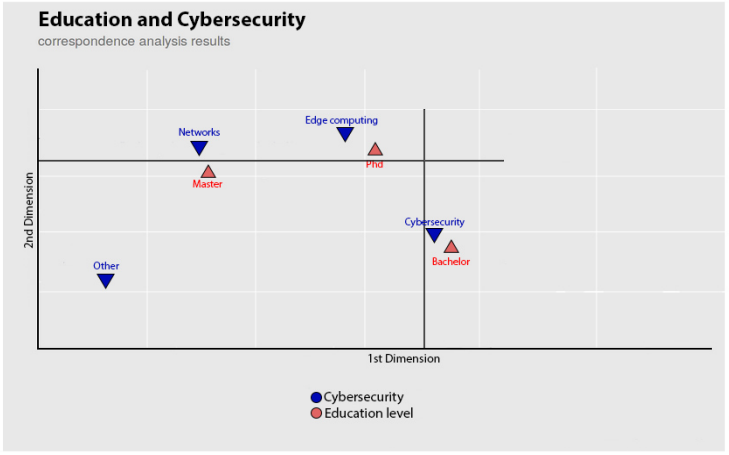

Figure 5: Comparison of demand between education and cybersecurity

As can be seen in Figure 5, undergraduate graduates mostly work in the field of cybersecurity. In the higher educational level groups, the lowest educational level was at the master's level for those working on network and at the doctorate level for those working in Edge computing.

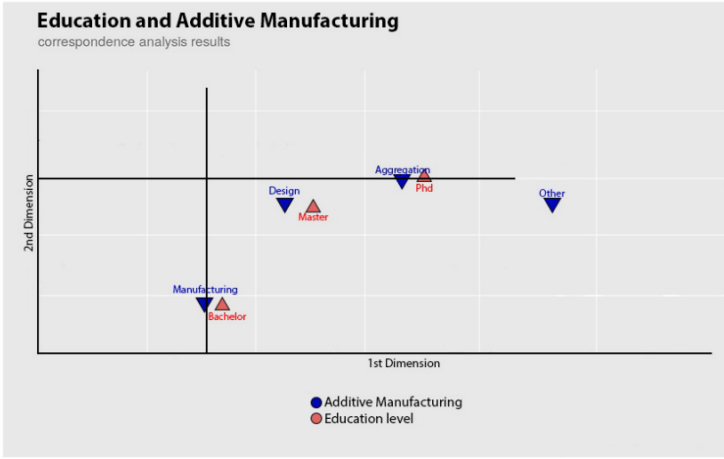

Figure 6: Comparison of demand between education and the additive manufacturing sector

As can be seen in Figure 6, graduates with doctoral degrees mostly work in the field of aggregation. In the next educational level groups, the lowest educational level was at the master's level for those working on design and at the undergraduate level for those working in the field of manufacturing.

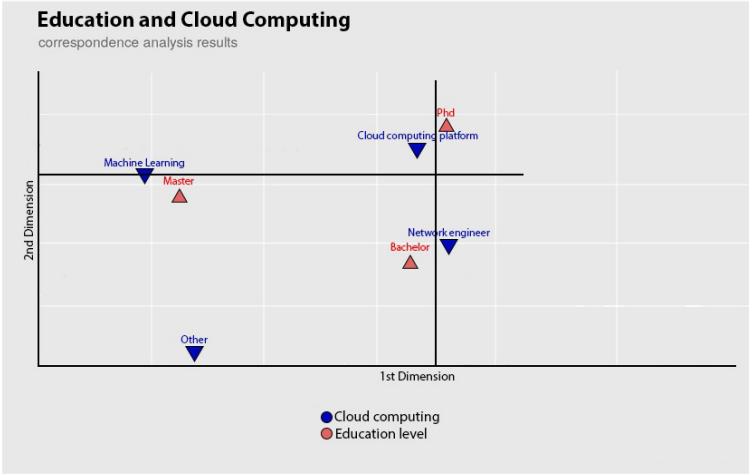

Figure 7: Comparison of demand between education and the Cloud computing
Source: own.

As can be seen in Figure 7, the majority of graduates with doctorate and undergraduate degrees in the Cloud sector work in the field of Cloud computing and network engineering. In the next educational level groups, the lowest educational level was at the undergraduate level in the field of machine learning.

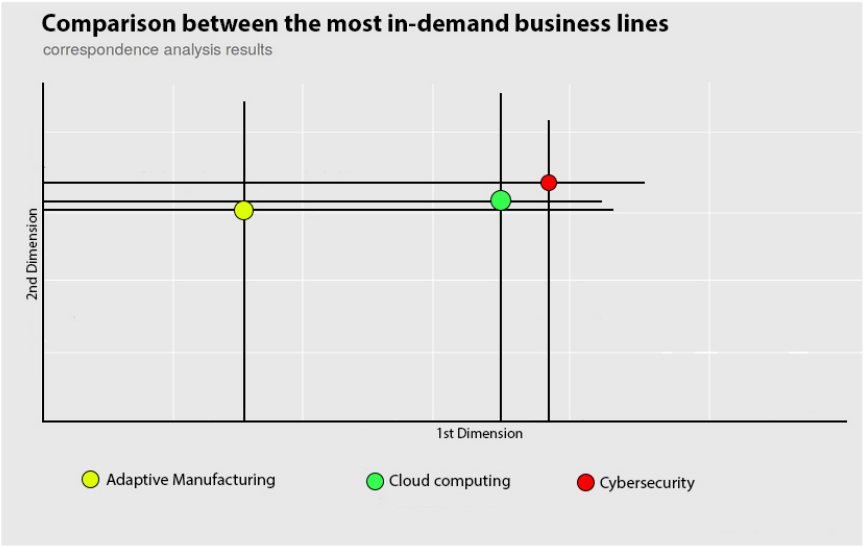

Figure 8: Comparison of intersections between the three most demanding sectors
Source: own.

As shown in Figure 8, based on the intersections of the three sectors analysed, the most in-demand business line with the highest average educational level was identified in the field of cybersecurity. The industry with the least demand and the lowest average educational level was adaptive manufacturing.

4 Conclusions

In conclusion, the results of the analysis carried out in this study indicate that cybersecurity, additive manufacturing, Cloud-based systems, system integration, big data, the internet of things, virtual reality and autonomous systems are currently the trendiest industries preferred by graduates. Therefore, the skills needed in these positions should be defined and universities should revise their curriculums to equip their students with those skills. Since the COVID-19 pandemic, digital

transformation has accelerated in universities. However, University 4.0 does not only mean digital transformation, rather it is a concept that provides the necessary skills to students who are future employees in order to prepare them and the whole of society for Society 5.0, which is a new level of social development.

The limitations of this study are that the results of the analysis were obtained using only one of the machine learning algorithms used for the data set. The business lines of Industry 4.0 should be described separately, and the fact that data visualisation is not added graphically is one of the other limitations of this study. For future studies, by using different types of machine learning algorithms, the 'accuracy' scores can be compared to the analysis results on the same data set, thus the algorithm that gives the best result can be selected.

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DIGITISATION – AN IMPORTANT TOOL FOR THE TRANSFORMATION OF SOCIETY IN TERMS OF SUSTAINABLE DEVELOPMENT

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Abstract In the post-pandemic period, greater emphasis has been placed around the world on addressing environmental and societal issues, leading to a stronger perception of society's impact on environmental protection. One of the strategic plans for how the government of the Slovak Republic can contribute to the start of rapid and sustainable economic growth after the effects of the COVID-19 pandemic in Slovakia is the Recovery and Resilience Plan of the Slovak Republic. The role of the Green Economy within the Slovak Recovery and Resilience Plan is to support environmental sustainability, while the transformation of society into a digital society and 'digitisation' itself is considered a significant green innovation in a sustainable business environment with a positive impact on environmental protection. The aim of the paper is to evaluate the key area of public policy digitisation, because its successful implementation in society has a significant impact on the Slovak legislation in the field of accounting.

Keywords: green economy, digitalisation, COVID-19 pandemic, accounting act, sustainable development

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1 Introduction

The COVID-19 pandemic has raised many questions throughout the world about the impact our society has on the environment and the search for solutions and tools that could help in facilitating environmental sustainability. (Biela, 2021; Glittová, 2021) Overall, sustainability emphasises protection of our natural environment and human health, while in order to support a balance between the ecosystems and innovations and economic behaviour it needs to be improved in the name of sustainability of people and the environment (Bednarčíková & Repiská, 2021). Many companies perceive that a digital society has a significantly positive effect on environmental protection while 'digitalisation' itself is perceived as an important green innovation of a sustainable business environment with a positive impact on environmental protection. (Brenner & Hartl, 2021) COVID-19 has had a drastic impact on the global economy, business activities and people, however, it is digitalisation that has helped many companies in the private and public sectors to adjust to the situation and overcome the current situation caused by the coronavirus. It could be said that even if the COVID-19 restrictions are lifted, the experience of restricted living during the pandemic gave rise to a trend where people, regardless of their lifestyle choice and acceptance of the options offered by digitalisation, will have to accept and live in a digital world that is gaining on intensity.

2 DigitaliSation in the Slovak Republic

The availability of scientific and technological information, access to environmentally friendly technologies and their transfer represent basic requirements for achieving sustainable development (Rusko, 2019). There are already a number of digitalisation projects that have been applied in Slovakia, with the aim of simplifying administrative processes, for example, in financial administration. The aim of financial administration is to utilise digitalisation in the creation of paper-free financial administration, electronic tax administration, the establishment of a new customer (taxpayer) care system, strengthening of control and analytical activities and support for a call centre and communication with clients (Financial Administration, 2021). The Financial Administration of the Slovak Republic has already implemented digital projects and is gradually implementing other such digital projects. It is currently applying four digital projects in the area of digitalisation, namely electronic communication, eKasa, a call centre and social

networks, and TAXANA (chatbot) (Financial Administration, 2021). Overall, the implementation of digitalisation of the Financial Administration has been met with a positive response in relation to the everyday activities of businesses or citizens, which is also reflected in a significant increase in the portion of electronic submissions performed remotely without travelling, as well as the preference of energy-efficient technologies, both of which contribute to meeting long-term environmental goals (Digitálne Slovensko, 2021). The next project, which facilitates digitalisation by use of own key areas, is the Recovery and Resilience Plan of the Slovak Republic.

2.1 Digitalisation according to the Recovery and Resilience Plan of the Slovak Republic

The Recovery and Resilience Plan (RRP) of the Slovak Republic has been designed to contribute to the start of rapid and sustainable economic growth after the effects of the COVID-19 pandemic in Slovakia. Following a positive review of the RRP in July 2021, the Council for Economic and Financial Affairs approved the plan, thus Slovakia became one of the first countries to secure finances for the realisation of key reforms and investment in relation to the RRP, which are important for a sustainable and competitive future of Slovakia and for a quick recovery from the crisis (Ekonomika, 2021). The RRP of the Slovak Republic 2021 focuses on five key areas of public policies (Recovery and Resilience Plan, 2021):

- green economy,
- better health,
- efficient public administration and digitalisation,
- high-quality education,
- science, research and innovations.

The area of efficient public administration and digitalisation comprises five key components:

1. Improvement of the business environment,
2. Reform of the justice system,

3. Fight against corruption and money-laundering, security and protection of the population,
4. Digital Slovakia (country in phone, cybersecurity, fast internet for everyone, digital economy),
5. Healthy public finances.

The main goal of this key area is a functional digital economy and a society ready for ongoing technological changes in digitalisation, where the development of electronic public administration (eGovernment) which provides services focused on citizens and business owners as well as cybersecurity – processes and principles that secure trust in the interaction of citizens, businesses and public administration, digital skills of not only pupils and students, but also employees within industries and public administration or seniors so that no entity would be excluded from this digital age – represents a necessary requirement in order to achieve this goal. High-quality, high-speed infrastructure built upon optic and new technologies represents the base of digitalisation. Improvements in eGovernment facilitated by a connectivity reform, which should enable access to online tools and services for all citizens, should speed up digitalisation. The core of digital transformation should be realised by reforms and investments, not only in the public administration sector, but also in areas of industrial production and service provision, mainly via utilisation of digital technologies that impact society (Digitálne Slovensko, 2021).

This component enables the realisation of transformation in two areas – digital transformation and green transformation. Support for research, innovation and education is a crucial attribute for the success of the green transformation. To contribute to the green transformation, it is possible to take advantage of digital technologies and their benefits (Green Deal, 2021). Expanding the availability of ultrafast broadband connection is based on specific recommendations for the country in relation to the development of digital infrastructure, as well as essential reforms of the RRP of the Slovak Republic for digitalisation and connectivity (Digitálne Slovensko, 2021). Successful countries have sped up their digitalisation of various administrative processes pertaining to obtaining financial assistance from state support schemes online during the pandemic, and in general being behind in digitalisation impacts gross domestic product and dealing with the corona crisis (FinReport, 2021).

2.2 Digitalisation of bookkeeping

Digital transformation is a profound change that accelerates business activities, process, competencies and models with the aim of fully utilising the change and opportunities in digital technologies and their strategic impact on society as a priority (Bican & Brem, 2020). The transformation of society to a digital society has also affected the Slovak Republic. Its impact is reflected in the changes of new Slovak legislation, which incorporates provisions dealing with digitalisation of various manufacturing or administrative processes. The digitalisation of accounting has been significantly impacted by Act No. 456/2021 Coll., amending Act No.431/2002 Coll. on accounting amended with effect from 1st January 2022. This act reacts to the development in society and the increasing trend of digitalisation of processes of a reporting entity recoded in its accounting. The Accounting Act adds and details conditions that a reporting entity is obliged to follow during the processing of electronic bookkeeping records.

The change specifically happened to the provision of Accounting Act in Sec. 31 Accounting record, Sec. 32 Demonstrability of the accounting record, Sec. 33 Transfer of the accounting record (Transformation of the accounting record from 1.1.2022) and the provision relating to the archiving of documentation, i.e. Sec. 35 Storing and protection of accounting documentation.

Digitisation and its systems allow entities to record the same as can be recorded on paper. Therefore, in the interest of environmental protection, entities are leaning towards the digitisation of administrative processes and bookkeeping records. Due to this interest, the amendment to the Accounting Act has defined, in addition to the term 'accounting record in paper form' (in the previous Accounting Act defined as a written form of an accounting record), the term 'electronic accounting record', which means an accounting record:

- issued in an electronic format and received or accessed in an electronic format, where the electronic format is defined by the issuer of the bookkeeping record or set by an agreement with the recipient of the bookkeeping record,
- sent electronically, where it may constitute an attachment to an email,

- in an electronic format for internal purposes of the reporting entity (Sec. 31 (2) (b) Accounting Act).

In terms of the bookkeeping records, the reporting entity is obliged to ensure the credibility of the origin, integrity of the content and readability of the record from the time of issue of the bookkeeping record or the receipt or access of the bookkeeping record until the end of the retention period of the accounting documentation, i.e. for a period of ten years following the year of its last use. Credibility of the origin of the bookkeeping record is provided by the issuer of the accounting record as well as by the recipient. The issuer of the bookkeeping record must be able to prove that they truly did issue the accounting record, while the recipient of the accounting record must be able to prove that the bookkeeping record they received is from the issuer (Sec. 31 (4) Accounting Act). Due to the increasing trend of digitalisation promoting more frequent transfers of bookkeeping records in an electronic format as well as access to the accounting record or transformation of the bookkeeping record at the reporting entity, the reporting entity is obliged to ensure the integrity of the bookkeeping record, which is to ensure that the facts recorded in these records do not change (Sec. 31 (5) Accounting Act). Readability of the bookkeeping record is ensured if the record can be read by the human eye. The reporting entity is obliged to retain the integrity of the contents during this process (Sec. 31 (6) Accounting Act).

When ensuring the credibility of the bookkeeping record, the reporting entity must make sure that the accounting record meets the requirements of a bookkeeping record under Sec 31 (3) of the Accounting Act, regardless of its form. A bookkeeping record is credible providing its content directly or indirectly proves a fact by the content of other bookkeeping records (Sec. 32 (1) Accounting Act). The Accounting Act regulates the signature record and what it considers to be a signature record, which is a big plus for digital processes today. A signature record is a handwritten signature, a qualified electronic signature or a similar credible signature record that substitutes a handwritten signature in an electronic format, which allows for clear and credible identification of the person providing the signature record (Sec. 32 (2) Accounting Act).

The provision of Sec. 33 of transformation of a bookkeeping record details what a transformation of a bookkeeping record is and the methods of format change of the accounting record. Under the Accounting Act, transformation means a change in the form of the accounting record during the processing of the record by an reporting entity while preserving the integrity of the record (Sec. 33 (1) first sentence of the Accounting Act), whereas a change of a bookkeeping record from a paper format into an electronic format or a change from an electronic format into a paper format constitutes a change in the format of the bookkeeping record (Sec. 33 (1) second sentence of the Accounting Act). The transformation of a bookkeeping record can only be performed by the reporting entity if the bookkeeping record is credible (Sec. 33 (2) Accounting Act).

The reporting entity may perform the transformation of a bookkeeping record from a paper format into an electronic format through a guaranteed conversion or by scanning it into a raster graphic file format, the transformation thus significantly simplifies this process. During this transformation, the reporting entity must ensure that all the requirements for a bookkeeping record are met. The reporting entity must ensure:

- completeness of the bookkeeping record in its original and new form,
- content and visual match of the bookkeeping record in its original and new form,
- readability of the whole area of the bookkeeping record in its new form,
- integrity of the bookkeeping record content, i.e. ensuring that no changes are recorded in the factual content of the bookkeeping record after transformation.

The Accounting Act also sets out a situation whereby a reporting entity does not keep bookkeeping records in an electronic format. In such cases, the reporting entity may perform the transformation of a bookkeeping record from an electronic format into a paper format if the accounting record does not contain a qualified electronic signature or a qualified electronic stamp (Sec. 33 (4) Accounting Act). Transformation of a bookkeeping record that does not contain a qualified electronic signature or a qualified electronic stamp from an electronic format into a paper format is performed by a reporting entity through the use of an output computing

device, which allows for the record to be printed by means that ensure the integrity and readability of the content of the bookkeeping record.

The amendment to the Accounting Act has had a significant impact on the storing and protection of accounting documentation in an electronic format. In the interests of the consistent protection of bookkeeping records during their storage, the reporting entity is obliged to follow the established process for the storage of accounting documentation. Due to the fact that the storage of accounting documentation already happens in an electronic format, electronic storage of accounting documentation means storage on a data carrier. The data carrier format is to be determined by the reporting entity. This may be a USB key, an external hard drive, a memory card, storage, etc. During storage of accounting documentation the reporting entity is also obliged to ensure that the bookkeeping records in an electronic format meet the relevant requirements, providing that the bookkeeping records that are stored and in the correct format as the result of a bookkeeping record transformation (Sec. 35 (5) Accounting Act).

3 Conclusion

Overall, sustainability focuses on the protection of our natural environment and human health, and the level of the protection of our environment protection and human health can be increased by implementing digitalisation as an important green innovation within a sustainable business environment. The coronavirus increased pressure on the implementation of digitalisation into the work process of reporting entities, who had to react to the changes and adjust their processes connected to the digitalisation of the tax system and processes related to accounting. Digitalisation of accounting in the Slovak Republic is governed by the amendment of the Accounting Act, which reacts to the development within society and the increasing trend of digitalisation of processes within a reporting entity that are recorded in its accounting. The Accounting Act adds and details conditions that reporting entities are obliged to adhere to during the processing of electronic bookkeeping records. It should be noted, however, that the authors of this study were not able to obtain information on the number of entities that have already starting using digital accounting in the Slovak Republic, thus during the coronavirus crisis it can be said that this trend is gaining in momentum and it is very likely that the trend of digitalisation of society will follow suit, and only businesses that are well adjusted to

the digital environment will be able to fully profit from the digitalisation in the interest of environmental sustainability.

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Zákon č. 456/2021 Z. z., ktorým sa mení a dopĺňa zákon č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov.

A Systemic Risk Indicator for Leveraged Finance Exposure in the Banking System

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Abstract In recent years, the context of the banking system, characterised by expansive monetary policies, has boosted the investments in leveraged loans. The COVID-19 pandemic brought the first real slowdown of the global economy since the financial crisis of 2007-08, and the growth of the leveraged loan market has been subject to significant attention from the competent authorities. Banks have remained solid despite the adverse outlook, however, the banking landscape continues to be impacted by the uncertainty relating to the evolution of the pandemic. The original sample for this paper, made up of leveraged loans, combines instrument-specific information with information on financial borrowing and the composition of the syndicate of banks/lenders. The aim of the paper is to identify a systemic risk indicator that takes into account the concentration of credit risk within each bank. For this purpose, using an M-quantile regression, it is possible to obtain an indicator (M-quantile coefficient) for each bank that varies between 0 and 1, where higher values indicate the greater presence of risky leveraged loans in that specific bank. Combined with an indicator of loan sharing between banks, this also allows a graphical representation of the network of banks in this specific market.

Keywords: leveraged loans, leveraged finance, syndicated loans, systemic risk, banking supervision, M-quantile regression

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1 Introduction

The growth of the leveraged loans market over the last decade has caused concern among the competent authorities (European Central Bank, 2018) due to the concentration of these operations within the same lender and, consequently, the systemic risk due to the interconnectedness in the financial system (Financial Stability Board, 2019). This was among the reasons that, among the priorities for 2022-2024, the European Central Bank (2022) recently included exposure to leveraged finance as a key vulnerability in ensuring that banks emerge from the pandemic healthily. In order to address the impact of COVID-19 and ensure that banks remain resilient, it is therefore essential to prevent the rise of unmitigated risks in this area. Syndication between lenders of leveraged loans is particularly useful for diversifying risk and allowing companies to access credit more easily, however, this can also be seen as a weakness of the system as greater interconnectedness during a crisis can lead to an increase in systemic risk (Cai et al., 2018).

In this paper the authors focus on leveraged transactions, as they are more vulnerable and more significant in terms of systemic risk. The development of a methodology for the supervision of the banks involved in this market becomes particularly useful, in order to promptly capture any concentrations that may be considered too high for the solidity of the banking sector, and which could have dangerous consequences in terms of systemic risk. The authors propose that new measures are used starting first from the identification of the concentration of risky leveraged loans within each bank. For this purpose, an M-quantile regression was used to obtain an indicator between 0 and 1, which summarises the concentration of credit risk by estimating the M-quantile coefficient. The result of this indicator, combined with the size of the bank in the reference market, provides a quantification of the systemic risk among all the banks included in the syndicates. The results show the value of this indicator for all the banks on the 2021 list of Global Systemically Important Banks (G-SIBs), based on the methodology designed by the Basel Committee on Banking Supervision (BCBS). Once the indicator has been obtained, in order to identify the interconnectedness in this market, the authors propose a new measure based on the similarity/distance of loans between two banks. This measure, which can be reported as a symmetric matrix for all banks, is particularly useful in understanding the extent to which two banks tend to be present in the same transactions, effectively leading to a greater concentration among banks that frequently share the same

transactions and to a lower risk mitigation. The concentration indicator obtained for each bank, combined with the latter, allows a graphical representation of the banking network in this specific market. Therefore, in addition to providing a contribution to the supervision of the risk of leveraged loans, this paper can offer a starting point for the deepening of the propagation of systemic risk in this specific market. Overall, the paper relates to two different strands of literature – theoretical literature on syndicated loans (Sufi, 2007; Achleitner et al., 2012; Becker and Ivashina, 2016; Bruche et al., 2020), and literature on systemic risk (Allen and Gale, 2000; Huang et al., 2009; Gai et al., 2011; Caballero and Simsek, 2013; Engle et al., 2015; Acharya et al., 2017; Cai et al., 2018).

2 Data

The dataset used was obtained through Refinitiv Datastream and relates to 1,789 leveraged loans issued between January 2013 and February 2022 with publicly available information. Data about the financial instrument are combined with qualitative and quantitative information on the borrower, including a large number of financial indicators that have been used as predictors in the model for this paper. The information on the instruments includes the compositions of the syndicate, through which the authors built dummy variables for each bank, regardless of whether or not it is a lender, as well as the corresponding amounts. The response variable is a dummy that is equal to 1 in cases where Moody's corporate debt rating is lower than or equal to B1, otherwise it is 0. All the leveraged loans have an available rating, considering that they relate to companies with publicly available information. For this reason, the use of the rating as a response variable can be particularly useful for the validation and construction of a rating for all the other instruments on the market that often do not have one.

3 Methods

An M-quantile regression (Breckling and Chambers, 1988) was used in order to build the concentration indicator of risky leveraged loans within each bank. For a continuous response and, for example, a quantile of $q = 5\%$, the quantile regression separates the lowest 5% of the conditional distribution from the remaining 95%, i.e. a generalisation of median regression. An M-quantile regression could be considered

as a quantile-like generalisation of mean regression based on influence functions (M-regression).

The M-quantile of order q for the conditional density of a continuous outcome y is defined as solution MQ_q, which satisfies:

$$\int \psi_q\left(\frac{y-MQ_q}{\sigma_q}\right) f(y)dy = 0 \quad (1)$$

where $\psi_q(t) = 2\psi(t)\{qI(t > 0) + (1-q)I(t \leq 0)\}$, ψ is an influence function and σq is a measure of scale for y-MQq. The corresponding linear M-quantile regression model is the one for which the M-quantile:

$$MQ_q(y \mid \boldsymbol{x}; \psi) = \boldsymbol{x}^T\boldsymbol{\beta}_q \quad (2)$$

The unit specific order q_{ij} is such that:

$$y_{ij} = \boldsymbol{x}^T\boldsymbol{\beta}_{q_{ij}}.$$

An estimate of qij can be obtained by fitting a set of M-quantile regression lines for a specific grid of values for q ∈ (0; 1) and then interpolating the two closest values.

In the data obtained in this study, if a higher concentration of risky leveraged loans is present, then leveraged loans belonging to the same bank should lie on a similar portion of the conditional distribution of the response given the co-variates and should have a similar q coefficient.

A concentration score can be obtained by suitably averaging the estimated M-quantile coefficients within the bank i (see Fiaschi et al. (2020) for an M-quantile application to get a performance indicator), considering the weight pij corresponding to the amount held by bank i for leveraged loan j:

$$\widehat{q_i} = \sum_{i=1}^{m}\sum_{j=1}^{n_i}\hat{q}_{ij}p_{ij} \quad (3)$$

Then, from the concentration indicator for each bank, a systemic risk indicator can be obtained by adequately considering the weight of each bank in the leveraged loan market:

$$SYMQ_i = \widehat{q_i} \cdot \frac{BA_i}{\sum_m BA_i} \tag{4}$$

where BA_i is the amount held by bank i in the leveraged loan market.

In order to graphically represent the network of banks and to quantify the similarity/distance between two banks, the authors propose the following loan sharing indicator between bank i and bank j:

$$LS_{ij} = \frac{ShA_{ij}}{BA_i + BA_j - ShA_{ij}} \tag{5}$$

where ShA_{ij} is the number of leveraged loans shared by bank *i* and bank *j* in the different syndicates.

Finally, in the graphical representation, the vertex for bank *i* will be the $SYMQ_i$ indicator, while the edge between bank i and bank *j* is given by LS_{ij}.

4 Results and conclusions

Part A of Figure 1 shows the banking network considering the $SYMQ_i$ indicator for the vertex size and the LS_{ij} indicator for the edge width between bank *i* and bank *j*.

Part B of Figure 1 shows the values of the $SYMQ_i$ indicator for the Global Systemically Important Banks (GSIBs) considered in the network. The edges are shown in red when the LSij indicator is higher than 0.3 (30%), which corresponds to the amount of common leveraged loans between bank *i* and bank *j*.

The graph shows a complex network of relationships between banks in this specific market, where there are banks that are much more exposed and with a significant concentration in terms of credit risk. For example, the value of the $SYMQ_i$ indicator for bank 1 of 0.17 may be interpreted as follows: the riskier leveraged loans in terms of credit risk held by bank 1 represent approximately 17% of the market.

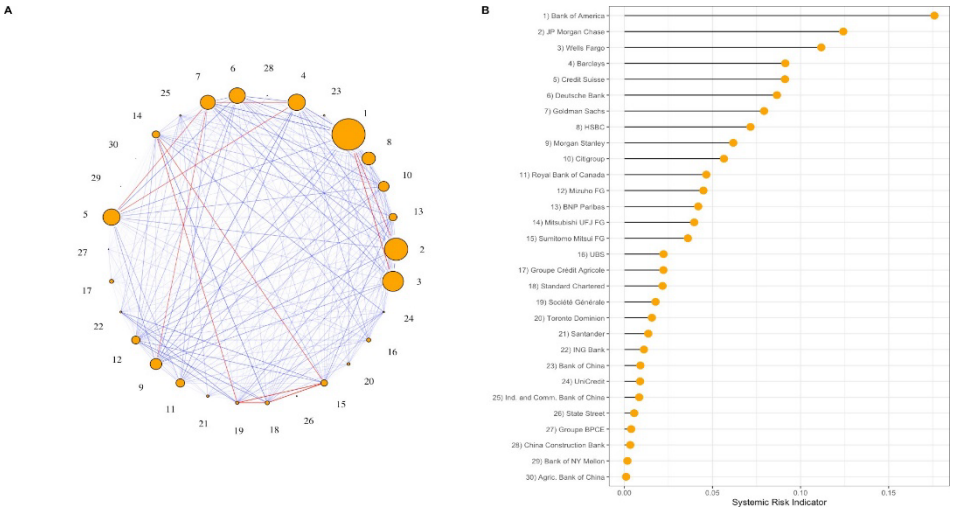

Figure 1: Banking network in the leveraged loans market (Jan 2013-Feb 2022)
Source: own.

The graph shows a complex network of relationships between banks in this specific market, where there are banks that are much more exposed and with a significant concentration in terms of credit risk. For example, the value of the $SYMQ_i$ indicator for bank 1 of 0.17 may be interpreted as follows: the riskier leveraged loans in terms of credit risk held by bank 1 represent approximately 17% of the market.

In terms of the policy implications, the authors of this paper believe these findings may be a contribution to concerns about lender concentration and interconnectedness in the leveraged loans market (Financial Stability Board, 2019). Indeed, through the results obtained, it is possible to monitor the concentration in each bank, the importance in terms of systemic risk and the relationships between the banks participating in the syndicate. Syndication is certainly useful for risk mitigation, and adding a monitoring of the proposed indicators could be an extra help in reducing systemic risk during a period of high uncertainty, such as that being currently experienced in the post-pandemic era.

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SUSTAINABILITY AND LABOUR LAW

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Abstract This article explores the question of how sustainability and labour law are interrelated. The modern world of work is characterised by the growing social and environmental responsibility of companies. Especially in the post-COVID era, sustainability also plays an increasingly important role in the corporate context, which is also noticeable in the so-called 'war for talent'. Achieving personal career goals is no longer enough for employees today. Corporate values and in particular the so-called ESG criteria (Environment, Social, Governance) are thus also becoming increasingly important in the employment relationship and in corporate reporting requirements. In terms of social sustainability, labour law instruments can, for example, promote the creation of a discrimination-free working environment, the introduction of flexible working time models or the protection of whistleblowers. From an ecological perspective, labour regulations are also suitable for implementing 'green mobility' and other measures to reduce companies' ecological footprints. Working from home, which experienced a huge boom during the COVID-19 pandemic, is also sustainable, especially from an ecological point of view. Appropriate consideration of these sustainable work tools in future corporate social responsibility (CSR) strategies not only creates a competitive advantage but can also be beneficial in recruitment.

Keywords:
sustainability,
labour
law,
war for talent,
ESG,
CSR

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1 Introduction

Sustainability and labour law – what do they have in common? What may seem strange at first glance is becoming increasingly important. Sustainability is in vogue and has become part of everyday language. Sustainability, along with CSR (Corporate Social Responsibility) and ESG (Environment, Social and Governance), has long since become part of corporate reality. In 1987, the United Nations World Commission on Environment and Development ('Brundtland Commission') defined sustainability as *'meeting the needs of the present without compromising the ability of future generations to meet their own needs.'* (Brundtland, 1987). Today, sustainability is understood as a three-dimensional concept in the sense of an interweaving of ecological, social and economic requirements. While CSR refers to corporate positioning in terms of sustainability, ESG criteria are primarily concerned with companies' information and reporting obligations. The special environmental, social and economic responsibility of companies is also reflected in the relationship between employers and employees. Labour law provides the legal framework for operational HR work in companies, thus also supporting the sustainability efforts of HR management. Thus, legal regulations can promote sustainable development but they can also hinder it (Rühmkorf, 2018). The purpose of this paper is first to shed light on the relevance of sustainability for labour law (Part 2.). Subsequently, selected examples will be used to illustrate the link between sustainability and labour law (Part 3.). This is followed by a summary and an outlook with concrete ideas for implementation in companies (Part 4.).

2 Relevance of sustainability for labour law

Due to the CSR Directive (2014/95/EU) adopted at European Union level, large capital market-oriented companies are required to supplement their reporting with non-financial information (Kocher, 2021). The new CSRD draft (Proposal for a Corporate Sustainability Reporting Directive) of 21 April 2021 (European Commission, 2021) will lead to the realignment of sustainability reporting as of the 2023 financial year. The CSRD draft provides for considerable expansion of those companies that will be subject to reporting requirements in the future (it is estimated that this will affect around 50,000 companies in the European Union). The CSRD draft places particular emphasis on the three core elements of sustainability reporting: 'Environmental' (climate protection, circular economy, etc.), 'Social' (equal opportunities, working conditions, etc.) and 'Governance'. Thus, in addition

to a large number of other topics (for example, on environmental and climate protection or respect for human rights), the CSRD draft stipulates, among other things, that the companies concerned must also report on working conditions, diversity, equal opportunities (including gender equality), inclusion of people with disabilities, etc. The CSRD draft follows a 'double materiality' perspective. This means that in future, the reporting requirements will stipulate that companies must record the effect of sustainability aspects on the company's economic situation, while at the same time also clarifying the impact of the company's activities on sustainability aspects.

However, sustainability in labour law is not only relevant in the context of this reporting obligation but also represents a decisive factor in the individual employment relationship. For many employees, sustainability has become a decisive criterion when looking for a job. Achieving personal career goals is no longer enough for the employees of today. Sustainability is also becoming increasingly important when choosing an employer. According to a study conducted by the German online job platform StepStone and the Handelsblatt Research Institute (HRI) in 2021 (StepStone, 2021), in which around 12,000 people were surveyed on the importance of the topic of sustainability at work and when searching for jobs, almost half the respondents (47%) said that they specifically look for sustainable companies when changing jobs. Around a third (34%) said that they would even accept a lower salary for this. For about three quarters (76%) of the employees in Germany, it is important that their employer attaches great importance to the issue of sustainability. In addition, the study shows that sustainability is also an important aspect of the employment relationship for older employees. This shows that sustainability is playing an increasingly important role in the employment relationship, particularly in the post-COVID era, which should not be ignored against the backdrop of the increasingly fierce battle for skilled workers – the 'war for talent'.

3 Elements of sustainability in labour law

Elements of sustainability can be found in numerous labour regulations, partly regulated in statutes and partly in agreements between employers and employees.

3.1 Equality and diversity

The prevention of discrimination and the creation of a discrimination-free working environment are among the essential components of sustainable business in the sense of the social dimension of sustainability. The legal basis for this within the European Union is provided by the EU anti-discrimination directives (European Union, 2000/2002/2004/2006) and their implementing laws in the member states of the European Union. Internal company processes, for example in the selection of applicants, the context of personnel development, the structuring of remuneration, etc., must be regularly checked to ensure that they are carried out in a non-discriminatory manner. Diverse people also enjoy the protection of the EU anti-discrimination directives and their implementing laws. Diversity is highly valued, especially by the younger generation, and is important when choosing an employer. Diverse people must not be discriminated against on the basis of their gender or sexual orientation. In this context, there are a variety of implications under employment law, ranging from gender-neutral job advertisements to the right to reissue an employer's reference after a gender reassignment. In addition, in the context of inclusion, attention must be paid to the equal treatment of disabled people in working life.

3.2 Flexible working hours

Flexible working time models lead to greater satisfaction among employees, thus increasing sustainability in companies and in employment relationships. During the COVID-19 pandemic in particular, the need for more flexible working conditions, especially flexible working time arrangements, once again became clear. In addition to optimising the work-life balance, however, flexible working time models can also promote the ecological dimension of sustainability. As pointed out by Frey (2019) in relation to the impact of working hours on the environment, people would only have to work nine hours per week instead of forty in order to achieve the current goal of international climate policy, i.e. limiting global warming to less than two degrees Celsius compared to the pre-industrial era. In Germany – similar to other EU member states – the European Working Time Directive for employment relationships has been implemented through the Working Time Act. This law contains clear rules on maximum permissible working hours, breaks, rest periods between the end of work and the beginning of work, etc. However, these rules – the basic concept of which serves to protect employees – are in part too rigid to meet

the desire for a modern work-life balance. Against this background, possibilities are being sought within the framework of labour law to meet the need for more flexibility, for example by introducing trust-based working time, working time accounts or sabbaticals.

3.3 Whistleblower protection

The European Union is currently regulating the legal treatment of whistleblowers, i.e. persons who report irregularities in companies. Uncovering and eliminating internal grievances and protecting whistleblowers from disadvantages under labour law is part of sustainable corporate management. To date, the protection of whistleblowers has regulated very differently within the European Union. The EU Whistleblower Protection Directive 2019/1937 of 23 October 2019 (European Union, 2019) now protects employees who report suspected violations of EU law. The directive stipulates that companies with more than 249 employees (more than 50 employees as of 17 December 2023) must set up a whistleblower system within the company. Currently, when implementing the directive into national law, there is even a tendency for EU member states to expand the scope, so that not only violations of EU law, but also those of national law, are covered.

3.4 Climate protection

Currently, there are few labour laws that require employers to consider climate protection. The most important part in an employer's environmental strategy is likely to be reducing the carbon footprint caused by the company's activities. This can be done, for example, through a focus on 'green mobility'. This not only includes switching from combustion engines to electric motors, but also completely replacing company cars with alternatives such as carpooling or car sharing, offering company bicycles or subsidised/free tickets to use local public transport. A mobility budget can also be an interesting and environmentally friendly alternative to the company car. In this case, the company provides its employees with a budget that can be used flexibly for all means of transportation. In principle, a corresponding provision in the employment contract is sufficient, whereby aspects such as the principle of equal treatment, participation of the works council and data protection must be taken into account. It is also conceivable to think of a change in company policy in relation to business trips and travel expenses (online meetings vs. face-to-face meetings; train instead of flight, etc.) and a related adjustment of travel expense guidelines.

Incentives can also be created via sustainable remuneration models to motivate employees to align their actions more closely with sustainability goals. In the case of managers, for example, this can be done by means of sustainability-oriented target agreements. Employees can also be motivated to be more sustainable through bonus pay agreements (e.g. bonuses for reducing resource consumption). Climate officers or energy scouts, whose task it is to identify energy-saving opportunities in the company, can supplement the environmental strategy (Bohnenberger, 2022).

3.5 Working from home

'Working from home' is not a clearly defined term. The terms 'working from home', 'teleworking' and 'mobile working' are often used interchangeably, although they differ in content. In (home-based) 'telework' (often also called the 'home office'), employees work exclusively from home and no longer have a workplace in the company. In so-called 'mobile work', employees perform their work using a mobile device (smartphone, tablet, laptop) while on the road or from another location. 'Working from home' covers both the types described, although the terminology certainly differs, especially in the international environment. In addition, hybrid systems exist, such as alternating teleworking, in which work is performed alternately in the 'home office' and in the workplace. Of course, 'working from home' is not a new phenomenon, however, during the COVID-19 crisis in particular, 'working from home' was used as an effective lever against the spread of infection, thus it experienced an enormous boom. In Germany, for example, 4% of employees worked from home prior to the COVID-19 pandemic, while during the crisis this figure was between 27% (April 2020) and 24% (January 2021) of employees (Statista Research Department, 2022). It is already apparent that the trend towards 'remote work', which was greatly accelerated by the pandemic, is leading to a major change in the world of work, and that 'working from home' has become an integral part of labour relations.

So, what about the sustainability of 'working from home'? According to a 2020 study by Büttner and Breitkreuz (commissioned by Greenpeace), CO^2 emissions from transport could be reduced by 5.4 million tonnes per year if 40% of employees work permanently from home two days per week (Büttner & Breitkreuz, 2020). The study also shows that 'working from home' can reduce CO^2 emissions in the long term. A 2021 study by the Carbon Trust – based on a statistical analysis of the COVID-related work situation in six countries – also assumes a savings potential of 700kg of

CO^2 per year per person in the long term (Carbon Trust, 2021). In addition, 'working from home' promotes the flexibility of employees and leads to more equality. Lord (2020) notes in his article titled 'The social perils and promise of remote work': *'The need to commute and work from an office at set hours of the day can be inconsistent with the demands of one's family or childcare responsibilities. As women have historically borne a disproportionate share of child-rearing and household responsibilities, they have often had to say no to higher-paying, higher-level positions and careers.'* Accordingly, 'working from home' protects the climate, relieves traffic congestion and promotes equality. However, 'working from home' is not completely sustainable. Many employees complain about the lack of social contact with colleagues and the mixing of work and leisure time when working from home. Poor internet connections, lack of space and IT security can also make 'working from home' difficult.

The legal aspects of 'working from home' are currently regulated very differently in Europe. While 'working from home' is already enshrined in statutes in some European countries, there is still no legal regulation on this subject, at least in Germany. Thus, in Germany there is neither a legal obligation to work from home nor a right to work from home. The instruction to work permanently in a home office is also not covered by the employer's right of direction under labour law. In principle, the employer determines the employee's place of work at its reasonable discretion, however, the employee's private home is not part of this. An instruction to 'work at home' is therefore only possible if a corresponding agreement has been reached between employer and employee, for example in the employment contract. During the COVID-19 pandemic, however, the German Infection Protection Act and corresponding occupational health and safety ordinances repeatedly mandated a temporary home-office obligation in order to reduce the number of contacts and contain the spread of coronavirus. Employers were required to allow their employees to perform office work or similar activities at home unless there were compelling operational reasons not to do so. The current German government now wants to create a legal right to home office or at least the right of employees to discuss this issue with their employer. Regardless of this, numerous companies have already moved to offer 'working from home' in agreement with employees or to enable 'working from home' or hybrid working through corresponding company agreements.

Even during 'working from home', the respective obligations of the employer and the employee under labour law remain in force. The employer is responsible for compliance with the statutory maximum working hours as well as breaks and rest periods. 'Working from home' should not be confused with flexible working hours. In principle, 'working from home' must be performed in the same way and at the same times as in the company. If flexible working in the home office is intended, 'working from home' must be supplemented by appropriate working time models. Finally, the employer remains obliged to ensure compliance with data protection regulations and, if necessary, to contribute to the additional costs of 'working from home'.

4 Conclusion and outlook

Employees' desire for environmental and social sustainability will increasingly shape labour law in the future. Sustainability is one of the most important future trends that no company can escape. Legislators are increasingly enacting regulations that also focus on the sustainability aspect in labour law. This can be seen, for example, in the CSR reporting obligation for certain companies or in anti-discrimination legislation within the European Union. Especially in times of a shortage of skilled workers and the 'war for talent', sustainability in labour law is of particular importance. Employees expect their employer to make a clear commitment to sustainability that goes beyond their legal rights as employees. However, in order to be able to invoke sustainability, it is not enough to merely fulfil legal obligations. In addition to complying with legal obligations, employers are in principle free to voluntarily create an even more sustainable working environment and align their CSR strategy accordingly (Wolf, 2015). Some companies already meet this requirement (e.g. in the field of climate protection), thus improving working conditions. In addition to advantages in the recruitment of employees, this also results in an increase in employee satisfaction. Furthermore, this can help to create competitive advantages, which can be particularly essential in the post-COVID era. Those who merely wait for the legislator to impose legal obligations and then implement them will lose out. As part of the respective CSR strategy, a company's sustainability programme can also be anchored in a code of conduct. In such a code of conduct, companies can set out their commitment to ecologically, socially and economically sustainable action, thus making their sustainable goals more binding. The example of 'working from home' in particular shows how COVID-19 has changed our lives and the world of work. The home office will prevail, even when

the pandemic is under control. Even if 'working from home' is not completely sustainable, it does have the effect of reducing CO^2 emissions. However, again, simply allowing the home office is not enough. Anyone who declares the home office as the new working model should also have a corresponding strategy and – providing there is no statutory regulation to this effect – ensure that the agreement is legally secure.

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RISK MANAGEMENT APPROACH IN MACEDONIAN CUSTOMS

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Abstract International trade of goods and services is conducted in an environment that is exposed to widespread risks. The customs administrations of all countries are expected to affect the facilitation and acceleration of international trade while protecting their economies and citizens. This is a big challenge that can only be addressed by applying methods that will balance these two requirements. Applying a risk management approach in the everyday work of customs administrations is the best known way to accomplish a balance of these specified requirements. As a modern administration, the Customs Administration of the Republic of Macedonia has incorporated a risk management approach as general policy in all its customs offices. Customs controls are based on risk assessment, profiling and selectivity, disposing risk areas and facilitating management decisions on the allocation of resources. The aim of this paper is to analyse the importance of implementation of a risk management approach, with a focus on the Customs Administration of the Republic of Macedonia. Using statistical methods, calculations will be made to create indicators for the implementation of the risk management approach in the Customs Administration of the Republic of Macedonia.

Keywords:
risk,
risk management approach,
customs,
Customs Administration of the Republic of Macedonia,
indicators

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1 Introduction

The application of risk management in the everyday work of the Customs Administration of the Republic of Macedonia helps customs to effectively collect revenue, facilitate trade and protect society in terms of security and safety.

Risk management is successfully applied in the private and public sectors as a way to determine areas of risks and to support management in making the best decisions according to that information. Implementation of a risk management approach should ease the controls on the less risky consignments and focus on the consignments that represent the greatest risk. This would reflect a balanced approach between control and trade facilitation. The World Customs Organization (WCO), according to Standard 6.3 of the Revised Kyoto Convention (RKC), defines risk management as 'the systematic application of management procedures and practices providing Customs with the necessary information to address movements or consignments which present a risk.' (WCO, 1999).

There are five main steps in the standard customs risk management process as defined by the WCO (WCO, 1999): 1. Establish context; 2. Identify risks; 3. Analyse risks (likelihood of a certain risk occurring); 4. Assess and prioritise risks (classify risks as high, medium or low); 5. Address risks by accepting and monitoring low-priority risks. Constant monitoring and review are crucial in this process in order to eliminate false negative or false positive risk assessments.

Risk management within Customs can be strategic (identifying areas of risk, e.g. exclusion of drugs, weapons, import/export prohibitions, quotes etc.), operational (determination of the control level needed to deal with the assessed risk) or tactical (in their everyday work, officers make decisions about which consignment needs greater control according to their experience, skill and intelligence). The risk management process can apply across all of these levels.

2 Literature review

Hintsa, Männistö, Hameri, Thibedeau, Sahlstedt, Tsikolenko, Finger, Granqvist (2011, p.3) stated that 'customs risk management has its own limited legacy in literature, consisting mainly of policy papers, practitioner guidelines, technical reports, project reports and press releases. Academic literature is currently very

limited, possibly due to its previously perceived niche nature and security sensitivities linked with the topic.'

According to Anderson and Terp (2006), 'Customs risk management has always been at the core of customs administration and is a fundamental discipline enshrined within the WCO's Revised Kyoto Convention on the Simplification and Harmonization of Customs Procedures. It has proven to be the most effective means of managing the huge volumes of cargo that enter the country every day of the week because it allows an administration to concentrate resources on high-risk areas while allowing low-risk cargo to flow unimpeded into the commerce of the country.'

Harrison (2007) and Conrow (2003) claim that customs risk management coupled with good intelligence and effective data analysis allows the profiling and targeting of cargo prior to arrival at a port so that low-risk cargo can be released immediately, and high-risk cargo can be diverted for physical examination. Dunne (2010, p.16), stressed that a customs risk management system provides an opportunity to 'determine risks' and is 'a genuine way of thinking without which the customs authorities may react to different situations and anticipate the necessary initiatives and the language is usually known as risk analysis.' The implementation of a risk management system in customs was discussed by Jacob and Zaharia (2012, p.3): 'Risk management is a process that determines the risk of an activity, the seriousness of these risks, the means to avoid, control or prevent them.' Frank Altemoller's opinion is that in order to implement increased protection of international supply chains, authorities must identify the specific risk to which they are exposed. Ascertaining risks and tackling them effectively, as suggested in the paper, can be done by implementation of a risk management system in customs (Altemoller, 2011). Drobrot, Klevleeva, Afonin and Gamidullaev (2017, p.4) define customs risk management as 'an effective means of treating flows involving a large number of people, goods and vehicles with limited resources and changing risks without impeding the flow of legitimate trade.'

The above-mentioned study papers on customs risk management link the efficiency of customs administrations with the implementation of a risk management approach. Furthermore, the author of this paper is of the opinion that the customs risk management approach has a positive effect in terms of making the best decisions, according to the information obtained, in terms of risk exposure.

Implementation of a risk management approach should ease the controls on the less risky consignments and focus on the consignments that represent the greatest risk.

3 Implementation of a risk management approach in Macedonian customs

The Macedonian economy is highly dependent on international trade, therefore policies of facilitating trade by accelerating and simplifying customs procedures are necessary while protecting society. Implementation of a risk management approach in the Customs Administration of the Republic of Macedonia began in 2002 with the application of the selectivity control method in some customs offices (CARM, 2006), which has now become general policy in all customs offices in the CARM. A supporting legal framework was needed for further development of the risk management approach. This approach was enshrined in the Customs Law and other customs regulations as a fundamental doctrine of the everyday work of the Customs Administration of the Republic of Macedonia.

The risk areas determined upon implementation of the Guidelines on selective controls of customs operations (CARM, 2015) are: 1. Avoiding payment of taxes by: declaring and accepting improper customs value, declaring and accepting improper subheadings or further subdivisions of the Combined Nomenclature (CN), declaring and accepting improper origin/preferences, discharging of imports for processing, discharging of outward processing, unlawful removal of goods from customs supervision, failure to report imported goods for customs clearance; 2. Threatening the safety and reliability in terms of public health, environment and consumers, including proper application of measures concerning the import and export of goods to and from the Republic of Macedonia through: smuggling of weapons, smuggling of drugs and precursors, money laundering and financing terrorism, smuggling endangered animal and plant species, smuggling of nuclear and radioactive material, smuggling of high technology and weapons, illicit trade in dual use, smuggling of cultural heritage, trafficking in counterfeit/pirated goods, environmental crime, and trafficking.

The risk areas determined in this document are not permanent but can be modified according to the basic responsibilities of the Customs Administration of the Republic of Macedonia. The risk areas determined are the main basis for the identification of risks and analyses carried out by the Risk Analysis Department in

terms of likelihood and consequence, thereby producing an estimated level of risks. The process continues by assessing and prioritising risks by comparing the estimated levels of risk against the pre-established criteria, and classifies those risks as high, medium or low. After deciding which risks are acceptable, the development and implementation of a specific management plan follows, in which risk indicators and risk profiles are determined. The information obtained through the risk profiles is used as selection criteria on control channels for customs control (Miloshoska, 2016, p.17). The Customs Administration of the Republic of Macedonia uses 'red' (mandatory physical and documentary inspection of the goods), 'yellow' (documentary control only), 'blue' (control at a later stage-post clearance control), and 'green' (immediate release of the goods with no control) channels for customs control.

Today, the legal framework for the customs risk management approach in Macedonian Customs is covered by the Customs Law. Article 4 defines risk as 'the possibility of an evasion of duties or endangering of the security and safety of the Republic of Macedonia, in respect to public health, the living environment and consumers.' (Customs Law, Article 4). Risk management means the systematic identification and application of all the measures necessary to limit the exposure to risk. This also includes actions, such as the gathering of data and information, risk analysis and risk assessment, the providing and taking of measures and regular supervision, and reconsideration of the results of the measures taken, based on international and domestic sources and strategies (Customs Law, Article 4).

4 Indicators on implementation of the risk management approach in Macedonian customs

Indicators on implementation of the risk management approach in Macedonian Customs relate to the distribution of customs declarations by channels (selective control of customs declarations), the number of processed declarations and the time of processed declarations, the number of felony and misdemeanour charges, and total revenue collection.

The Customs Administration of the Republic of Macedonia operates four clearance channels. In 2018, approximately 75% of the total imports and exports were selected for the green channel, while only 6% of the total imports and exports were selected for the red channel (CARM, 2014-2018). The distribution of the total imports and

exports on the green channel increased from 52% in 2014 to 75% in 2018, which shows the application of risk selectivity in the daily work of Macedonian Customs. Figure 1 shows that Macedonian Customs applies a risk management approach and has improved the system for selective controls by reducing the percentage of physical and documentary customs controls from a rate of 17% for physical controls in 2014 to 6% in 2018, and from a 30% rate for documentary controls in 2014 to 17% in 2018. The Customs Administration of the Republic of Macedonia has adopted a risk management approach, has applied risk-based selectivity (red/yellow/blue/green channels), and is capable of conducting high-risk operations, while increasing the efficiency of customs clearance for low-risk shipments. Macedonian Customs can determine shipments that require additional inspection in the form of physical and documentary customs control in order to fulfil its obligations in terms of safety and security.

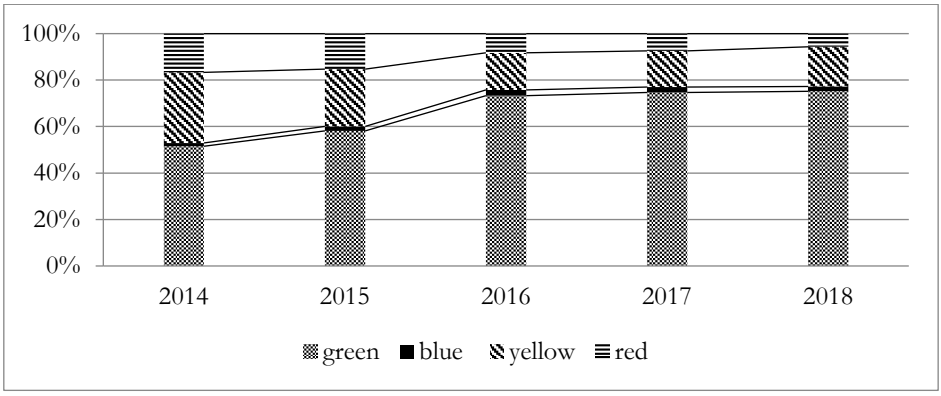

Figure 1: Indicator of selective control on customs declarations in Macedonian Customs
Source: CARM (2014-2018), author's calculations (Official data for 2019 and 2020 had not yet not been published by the Customs Administration of the Republic of Macedonia at the time of writing of this paper)

Another important indicator related to application of the risk management approach in the customs operations of Macedonian Customs is the average processing time on the customs declarations by channels. When analysing these data (Figure 2), it is noted that the average time required to process the declarations distributed on the green channel (immediate release) reduced from 29 minutes in 2014 to 23 minutes in 2018. Comparing the data related to the number of declarations processed in 2018 to that of 2014, an increase of 77% can be seen in 2019, whereas the number of

employees increased by only 2% (CARM, author's own calculations). These figures show an increase in efficiency and productivity in customs practices, leading to gains in time and resources for export and import entities. In contrast, the average time required for processing the declarations distributed on the red and yellow channels increased from 176 minutes in 2014 to 206 minutes in 2018 for the red channel, and from 82 minutes in 2014 to 122 minutes in 2018 for the yellow channel. These figures show that by applying a risk management approach, Macedonian Customs detected shipments that represent a high risk and conducted additional physical and documentary controls in order to protect its economy and citizens in terms of security and safety.

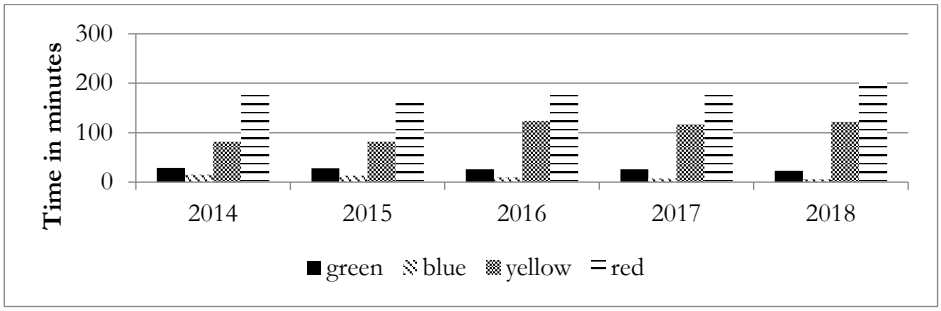

Figure 2: Average processing time of customs declarations by channels
Source: CARM (2014-2018), author's own calculations (Official data for 2019 and 2020 had not yet not been published by the Customs Administration of the Republic of Macedonia at the time of writing of this paper)

Implementation of a risk management approach assists in the successful fight against customs crime. Using the data obtained in the risk analysis, customs officials can use their capacity to detect and prevent crime. Indicators on the detection of crimes by Macedonian Customs relate to the number of the submitted felony charges, the number of submitted misdemeanour charges and the number of the submitted charges per employee (Figure 3).

The indicator of felony charges shows the continuous efforts of Macedonian Customs in fighting crime and protecting society. The highest number of submitted felony charges occurred in 2015, when 110 such charges were recorded. This figure then decreased by 58% in 2019 when 46 felony charges were recorded. In 2019, the highest number of declarations was processed, while the lowest felony charges were recorded. These figures indicate that implementation of the risk management

approach enables the allocation of resources to the appropriate high-risk shipments. The long-term application of the risk management approach changes organisational behaviour and individual behaviour by deterring them from carrying out criminal activities. This strengthens the preventative role of the Customs Administration of the Republic of Macedonia in the fight against crime.

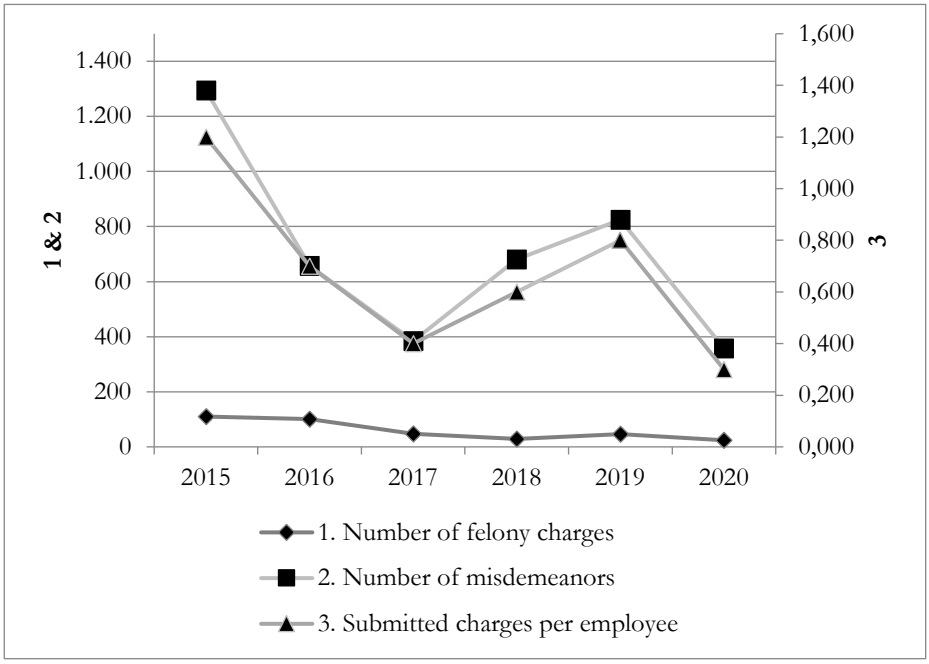

Figure 3: Indicators on the detection of crime by Macedonian Customs
Source: CARM (2015-2020), author's own calculations

As an important state institution, the Customs Administration of the Republic of Macedonia operates under the umbrella of the Ministry of Finance. One of the basic tasks of Macedonian Customs is the calculation and collection of export and import duties, taxes and other fees related to the import, export or transit of goods. The duties and taxes administered by Macedonian Customs are: customs duties, VAT on import, excise duties (production, import and trade), and fees.

Some of the indicators that present the fiscal role of Customs relate to the number of employees, the total volume of collected revenues of customs and excise duties, VAT, fees and collected revenue per employee (Figure 4).

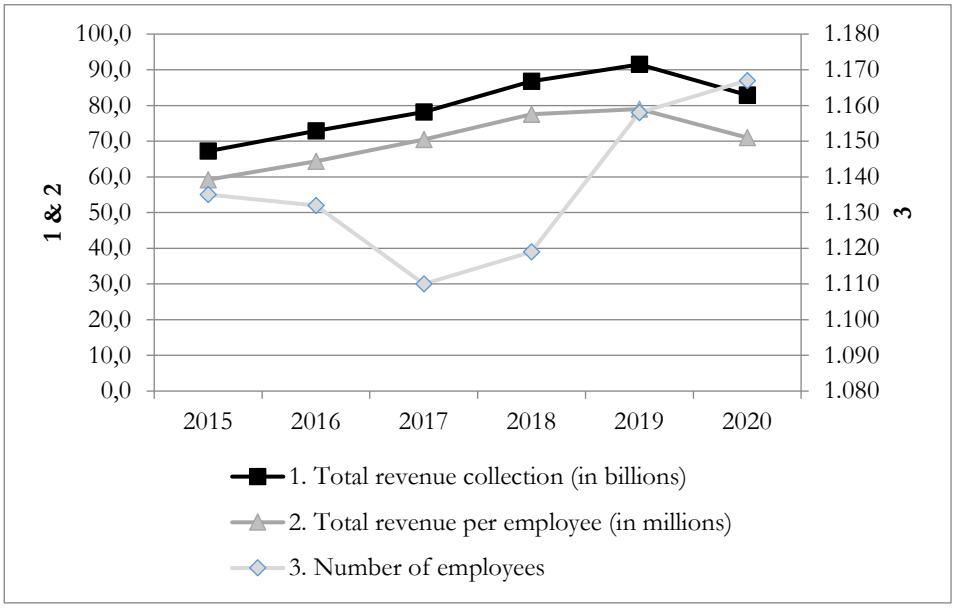

Figure 4: Indicators showing the fiscal role of Macedonian Customs
Source: CARM (2015-2020), author's own calculations

The indicator related to the number of the employees shows that there is no significant fluctuation in these numbers, whereas the total revenue collected in customs and excise duties, VAT and fees expanded rapidly during the analysed period of 2015-2019. The decrease in total collected revenue in 2020 is the result of the reduced workload as a consequence of the COVID-19 crisis, therefore that year is not relevant for this research. The indicator on the revenue collected in customs and excise duties, VAT and fees shows an increase of 36% in 2019 compared to 2015. Additionally, the indicator on the revenues collected per employee shows an increase of 20% in 2019 compared to 2015. By analysing these indicators it can be concluded that the fiscal role of the Customs Administration of the Republic of Macedonia has significantly improved over the years (Figure 4).

5 Conclusions

Analysis of the risk management approach in Macedonian Customs raises some key conclusions.

First, as a modern service, the Customs Administration of the Republic of Macedonia operates in four main areas: trade facilitation, revenue collection, community protection, and national security. To maintain its goals, implementation of the risk management approach in everyday work is necessary. The legal framework for implementation of the customs risk management approach in the Republic of North Macedonia is covered by the Customs Law. According to its provision, Macedonian Customs has developed a modern risk management system on a strategic, tactical and operational level.

Second, the indicators analysed on the implementation of the risk management approach in Macedonian Customs illustrate the current situation in relation to facilitation of trade, revenue collection, community protection and national security.

The facilitation of trade was analysed using the indicator on the selective control of customs declarations in Macedonian Customs and the average processing time on customs declarations by channels. The results of an analysis of these data show that in 2018 approximately 75% of the total imports and exports were selected for the green channel, while only 6% of the total imports and exports were selected for the red channel (CARM, 2014-2018). The average time required to process the declarations distributed on the green channel (immediate release) reduced from 29 minutes in 2014 to 23 minutes in 2018. These figures show an increase in efficiency and productivity in customs practices, leading to gains in time and resources for export and import entities. Implementation of the risk management approach has allowed Macedonian Customs to speed up customs procedures for low-risk shipments that are within the customs laws and regulations.

Community protection and national security was analysed using the indicators on the detection of crime by Macedonian Customs. Analysing these indicators showed that the highest number of submitted felony charges occurred in 2015, when 110 such charges were recorded. This figure then decreased by 58% in 2019 when 46 felony charges were recorded. In 2019, the highest number of declarations was processed, while the lowest felony charges were recorded. These figures indicate that implementation of the risk management approach enables the allocation of resources to the appropriate high-risk shipments. It is notable that Macedonian Customs has a strong commitment to its role in the prevention and detection of crime and protection of its citizens, however, more efficient control methods still need to be developed in terms of customs misdemeanours.

Revenue collection was analysed using the indicators showing the fiscal role of the Customs Administration of the Republic of Macedonia. By analysing these indicators it can be concluded that the fiscal role of Macedonian Customs has improved significantly over the years. The indicator on the revenue collected in customs and excise duties, VAT and fees shows an increase of 36% in 2019 compared to 2015.

Finally, the Customs Administration of the Republic of Macedonia applies a customs risk management approach (as shown by the indicators analysed) while conducting customs operations. The application of a risk management approach and the use of risk-based selectivity criteria allow Macedonian Customs to allocate its resources to high-risk shipments while increasing the efficiency of the clearance process for low-risk shipments. Nevertheless, the data analysed show that the quality of risk management could be improved as part of the organisational culture and the decision-making process at all levels of the organisation. Macedonian Customs faces a challenge in balancing border security and safety threats while facilitating trade. Customs and other border security and management agencies should work together to fulfil their new roll.

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MARITIME TRANSPORT CLUSTER DEVELOPMENT IN GEORGIA

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Abstract The geopolitical location in Georgia creates opportunities for maritime cluster development. The functioning of the international transport corridor depends on the ports and maritime transport. The country's strategic location on the 'One Belt One Road' (OBOR) route, positioned along the shortest route between China and Europe. The development of maritime cluster gives Georgia the function of international importance and provides more opportunities for sustainable development. The purpose of this paper relates to the possibilities of establishing maritime clusters in Georgia. Creating a cluster provides new opportunities for innovative handling of technological operations in port logistics. Creation of a maritime cluster on the basis of the Port of Batumi and the port of Poti, should increase the competitiveness of both the ports and other companies – as a cluster member. There are advantages of creating marine clusters in Georgia, such as it's: geopolitical location, attractive investment environment, regulated transportation infrastructure, vast seaport. The need to find solutions to the ongoing effects of the COVID-19 pandemic, strengthening Georgia's transit function and transformation of the country's ports into a maritime transport cluster will improve the competitiveness of the Georgian economy after the pandemic.

Keywords:
Georgia, cluster, maritime, transport, transit, ports

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1 Introduction

Global experience of transport and logistics clusters operation shows that their activity is effective in areas with high transit potential. Georgia's geopolitical location creates opportunities for the development of transport clusters. The most important road route from east to west and, from north to south, the Trans-Caucasian Transit Corridor, (CTC) is the shortest way to connect East Asia with Europe. Rational use of the CTC ensures Georgia as a state and provides it with economic security. The concentrated traffic flows of Georgian sea ports are important links in the supply of the transport and logistics chains. Creation of a maritime cluster on the basis of the Batumi and Poti sea ports should increase the competitiveness of the ports and other companies as a cluster member.

A cluster is considered as a group of competitive companies and enterprises (industrial, commercial, transport, logistics), that are linked geographically and cooperate on a voluntary basis to improve the overall efficiency of the logistics process.

M. Haezendonck was the first scholar to use the term 'port cluster' and draw from cluster theories. She defines a port cluster as a set of interdependent firms engaged in port related activities, located within the same port region and possibly with similar strategies leading to a competitive advantage and characterised by a joint competitive position vis-à-vis the environment external to the cluster.' (Haezendonck, 2001, p. -136). Seaport clusters are described by (Langen et al. (-2004) as contributing to the performance analysis of seaport clusters and their structure.

M. Haezendonck analyses the performance of a port cluster with an adapted version of Porter's diamond framework (Porter, 1990, Krugman et al., 1995). She identifies 14 factors that influence the competitiveness of seaports, including internal competition, internal cooperation and relationships in the cluster, the presence of related and supporting industries and the behaviour of the government. The study is a major contribution to understanding port clusters, however it has the following shortcomings:

- ✓ The issue of identifying the firms in the cluster is not addressed. This is relevant since the question of what a port cluster actually is still unclear.

- ✓ It focuses on two commodity groups: containers and break bulk. An analysis of the competitiveness of a complete port cluster is still lacking.
- ✓ Throughput volume is used as performance indicator. This indicator is at best a partial
  indicator of performance. It might be a good indicator for the performance of the cargo handling industry, however a port cluster encompasses many activities whose performance is not directly related to cargo throughput.

2 Ports in Georgia

The Poti sea port is the largest port in Georgia. It provides a gateway to Europe for traders from Azerbaijan, Georgia and Armenia. It handles liquids, container traffic, dry bulk cargo and passenger ferries. The port includes 15 berths, has a total length of 2,900 metres, more than 20 quay cranes and 17- kilometres of rail tracks. It offers direct ferry traffic with the Black Sea ports of Ukraine and Bulgaria and to Georgia's railway network.

The strategic location of the Poti sea port, brings significant logistics and supply chain advantages to companies looking for a rapid, straightforward business start-up in a tax-friendly environment.

The types of vessels that regularly call at the Poti seaport are general cargo (39%), fishing (24%), bulk carrier (10%), fishing vessels (6%) and container ships (6%). Since assuming operations in 2011, APM Terminals (the independent terminal operating division of the Maersk Group) has invested over USD 80 million in upgrading the outdated port infrastructure and service facilities, including the construction of a new Customs Centre, as well as new rail and lorry. During the COVID-19 Pandemic, the Poti pea Port continued upgrades of the port infrastructure and equipment to make it the most productive and safest port in the region

The Poti Free Industrial Zone is located at the heart of the historic Silk Road and remains the shortest link between Europe and Asia. It is the hub of the growing Caspian – Caucasus region.

In 2020, APM Terminals Poti announced its plans to create a deep-water port by investing over USD 250 million of private capital for phase 1 and a substantial amount for phase 2 in extensive development of the port infrastructure and superstructure.

The expansion plan for the Poti sea port that was presented to the Government of Georgia consists of two stages of construction and development. The first stage includes a breakwater of 1,700m and a 400m multipurpose quay with a depth of 13.5m able to handle dry bulk cargo and an incremental 150,000 twenty-foot equivalent units (TEUs). This berth will be able accommodate container vessels of up to 9,000 TEU.

The history of transit navigation dates back to ancient times. The port was declared free-trade zone in 1878. From the outset the main factor in development of the Batumi sea port was oil. It was the basis for construction of the Batumi-Baku railway line. By the beginning of the 20th century, the Batumi sea port had become one of the leading ports of the Black Sea based on its importance and freight turnover. During the period of the Soviet government, the Batumi sea port was registered as a port of the highest category. Participation in the transportation of oil transformed the Batumi sea port into an important centre of the Eurasian transportation corridor.

The advantageous strategic and geopolitical location of the seaport Batumi became a key factor in the adoption of JSC KazTransOil, a subsidiary of the Kazakhstan national oil and gas company JSC KazMunayGas.

Table 1: Operating data of the Batumi seaport

	2014	2015	2016	2017	2018	2019	2020	2021
Dry cargo turnover, thousand MT	1, 203	1, 046	862	795	1,189	694.5	913	1-21
Oil and oil products, million MT	4.5	3.9	3.4	2.1	1.0	0.9	1.2	1.5
Containers turnover, TEU	61,980	54,695	55,781	76,025	90,002	116,081	103,302	99,187
Ships call, unit	585	570	663	527	584	578	589	567

Source: https://www.batumiport.com/en/about_the_company/statistics/

Anaklia's deep-water sea-port, is being implemented by the Anaklia Development Consortium. The consortium comprises "TBC Holding-"s and the American Investment Holding-"s Conti International", which implement infrastructure and construction projects. The contractors of the Anaklia Development Consortium are also the well-known sea-port design company "Moffatt & Nichol" and the Dutch consulting company "Maritime & Transport Business Solutions", which specialised in the issues of port transactions.

In the longer term, throughput at the port is expected to reach 100 million tonnes, however initially the construction of three phases is planned. The first three phases should be constructed within 12 years. For the first three years, it is foreseen that the throughput of the port will be 7 million tonnes, and by the 12th year, it will reach 40 million tonnes of cargo. Around 80% of goods in the are transported by sea. According to data, there was a record increase in the amount of containerised goods in the country (43%).

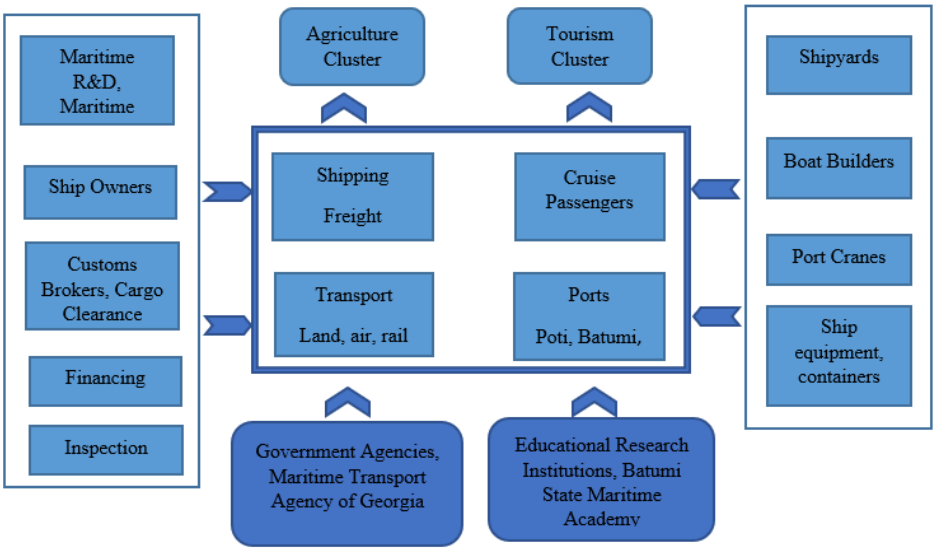

Figure 1: Map of the Batumi Marine Transportation Cluster [2]
Source:https://www.isc.hbs.edu/Documents/resources/courses/moc-course-at-harvard/pdf/studentprojects/Miami%20Marine%20Transportation%20Final%20Report.pdf

A maritime cluster can be formed from such bodies as the Batumi seaport, government and local self-government authorities, the Maritime Transport Agency, banking and financial institutions, non-governmental organisations, research institutions and region science-education centres.

The concentrated traffic flows of Georgian seaports and are important links in the supply of the transport and logistics chain and should be the core of the logistics cluster. Creation of a maritime cluster on the basis of the Batumi and Poti seaports should increase the competitiveness of the ports and other companies as a cluster member.

The role of maritime transport as a key sector increased around the entire world during the pandemic and was of great importance in terms of the continuous and uninterrupted delivery of vital goods during the crisis. There is a requirement, however, for actions to be agreed upon for the standardisation of data, monitoring of ports activities and developing the defence mechanisms to improve cyber security.

The EU has been supporting the development of the Georgian maritime sector through various projects and programmes, such as the reinforcement of navigational safety and security, protection of the marine environment, modern standards of education and training for international accreditation. With the support of the EU, from 2021, the country have a Maritime Transport Strategy. These reforms are creating jobs, helping protect the environment and helping support the establishment of a sustainable maritime transportation system that will help Georgia become a key transit hub for the region.

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THE COVID-19 PANDEMIC AND THE ARM'S LENGTH PRINCIPLE

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Abstract The wide-ranging economic impacts of the COVID-19 pandemic suggest that previous analysis methods such as the arm's length principle can no longer be fully applied in the usual way. The SARS-CoV-2 virus has disrupted companies' accounting, administration, and controlling systems. These systems are essential for analysing the prices applied to related companies. Comparative data evaluation over time is essential to understanding an economic entity. The different measures governments have implemented to contain the epidemic and help businesses to operate have disrupted the economy. Thus, the year-on-year business performance is no longer comparable using annual historical data. Considering future changes in contractual relations analysis is also necessary because non-transitory factors should also be assessed. These factors are incorporated in the countervalue of pricing, which also changes the cost price calculation methodology. Determining force majeure situations is crucial in contracts since its assessment is a legal problem, even for independent undertakings. This paper aims to show how national GDP data help examine the application of the arm's length principle. Since the COVID-19 pandemic, internal comparative prices, pricing mechanisms and pricing principles have become more valued than the use of external comparables. This trend is expected to continue.

Keywords:
arm's length principle,
comparability analysis,
COVID-19 pandemic,
GDP,
OECD guidelines

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1 Introduction

The application of the arm's length principle and its examination for multinational companies remains of particular importance following the emergence of the SARS-CoV-2 virus.

Coronavirus, which led to a pandemic in 2020, resulted in a crisis and has rapidly become a real challenge – one that was not only economic but also cost lives and had a social impact. Everyone has been confronted with the effects of COVID-19 and is a factor that everyone can see and experience (Szóka, 2020).

The economic impact of the COVID-19 pandemic has been particularly wide-ranging, therefore the previous methods of analysis can no longer be fully applied to the application of the arm's length principle.

The virus spread very rapidly, which, in addition to its impact on medical infrastructure, completely transformed our economy.

Different countries have experienced the emergence of the virus at different times and at various intensities, and most governments have tried to respond to the crisis with a wide range of measures to support the economy, jobs and people's incomes.

Changes in economic life and the actions of governments have raised some problems when examining the application of the arm's length principle.

The problems are complicated by the fact that the analysis itself is based on accounting data. The basic principle for comparing data is that it is always possible to compare indicators calculated on the same basis. This principle was violated during the crisis for the reasons mentioned above.
The aim of this paper is to show, in addition to the problems encountered, how national GDP data help to examine the application of the arm's length principle.

2 Examination of the arm's length principle

For guidance on the application of the arm's length price principle, please refer to the guidelines published by the Organisation for Economic and Cooperation and Development (OECD). In January 2022, the most recent single set of guidelines – OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations 2022 – was published (OECD, 2022a). Prior to this, in December 2020, however, the changed economic environment following the SARS-CoV-2 virus made it necessary to draft a supplementary publication to provide a robust assessment of the arm's length principles during this period and beyond titled 'Guidance on transfer pricing requirements for the COVID-19 epidemic' (OECD, 2020).

The purpose of the guidance is to assist in applying a reasonable method of assessment during the relevant period in order to determine the arm's length price, which can not only be applied for tax purposes but also to provide investors and owners with a risk identification and control function.

Moreover, all this is an important area in the public sector in addition to the private sector. This is based on the fact that transfer pricing rules apply to companies with a decisive influence on municipalities just as they do to any other company, which, in addition to tax audits, also supports the application of the arm's length principle in the case of audits by the State Audit Office (Berényi, 2015).

2.1 Presentation of the company: comparison of the periodic results of the company

The first step in applying the arm's length principle is to use comparative data over time to show and evaluate the trend in the operation of a business in order to understand and describe it.

For the periods affected by COVID-19 and subsequent periods, this comparability analysis is of particular importance, and therefore as a first step in the comparability analysis, it is necessary to document the changes due to the epidemic and their impact for each business unit individually in such a way that it is necessary to show the change in the market, operational and financial risks of the business in each case.

The general problem is that comparability analyses typically rely on historical data, which may present a distorted picture for these periods.

To eliminate or avoid bias in comparability analysis, it is necessary to present a deeper analysis than previously expected, which will rely much more on well-developed management accounting principles (Hegedűs, 2020).

The role of management accounting is necessary to ensure comparability. A distinction should continue to be made between transactions with related parties and transactions with unrelated parties. In addition to this, however, it is necessary to identify the costs and expenses and, of course, the revenues that are incurred in the future and which are thus included in the selling price.

An important parameter is that it is also necessary to draw up statements for periods within the year in order to select test periods or exclude periods that would distort the comparison.

It should not be forgotten that several countries have experienced shutdowns of varying periods and intensity that have affected the operation of their businesses.

Macroeconomic information, the use of statistical methods and comparisons with projected internal fiscal data can also help in the analysis of a given period, for example macroeconomic information (e.g. country-specific gross domestic product (GDP) data) or industry indicators, public reports issued by central banks, government agencies, industry or trade associations.

When presenting a particular company, it is therefore useful to make comparisons with macroeconomic data in order to obtain a comprehensive picture.

2.2 Initial steps in creating an external comparison sample

One of the accepted methods for assessing the arm's length principle is to compare the profitability of a company with similar activities and parameters with other companies.

A key issue in the method of analysis is to construct an external comparator sample of enterprises that are as similar as possible to the enterprise in question.

Similarity should not only be limited by activity and type of enterprise but also by size and geographical location.

In the context of the COVID-19 pandemic, the extent to which an international sample can be used is a particularly sensitive issue in the context of this comparative sample, due to the factors mentioned above (different intensity of the epidemic in different periods or the impact of different government measures in different countries).

For this purpose, as an overview, the authors of this study examined the evolution of quarterly GDP data for a few countries, since the quarterly GDP data are good illustration of the impact on companies and that of the epidemic period. GDP is a standard measure of the value added generated by the production of goods and services in a given country over a given period, and is one of the most important indicators of economic activity.

In Hungary, based on the guidance issued by the National Tax and Customs Administration in May 2021 (entitled Application of international business databases containing firm-level data in transfer pricing), the sample of firms operating in the same or most similar macroeconomic geographic area as the market environment of the business under investigation should be selected from the sample within the country during the pandemic period (NTCA, 2021).

In the event that there are not enough samples in Hungary, the extension of the geographical condition should first be done for the V4 or V6 countries, followed by the EU member states of the Eastern European region, then the Central and Eastern European region, and if this is not sufficient, the EU-27 member states and the United Kingdom are proposed. As a further addition, EFTA countries (Iceland, Liechtenstein, Norway and Switzerland) could be added as a last resort to extend the survey to the global level.

Based on the data published by the OECD, and without claiming completeness, the indicators of the V4 countries and Slovenia and Austria are therefore examined in this analysis for the 2019-2021 period based on a quarterly breakdown.

The analysis clearly shows that for all the countries under review, changes can be seen over almost the same period, albeit to varying degrees.

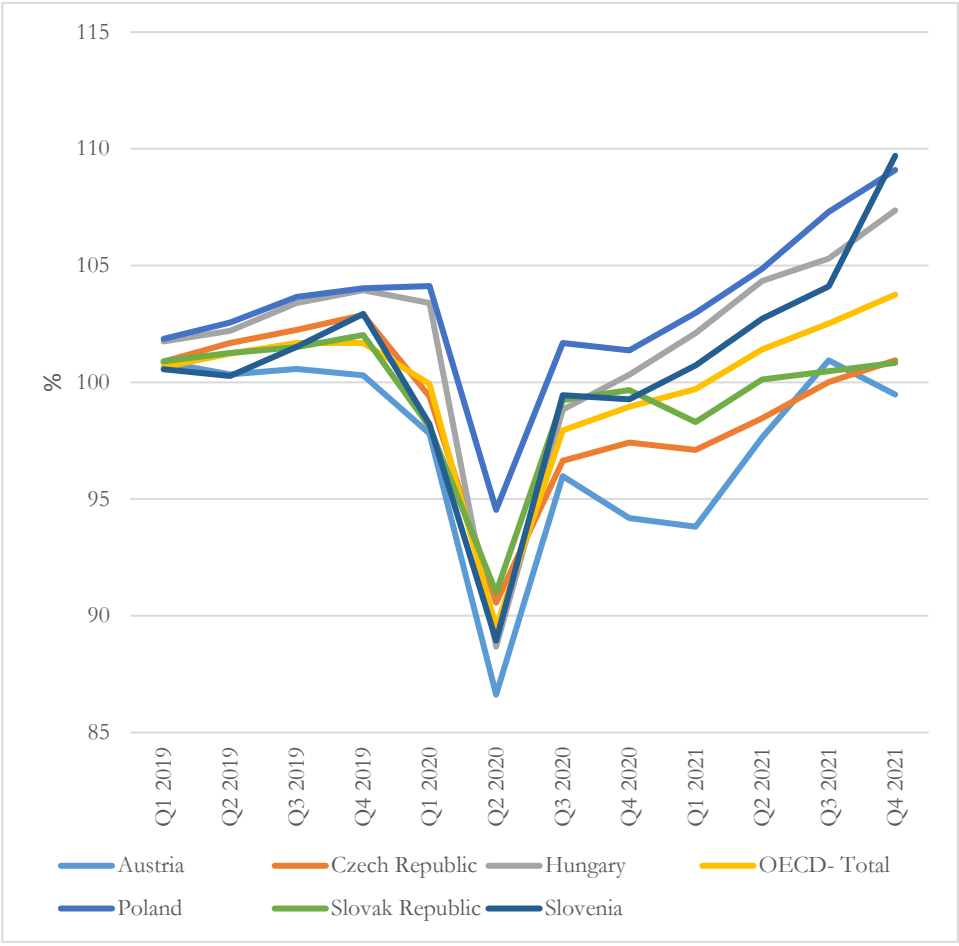

Figure 1: Quarterly GDP percentage change between 2019 and 2021 (Q4 2018 = 100%)
Source: authors' own editing based on the OECD (2022b)

The COVID-19 pandemic first appeared in Europe in February 2020. In terms of quarterly data, the first quarter of 2020 was the first quarter to see a decline in GDP data, with the exception of Hungary and Poland. Hungary exhibited a minimal decline, while Poland showed a further increase. For Austria, the Czech Republic, Slovakia and Slovenia, GDP figures fell below their Q4 2018 levels.

Table 1: Quarterly GDP percentage change between 2019 and 2021 (Q4 2018 = 100%)

	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021
Austria	100.86	100.34	100.57	100.30	97.80	86.62	95.98	94.18	93.81	97.63	100.94	99.48
Czech Republic	100.89	101.68	102.24	102.88	99.40	90.56	96.64	97.42	97.11	98.46	100.01	100.94
Hungary	101.75	102.20	103.40	103.95	103.40	88.67	98.83	100.33	102.11	104.34	105.29	107.36
OECD - Total	100.63	101.23	101.68	101.68	99.93	89.50	97.94	98.96	99.71	101.40	102.52	103.75
Poland	101.86	102.56	103.66	104.02	104.12	94.54	101.68	101.36	102.98	104.87	107.30	109.09
Slovak Republic	100.91	101.26	101.5	102.02	98.09	91.00	99.25	99.67	98.29	100.12	100.48	100.83
Slovenia	100.56	100.27	101.52	102.94	98.20	88.93	99.45	99.27	100.72	102.73	104.11	109.70

Source: authors' own editing based on the OECD (2022b)

Notes:

The highest GDP data prior to the emergence of the pandemic
The deepest GDP data due to the emergence of the pandemic
Re-achievement of pre-epidemic GDP data

In the 2nd quarter of 2020, there was already a strong decline in all countries, followed in Q3 by a larger improvement and then by a slow increase.

For the countries under review, the GDP figures for Q4 2019 were able to compensate for the economic downturn following the onset of the COVID-19 pandemic for a different period. Some countries, such as Hungary, Poland and Slovenia, reached their pre-pandemic GDP levels after Q2 2021, while others, such as the Czech Republic and Slovakia, did not even reach their pre-pandemic GDP levels in Q4 2021.

Looking at OECD countries in general, it can be concluded that the economies of OECD member countries collectively were able to reach the pre-pandemic level of COVID-19 by Q3 2021, with the highest level in Q3 2019.

3 Conclusions

In the analysis of the six countries, it can be concluded that in the case of an international comparison, due to the COVID-19 pandemic, it is necessary to take into account that each country experienced the epidemic at a different time and with different intensity. Therefore, if it is not possible to find enough samples within a country, it is worth extending the sample to countries that experienced the same intensity in economic life during a similar period, which can be achieved by mapping the GDP trends of the countries concerned.

Given that these effects have varied across industries, it may be worth looking beyond the variation in national data to examine the comparative sample of the firm under investigation at a sectoral level.

In addition, analysing the evolution of the GDP of a company's country at the industry level may also allow further correlations to be identified, such as the extent to which the company in question fits into the pandemic situation during this period.

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THE VIEWS OF GENERATION Z ON PROGRESSION AT WORK

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Abstract The main purpose of this paper is to discuss the views of Generation Z in relation to progression at work. Based on a field survey of 113 business students. Generation Z members are encouraged to work hard, take responsibility and learn continuously as an appropriate way of increasing their chances of promotion at work. Their flexibility and intention to achieve their goals is also evident, which is reflected in their willingness to change their work environment if it does not suit them or does not allow them to achieve their goals. Difficult tasks present challenges that they want to overcome. Generation Z's motivation is declining rapidly, therefore constant encouragement is important to improve satisfaction and help organisations to achieve their goals. Due to their specific characteristics and habits, this generation will play a key role in the future in helping companies achieve their goals and establishing or improving their reputation and visibility in society. Companies will need to offer their employees value for money, otherwise they will lose quality staff and be plunged into crisis.

Keywords:
Generation Z, ethical and moral behaviour, career progression, self-criticism, norms and values

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1 Introduction

Examination of Generation Z has become an interesting topic of research in recent times (Arora et al., 2020; Balan & Vreja, 2018; Bender, 2021; Böhlich & Axmann, 2020; Emese, 2016; Sanalan & Taslibeyaz, 2019; Suarez & McKee, 2018). Studies are looking at Generation Z from various perspectives. Researchers initially sought to identify the characteristics and features of this post-millennial generation, but later turned to studying specific areas related to Generation Z. To date, a number of studies have been carried out to identify the characteristics of Generation Z in general and to compare them with those of previous generations.

In the area of management and business, studies prevail on how to integrate Generation Z into an organisation as effectively as possible and how to take advantage of the benefits that Generation Z brings with it. Generation Z is slowly entering the labour market. Due to their specific characteristics and habits, this generation has a lot to contribute to improving performance and innovation in companies. They can also accelerate digitalisation and the introduction of Industry 4.0 in companies, given their very good knowledge and use of modern technology. This in turn results in better business performance and a competitive advantage, as well as continuous improvement and progress, which will be key to keeping businesses on the market in the future. However, Generation Z has higher expectations and demands (Dolot, 2018; Prund, 2021; Vasilyeva et al., 2020). Identifying the needs of Generation Z will also be very important for employers. If they do not identify and meet the needs of their employees, they will leave the company for one that will meet their needs and give them a better chance of achieving their personal goals (Meret et al., 2018).

Generation Z is defined as the generation whose members were born between 1995 and 2010 (Črešnar & Nedelko, 2020). The characteristics of Generation Z suggest a strong tendency towards self-expression and self-fulfillment in the workplace, which consequently suggests a strong tendency towards career advancement. This triggers the questions 'What would representatives of Generation Z be prepared to do to advance their career?' Would they 'soil their name and image' in order to be promoted? The authors of this paper wanted to discover the answers to these questions by carrying out a survey of attitudes among Generation Z members. To the best of the authors' knowledge, to date no research has been carried out that reveals the attitudes of Generation Z towards promotion at work. Thus, this research

is expected to yield useful findings that can be used in further research on Generation Z, especially in relation to motivation and moral values. The aim of the survey among business students was to find out the views of Generation Z on career advancement, and to relate the results of the survey to the previously highlighted characteristics of Generation Z (with a focus on ethical and moral responsibility and the values of Generation Z).

The structure of this paper is as follows. It begins with a brief introduction to Generation Z followed by a focus on the importance of promotion at work as a way to motivate Generation Z. The results are illustrated of the survey on the views of students as representatives of Generation Z on the use of certain actions to improve the chances of promotion at work. The authors then tried to relate the results to the previously known characteristics of Generation Z, especially in relation to ethical and moral responsibility.

2 Theoretical background

A generation can be defined as a group of people defined by common characteristics, traits, values and historical events that have marked a period of time for that group of people. Generational differences also affect other aspects of people management, training procedures and career building and development or rewards and motivation at work (Fratrièová & Kirchmayer, 2018).

Throughout history, the following generations have been identified over the last hundred years: (1) the 'traditional generation' or 'silent generation' (individuals born between 1925 and 1946), (2) the 'baby boomers generation' (individuals born between 1946 and 1964, (3) Generation X (individuals born between 1965 and 1980), (4) Generation Y or millennials (individuals born between 1980 and 1995), (5) Generation Z (individuals born between 1995 and 2010) and (6) Generation Alpha (individuals born after 2010) (Črešnar & Nedelko, 2020; Klopotan et al., 2020).

Generation Z (also Gen Z, iGen, centennials or post-millennials) is slowly but steadily entering the workplace, bringing with it a number of changes (Kılıç et al., 2021). To understand these changes, it is necessary to get to know Generation Z a little better. This generation is the first fully digital generation born at a time of the most intense technological development. Members of this generation are digitally literate and have no problems working with modern technologies. Social networks

(Facebook, Twitter, Tiktok, Snapchat, Instagram, etc.) are the main means of communication (Dolot, 2018).

Tari (2011) defines Generation Z representatives as: (1) having less attachment to parents and other family members; (2) having lower emotional intelligence and lower concentration due to multitasking; (3) wanting to leave a visible mark or do something for which future generations will remember them; (4) considering the opinion of their peers as very important; (5) being highly creativity due to the digital environment (social networks, computer games, simulations, etc.) in which they are present on a daily basis; (6) being open-minded towards people who think differently (sexual orientation, partnership, etc.); (7) following famous people and influencers and trying to emulate them and (8) using different ways of learning (YouTube, podcasts, online courses, etc.) (Emese, 2016; Lev, 2021).

According to Half (2015), Generation Z will be loyal to their employer if it gives them the opportunity to develop their career, learn new skills and move up the ranks of the organisation. They also expect to be well paid and have a good working environment.

Promotion at work is one of the best ways to motivate employees. For the employee who is promoted, it usually brings an increase in power and authority, as well as higher pay, additional material benefits and bonuses (Chillakuri, 2020; Sanalan & Taslibeyaz, 2019). Due to the increasing competition among employees and the limited number of promotion opportunities, employees are keen to improve their chances of promotion. There are many different ways of improving one's chances of being promoted. However, some actions that improve promotion prospects can be classified as ethically, morally or even legally objectionable (illegal, prohibited by law) actions (Prund, 2021; Zabel et al., 2017).

Business ethics can be defined as the way a company behaves or acts in accordance with moral principles, values and norms. It is necessary to distinguish between the ethical actions of the individual and those of the company. Research on ethics and ethical values (Boyd, 2010; Klopotan et al., 2020; van der Walt et al., 2016; VanMeter et al., 2012) confirms differences in the perceptions of ethical and unethical behaviour between generations. They also show links between the characteristics of members of each generation and their definition of business ethics. In this paper,

the authors focus on the study of business ethics at the level of the individual employee (de Gama et al., 2012).

Given the characteristics of Generation Z, it can be assumed that this generation will use fewer ethically and legally questionable actions in order to improve its position in an organisation or in the wider environment (Graczyk-Kucharska & Erickson, 2020). Similarly, actions that improve the chances of advancement in the workplace and that are defined as appropriate by members of the post-millennial generation can also be inferred. Ethical behaviour brings greater respect both at the level of the individual employee and that of the organisation (Suarez & McKee, 2018). Based on these cognitions, the central research question of this paper is 'What would representatives of Generation Z be prepared to do in order to advance their career?' In that context we can distinguishing between most and least acceptable activities that are individuals willing to conduct for their promotion, on an interval.

3 Field survey among Generation Z

A survey was conducted among students of the Faculty of Economics and Business (FEB) in Maribor, Slovenia, during the 2021/2022 study year. All the participants took part in the survey on a voluntary basis. The questionnaire is based on the second part of the questionnaire titled 'A Survey of Work-Related Issues', which was developed by an international group of researchers from Oklahoma (USA), the so-called 'University Fellows International Research Consortium'. The authors asked the students about their views in relation to promotion at work with the help of 38 different actions that can be taken to increase an employee's chances of promotion. The respondents expressed their views relating to each statement using a Likert-type scale ranging from 1 ('completely acceptable action') to 8 ('completely unacceptable action'). The questionnaire was completed by 113 people born between 1998 and 2002.

The results of the survey have been divided into three groups, according to the mean values of the 38 scenarios. Table 1 lists the most acceptable activities to improve the chances of promotion for Generation Z, Table 2 lists those that are considered partly acceptable, while Table 3 shows the least acceptable activities.

Table 1: Most appropriate activities to improve chances of promotion according to Generation Z

	Question (claim, argument)	Mean	Std.	99.7% Confidence Interval[1]
1.	Develop a basic knowledge of the tasks of the job.	1.637	1.198	1.29-1.98
2.	Demonstrate the ability to get the job done.	1.717	1.223	1.37-2.07
3.	Leave the company for a better job in another company.	1.814	1.223	1.46-2.16
4.	Behave in a way that is acceptable in the company.	2.009	1.46	1.59-2.43
5.	Help subordinates develop their skills in order to help them achieve their goal.	2.035	1.072	1.73-2.34
6.	Dress like a successful businessperson.	2.204	1.242	1.85-2.56
7.	Ask to be given responsibility for an important project.	2.336	1.194	1.99-2.68
8.	Try to assert themselves by volunteering for important projects.	2.354	1.382	1.96-2.75
9.	To make important people in the company aware of their achievements.	2.381	1.155	2.05-2.71
10.	Maintain good working relationships, even with other employees they dislike.	2.513	1.198	2.17-2.86
11.	Try to increase the credibility of the work by obtaining an advanced degree (e.g. Master's, PhD).	2.575	1.419	2.17-2.98

Table 2: Partially appropriate activities to improve the chances of promotion according to Generation Z

	Question (claim, argument)	Mean	Std.	99.7% Confidence Interval[2]
1.	Work outside regular working hours when necessary to complete work.	2.735	1.073	2.43-3.04
2.	Establish a close relationship with a person higher up in the hierarchy who could be a mentor to them.	2.761	1.576	2.31-3.21
3.	Find out what the important people in the company like so that they can be promoted more easily.	2.867	1.717	2.38-3.36
4.	Use technical knowledge to make a superior dependent on their help.	2.982	1.8	2.47-3.50
5.	Try to behave in a way that they think will win them the admiration of their colleagues.	3	1.76	2.50-3.50

[1] 99.7% Confidence interval of the difference in population
[2] 99.7% Confidence interval of the difference in population

	Question (claim, argument)	Mean	Std.	99.7% Confidence Interval[2]
6.	Assess how an influential person could help them gain promotion and then support and work for that person.	3.177	1.587	2.72-3.63
7.	Volunteer to perform an unwanted task in order to be more appreciated by their superiors.	4.283	2.168	3.66-4.90
8.	Support the opinion of important people in the company, even if they disagree with that opinion.	5.699	1.444	5.29-6.11
9.	Threaten to leave the company if their demands are not met.	5.726	1.547	5.28-6.17
10.	Do not bring problems to the attention of those higher up in the hierarchy for fear of their superiors.	5.788	1.484	5.36-6.21
11.	Withhold certain information to avoid being judged less favourably by someone else.	5.903	1.522	5.47-6.34
12.	Try to get answers to questions in a promotion exam in order to gain more points than other candidates.	6.044	1.604	5.58-6.50

Table 3: Least appropriate activities to improve the chances of promotion according to Generation Z

	Question (claim, argument)	Mean	Std.	99.7% Confidence Interval[3]
1.	Try to influence a superior to make a bad decision if such a decision would help their promotion.	6.124	1.44	5.71-6.54
2.	Write a false CV to make themselves look better than they really are.	6.425	1.407	6.02-6.83
3.	Threaten to release confidential information to someone outside the company if their requests are not met.	6.434	1.438	6.02-6.85
4.	Take credit for the good work of their subordinates.	6.487	1.39	6.09-6.89
5.	Steal confidential business documents and give them to someone else in the company in exchange for a better job in that company.	6.664	1.461	6.24-7.08
6.	Contact a person who might obtain damaging information about other candidates for promotion.	6.752	1.36	6.36-7.14
7.	Blame others for one's own mistakes.	6.77	1.499	6.34-7.20
8.	Use friends to undermine the reputation of a person who is their rival for promotion.	6.77	1.451	6.35-7.19
9.	Spread rumours about someone who is holding them back from promotion.	6.823	1.507	6.39-7.25

[3] 99,7% Confidence Interval of the Difference in Population

	Question (claim, argument)	Mean	Std.	99.7% Confidence Interval[3]
10.	Use harmful information to blackmail a person who can help them get promoted in the company.	7.018	1.35	6.63-7.40
11.	Try to create a situation in which the person being considered for promotion is caught using drugs or engaging in other illegal activities.	7.053	1.516	6.62-7.49
12.	Install a recording device in the office of another candidate for promotion in order to obtain important information about them.	7.124	1.371	6.73-7.52
13.	Psychologically harass a competitor for promotion with anonymous, threatening phone calls.	7.327	1.648	6.85-7.80
14.	Hire a criminal to seriously injure their competitor for promotion.	7.389	1.588	6.93-7.84
15.	Offer sexual favours to a superior.	7.558	1.31	7.18-7.93

The survey results show that Generation Z is in favour of actions where employees improve their chances of promotion through their work, experience and results (Table 1). They also consider it acceptable to change their working environment in order to get a better job in another company[4]. However, they disapprove (i.e. at least do not favour) of actions that are morally and ethically questionable or even illegal in order to improve promotion prospects (Table 3).

4 Discussion

The results can be linked to the characteristics of Generation Z (Arora et al., 2020; Lev, 2021; VanMeter et al., 2012) relating to their moral and ethical behaviour. The representatives of Generation Z who took part in the survey want to prove themselves in both personal and business environments, as indicated by the survey results. In fact, Generation Z emphasises actions that relate to proving oneself, one's work and performance, as well as one's enthusiasm and contribution to the success of the company and wider society, as the most relevant ways to improve one's chances of advancement.

[4] Question 3 in Table 1

Generation Z is flexible and adapts very quickly and effectively to changes in the work environment and beyond (Emese, 2016). Therefore, changing jobs and environments is not difficult for them, the latter is just a challenge and an opportunity, which members of this generation are known to grasp with both hands and in which they are of favour. Previous generations have been characterised by company loyalty, with many people remaining loyal to one company throughout their career (Boyd, 2010).

The post-millennial generation is quite ethically and morally responsible, which is also reflected in their tendency towards greener industry, organic food and waste reduction, and a greater concern for a healthy and clean environment (Bulut & Maraba, 2021). Their ethical and moral behaviour is also reflected in a negative attitude towards actions that are morally and ethically questionable or even criminal (such as threats, use of violence, lying, etc.), even if these actions would improve their chances of advancement or make it easier for them to achieve their personal goals (Fratrièová & Kirchmayer, 2018). Generation Z has a neutral stance towards actions that are socially accepted as partly controversial or questionable, but not illegal, or highly morally and legally questionable. The choice of such actions depends on the individual and their personality.

Based on the research, it can be concluded that members of Generation Z strive to achieve their goals in a 'relatively ethical' way through their own actions and efforts rather than by taking side-roads or shortcuts that, in one way or another, are controversial or even illegal. This reflects cognitions about the characteristics of Generation Z (Emese, 2016; Tari, 2011), their interest in ethical behaviour and work ethics. If, despite their best efforts, employees do not achieve their demands or expectations, they are more likely to change their working environment and less likely to take controversial actions, as they are reluctant to take actions that they themselves would not want other people to take.

Employers in business need to be aware of the characteristics of Generation Z, to know and understand their expectations and needs, and to adapt to a certain extent if they want to retain quality staff in their business (Bender, 2021). Generation Z represent a significant challenge in terms of employee management, human resources management, motivation and work organisation in general. At the same time, Generation Z also represents an opportunity for employers (Francis & Hoefel, 2018), as it can bring many advantages to companies and contribute to faster

digitisation and computerisation, the implementation of Industry 4.0, increased innovation and quality, and overall business growth and development (Bender, 2021; Dwivedula et al., 2019; Yunos & Din, 2019).

The most important thing in the future will be to find a 'middle ground' that both satisfies the personal needs and interests of employees while also contributing to companies' growth and development. Many companies are already aware of the importance of quality and qualified staff and are investing heavily in improving employee satisfaction in order to retain the best employees (Bender, 2021; Vasilyeva et al., 2020).

5 Conclusions

Previous research has examined Generation Z in terms of personality traits, generational characteristics and their behaviour at work, whereas this research specifically focuses on attitudes towards promotion in work environments. However, in addition to these attitudes, the results include the 'hidden' personality traits and characteristics of the generation. This research could be useful for companies in setting up reward and motivation systems in their organisations, especially in relation to retaining successful employees in the company and also in terms of improving the climate in the organisation. In summary, the Generation Z entering the labour market is ethically and morally responsible and expects the same from their employers, who will have to adapt accordingly.

The main limitation of the paper is related to defining different groups of (un)ethical behaviour related to promotion in the workplace, as only 38 scenarios were categorised into three groups of behaviour, based on the obtained mean values of each statement – ranging from the most ethical to the least ethical. This limitation provides a direction for further research, as the next logical step would be to identify different groups of unethical behaviour of Generation Z in relation to advancement in the workplace and delve deeper into (un)ethical behaviour in terms of advancement in the workplace.

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Sustainable Learning and the Cultivation of Students' Core Literacy From the Perspective of Comprehensive Learning: The Application of Multimedia in a Flipped Classroom

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Abstract Cultivating students' core literacy is the ultimate goal of education. It is restricted by multiple factors and it is necessary to consider that students at different stages have different physiological and physical characteristics. Studies have a great impact on the teaching process. Therefore, this article analyses the various factors that cultivate students' core literacy in classroom teaching under multiple influencing factors with multimedia at the core. It also tracks and researches the sustainable development of students through a case analysis and the characteristics of relevant survey data, using Stata tools for empirical analysis. Finally, feasible measures are provided for the formation of a flipped classroom teaching that cultivates students' core literacy.

Keywords:
flipped classroom, multimedia technology, sustainable learning, cultivation of core literacy teaching and learning method, students

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1 Introduction

Learning is a long-term process. Ensuring students' sustainable learning and the cultivation of core literacy is the key to modern teaching and is also the focus of current educational research (Xuedong, 2018).

To date, most of the research into sustainable learning and the cultivation of core literacy has been focused on the definition of related concepts, such as sustainable study and core quality (Zailiang et.al, 2019). In combination with the current education process in China, the cultivation of sustainable learning and core literacy has furthered the conceptual analysis, put forward some theoretical schemes (Yandong, 2021), and/or analysed how to mobilise sustainable learning and cultivate students' core literacy in schools (Ye, 2021). These studies are analysed from the context of theoretical and empirical sustainable learning and the necessity and urgency of the cultivation of core literacy in modern teaching. However, they are not proven by experimental tracking or data on actual teaching experiment reforms. To implement these new concepts and ideas into actual teaching, there is a need to constantly adjust the teaching method to explore a suitable teaching mode. Advanced modern education concepts such as sustainable learning and the cultivation of core literacy can be integrated into teaching to help students better experience classroom teaching and acquire more knowledge.

On the basis of the above background, the authors of this paper carried out empirical research on the actual reform of teaching patterns and the perspective of experimental teaching, as well as the integrated perspective of sustainable learning and the formation of students' core accomplishments. This was done by tracking teaching experiment data, a systematic analysis of the subjective and objective factors of sustainable learning, cultivation of the mechanism of students' literacy and the influence of the core role it provides in offering guidance for further teaching reform.

2 Materials and Methods

The authors of this paper carried out experimental tracking research and the evaluation of data on 360 students from six universities in Liaoning Province. Each undergraduate business school randomly selected two ordinary classes with similar student performance (30 students in each class). One of the classes has adopted traditional multimedia teaching methods, while the other uses flipped classroom multimedia teaching methods to conduct tracking of a learning experiment. An evaluation team of 10 people was organised in each business school to conduct a two-year teaching tracking evaluation conducted in accordance with the core literacy development standards. The curriculum-related indicators of students and teachers are evaluated every Friday (refer to Table 1 for evaluation methods), and a total of 70 weeks of evaluation (excluding weeks with less than five learning days) are obtained for the empirical part of this article.

After completion of data collection, a total of 25,200 copies of data were imported into Excel, and the collected data was statistically analysed using Stata software.

3 Results

3.1 Description of variables

Based on the above analysis of the factors affecting sustainable learning and core literacy development of flipped classroom students from subjective and objective perspectives, the following variables were selected for empirical study in this paper in order to conduct an empirical analysis on the relevant factors and mechanisms of the development of core literacy among flipped classroom students.

3.2 Model setting and empirical methods

An explanatory model was constructed to reflect the correlation between sustainable learning and the cultivation of students' core literacy from the perspective of comprehensive learning:

Model 1: $\mathrm{Y1_{CAA}} = \alpha_1 X1_{SC} + \alpha_2 X2_{SII} + \alpha_3 \mathrm{X3_{COL}} + \alpha_4 \mathrm{X4_{TTS}} + \alpha_5 \mathrm{X5_{TCE}} + \alpha_6 \mathrm{X6_{TMD}} + + \beta_1$

Model 2: $Y2_{CEE} = \alpha_1 X1_{SC} + \alpha_2 X2_{SII} + \alpha_3 X3_{COL} + \alpha_4 X4_{TTS} + \alpha_5 X5_{TCE} + \alpha_6 X6_{TMD} + +\beta_2$

Table 1 (below) sets out the variable definitions shown in the above model, where $\alpha_1 \ldots \alpha_6$ represents the correlation coefficient between the dependent variable and the independent variable, and β_1 and β_2 represent the adjustment coefficient of the model. Based on the above model, the authors of this article used Stata software to perform a model analysis base on the previous data, as well as a stationarity test, cointegration test and cointegration regression on the data, then carried out regression verification on the error correction model to complete the empirical analysis.

3.3 Empirical Results

3.3.1 Results of the data stationarity test

The results of the data stationarity test carried out in the empirical process are shown in Table 1 below. In terms of the stationarity test, the sample data collected has good characteristics of a stationary time series, therefore the regression analysis method can be used to forecast the analysis. The results show that all variables for Y1 and Y2 have good, stable sequence features.

Table 1: Data Stationarity Test

	(1)	(2)
Variable	Y1_CAA	Y2_CEE
X1_SC	0.2554 * (0.4146)	0.4155 (0.2264)
X2_SII	-0.022* (0.0252)	-0.0212 (0.0424)
X3_COL	0.2316** (0.1116)	0.160** (0.052)
X4_TTS	-2.542* (1.132)	0.61 (1.543)
X5_TCE	0.2106** (0.1104)	0.161** (0.034)
X6_TMD	0.2323** (0.1293)	0.1822** (0.062)
Constant Term	0.2316** (0.1012)	0.151** (0.049)
Annual Fixed Effect	Control	Control
F Statistic	11.25***	31.20***
Sample Size	16	16

3.3.2 Cointegration test results

As can be seen by the variables of the stationarity test, although its sequences show a sequence of stability, the variables are also affected by the unit root, therefore it is difficult to estimate and implement directly, hence an equation is required to estimate the combination and cointegration test together in order to test the equilibrium between the variable correlation. As can be seen from the results, all the variables significantly correlate with Y1 and Y2, especially the two subjective variables – student interest degree score (X2_SII) and student learning continuity score (X3_COL), which cointegrate with the student comprehensive ability score (Y1_CAA) and the student comprehensive experience score (Y2_CEE), thus showing significant correlation.

3.3.3 Granger causality test results

In Table 2 below, the Granger causality detection method has been used to detect the co-integration correlation between variables, and the specific detection description is as follows.

Table 2: Cointegration Test Results

Direction of causality	Lag phase	F statistics	F Statistical critical value (5%)	Direction of causality	Lag phase	F statistics	F Statistical critical value (5%)
X1→Y1	1	4.07885	0.0485	→	4	6.75852	0.0112
X2→Y1	1	7.70482	0.0128	→	4	5.63253	0.0189
X3→Y1	4	4.52554	0.0338	→	5	12.2521	0.0071
X4→Y1	1	7.85256	0.0458	→	5	16.3252	0.0042
X5→Y1	2	5.32145	0.0121	→	5	5.12421	0.0158
X6→Y1	3	4.04487	0.2521	→	5	17.2325	0.0232
X1→Y2	1	5.56325	0.0152	→	5	5.42152	0.0412
X2→Y2	2	6.21521	0.0312	→	5	9.85215	0.0128
X3→Y2	3	4.25325	0.0053	→	5	5.12412	0.0148
X4→Y2	3	4.25625	0.0036	→	1	4.95226	0.0258
X5→Y2	2	4.52575	0.00363	→	3	9.65852	0.0402
X6→Y2	1	5.785322	0.0315	→	1	9.36521	0.0085

As can be seen from Table 2 above, by using the Granger causality test, to a large extent the test data indicates that the comprehensive score of teaching skills (X4_TTS), the comprehensive score of teaching content (X5_TCE), and the comprehensive score of multimedia presentation content skills (X6_TMD) directly affect the students' comprehensive ability score (Y1_CAA) and the students' comprehensive experience score (Y2_CEE). Moreover, the influence of Y2_CEE is more significant.

4 Discussion

1) In terms of students' subjective behaviour, the influence of the comprehensive teaching score Y1_CAA is more significant than that of the objective factors, and the influence of objective factors is mainly reflected in the influence of the students' comprehensive experience score (Y2_CEE);

2) From a subjective point of view of the influence on students' comprehensive ability score (Y1_CAA), the students' comprehensive ability score (Y1_CAA) is more influenced by the students' interest degree score (X2_SII) and students' learning continuity (X3_COL). Compared with the attention duration score (X1_SC), the effect was more significant.

3) Objective factors mainly affect the students' comprehensive experience score (Y2_CEE) and the influence of the teaching content comprehensive score (X5_TCE). In addition, the multimedia presentation content skill score (X6_TMD) is higher than that of the teaching skill comprehensive score (X4_TTS).

Based on the above data analysis combined with the actual situation, the factors that affect the development of students' comprehensive literacy can be analysed from two aspects.

The subjective factors include the following:

1) Sustainability of students' attention

From the perspective of developing students' core literacy and sustainable learning, whether flipped or traditional, both teaching models are human-oriented. Both models emphasise the cultivation of students' autonomous learning ability in the learning process. Therefore, in a flipped classroom, students also need to maintain sustainable concentration during the teaching process. It is supposed that students' inattention reduces the effectiveness of teaching, while in flipped classrooms, video learning comes before class learning and in-class interaction. In such cases, students are required to maintain attention for a long time and must pay continuous attention to the knowledge and problems in the course in order to develop the core literacy of sustainable learning through a flipped classroom. Therefore, in the process of analysis, this paper started from the perspective of the sustainability of students' attention, taking it as a subjective factor, in order to conduct an in-depth discussion and analyse the impact of the sustainability of students' attention on student learning and the cultivation of core literacy in a flipped classroom.

2) Students' interest in learning

Different students have different degrees of interest in different knowledge and courses of study. It can be considered that interest is an important factor for students to learn and accept new knowledge. The same interest affects the development of students' core literacy in flipped classrooms. Students with a strong interest in the teaching mode of flipped classrooms are more likely to focus on the relevant knowledge prior to the class. When students' interest is stimulated, they are more likely to accept relevant knowledge autonomously, learn more and have a better experience. In addition, from the perspective of sustainability, students' interests provide them with an advantage in terms of sustainability. According to the above analysis, this research focuses on and analyses the influence of students' core literacy in a sustainable flipped classroom from the level of students' interest in learning, and uses it as a subjective factor to analyse and explore the level of students' interest in learning – whether in terms of the development of core literacy or the relevance and influence of the mechanism.

3) Student learning continuity

Students' continuous learning behaviour is an important manifestation of their core literacy. This behaviour is not only based on students' interests, but also reflects the comprehensive and continuous performance of students in the learning process. Continuous learning behaviour is the execution process and result of students' autonomous learning, and is also an important manifestation of autonomous learning ability. Students who can actively participate in flipped classroom learning in actual teaching will have more opportunities to learn and maintain higher learning efficiency in the classroom.

Therefore, in this study, it can be considered that the enthusiasm of students' participation in the learning process is a subjective influencing factor. From the perspective of the continuity of the enthusiasm of students' participation in learning, its impact on students' sustainable learning and core literacy development can be analysed and explored. It would be helpful to comprehensively analyse the subjective comprehensive influence of students on their sustainable learning and core literacy development.

The objective factors include the following:

1) Teaching skills of teachers

The introduction of core literacy requires teachers' literacy to keep up with the pace of the educational era, and to be continuously improved, in order to 'escort' the cultivation of students' core literacy. The task of the teacher is to impart knowledge to students and to cultivate in them the necessary skills and qualities. This requires teachers to guide students to gain true knowledge on the premise of completing the improvement of their own core literacy in order that they can help in cultivating students' core literacy. Therefore, under the requirements of sustainable learning and core literacy development, teachers should strengthen their professional literacy and establish correct educational concepts.

This article discusses the influence of teachers' teaching skills on students' sustainable learning and core literacy development, and analyses teachers' teaching skills from this perspective, in order to influence the sustainable learning and core literacy development of students in a flipped classroom.

2) Content setting skills

The course content and teaching content directly affect the appeal of the whole course. It also has an effect on the efficiency of the teaching of the entire course to a certain extent. Therefore, courses that are attractive and have rich content are the key to flipped classroom teaching, as well as the basis for students' continuous learning and the cultivation of core literacy. In this aspect, this paper focuses on how teachers combine the characteristics and composition of a flipped classroom, analyses in detail the setting of the curriculum content by teachers and the combination with the mode and structure of the flipped classroom. In addition, the authors discuss the objective impact of the content of the curriculum on students' sustainable learning and the cultivation of students' core literacy.

Therefore, this paper sets the course content for objectively evaluating sustainable learning for students and core literacy, which form one of the important factors of the influence in the evaluation analysis, and also explores and analyses the contents of the course in terms of sustainable learning and the cultivation of students' core literacy.

3) Multimedia display content skills

From the point of view of teaching activities, multimedia video is used to promote favourable support for autonomous learning among students. From the concept of a small class, the method of making multimedia video is very common, since a survey of students found that more than half of them think more fluently in their own language and the speed at which they do so is appropriate. Therefore, this highlights that multimedia video is easy to understand and operate. There are several dimensions in play: logic, clarity and the level of design of the lectures need to be improved. Logic taught by teachers is related to the student understanding effect. The clarity of the pictures directly affects students' self-learning emotions. The

design of levels provides time for students to think and guides them to generalise and apply knowledge.

Therefore, in the research carried out for this paper, teachers' multimedia presentation skills are taken as a key objective factor that affect students' sustainable learning and the cultivation of core literacy, which is used as an objective factor to discuss and analyse its influence on students' sustainable learning and the cultivation of core literacy, and its mechanism of action is analysed.

5 Conclusions

Based on the previous theoretical and empirical analysis, the results show that the indicators selected subjectively and objectively in this article strongly correlate with students' comprehensive level and experience. Based on the empirical results, the following conclusions and suggestions can be drawn:

Teachers should pay attention to inspire students' ability to learn autonomously, cultivate students' interest in the course during the process of teaching, actively promote students' subjective initiative, make students aware of the course of interest, and, in turn, the key is to let students understand the pleasure of their interest in learning, which can subjectively lead to a deeper understanding of learning. The necessity to develop core literacy should be recognised, and guidance on students' learning behaviours and interests should be strengthened to ensure the sustainability of their learning.

The flipped classroom, to a certain extent, has effectively stimulated students' autonomous learning ability. In a flipped classroom, students experience two aspects, to a large extent influenced by the content of the teaching curriculum and the use of multimedia techniques, which require teachers to reverse the process of classroom teaching. Meanwhile, in combining multimedia teaching, the advantages of multimedia teaching should be taken into account, combined with the flipped classroom, and interest should be integrated into the classroom in order to stimulate students' interest in learning and ultimately improve students' course experience.

In the flipped classroom, teachers should make the most of the advantages of multimedia and strengthen the study of multimedia presentation skills, thus stimulating students' interest in learning. This can be achieved by allowing students to, for example, watch a multimedia video prior to class, which can be beneficial in stimulating students' enthusiasm to learn and their quick grasp of relevant knowledge before class, In addition, students can actively interact and communicate with teachers in class in order to maintain the development of sustainable core literacy.

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THE CHALLENGES OF FUNDING AND CONDUCTING SCIENTIFIC RESEARCH IN POST-COVID-19 GEORGIA (CASE OF THE SHOTA RUSTAVELI NATIONAL SCIENCE FOUNDATION OF GEORGIA)

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Abstract The purpose of this paper is to identify the main scientific challenges caused by the COVID-19 pandemic in Georgia. The facts are based on the: statistics of budget allocation to science promotion and grant financing by the Ministry of Education and Science of Georgia and the Shota Rustaveli National Science Foundation of Georgia (SRNSFG). The major obstacles faced by the scientific community due to the pandemic are also described below. As expected, grants for scientific research were reduced during the pandemic. It is obvious that as well as financial problems, the pandemic has caused many other scientific obstacles. It is important to identify these problems and consider the SRNSFG's approach to reducing them. By conducting research on this issue, the author of this report concludes that the pandemic caused both financial and logistical problems in the scientific community of Georgia. Regardless of the circumstances, the measures implemented in the Georgian education system have been positively evaluated by some international organisations, such as: Microsoft, UNICEF, and the OECD.

Keywords: COVID-19 pandemic, scientific challenges, grant funding, state budget, problems of conducting research, Shota Rustaveli National Science Foundation of Georgia (SRNSFG)

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1 Introduction

In December 2019, a new virus COVID-19 spread in China. A few months later, the World Health Organization declared COVID-19 a pandemic due to the record-breaking speed at which it spread throughout the world. In a short period of time, COVID-19 not only caused massive damage to healthcare, but also to education, economy, tourism and other sectors. The pandemic has also affected every stage of the education system.

Despite these difficulties, according to a 2020 report by the Ministry of Education and Science of Georgia, the Organization for Economic Co-operation and Development (OECD) has named Georgia and Finland as leaders in successfully adapting the education system and introducing distance learning. Georgia's education executives were also highly praised and named by UNICEF and Microsoft as one of the best role models (Government report to citizens of Georgia, 2020).

The long-term development of a country's economy is unimaginable without the promotion of an economy based on scientific advances, modern technologies, knowledge and innovation. However, the shortest route to sustainable development cannot be presented as individual elements (university, public sector, industry, etc.), but rather as a whole system as a combination of education and science economics and the clusters necessary for the formation of a cluster ecosystem (Gagnidze, 2018).

Given the limited financial resources, it is crucial to implement targeted funding. By funding scientific research and disseminating their positive social effects in society, the government should promote the development of human capital (Polodashvili, 2020b).

The interests of economic development mean that the government must allocate funds for research that is helpful for both, business and universities (Dominici & Gagnidze, 2021).

Commercialisation of scientific research and the resulting creation of intellectual property is particularly important. Patent data is a valuable source for understanding processes in innovation technologies and industries. Such information is crucial for predicting future technology trends and R&D directions (Sobolieva et al*,* 2020).

In fact, of late reforms have been carried out in different directions in Georgia, including the system of science and education. However, the scientific study of the current reforms is only given as separate evaluations, which is not sufficient for achieving long-term effective results (Gagnidze & Maisuradze, 2016).

2 Scientific challenges in post-COVID-19 Georgia

The pandemic has caused many difficulties for the scientific community. Based on statistics, compared to 2019, in 2020-2021 the share of funds allocated from the budget of the Ministry of Education and Science of Georgia to support science and scientific research decreased (5).

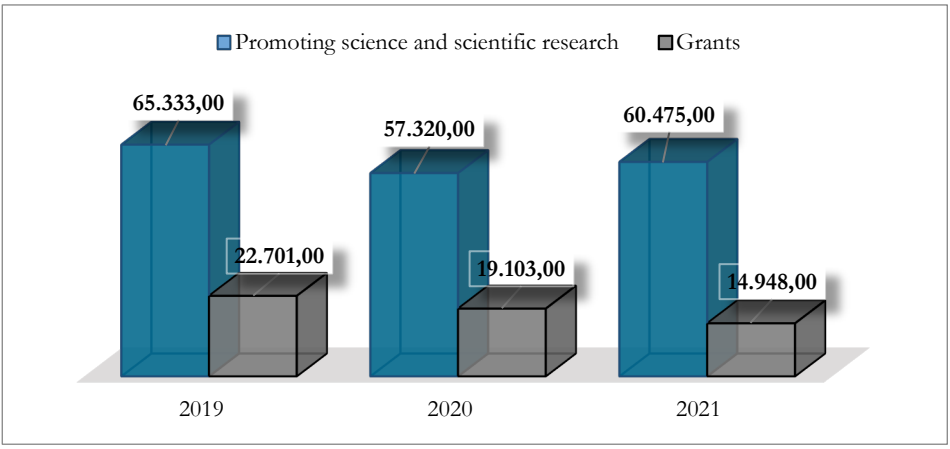

Figure 1: Budget payments of the Ministry of Education and Science of Georgia according to the programme classification in Georgia in 2019-2021. Annual approved plan (thousand GEL).

Source: https://mes.gov.ge/publicInfo/?page_id=143

As shown in Figure 1, in 2020 the budget allocated to the Ministry of Education and Science in the field of science and scientific research reduced by 12% compared to the previous year, whereas in 2021, compared to the same period last year, it increased by 5%.

The reduction in the state budget primarily affected the Shota Rustaveli National Science Foundation of Georgia (SRNSFG), which is the organisation under the Ministry of Education and Science of Georgia. The SRNSFG provides funding for scientific researchers, scientists and scientific institutions, as well as supporting the development of science, technology and innovation (STI) systems in Georgia. The foundation implements state grant calls, targeted programmes and projects, and is involved in international scientific networks and joint projects.

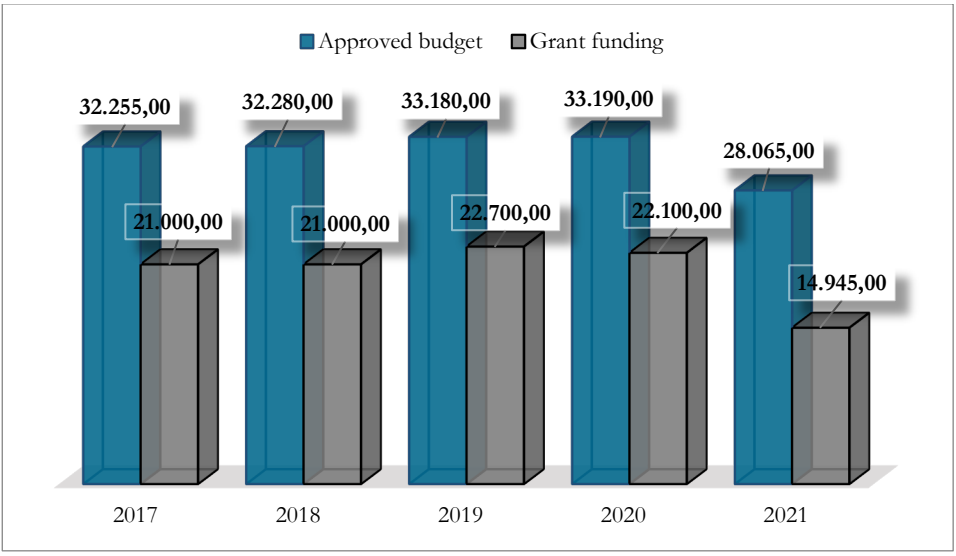

Figure 2. Share of grant funding in the total approved budget of the SRNSFG in 2017-2021 (thousand GEL).

Source: https://rustaveli.org.ge/geo/dafinanseba-da-khardjtaghritskhva

According to Figure 2, during the 2017-2021 period, the foundation received the lowest amount of state funding in 2021 – GEL 28,065 million GEL. It should also be noted that due to the newly announced pandemic, in 2020 the foundation's approved budget of GEL 33,190 million was adjusted and reduced to GEL 29,804 million. The share of grant funding in the total budget was relatively stable in 2017-2020, ranging from 65-68%, but dropped dramatically in 2021 to just 53% (6).

It must be mentioned that applied research receives less fund from the state budget than fundamental (basic) research. Figure 3 illustrates the number of the winning projects in the frame of fundamental and applied research state grants administered by the SRNSFG.

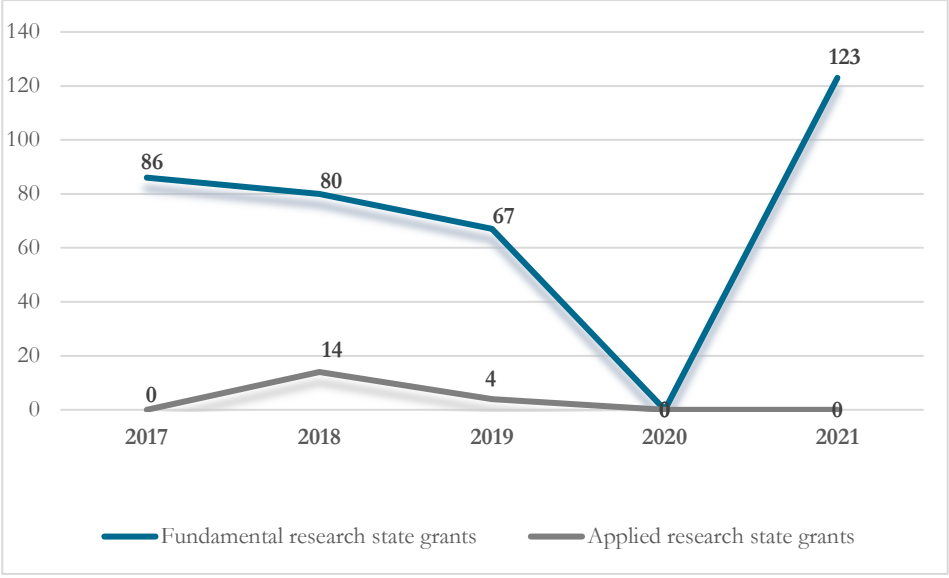

Figure 3: Number of fundamental and applied research grant projects funded by the SRNSFG in 2017-2021

Source: https://rustaveli.org.ge/geo/konkursebi-da-programebi

As can be seen in Figure 3, in the past few years, there have only been two calls for applied research state grants – in the years 2018 and 2019. At the same time, calls for fundamental research grants received the largest state funding among the calls administered by the foundation.

During the pandemic, when state funding was reduced, Georgian scientists had another opportunity to submit their applied research projects within the innovative Applied Research Grants Programme (ARGP). This programme was part of the innovation ecosystem (GENIE) project and was fully funded by the International Bank for Reconstruction and Development (IBRD). The ARGP programme was administered by the SRNSFG in 2020. Based on the foundation's statistical data, the

overall success rate of the call was 75%, which was one of the highest rates of the calls administered by the SRNSFG.

According to statistics, when international scientific calls are administered by foreign countries, the participation of Georgian scientists in them is quite low. Relatively, the funding allocated to bilateral calls, is not fully used. There are several reasons for this low activity: the existence of double standards and requirements, double eligibility checks of registered projects, language and cultural barriers (Polodashvili, 2020a).

2.1 Some logistical problems of conducting scientific research in Georgia

Along with financial problems, the pandemic has caused many other obstacles for the scientific community. It is important to identify these problems and consider the measures taken by the SRNSFG (the main state-funded scientific research organisation) to address or reduce them.

Due to the pandemic, the main problems identified in conducting scientific research are:

- The risk of full or partial non-fulfilment of commitments made by scientists/groups of scientists within the framework of grant funding.
- Due to the closure of the country's air borders and the declaration of a state emergency in the country, it became impossible to conduct planned research visits, or attend conferences and workshops abroad under the grant budget.
- Due to the closure of the borders, research visits by foreign scientists to Georgia under the grant agreements were not achievable.
- With effect form 12 March 2020, the National Science Foundation switched to a remote mode of working, thus restricting visits by scientists and the registration of documents was only allowed on two working days a week.
- Due to the remote work mode, grant holders / applicants did not have the opportunity to consult in person regarding grant issues.
- The existence of only a remote form of communication required a constant connection to the internet and access to a computer, as well as to the

computer programmes needed to receive remote consultations. Access to all of the above was often problematic in many parts of Georgia.

Due to the above, the fulfilment of the obligations under the grant agreements concluded by the foundation and the deadlines for the submission/review of reports were extended until the end of the state of emergency in the country. The force majeure clause became effective in the grant agreements.

It is important to note that the SRNSFG renewed its contract with the world-leading publishing house Elsevier in 2021. The SRNSFG fully funded access to the Elsevier database for the consortia, which consists of 55 members including both state and private universities, research centres and institutions and the representatives of the consortia have access to Elsevier Scopus database, the Science Direct platform and institutional funding, which gives them an opportunity to use the world's newest literature for their research and educational activities. Due to the COVID-19 pandemic, the foundation provided remote access to Elsevier's databases for consortium member organisations. The total value of the subscription is EUR 970,681.05 and it is fully funded by the SRNSFG.

3 Conclusions

The COVID-19 pandemic has been in existence throughout the world for the last three years. Therefore, it is important to find ways to coexist with the virus and fully adapt to it from both sides – the scientific community and government agencies. It is necessary to increase the targeted funding of scientific research, as well as to promote science through the formation of state policies.

Positive social effects can be spread in society by financing applied research in Georgia, which will have a practical impact on the country's long-term development.

In today's post-COVID-19 times, scientists should take into consideration the existing risks of the pandemic in their research and introduce some ways to reduce/eliminate them.

Ultimately, overcoming the scientific obstacles caused by the pandemic will only be possible with a complex approach, i.e. with the involvement of both the public sector and civil society.

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MODELLING USERS' PREFERENCES TOWARDS AUTONOMOUS VEHICLES

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Abstract The demand for autonomous vehicles (AVs) will most likely grow in the upcoming years, thus revolutionising transport. As highlighted by KPMG and many academics, one of the key factors of the mass implementation of AVs is their public acceptance. As a result, there is a growing body of literature investigating consumer acceptance of AVs. The authors of these studies mostly use various versions of the available technology acceptance models. However, there is a limitation to using these models to investigate the consumer acceptance of AVs, since they assume that the respondents have real-life experience of using the given technology, which is not the case with AVs. In this pilot research, the author uses conjoint analysis, which is widely applied to better understand users' preferences during product development and research. The product attributes are formed according to the independent variables of the model of the Unified Theory of Acceptance and Use of Technology. Eighteen cards were created with a combination of different attribute levels. These cards were evaluated by 202 respondents in two steps. It was found that this research model is capable of measuring users' preferences towards AVs, and safety is the most important factor in the decision-making process.

Keywords:
autonomous vehicles,
conjoint analysis,
preferences,
safety,
UTAUT

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1 Introduction

Autonomous vehicles (AV) will revolutionise mobility affecting every member of society. Several studies point out in international literature that one of the key aspects of the widespread propagation of AVs is their public acceptance. The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) model are extensively used to investigate consumers' intentions to use AVs. However, several authors have recently pointed out an important limitation of these models, i.e. the lack of respondents' real-life experience with AVs. To fill this gap, the objective of this study is to create a research model that is capable of measuring people's preferences towards AVs. Conjoint analysis is used to identify to what extent each product attribute corresponds to the total utility of a new product. In the research design, the author of this paper used the independent variables of the UTAUT model as attributes in the conjoint analysis where the attribute levels were presented by a 3-point Likert scale. Eighteen cards were created and handed out for evaluation to N=202 participants. First, they were asked to put the cards in the order of their subjective preferences creating a sequence of the cards. Thereafter, each card was evaluated by the respondents on a 10-point Likert scale. The author of this paper aims to answer the following research question: Which attribute of the UTAUT model has the highest partial utility in the total utility of a fictive L5 AV? This study begins by defining AVs and their potential benefits and disadvantages, underlining consumers' acceptance of this new technology. In the next section the author discusses which models are most used in the research of consumer acceptance of AVs and introduces a UTAUT-based conjoint analysis method which can be used to examine consumers' preferences toward AVs. The primary research and its results are described in the next chapter. Finally, conclusions are drawn in the last section.

2 Autonomous vehicles (AV)

As part of the Fourth Industrial Revolution, AVs present a safer, more efficient, environmentally more sustainable and less energy consuming mode of transportation. The Society of Automotive Engineers (2018) defined a 6-level scale of automatisation from L0 to L5, in which L0 means no automatisation while L5 stands for fully automated vehicles with no driver at all. In this study, AVs refers to L5 AVs. One of the key factors in the widespread adoption of AVs is public acceptance (Lukovics et al., 2018). People do not have a united attitude towards AVs.

Some have a positive attitude and think that the number of accidents will decrease, that they will be less severe, and that the travelling time will be reduced along with less environmental weight (Scholette & Sivak, 2014). While travelling in an AV, one can relax, read, work, eat, drink, or do whatever they please (Kyriakidis et al., 2015). Nevertheless, there are also concerns about AVs. According to Kaur and Rampersad (2018), the potential failure of the system is not the only fear among future passengers. There is also the question of responsibility in the event of a potential accident as well as the possible risk of software attacks and destination tracking. They also found that the risk perception of a given new technology undermines its consumer acceptance, meaning the more dangerous people assume AVs are, the less accepting they are. Raue et al. (2019) also pointed out that one of the biggest impediments of the acceptance of AVs is loss of control over the vehicle itself.
There are several research models to measure the public's behavioural intention towards new technologies (Venkatesh et al., 2016) and hundreds of studies have been published examining the acceptance of AVs in the past few years. Many of them use the UTAUT model to better understand people's intentions to use AVs.

3 Unified theory of acceptance and use of technology (UTAUT)

The UTAUT model (Venkatesh et al., 2012) is based on previous technology acceptance models and is successfully used in the investigation of people's attitudes towards AVs (Keszey, 2017; Nordhoff et al., 2020). In the UTAUT model, Behavioral Intention (BI) is the dependent variable that is directly affected by the independent variables, while Performance Expectancy (PE) shows how much benefit could be gained by using a given new technology. In the case of AVs, this is a reduction in travelling time, more flexibility and higher performance (Nordhoff et al., 2020). Effort Expectancy (EE) reveals how hard people find learning to use a given new technology (Venkatesh et al., 2012). Social Influence (SI) affects one's acceptance of a given technology, because if the important people in one's surroundings, such as family or friends, recommend the use of the technology, it is more likely that they will adopt it (Nordhoff et al., 2020). Facilitating Conditions (FC) are the things that ease the use of a given new technology. In the case of AVs, these are previous experience of information technology, financial background and the perception of how one could get help if in need while using an AV (Venkatesh et al., 2012). Hedonic Motivation (HM) refers to how enjoyable it seems to travel in an AV. Price-Value Perception (PV) is added to the UTAUT model because if one has a desire to use a new technology, they need to pay for it out of their own pocket

(Nordhoff et al., 2020). According to the findings of Kapser and Abdelrahman (2020), the UTAUT model needs to be extended by adding Perceived Risk (PR) when investigating the acceptance of AVs. Keszey (2020) reviewed the existing studies that use the UTAUT model to investigate consumers' acceptance of AVs. She found that although the model constructs are valid, there is a limitation that should not be ignored, i.e. due to the current status of the development of L5 AVs, the respondents in these surveys had no real-life experience of travelling in an L5 AV. As a result, their answers are based on subjective assumptions.

If we think of AVs as fictive products, conjoint analysis can be used to better understand people's preferences towards them. In the pilot research for this paper, the author has assumed that the independent variables of the UTAUT model can be used as factors with different values in the process.

4 Conjoint analysis

Conjoint analysis is used in marketing research to better understand users' preferences toward products (Green et al., 2001; Gustaffson et al., 2003; Wittink et al., 1994). The main goal of the research method is to design new products according to the requirements of the market. To apply this method, it is important to investigate participants' preferences in relation to a product's utilities. It is assumed that every product has a total utility that is equal to the sum of its partial utilities. The question is to what extent each factor contributes to a product's total utility (Malhotra, 2005). The database analysed in conjoint analysis comes from the preferences of the interviewed subjects.

In the research design, the research defines each factor and their values in advance. Each combination of these factor values embodies a fictive product. The subjects interviewed are given cards with the attribute combinations and asked to rank them (Mahajan et al., 1982). Conjoint analysis makes it possible to derive metric partial utilities from the ranking results, therefore the sum total of these partial utilities are the metric total utilities. In the research model, the independent variables are the object attributes, and the dependent variables are the preferences of the persons interviewed for the fictive product. The utility structure of several participants can be computed through the aggregation of their single results (Page-Rosenbaum, 1987). In the model used in this paper, the author has used the independent variables (PE, EE, SI, FC, HM, PV, PR) of the UTAUT model by Venkatesh et al. (2012) as

the factors in the conjoint analysis. As factor values, a 3-point Likert scale was used (1-worse than current, 2-as good as current, 3-better than current). In order to answer the research question, three hypotheses were tested:

- H1: Every UTAUT-based factor has a positive partial utility, meaning the respondents prefer the best case by each attribute.
- H2: Perceived Risk (PR) is the most important factor in the decision-making process. Maximum safety is crucial.
- H3: Effort Expectancy (EE) and Social Influence (SI) are the least important factors in the decision-making process due to the age of the respondents.

5 Primary research

In this paper, the author conducted a conjoint analysis with N=202 participants. First, by using the IBM SPSS orthogonal design, 18 cards were created with different attribute levels each representing a fictive L5 AV. The attributes are implemented from the UTAUT model, and each has a 3-point Likert scale attribute level. These cards were then edited in Adobe Photoshop and 28 full colour copies were printed. The upcoming generation was targeted as participants, i.e. 15-19 years old, because it is assumed that AVs will be a feature of their adult life. The four local high schools in Senta, Serbia, were kind enough to allow the author of this paper to carry out research among their students. Four classes with approximately 20 students each from the aforementioned high schools participated in the data gathering exercise. There was a 45-minute time limit for the data gathering itself. In this time window, the participants were first shown a 15-minute presentation with the following structure: 1) SAE automation levels 0-5, pointing out that the research is investigating L5 AVs; 2) A description of the UTAUT-based attributes; 3) An introduction to the cards with a description of the tasks to be completed. After the presentation, the participants had 30 minutes to complete the survey. Task 1 was a little more complicated because of the large number of cards, therefore it was accomplished in two steps. First, the subjects had to divide the 18 cards into two groups of nine (desirable, not desirable). Next, they were asked to put the cards in order (nr.1=most preferred; nr.9=least preferred) in each group. In Task 2, each card (1-18) was evaluated by the respondents on a 10-point Likert scale. The subjects

recorded their answers on a 2-page data gathering sheet which also included demographic questions.

The sample for this paper is formed by the four high schools (3 classes each) in Senta (Grammar School Senta, Bólyai Grammar School for talented students, Economic and Commerce school Senta, and Health Care High School Senta), and is not assumed to be representative. Almost all the 202 respondents had already heard of AVs, are between the age of 15 and 19, and roughly two thirds of them are female. Only few have a driver's licence and they mainly reach their destination by bus or car. The majority of the participants live in the surrounding towns, while a smaller number live in villages.

The author began by analysing the sequence of the cards representing the given 18 fictive AVs. This was achieved by running the sequence in IBM SPSS syntax where the plan file and the gathered data were compared. This model proved it was capable of measuring the respondents' preferences towards AVs (sig.=0.002; Pearson's R=0.648; Kendall's tau=0.49). It was found that EE (-0.852) and SI (-0.864) had negative importance values, therefore H1 is rejected. The two dominant attributes were FC (3.910) which represents the functional safety, and PR (3.226), which represents the physical safety, meaning that the safety of future AVs is the most important factor. Based on this result, H2 is accepted. SI (0.864) and EE (-0.852) are of the least importance value, thus H3 is accepted.

Next, the author analysed the scores of each card (1-18) on a 10-point Likert scale. The method was similar to the one used previously, except that the Task 2 data file was used and the scores were run in syntax. The model and its constructs turned out to be significant with strong correlations (sig.=0.000; Pearson's R=0.941; Kendall's tau=0.673). Every attribute had a positive importance value (PR= 4.117; PE= 1.949; PV= 1.909; HM= 1.886; FC= 1.722; EE= 1.115; SI= 1.111), therefore H1 is accepted. PR (29.2%) had the highest level of importance, thus H2 is accepted. EE and SI had the lowest importance values, therefore H3 is accepted. The conclusions of this two-step hypothesis test are shown in Table 1.

Table 1: Hypothesis Test

Hypothesis	Sequence	Score	Sum
H1: Every UTAUT-based factor has a positive partial utility, meaning the respondents prefer the best case by each attribute	Rejected	Accepted	Partially accepted
H2: Perceived risk (PR) is the most important factor in the decision-making process. Maximum safety is crucial.	Accepted	Accepted	Accepted
H3: Effort Expectancy (EE) and Social Influence (SI) are the least important factors in the decision-making process due to the age of the respondents.	Accepted	Accepted	Accepted

Source: Author's own

6 Discussion

The objective of this pilot research was to validate the author's research design for application. It was assumed that, using conjoint analysis, the independent variables of the UTAUT model can be used to better understand users' preferences toward AVs. According to the results, the author finds that conjoint analysis can be useful in better understanding people's preferences towards AVs, however, further research is required. The research question asked: Which attribute of the UTAUT model has the highest partial utility in the total utility of a fictive L5 AV? The results show that safety (PR) has the highest effect, followed by operational attributes (PE, FC, HM, PV), while SI and EE fall behind.

Conjoint analysis allows the best combination of attributes to be identified based on the respondents' answers. The two analysing procedures (sequence, score) led to different, yet very similar, cards, which show the most desired attribute levels of AVs.

According to the sequence syntax run, high school students in Senta would prefer an AV that offers an immediate solution should it malfunction in any way (FC=3.910) and one that provides maximum safety (PR=3.226). Such an AV would provide a better solution for mobility (PE=1.689) while also being cheaper (PV=0.524), and using the vehicle would be more enjoyable (HM=0.432). SI (-0.864) and EE (-0.852) both resulted in a negative utility value. This could mean that the respondents are prepared to compromise on SI and EE in favour of the other attributes. Another explanation is that the respondents are digital natives, therefore they assume that they would be able to operate an AV (EE), and the teenage generation simply does not care what others think about them (SI). The results of

the second task yielded a more accurate model. In this case, all the attribute levels were positive, meaning the respondents favour the highest value of each attribute. As a result, the most preferred AV can be identified as an extraordinarily safe vehicle (PR=4.117) that offers the best solution for mobility (PE=1.949) and is cheap (PV=1.909). A ride in this fictive AV is hedonistic (HM=1.886) and there would be assistance if it malfunctioned (FC=1.772). Similarly, as in the sequence run, EE (1.115) and SI (1.111) were the least important values, however, this means that the respondents would prefer the AV to be easy to use and popular.

7 Conclusions

By comparing the results of the two analyses, the author of this paper found that both models were significant with strong correlations, which allows the interpretation of respondents' preferences towards AVs. The results of the second method, in which participants had to evaluate (10-point Likert scale) each card (1-18), led to more accurate results a with higher explanatory power.

As a conclusion, the use of conjoint analysis with independent UTAUT variables is a feasible way of measuring AV preferences. The main finding is that safety has the highest partial utility, while social influence and effort expectancy have the lowest. The results are promising but also limited due to the characteristics of the sample, therefore the research method needs to be further validated by carrying out additional research.

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New Trends in Corporate Reporting in the Light of Sustainability

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Abstract Independently of the negative economic, social and human effects of the COVID-19 virus, sustainability is an emerging issue. The purpose of sustainability and integrated reporting is to create a holistic approach to performance measurement, bridging financial and non-financial measures based on integrated thinking that covers all the key elements of a business. Publishing these reports is a way for external communication to show a comprehensive picture. In order to prepare a good quality report, companies need to identify their stakeholders, their interests, needs and expectations while also presenting all the relevant information in a concise and structured report. In this paper, we describe the background and development of sustainability/integrated reporting in terms of its regulatory and application environment. We concluded that although there are different interests and approaches, intensifying intensions to form generally accepted and uniform regulations in sustainable reporting are existing and escalating. In this paper, we summarise the practice of companies from some EU countries in sustainability/integrated reporting. In practice, despite the common EU directive, the content, level of detailed presentation and structure of the reports of non-financial information differs from country to country and company to company, which restricts the ability to compare these reports or elements.

Keywords: sustainability, integrated reporting, COVID-19, disclosure, non-financial information

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1 Introduction

In recent years, financial crises, accounting and remuneration scandals, as well as growing public awareness about the impact of business activity on social and environmental issues, have led to a greater demand for transparency and accountability in corporate reporting and behaviour (Wulf et al., 2014). The last financial crisis has heightened criticism of the short-term shareholder value perspective (Velte, 2014) and companies have come under increasing pressure from stakeholders to adapt their business practices and become more accountable on environmental, social and governance issues (Kolk and van Tulder, 2010; Seuring and Mueller, 2008).

Therefore, traditional accounting and financial reports come to be regarded as no longer being sufficient to meet reporting needs on all these issues. Initially, the focus was on intangible assets and their increasing importance for business value (Graham et al, 2005). This led to companies publishing supplementary information through voluntary reporting (Wulf et al., 2014). The focus subsequently broadened to include environmental and social issues (Kolk, 2006). The issuing of standalone sustainability reports has since become standard business practice. However, a key criticism of the publication of a range of different reports by companies concerns the large amount of information produced in disconnected and unrelated formats, without sufficient integration of financial and non-financial information (Eccles and Krzus, 2010; Eccles and Serafeim, 2014).

The idea of integrated reporting has been considered for about 40 years by companies, accountants and academics, and the first integrated reports were published by companies in the early 2000s (Delphine et al., 2019). Todd (2005, p.1) broadly defines integrated reporting as '*reporting that meets the needs of both statutory financial reporting and sustainability reporting*.' In practical terms, this usually means one annual report containing sustainability performance information and financial statements.

2 Development of sustainability regulations and reporting

As consequences of sustainability initiatives – as milestones: the Burtland Report of WCED (World Commission Encironement Development) in 1982, Rio Declaration in 1992, document of EAA (European Environmental agency) titled The United Framework Convention on Climate Change in 1993, the Kyoto Protocol in 1997, the Paris Agreement in 2016, the Net Positive Impact in 2013, the UN SDGs (United Nations Social Development Goals) in 2015, the term and concept of circular economy of UNCTAD (United Nations Conference on Trade and Development) in 2015, the EU Green Deal in 2019 – the environmental issues became more relevant and regulated in corporate and financial reporting. Different approaches for standardisation have been published detailing what and how to report.

The concept of Corporate Social Responsibility (CSR) can be treated as the first one in sustainability. It can be linked to the American economist Howard Bowen and his publication of 'Social Responsibilities of the Businessman' in 1953. The concept of CSR became widely known and used from the 1970s, first in the USA and later worldwide (Lapati Agudelo et all, 2019.) CSR Europe was founded by European business leaders in 1995. In July 2001, the European Commission presented a Green Paper titled 'Promoting a European Framework for Corporate Social Responsibility'. The Green Paper defined CSR as 'a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis' as they are increasingly aware that responsible behaviour leads to sustainable business success (CSR, EC, 2002)
The Global Reporting Initiative (GRI) was founded in 1997 and the first GRI Guidelines were published in 2000. After the issue of four guidelines in 2016, the GRI transitioned from providing guidelines to setting a global standard for sustainability reporting – the GRI Standards. The GRI Standards allow an organisation to report information that covers all its most significant impacts on the economy, environment and people, or to focus only on specific topics. In 2020, approximately 73% of the G250 and 67% of the N100 used the GRI (KPMG: Survey on Sustainability, 2020).

The Carbon Disclosure Project (CDP) was established in the beginning of 2000s as a not-for-profit charity that develops disclosure systems focusing on climate, water

and forest issues. The CPD differentiates between companies, cities, governments, investors, states, public authorities and supply chains. More than 13,000 companies apply to report CDP (cdp.net).

The Greenhouse Gas (GHG) Protocol establishes a comprehensive, global, standardised frameworks to measure and manage greenhouse gas emissions from private and public sector operations, value chains and mitigation actions. Its history dates back to the 1990s when the need for GHG accounting and reporting arose. The first publication was the Corporate Standard in 2001, which was updated in 2015, and since then five standards and several guidance and calculation tools have been issued (ghgprotocol.org).

The Climate Disclosure Standard Board (CDSB) was established in 2007. In 2010 a document was published titled 'Framework for reporting environmental and social information' and in 2015 the 'Framework for reporting environmental and climate change information' was released. Other guidelines were developed for climate, social, biodiversity and water topics. The frameworks are voluntary, and their main objectives are to support companies in reinterpreting their sustainability information into long-term value, providing financial information supplemented with other relevant sustainability information for investors and minimising the reporting burden and simplifying the reporting process (cdsb.net).

In 2010 the ISO 26000 'Guidance on Social Responsibility' was issued, which is an international standard developed to help organisations effectively assess and address social responsibilities that are relevant and significant to their mission and vision. It can be said that this was the first standard with a holistic integrated approach that set seven core subjects and states with interdependencies between. The organisation of a company was in its focus and the core subjects are governance, consumer issues, community involvement and development, human rights, labour practices, the environment, and fair operating practices (ISO 26000, iso.orgh).

The Sustainability Accounting Standard Board (SASB), which operates with the support of the Value Reporting Foundation (VRF), has developed standards for 77 industries in ESG issues. The Board provides guidance for financial and sustainability materiality, thus supporting the understanding of integrated thinking

(sasb.org). At the end of 2021, the VRF and CDSB were consolidated into the International Sustainability Standard Board within the IFRS Foundation (sasb.org).

The IIRC was founded in 2010, with an ambitious mission to establish integrated reporting as the primary reporting vehicle (IIRC, 2011) and 'the' corporate reporting norm. The IIRC defines its framework – published in 2013 and updated in 2021 – as being principle-based rather than rule-based. According to the IIRC, the purpose of integrated reporting (<IR>) is to explain to providers using the Six Capitals approach – financial, manufactured, intellectual, human, social and relations and natural - how an organisation creates value over time by developing integrated thinking (integratedreporting.org).

In financial reporting, the first non-financial disclosure requirements were published at the beginning of the 2010s. In 2014 the European Union amended Directive 2013/34/EU on disclosure of non-financial and diversity information by certain large undertakings and groups. The 2014/96/EU regulation applies to public companies with more than 500 employees that are required to report on environmental, social and employee-related, human rights, anti-corruption and bribery matters. Additionally, these large corporations are required to describe their business model, outcomes and risks of the policies on the above topics, and the diversity policy applied for management and supervisory bodies. The reporting techniques are encouraged to rely on recognised frameworks such as GRI Standards, ISO 26000, OECD Guidelines, UN SDGs, etc.

The SFDR (Sustainable Finance Disclosure Regulation) (2019/2088 EP SFDR)came into effect in March 2021, which imposes mandatory ESG disclosure obligations for asset managers and other financial markets participants. The SFDR was introduced by the European Commission alongside the Taxonomy Regulation and the Low Carbon Benchmark Regulation as part of a package of legislative measures arising from the European Commission's Action Plan on Sustainable Finance. It aims to create transparency in relation to sustainability risks, the consideration of adverse sustainability impacts in their investment processes and the provision of sustainability-related information with respect to financial products.

The Taxonomy Regulation (EU: 2020/852 EP) came into effect in January 2022 and establishes a classification system – a taxonomy – which provides businesses with a common language to identify whether a given economic activity should be considered as '**environmentally sustainable'**. It must be applied by financial market participants and all companies are subject to the NFRD (Non-Financial Reporting Directive) or CSRD (Corporate Sustainability Reporting Directive).

The CSRD (EU CSRD) is the latest regulation is in a proposal stage which is expected to apply from 2023. The scope will be all EU large companies and all listed companies (except listed micro companies). It will introduce more detailed reporting requirements, and a requirement to report according to mandatory EU sustainability reporting standards. It also requires companies to digitally 'tag' the reported information (Taxonomy Regulation). It is challenging for audit companies as well, as the CSRD requires the audit (assurance) of reported information.

3 Research

We surveyed the published financial statements, including non-financial information and sustainability reports, of listed entities in order to gain a comprehensive understanding and draw conclusions about their reporting practices. We conducted desk research on German and Italian practice and compared them in order to obtain a more global view.

The research methodologies of this paper include desk research and a review of scientific and professional papers in order to present the trends and variety in sustainability regulations and reporting initiatives. Desk research was used for German and Italian practice and empirical research was carried out in the case of Hungarian practice by looking through the financial statements of listed companies. The results of this process were then summarised.

3.1 Practice in Hungary

We analysed the financial statements, annual reports and sustainability reports or other non-financial information of companies listed on the Hungarian Stock Exchange. The accounts are made fully public in Hungary for companies that are subject to the Accounting Act. Companies listed on the stock exchange required to

prepare standalone and consolidated financial statements in accordance with International Financial Reporting Standards as of the 2017 financial year, however, they must also comply with the requirements of the Accounting Act while remaining subject to the Hungarian Accounting Act.

The securities of 63 companies are traded on the Budapest Stock Exchange, of which 20 issue bonds and four are not registered in Hungary but whose securities are traded on the Budapest Stock Exchange. For the purposes of analysis, we selected the published 2020 financial statements of the remaining 39 companies that trade shares. The research questions were whether the companies disclose non-financial reporting content in the financial statements prepared in accordance with the IFRS and the NFRD and whether they prepare separate sustainability/integrated reports in addition to the financial statements or are integrated in their annual reports.

We classified the 39 share trading listed companies based on their activities and we were able to confirm that all the main industries and business activities are represented.

Table 1 shows the minimum, maximum and average sales, the balance sheet total in HUF million and the number of the employees for the financial year 2020 of the listed companies under review.

Table 1: Financial statement data (LCU=local currency unit)

	Total assets m LCU 2020	Sales m LCU 2020	Number of employees 2020
Min	7	0,45	2
Max	23,335,841	4,011,022	38,626
Average	961,278	175,587	2,921

Source: authors' own data collection based on data obtained from financial statements

The company with the largest balance sheet total and the highest number of employees is OTP Bank Nyrt (Plc), while MOL Nyrt (Plc) achieved the highest sales and the highest operating profit in the 2020 financial year. Of the companies surveyed, 85% published an annual report, two-thirds of which contain information on environmental protection.

According to Directive 2014/95/EU, disclosure of non-financial and diversity information by companies is mandatory. We examined to what extent these companies disclose information in accordance with the requirements of the NFRD:

- 30% of the published reports contain a business model presentation
- 55% include social and employment policy issues
- 18% deal with the fight against corruption
- 21% deal with human rights
- 33% contain specific data and information
- 13% relate to integrated thinking

From the percentages above, it can be concluded that even if the reporting of non-financial information is mandatory, the companies do not mention all the elements. This can be explained with materiality, i.e. they select those issues that are relevant and material to the company. Of course, it could be argued whether the materiality approach is appropriate in such circumstances.

Of the companies researched, only four publish sustainability reports, and these are under GRI standards: ALTEO Plc. (energy service and trading), Magyar Telekom Plc. (telecommunication), MOL Plc. (oil and gas exploration and production), and OTP Bank Plc. (financial institution).

There are numerous other notable points in these reports:

- Two of the reports (ALTEO and MOL) are integrated reports and integrate the IFRS financial statements and a sustainability report. The other two companies published separate sustainability reports as a supplement to their financial statements.
- The sustainability/integrated reports are audited and verified by external audit companies, which issue assurance of the proper application of the GRI.
- Only one company (ALTEO) does not have an international background but nevertheless prepares a sustainability report.
- Although the main sustainability reporting guideline for these companies is the GRI, they also applied and referenced several other reporting frameworks and standards. In their reports the companies refer to SASB standards and indicators.

In addition, due to its specific activities, in its reports MOL also mentions the IIRC's IR Framework and the UN SDGs, the 'Sustainability Reporting Guidance For The Oil And Gas Industry', and GHG protocols.

3.2 Practice in Germany

Recent practitioner studies have analysed the reporting behaviour of DAX 160 companies since the implementation of Directive 2014/95/EU into German law (Kirchhoff, 2018; 2019; PWC 2018). The most recent study, which analyses the reporting year 2018 (Kirchhoff, 2019), shows that of the 92 companies analysed, 75% published a separate sustainability report and 25% chose some form of a combined report. Eighty-eight percent of the analysed companies used the GRI framework. Two companies also used the IIRC framework – BASF and SAP.

For the 2013 and 2014 reporting period, PWC conducted benchmark surveys of the reporting behaviour of DAX 30 companies and analysed them in relation to the content elements of the IIRC framework. For the 2013 reporting period, PWC concluded that DAX 30 companies were increasingly moving towards IR. This assessment was based on the increase in the number of companies publishing combined reports and the increase in IIRC-relevant information in annual reports (PWC, 2014). Three companies (BASF, Bayer, SAP) published integrated reports, of which BASF and SAP referred to the IIRC framework. A further four companies published combined reports and the remaining companies published a suite of multiple reports. However, in terms of IIRC-relevant information, some of the changes in the reporting behaviour were brought about by changes in German law (German accounting standards GAS 20). For the 2014 reporting period, PWC's survey highlighted a decrease in the pace at which DAX 30 companies were moving towards IR, with reporting remaining primarily 'compliance-driven' in most of the DAX 30 companies (PWC, 2016).

3.3 Practice in Italy

Many Italian large firms (e.g. Ansaldo, Cattolica Assicurazioni, Edipower, ENAV, ENEL, FCA, Ferrovie dello Stato, Leonardo, Maire Tecnimont, Mondadori, Monte dei Paschi di Siena, SNAM, Terna) that are subject to the provisions of Legislative Decree No. 254/2016 in terms of non-financial reporting publish sustainability

reports separately from financial accounts, usually based on the GRI's Sustainability Reporting Standards. IIRC standards are mentioned in all the corporate reports included in the sample. A growing number of large firms (e.g. A2A, Barilla, Luxottica) are starting to report their non-financial performance, referring explicitly to the Sustainable Development Goals.

A relatively small number of larger companies (e.g. DESPAR, Fideuram, GTS, UNICREDIT) have opted for fully-fledged Integrated Reporting <IR>. Most companies tend to explicitly adopt the 'Six Capitals' model, while others (e.g. A2A, Poste Italiane) published sustainability reports for many years, but have more recently switched to <IR>.

There are also examples of companies that have stopped issuing sustainability reports (e.g. Landi Renzo) and integrated reports (e.g. Bombardier Transportation Italy).

Interestingly, not only companies but also the Italian Football League adopted <IR> as early as 2013, and the Municipality of Sasso Marconi was the very first in Italy to adopt <IR> in 2019. Other companies (e.g. A2A) published sustainability reports for a few years but have more recently switched to <IR> (Dyczkowska, Madarasi-Szirmai, Tiron-Tudor ed., 2020).

4 Conclusions

From researching the sustainability initiatives with various focuses, it can be concluded that since the mid-1950s there have been several valuable and strong regulatory and professional intentions throughout over the world. The initial emphasis was on how to save the world, and how a sustainable, circular economy can be 'created'. These initiatives also directed attention to reporting issues. As a result, several frameworks, standards and guidelines were developed to support uniform understanding and measurement approaches and methods. There have also been strong debates over whether sustainability reporting and measurements should be voluntary or mandatory, what kind of information should be published, how this can be measured and presented in a comparable manner, and the size and activities of the companies where this has significant relevance.

Based on this research, we concluded that sustainability reporting and integrated thinking is less widespread in Hungary compared to the practice in Germany and Italy. Several reasons for this can be mentioned: the different sizes and interests of investors in these companies, the differences in managing risks, the companies' maturity, and the level and quality of integrated and responsible thinking and management. It is inevitable that the issue of the measurement and reporting of sustainability will also become increasingly relevant in Hungary, as the regulatory requirements are becoming more fixed. In addition, the application of these regulations will have rolling and multiplicative effects on companies throughout the economy, as there is an increasing internal need for companies to become sustainable.

From the empirical research carried out, it can be concluded that the largest listed and publicly accountable companies work on sustainability issues as they have an obligation to operate sustainably and the positive impact can increase the company's value and share price. In contrast, the ways such companies present sustainability issues vary greatly, so it can even be challenging to compare and analyse companies in the same industry. As there are many regulations, standards, etc. that must be applied, or are worth applying, the reporting burden and the cost of reporting will increase for companies.

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AGILE PROJECT MANAGEMENT AS A MULTI-LEVEL RESILIENCE ANTECEDENT

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Abstract The goal of this paper is to introduce evidence that an agile approach to project management could be a source of resilience at the individual, team and organisational levels in the current projectified environment. This article is designed as a review paper. The authors first discuss the trends and recent findings in projectification and then in resilience. In the continuation, the authors highlight the connections between these areas, which to date have not been widely discussed in existing literature, as well as where agile project management could be of great importance. Dependencies between projectification, resilience and agile project management are evident. Agile project management could be considered as an antecedent for multi-level resilience, however, empirical evidence supporting this claim does not yet exist, therefore the issue should be further investigated. Enough evidence has been collected to understand that it would be worth further investigating the dependencies between these concepts, as there is an opportunity to fill some gaps in existing academic knowledge and also create a hands-on practical contribution for contemporary organisations.

Keywords: projectification, multi-level resilience, resilience antecedents, agile project management, evidence

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1 Introduction

Organisations nowadays operate in a highly volatile, uncertain, complex and ambiguous environment (Bennett & Lemoine, 2014). Due to global competition, dynamic opportunities and the high complexity of business processes, adaptation, flexibility and changes are inevitable for every contemporary organisation (Williams, 2005). Since steering these challenges is traditionally covered by project management experts, it comes as no surprise that reliance on projects is increasing and consequently the number of project-based workers is also growing (Maylor et al., 2006), which could have a negative impact on the resilience of individuals and organisations. Additionally, an awareness of the shortcomings of traditional project-based structures in the current dynamic landscape is becoming increasingly present among modern managers (Williams, 2005). Recently, new concepts and approaches to project management have emerged, of which agile and hybrid project management are gaining in importance. The question arises: *Can an agile way of managing projects be an antecedent for multi-level resilience?* The authors of this paper aim to answer this question with the help of a review of existing literature. The paper has been structured as follows: first, as a part of the introduction, the concept of projectification is introduced and the possible negative consequences of the phenomenon. Second, there is a brief summary of the existing research streams of resilience with a focus on organisational context. Third, the authors discuss agile project management (APM) as a possible antecedent of multi-level resilience, concentrating on non-software organisations and projects. Finally, the paper concludes with the authors' final thoughts and further research indications.

2 Projectification

The phenomenon of projectification was first studied in Midler's article on Renault (Midler, 1995), however, the process itself was certainly not a novelty at that point in time (Maylor et al., 2006). Nowadays, project-based work contributes to about one-third of all economic activities in advanced economies (Schoper et al., 2018). Consequently, both business and academic interest in projectification has grown tremendously and to date studies have gone far beyond the fields of industrial organisation and project management discipline. Although cited in the vast majority of projectification articles, Midler (1995) did not provide a clear definition of the phenomenon. Nonetheless, definitions of projectification have been outlined, often based on Midler's research, for example, Bredin and Söderlund (2011) define

projectification as *'a change of the organizational structure, slowly moving the firm into putting more emphasis on the project dimensions of the organizational structure, from strong functional units where projects have played a subordinate role, to projects playing at center stage with functional units acting as labor pools.'* (Bredin & Söderlund, 2011, pp.9).

Projectification was initially studied as a managerial approach, however, recent studies have investigated the phenomenon from several different angles. Jacobsson & Jalocha (2021) systematically categorised existing projectification studies and identified four main streams – first, projectification as a managerial approach (e.g. Midler, 1995; Wenell et al., 2017; Maylor & Turkulainen, 2019), second, projectification as a societal trend (e.g. Jensen et al., 2017; Auschra et al., 2019; Mukhtar-Landgren & Fred, 2019; Hubmann, 2021), third, projectification as a human state (e. g. Ekstedt, 2009; Jensen, 2012; Packendorff and Lindgren, 2014; Cicmil et al., 2016; Jensen et al., 2017), and finally, projectification as a philosophical issue (Jensen, 2012; Jensen et al., 2016; Barondeau & Hobbs, 2019). At the organisational (meso) level, the phenomenon is mainly perceived positively with some possible negative consequences (Bogacz-Wojtanowska & Jalocha, 2016; Henning & Wald, 2019), however, in general the negative consequences are outweighed by the positive. At a societal (macro) level, projectification is an unavoidable direction and has both positive and negative impacts. Projectification as a human state, however, is most commonly described as an oppressive discourse with extensive negative consequences for project workers (Jacobsson & Jalocha, 2021). In a projectified environment, workers are exposed to vulnerable situations – both individually and collectively (Cicmil et al, 2016). Project-based work has been found to have mostly negative consequences for individuals' well-being (e.g. Bråthen & Ommundsen, 2018), as it has been indicated that project-based workers face negative mental stress and sleep issues (Myrmæl & Alfredsen, 2018), career insecurity, inequality and unemployment (Brunila, 2011; Sage, 2016). Cicmil et al. (2016) argued that projectification leads individuals to inter alia, *'dependence on great expectations, follies and sensations; commitment to blank sheets, fresh starts and 'professional' performance, internalisation of honour/shame and personal worthiness, exhaustion, finiteness and the end of resilience.'* (Cicmil et al., 2016, pp.66). As a result of the negative consequences, both companies and individuals might be put at a certain level of risk, for example in relation to a negative impact on revenues gained (Ekstedt, 2009). However, to some degree, it is still possible for individuals to emancipate themselves from the oppressive conditions of projectification (Waring & Thomas, 2010).

3 Multi-level resilience

Given the challenges organisations and their members face nowadays, it is no surprise that interest in the concept of resilience has grown steadily over the last few years. The majority of existing literature conceptualises resilience at an individual level, however, team-level and organisational-level resilience are also common streams in resilience-related studies (Reatze et al., 2021). Individual-level resilience is most frequently defined as a capacity, capability or state-like ability to maintain a normal level of functioning under challenging circumstances and rapid recovery from adversity-caused setbacks (Hartmann et al., 2020). Similarly, team-level resilience is often defined as the capacity to recover from any possible threats to a team's well-being, such as conflicts, setbacks or failures (Chapman et al., 2020), and organisational-level resilience as an organisation's ability to resist disruption and recover from the consequences of adverse situations (Horne & Orr, 1998).

The positive outcomes of resilience are clear, as they have been researched considerably in the past. At an organisational level, resilience impacts performance, effectiveness, creativity and innovation. The outcomes of team-level resilience include team attitudes, behaviour and performance. Individual-level resilience impacts health and well-being, employee attitudes, behaviour, performance and success (Raetze et al., 2021).

In addition to the outcomes, resilience antecedents have also been a focal point of existing research. At the organisational level, financial and material resources are commonly studied antecedents of resilience (e.g. Burke, 2005), structural resources (e.g. Lampel et al., 2014), and human and social resources (e.g. Lengnick-Hall et al., 2011). Additionally, several studies have focused on strategies and practices of organisational-level resilience, for example, scenario planning (e.g. Hillmann et al., 2018), change management (Ates & Bititci, 2011), and robust strategic planning (e.g. Demmer et al., 2011) have been considered as sources of organisational resilience, while a link between organisational resilience and innovation strategies has also been investigated (e.g. Wojan et al., 2018). Furthermore, corporate social responsibility practices (e.g. Ortiz-de-Mandojana & Bansal, 2016), HRM practices (Bardoel et al., 2014), and certain leadership practices (Harland et al., 2005) have been analysed in relation to organisational resilience. Theantecedents of individual-level resilience are developing skills and competencies (e.g. Howard & Irving, 2014), positive emotions and attitudes (e.g. Cooper et al., 2013), positive relationships (Bardoel et al., 2014),

leadership and management (e.g. Ashby et al., 2013), and organisational context factors, for example, employee-oriented HR management practices (e.g. Cooke). Some scholars have also focused on cross-level antecedents, for example certain organisational factors could potentially impact team-level resilience (van der Beek & Schraagen, 2015) or leadership could be considered as a source of cross-level resilience (Norman et al., 2005; Hudgins, 2016). Nevertheless, empirical evidence on the impact of a single antecedent at multiple levels remains very scarce to date.

Resilience at all three levels can be a demanding goal to achieve in a contemporary projectified environment. As the number of project workers and project managers increases (Maylor et al. 2006), new challenges arise – this means that individuals, teams and organisations involved in the process of projectification could benefit from finding a project management approach that would enable resilience across all three levels.

4 Agile project management as a resilience antecedent

4.1 Expanding the applicability of APM

Due to the increase of project-based work, new ways of managing projects have emerged over time. APM was initially a solution for the turbulent environment of software development projects. Nowadays, since many non-software projects are facing very similar disruptive dynamics, APM is also being considered as a possible approach for other areas, since it has resolved similar issues within software development in the past (Ćirić & Gračanin, 2017). Deliberately or not, companies are implementing some APM practices, since their traditional and formalised project management approaches often fail to meet the challenges of an innovative project portfolio (Conforto et al., 2014). Even though the majority of existing literature related to APM remains within the software development domain (Fernandez & Fernandez, 2009; Conforto et al., 2014), some attempts at broadening the scope have been made and APM is now moving on to other industries. For example, APM has been studied as a possible approach to construction projects (Nowotarski & Paslawski, 2015), new product development projects (Conforto et al., 2014; Stare, 2014), manufacturing projects (Somers et al., 2015), and services projects (Ruler, 2015), to name just a few.

The main challenges for project managers today are improving communication, team and people management, and increasing emotional management, such as managing frustration, stress and disconnection (Ballesteros Sánchez, 2018; Digital.ai, 2021). The reported benefits of APM could help with just that, as many of them are connected through the first principle of the Agile Manifesto – 'Individuals and interactions over processes and tools' – such as an improvement in team collaboration, an increase in transparency, visibility and knowledge sharing, an improvement in focus, etc. Furthermore, increases in productivity levels, speed and quality, customer interaction, flexibility and coping with change are among the beneficial reported outcomes of APM (Gustavsson, 2016).

Organisations across all industries should consider these benefits of APM, especially when exposed to the potentially damaging challenges of projectification. APM is not only an efficient tool for handling projects but could also be considered as a possible antecedent of cross-level resilience. Over recent years, studies of resilience across all three levels have already been conducted, some of which have also researched how a single antecedent functions across multiple levels simultaneously (Raetze, 2021). Adoption of an agile approach to project management could possibly benefit those people and organisations that are facing projectification-related challenges. As a result of adopting an agile approach, perhaps even positive consequences of projectification at an individual level could be discovered, as this is currently an under-researched side of the phenomenon (Jacobsson & Jałocha, 2021).

4.2 Challenges of APM in non-software industries

Although companies in more traditional industries could benefit from adapting APM (Conforto et al., 2014), some challenges remain and should also be taken into consideration. Since the Agile Manifesto was created in the context of the software development industry, it is impossible for the entire spectrum of organisations to operate according to all principles (Gustavsson, 2016). The main challenges in adapting agile practices were identified as inconsistencies in practices and processes across teams, challenges with organisational culture which is often not in line with agile values, general resistance to change, lack of support and skills (Digital.ai, 2021). Furthermore, certain challenges, which are not typical for the software industry but are present in other industries, could be addressed with a hybrid approach (Conforto et al., 2014).

5 Conclusion

Projectification, resilience and agile project management are all relatively new concepts, with a lot of space for further research. To date, these concepts had been evolving and had been studied in parallel, therefore, connections between them in existing research are very rare. That said, however, dependencies between projectification, resilience and agile project management are evident. Through the literature review, the authors of this paper collected enough evidence to understand that this issue is worthy of further investigation, as there is an opportunity to fill some gaps in existing academic knowledge and also create a hands-on practical contribution for contemporary organisations.

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How to Deal With Luxury and Prestige Goods in Business?

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Abstract The luxury goods market is growing constantly, despite the fact that there is no unified definition of the basic terms such as 'luxury' and 'prestige'. This can lead to misunderstandings and wrongly created synonyms. It is for this reason that, from an academic and organisational point of view, there is a distinct need to define the fundamental concepts and their differences in relation to the world of luxury and the luxury market, which is the main goal of this paper. The paper is constructed as a review paper. It begins with a comparison of various authors' views and definitions of 'luxury' and 'luxury goods'. This is followed by defining the terms 'prestige' and 'prestige goods' by reviewing authors' discussions based on this area. The research paper concludes with the design of a model for the future treatment of such goods in business. The term 'luxury' is a wide concept that has evolved over time. To understand the meaning of luxury, it must be understood as a whole. Prestige, meanwhile, goes hand in hand with the luxury goods market. This paper contributes to a better understanding of luxury and prestige goods in academic science, which can be applied for organisational purposes.

Keywords:
luxury,
luxury goods,
luxurious,
prestige,
prestigious

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1 Introduction

The first mention of the word 'luxury' dates back to Roman times when 'luxus' was defined as excess, extravagance, indulgence (Berthon et. al., 2009; Oxford English Dictionary Addition Series, 1997) as well as debauchery (Featherstone, 2016). The wide extent of what luxury represents is proving a problem for scholars in creating a unified definition (Brun & Castelli, 2013). Ko et. al. (2019) mention that *'The American Marketing Association dictionary terms do not contain a definition of luxury.'* Even though defining luxury is challenging, authors agree that it must be treated as a multifaceted concept (Brun & Castelli, 2013), because it relates to something that is more than just 'material' (Berthon et. al., 2009). Luxury is a concept that is both ambivalent and complex (Kapferer, 1998). There are four main categories of luxury goods: fashion, perfumes and cosmetics, drinks (wine and spirits), and jewellery. These categories were recently expanded to include cars, hotels, etc. (Amatulli & Guido, 2011; Jackson, 2004; Chevalier & Mazzalovo, 2008). When reviewing the literature on luxury, the word 'prestige' is often encountered. Light (2020) points out that these are different concepts that are often mistaken for synonyms. Ciornea et. al. (2011) agree that luxury and prestige have different meanings.

Therefore, in this paper the authors have examined the question of how to form more uniform treatment of this group of goods in business on the basis of various known definitions of luxury and prestige goods.

There are many different interpretations that can lead to all types of confusion when delving deeper into the matter. For example, how can the market share and size of luxury and prestige goods be determined when calculations and analyses depend solely on authors' subjective views? Based on this recognition, the authors of this paper came to the conclusion that there are different assessments of the size of the luxury market. Shen et. al (2020) (as cited in McKinsey, 2019) stated that the size of the luxury market in 2019 was worth approximately EUR 1.3 trillion (worldwide and overall), whereas for the same year Fortune Business Insights (2019) stated that the size of the luxury market was USD 316 billion (EUR 290 billion). It is for this reason that the authors of this paper recognised the need for a more stable factor to measure the size of the luxury market. Therefore, research was carried out on the Top 100 companies operating on the luxury good market that are recognised by Deloitte. The aggregate net luxury sale of goods of the Top 100 companies was: EUR 196.73 billion in 2013/14; EUR 203.89 billion in 2014/15; EUR 194.71 billion in 2015/16;

EUR 199.3 billion in 2016/17; EUR 226.85 billion in 2017/18; EUR 258 billion in 2019; EUR 231.45 billion 2020 (Deloitte, 2015; Deloitte, 2016; Deloitte, 2017; Deloitte, 2018; Deloitte, 2019; Deloitte, 2020; Deloitte, 2021).

Despite the COVID-19 pandemic, in 2020 the luxury market still recorded the second highest sales of luxury goods since 2013/14. Furthermore, forecasts for the luxury goods market are promising, ranging all the way from a compound annual growth rate (CAGR) of 3% (2020-2025, TechNavio, 2021) to a 3.72% CAGR (2022-2027, Statista, 2022).

2 Theoretical framework

2.1 Luxury goods

With his Theory of the Leisure Class (1899), as cited in Piccione and Rubinstein (2008), Veblen is considered the founder of the theory of irrational customer behaviour, whereby individuals buy luxury products to impress others and confirm their status by signalling their wealth to others. Luxury can be seen as goods or services that are comprehended as unusual and special. This leads to infrequent purchasing, which distinguishes them from ordinary goods (Walley et. al., 2013; Hansen & Wanke, 2011).

Dubois & Czellar (2002) simply define luxury as '*everything that is more than one needs',* wherein luxury is linked to '*perceptions of comfort, beauty and a sumptuous lifestyle'*. Based on Kapferer (2010), luxury represents the highest quality and limitless creativity. According to Ng (1987), price is the ultimate factor when it comes to luxury goods, because they '*are valued because they are costly'*. Brun & Castelli (2013) agree that perceived high cost is necessary but at the same time not a sufficient condition. This was proven by Amatulli & Guido (2011), who indicated the attributes linked to luxury goods, while consumers highlighted quality, craftsmanship and visual aspects, such as design and aesthetic value.

Luxury goods contain three important dimensions of instrumental performance by which they are distinguished from ordinary goods. These dimensions are functionalism, experientialism, and symbolic interactionism (Vickers, J. S., & Renand, F., 2003). Furthermore, Dubois et. al. (2001) list six facets to define and structure the concept of luxury. The first is excellent quality, followed by (as

previously mentioned) high price, scarcity and uniqueness, polysensuality and aesthetics, ancestral heritage and personal history, and superfluousness.

2.2 Prestige goods

As previously mentioned, the term 'prestige' is often falsely identified as luxury. Trubitt (2003) suggests alternate terms for prestige goods such as 'elite goods', 'status goods', 'primitive valuables' and even 'wealth'. As the author states, these are valued raw materials or manufactured objects that are used to establish and maintain social and political relationships. According to Barkow (1975), prestige forms an important factor in how people augment their social status in relation to other members of their social group. According to Dubois & Czellar (2002), prestige is '*a subjective evaluative judgement about the high social status of people or inanimate objects.*' Emotional reactions are often followed by appraisals, state Bagozzi, et. al. (1999) (as cited in Dubois & Czellar, 2002). Lee et. al. (2019) support the statement that people purchase prestige goods with the intention of differentiating their social class from that of others. Hayden (1998) agrees that people use prestige goods to demonstrate their wealth, success and power. As the author says, it is about the purpose for solving either a social problem or accomplishing a social task (e.g. attracting the opposite sex, allies, labour or even bonding members of social groups) by displaying success. Lee et. al. (2019) list prestige as including conspicuous values, uniqueness, social and emotional values, and quality value. Adams (2011) made an interesting statement that a wide range of products in use are not prestigious (even luxurious ones) because they are no longer unique.

The benefits gained from being prestigious could, over time, lead to an evolving desire for prestige and also to behaviour oriented to seeking it out (Aimée, 2008). One of the starting points could be '*informants refer to feelings of liking, awe and admiration toward prestigious people or objects.*' (Dubois & Czellar 2002). The authors of this paper thus came to the conclusion that, as a people, we have a tendency towards finding and establishing a position that will meet our needs for recognition and compliments in a particular social group.

3 How to consider LUXURY and PRESTIGE goods in business

In both theory and practice there is a need to have a simpler and clearer definition of luxury and prestige goods. This would provide a better understanding of the terms, wherein differentiating between luxury and prestige can positively affect an organisation's business results on the luxury goods market. Organisations are currently facing challenges in terms of how to treat luxury and prestige goods more efficiently in their businesses. It is for this reason that the authors of this paper developed a model based on previous definitions of luxury and prestige for the needs of business. The model shows that a product (e.g. cognac) can be both luxurious and prestigious at the same time.

The model provides organisations or individuals with an answer to the question of whether a product is: luxurious, prestigious, or luxurious and prestigious at the same time, and what level of luxury and prestige a particular product contains.

Table 1: Identifying levels of luxury and prestige

Level of luxury	Level of prestige
Is the product superfluous?	Am I establishing and maintaining a social relationship with this product?
Is the product considered unusual?	Would society connect the product to people of high(est) status?
Does the product signalise wealth?	Would society consider me wealthy if I had this product?
Is the product of the highest quality?	Would society recognise the superior quality of this product?
Does the product demonstrate exceptional creativity?	Does having this product reflect success?
Is the product unique and not mass produced?	Would society value this product as unique?
Is craftsmanship part of the product?	Does having this product demonstrate power?
Do I get a perception of beauty when looking at the product?	Is this product conspicuous?
Does this product portray a sumptuous lifestyle?	Can this product trigger emotional value?
How much does the product cost?	This product is not widely available.

To determinate levels of luxury and prestige based on the table above, the respondents were asked to answer each question (and the one statement) with a 'Yes' or 'No'. 'Yes' represents 1 point, while 'No' represent 0 points. The points collected were then inserted into a matrix. The results determinate the levels of luxury and prestige of a particular product.

*The question of 'How much does the product cost?' is divided into four categories: Under EUR 1,000 (0.25 points), between EUR 1,000 and EUR 5,000 (0.50points), between EUR 5,000 and EUR 50,000 (0.75points), EUR 50,000 and above (1 point).

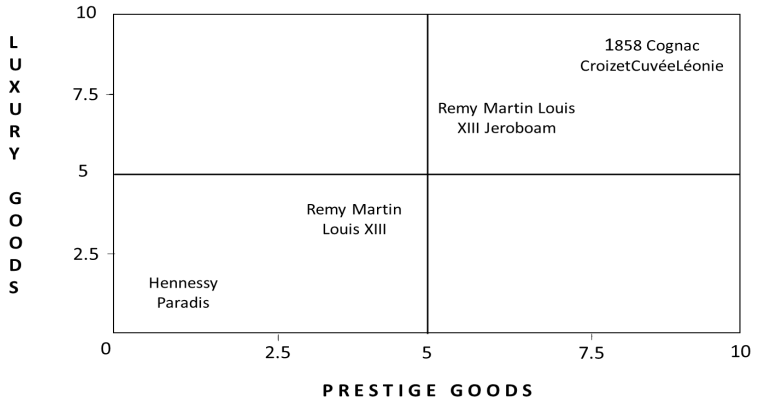

Figure 1: Matrix for defining levels of luxury and prestige

Source: own.

3.1 Interpretation of results

The matrix shows luxury goods on the vertical axis and prestige goods on the horizontal axis. Each term was divided into four categories, where 0 represents the lowest point (not at all luxurious or prestigious), and 10 represents the highest level of luxury and prestige. The categories are defined in the table below.

Ratio	Luxury goods	Prestige goods
0-2.5	Accessible luxury	The product is prestigious
2.6-5	High luxury	The product has a high level of prestige
5.1-7.5	Very high luxury	The product has a very high level of prestige
7.6-10	Ultra-luxury	The product is ultra-prestigious

4 Conclusion

The authors of this study find that the concept of luxury has changed and become wider over time. Due to its complexity, it is impossible to come up with a unified definition of luxury. The reason for this is simple. Luxury is more of a concept than a term, therefore it should be treated as such. The authors discovered that there are two sides to luxury – (1) individual, and (2) goods or services that are out of the ordinary (goods and services must contain price). Prestige, meanwhile, is more of a stable term, which has not changed over time, and which is not impossible to define. Existing definitions were built on the same fundamentals. While materialistic value is required to accomplish luxury, it is not required to accomplish prestige. Prestige as such can be completely unrelated to luxury, which proves that they are not synonyms.

The model developed for this study can be used in two ways: (1) individuals can compare their own expectations of a product with what the product represents. The model allows individuals to confirm if their expectations match the reality. (2) Organisations are competing in the markets of luxury and prestige goods like in any other. The model could help them to stay focused on the chosen level of luxury and prestige of a product, thus reducing the risk of under-pricing or overpricing the product.

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Changes in Initial Margin and Market Liquidity During the COVID-19 Pandemic

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Abstract The main role of central counterparties is the clearing and settlement of trades. In order to fulfil this role, they need to maintain financial resources to cover losses due to customer defaults. One element of these resources is the initial margin requirements. In this paper the authors have analysed whether a change in the value of the margin was followed by a significant change in the market liquidity of the most liquid Hungarian stock – the OTP Bank Group – during the period of the COVID-19 pandemic. Market liquidity is measured based on the daily traded volume. The results show that in most cases, no changes in the abnormal daily traded volume are seen on the market following a margin change, which means that no evidence has been found that margin changes and traded volume are related. This result is good from a practical point of view, because it means that the activity of the central counterparty did not negatively affect the liquidity of the market during the COVID-19 period.

Keywords:
margin,
market liquidity,
event analysis,
central clearing,
procyclicality

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1 Introduction

The financial crisis of 2008 highlighted the vulnerability of the financial system. Regulatory changes over the past decade have gradually increased the role of central counterparties (CCPs). Through the process of novation – becomes the buyer to every seller and seller to every buyer – CCPs increase transparency and, in order to fulfil their role, needs to maintain financial resources to cover losses due to customer defaults. To this end, CCPs operate a multilevel guarantee system, consisting of the initial margin requirements and the default fund contributions, paid by the clearing members, and also from 'skin in the game', which is a dedicated part of a CCP's own capital (Murphy et al., 2014).

This research focuses on the domestic – Hungarian – capital market, the Budapest Stock Exchange Ltd. (BSE), and the activity of the domestic central counterparty – KELER CCP Ltd. This study investigates the relationship between the initial margin and the market liquidity of the most liquid Hungarian stock – the OTP Bank Group – during the period from 1 January 2020 to 31 December 2021. The authors chose this timeframe because the Hungarian economy was notably affected during this period by the measures related to the COVID-19 pandemic. COVID-19 first appeared in Hungary at the beginning of March 2020, and the COVID-19-related restrictions were not eased until after the 2021 year-end.

In this study, liquidity refers to market liquidity, namely that '*a liquid market is a market where large volume transactions can be executed immediately or within a short period of time with minimal impact on market prices.*' (BIS, 1999, pp.13). The two most widely used liquidity measures are the bid-ask spread and volume (Kutas and Végh, 2005), which this study will apply later as a liquidity measure. This question will be analysed using an event study method, since this method is suitable for examining whether changes in the value of the initial margin result in a change in the liquidity of a security. This is an important question, since European regulation – the so-called EMIR (2012) – places a strong emphasis on protecting the market against procyclicality, meaning that during a potentially stressful period, the increased margin requirements imposed by the CCP should not create liquidity problems for market participants, which could deepen the crisis. Although procyclicality of margin requirements has been analysed in existing literature (e.g. Murphy et al., 2014; Berlinger et al., 2018) there is a lack of empirical studies that examine the effect of the initial margin required by

CCPs on the market in stressed market conditions. Therefore, the aim of this paper is to analyse whether the margin requirements during the period of the COVID-19 pandemic were followed by a change in the liquidity of securities.

2 Literature review

The effect of margin requirements on the market has been analysed from various aspects, mainly focusing on the changes in volatility and liquidity. In the related literature, the results are controversial. Some research states that margin can reduce the volatility of stock price (e.g. Hardouvelis, 1990), while others found that the effect of margin on volatility varies over time and differs across contracts on the futures markets (Fishe et al., 1990). Hardouvelis and Kim (1995) found that this relationship behaves differently on the spot and futures markets, while in a later study Hardouvelis and Theodossiou (2002) state that there is a non-linear relationship between margin and volatility. They also point out in their research the pyramiding-depyramiding effect, which highlights the procyclical nature of margins. Namely, in declining bear markets, margins should be reduced in order to free up liquidity and prevent a depyramiding effect (Garbade, 1982), while in a bullish market, margins increase and are maintained at a higher level to avoid the pyramiding effect. Park and Abruzzo (2015) also support the procyclicality phenomenon in their research, however, the results show an asymmetric relationship between the change in margin and volatility. The margin of the CCP increased as soon as the increasing volatility reached a certain level, while there was no immediate reduction in the margin after volatility reached a lower level.

Ma et. al. (1993) conducted an event study analysis to explore the relationship between margin changes and market reactions. Goldberg and Hachey (1992) and Hsieh and Miller (1990) found no significant relationship between changes in margin requirements and market volatility, while Kupiec (1993) showed that there is a positive relationship between the margin requirement and volatility of the spot equity market, since increasing margin requirements drain liquidity from the market, thereby increasing price volatility. Additionally, market participants have an effect on how the market reacts to a margin change. Based on the restriction hypothesis put forward by Nathan (1967), margin changes are most likely to have a destabilising effect for speculators. Moreover, Daskalaki and Skiadopoulos (2016) found that the market liquidity of individual contracts/groups is not affected by changes in margin,

regardless of how liquidity is measured, as changes in margin affect excessive speculation. They also observed that margin requirements are positively (negatively) correlated with price (return) changes, but only large and positive margin changes affect the characteristics of the commodity futures market, whereas small and negative changes do not.

Finally, Charath et al. (2001) investigated the impact of margin requirements on trader activity. They concluded that trading activity becomes increasingly sensitive to margin changes as the expiry of contracts approach. In addition, Chou et. al (2015) analysed trading activity, demonstrating that margin increases have led to a significant decrease in trading activity, thus suggesting that margin requirements impose high transaction costs on traders. As for price volatility and bid-ask spreads, they show that these are positively related to changes in margin.

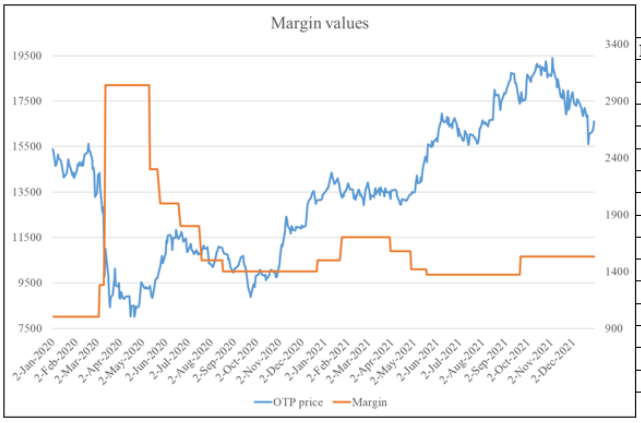
3 Methodology and data

Based on the existing literature, this study applies the event study methodology. An event study analysis measures a relationship between an event that affects securities and the return on those securities. In other words, whether a given event has an impact on the return of a given security. In this study, instead of analysing the return of an asset, the authors analysed the change in the liquidity of the asset. It is important to note that the change in the liquidity has been analysed, since the authors wanted to show whether an event has an effect on the liquidity of the stock. The question is not whether the stock is liquid or illiquid, but rather whether the event makes the stock more/less liquid, thus the log-change is measured in volume. However, further analysis would be required in order to determine a true causal relationship. In summary, the event analysis method is based on detecting abnormal changes in the traded volume after the occurrence of an event.

3.1 Event dates

The first step of an event analysis is to define the event whose impact the researcher(s) want(s) to investigate. In this paper, the authors examine how a change in the margin requirements of the Hungarian clearing house, the KELER CCP affected the log-change of the traded volume of the stock of OTP during the period from 1 January 2020 to 31 December 2021. The authors chose this period in order

to analyse how the margin changes during the period of the COVID-19 pandemic related to the change in the liquidity of the stock. The stock of the OTP Bank Group from the Budapest Stock Exchange was chosen, since it is the most liquid and most traded stock on the Hungarian market. The initial margin requirements for OTP were modified by the KELER CCP on the dates shown in the Figure 1 (KELER CCP, 2022). This study focuses on those events.



Date	Margin	Change
03 January 2020	1 000	
05 March 2020	1 280	increase
12 March 2020	1 740	increase
13 March 2020	3 040	increase
12 May 2020	2 300	decrease
26 May 2020	2 000	decrease
22 June 2020	1 800	decrease
20 July 2020	1 500	decrease
18 August 2020	1 400	decrease
23 December 2020	1 500	increase
25 January 2021	1 700	increase
31 March 2021	1 580	decrease
28 April 2021	1 420	decrease
19 May 2021	1 370	decrease
22 September 2021	1 530	increase

Figure 1: Dates of the initial margin changes
Source: Authors' own editing

The output of the event analysis depends largely on the choice of the so-called event window and estimation period. The event date is actually day zero of the analysis (Bowman, 1983), and the event window is the time interval around this date in which the impact of the event is examined. In this paper, the authors chose the day of the margin change (T) and the five trading days – namely one week – following it (T+5) as the event window, as well as the five trading days – also one week – before the change (T-5) as the estimation period. A short estimation window had to be applied since, according to Figure 1, there were several occasions when the consecutive margin changes happened within a short period of time. Even the T-5 days event window was still too long during March 2020, when the events were so close to each other that the estimation period contained the previous event as well. In order not to have a biased estimation, this problem was handled by decreasing the estimation period and the event window to T-4 and T+4 days, on 5 March 2020. In the case of 12 and 13 March 2020, two cases were handled as one event. The authors did not want to disregard these days since, from the viewpoint of this analysis, the March

2020 period is important, as this was when COVID-19 spread to Europe and the first notable measures were in place (Kormányhivatalok, 2022).

3.2 Definition of abnormal volume changes

The aim of this event analysis is to identify abnormal liquidity changes. To achieve this, it is necessary to know what the expected normal liquidity – measured in volume – changes would be. Estimating normal changes can be defined using statistical or economic models (Bedő, 2007), from which the authors chose to apply a statistical model, the so-called market model, applied by e.g. Fama et al. (1969). Its basic assumption is that there is some linear co-movement between the return of the *i*-th stock and the market return, R_m, according to the following equations, where the normalised return R_{it} of the *i*-th stock at time *t* can be seen:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it}$$
$$E(\varepsilon_{it}) = 0 \qquad var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

where α_i and β_i are the regression coefficients of *i*-th stock estimated by the OLS (Ordinary Least Square method), and ε_{it} is an error term with zero expected value. The coefficients α_i and β_i are computed over the estimation period and, taking them as constants, the abnormal returns (AR_{it}) are obtained by applying them to the event window, based on the following equation:

$$AR_{it} = R_{it} - (\widehat{\alpha_i} + \widehat{\beta_i} * R_{mt})$$

In this model, instead of the return of *i*-th stock, volume data has been used. However, instead of the market return, the authors chose not to use the traded volume of the index, on the one hand because there are no volume data available for the index, while on the other because it was proved by Amihud and Mendelson (1986) that there is a strong relationship between liquidity and returns. To be able to apply this model, the authors of this paper had to choose an instrument that was representative of the market against which they could perform the calculations. They chose the MSCI Emerging Markets Index, downloaded from Yahoo Finance (2022), together with the daily traded value of the stock of the OTP Bank Group. The index measures the performance of emerging markets, of which Hungary is one. To draw

conclusions about abnormal returns, it is necessary to cumulate them over time, which has been labelled as a cumulative abnormal return (CAR).

Whether the estimated volume change can be regarded as abnormal can be detected by statistical tests, for example by using the most commonly used parametric test – the Student's t-test. Its assumption is that abnormal returns follow a normal distribution. In the hypothesis testing, the null hypothesis is that the difference between the expected and realised return on a given day is not an abnormal return, therefore the event under investigation did not have a significant effect on the stock (McWilliams et. al., 1999).

After calculating the test function and critical values, if the test function is higher than the upper critical value or lower than the lower critical value, the null hypothesis is rejected. Therefore, in this case, the assumption that there are no abnormal returns is rejected. This implies that the event has had a significant effect on the value of the stock under consideration. If the value of the test function falls between the upper and lower critical values, the null hypothesis cannot be rejected, i.e. the returns realised in the event window are not abnormal returns, therefore the event did not have a significant impact on the value of the stock being tested (Rácz, 2019).

4 Analysis and result

For all of the events, the authors estimated the abnormal volume changes as well as the cumulative abnormal volume changes. As can be seen in Figure 2, it is clear that, mainly in those cases when the margin was increasing, the daily traded volumes decreased and vice versa. Therefore, in essence, if the margin is decreasing it is followed by more active trading the following day (or days) than expected. However, the figure only contains those events following volume changes, in which case one of the days within the event window proved to be significantly abnormal, as illustrated in Table 1 (highlighted in red). In terms of the other events – which are not shown in Figure 2 – the same phenomena can mostly be seen.

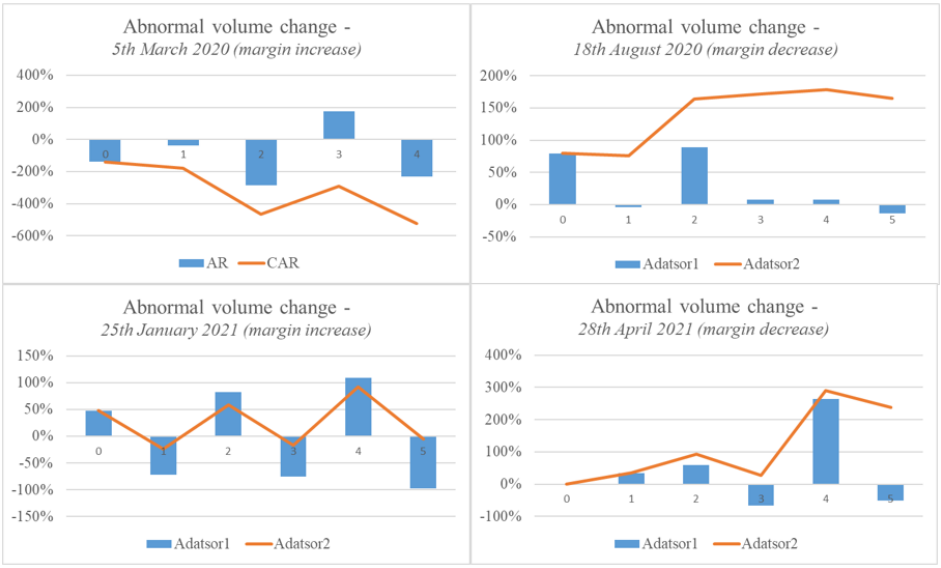


Figure 2: Significantly abnormal daily volume changes

Source: authors' own editing

Table 1: p-values

05 March 2020	increase	21,64%	17,91%	7,59%	11,77%	6,76%	
12-13 March, 2020	increase	38,21%	26,23%	20,55%	19,96%	27,55%	18,80%
12 May 2020	decrease	41,57%	39,05%	25,85%	31,20%	26,71%	19,77%
26 May 2020	decrease	17,70%	23,54%	24,04%	19,72%	40,49%	33,43%
22 June 2020	decrease	47,69%	45,93%	48,22%	39,35%	35,87%	37,54%
20 July 2020	decrease	34,36%	24,15%	42,92%	30,56%	30,42%	30,16%
18 August 2020	decrease	3,18%	5,28%	2,67%	3,04%	3,27%	3,76%
23 December 2020	increase	38,39%	41,95%	42,35%	48,81%	44,34%	49,96%
25 January 2021	increase	8,64%	20,69%	13,08%	32,56%	11,74%	44,98%
31 March 2021	decrease	14,15%	42,61%	27,20%	34,90%	30,46%	27,55%
28 April 2021	decrease	49,13%	18,09%	9,55%	28,23%	4,46%	5,45%
19 May 2021	decrease	30,53%	44,00%	47,18%	42,63%	40,91%	43,02%
22 September 2021	increase	14,74%	21,60%	18,87%	28,16%	25,23%	15,24%

Source: Authors' own editing

According to Table 1, it is evident that in most the cases, the margin change was not followed by a significantly abnormal change in traded volume. It is worth mentioning that the most notable margin changes, which occurred on 12 - 13 March, were followed by a weekend, and on the following Monday, no trading took place

on the market with OTP's stocks, as it was the time of the first lockdown due to the pandemic. The market had three days in which to react and build expectations into trading activity, therefore the results of the analysis are notably affected by the delay in the first trading activity compared to the margin change. There was only one event – 18 August 2020 – which was followed by significantly abnormal volume changes for a week, however, it would be misleading to draw general conclusion from just one event.

5 Conclusion

In this analysis the authors have shown that margin changes are followed by abnormal liquidity changes, however, these did not prove to be significant in the majority of cases. From a practical point of view this is an important result, since it means that the activities of the CCP have not caused a more illiquid market than prior to the margin change during the COVID-19 pandemic. Therefore, it was not possible to prove that the activity of the CCP would cause procyclicality. In future, it would worth analysing whether there is a causal relationship between margin changes and liquidity changes involving a longer time-period as well as a larger pool of stocks. Moreover, it would worth carrying out a causal analysis with different liquidity indicators, such as the bid-ask spread or a weighted average spread measure.

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DATA MINING WITH PYTHON

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Abstract As the amount of data in the world is exponentially on the rise, we need all the tools and knowledge we can get to analyse this data and extract valuable information. This allows important stakeholders to make data-driven decisions, thus providing added value in any organisation. The data mining process can be applied in virtually all kinds of organisations ranging from the public to the private sector. Employees use data in their professional lives and therefore need to be familiar with the knowledge discovery process. The focus of this article is Python as a tool for data mining. The authors concluded that Python is a great option for this task since it is open-source, free and comes with a huge community that develops the packages needed for analytics workloads and it also has lots of documentation. Its capabilities are demonstrated at the end of this paper, where the authors have set up a case study relating to airline passenger satisfaction. The main approach is exploratory data analysis through visualisations with the goal of finding hidden patterns in the data. A decision tree machine learning model was also developed to extract the features that contribute to a higher satisfaction level.

Keywords:
data mining, Python, knowledge discovery process, data mining techniques, machine learning

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1 Introduction

In the digital era, large amounts of data are being produced. Due to its huge volume, high velocity and variety, the term Big Data came into play. In order to find interesting insights and information in these huge piles of data, it is necessary to analyse them. This process is called data mining. It is the process of extracting information from datasets and providing end-users with added value. It provides insights into potential trends, correlations, patterns and outliers in the given data (Prasdika & Sugiantoro, 2018).

Data mining tends to be relevant for all sectors of the economy. It is usually mentioned in the context of business applications, such as identifying potential customers. There are also a lot of use cases in healthcare, energy production and other industries (Sumiran, 2018).

Its usage is also well known in manufacturing since new technologies, such as the Internet of Things and Cyber-physical Production Systems, make real-time data acquisition possible (Huber, Wiemer, Schneider, & Ihlenfeldt, 2019).

There is a vast array of tools and software available for data mining. Some of them are open-source and free, such as Python, R, and Orange, while others are offered by big corporations under a commercial licence. Some of the most commonly mentioned commercial tools are MATLAB, SAS Enterprise Miner, and IBM SPSS Modeler (Mikut & Reischl, 2011).

The focus of this article is the Python open-source programming language and specifically its applications and usage in data mining. The capacities of Python will be demonstrated on a use case analysing airline passenger satisfaction data.

2 Data Mining

The data mining process makes information accessible to users by extracting knowledge from the given datasets. The term 'knowledge' in this context means the acquisition of important correlations, patterns and relations in the data. The term itself is deeply connected with disciplines such as statistics and the newest technologies such as artificial intelligence and machine learning. As such, data mining uses statistical methods and subdomains such as exploratory data analysis at

its core, while at the same time enabling users to analyse data that was not intentionally designed for statistical analysis, since formal procedures or hypothesis testing, which are seen in the field of statistics, are not required (Schuh, et al., 2019).

2.1 The knowledge discovery process

Data mining usually consists of several standard phases that form the so-called knowledge discovery process. This is a guideline to get from raw data to valuable insights (Sumiran, 2018).

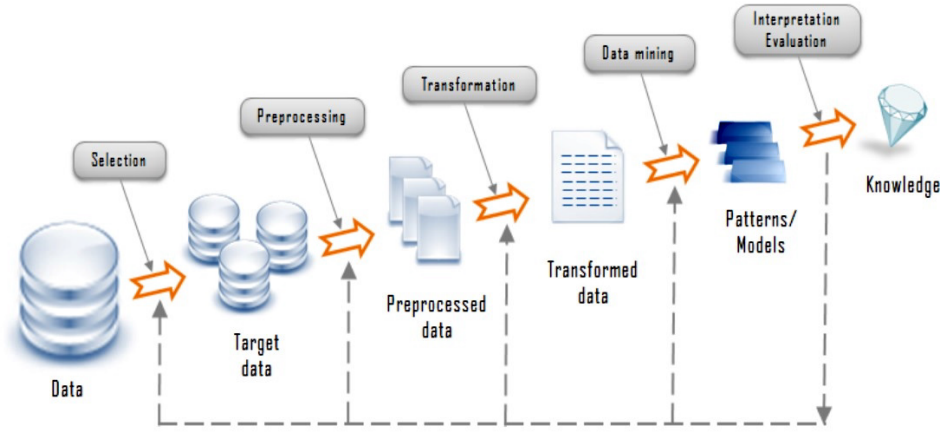

Figure 1: The knowledge discovery process
Source: (Sumiran, 2018)

The phases of the knowledge discovery process are shown in Figure 1 above. The first stage is the collection of raw data. Once this has been collected, certain parts of the data need to be selected that could be useful for solving the initial data mining problem. This data must then be preprocessed and cleaned to get rid of errors, inconsistencies, and missing values. Phase three is the transformation part, where the data is brought in an appropriate format to solve the data mining task. The next phase is the data mining itself. One or more techniques are applied with the main goal of discovering new patterns. Thereafter, it is a good practice to visualise and evaluate the findings in order to reach useful conclusions and complete the knowledge discovery process successfully. These insights can now be used to make data-driven decisions.

2.2 Common data mining techniques

Classification is a very common approach. The general idea is to classify each item into a predefined class or group (Sumiran, 2018).

In this method, a dataset of correctly pre-classified examples is used to develop a model for further classification of unknown examples. This technique is useful for problems such as fraud detection (Ramageri, 2010).

Another fundamental technique in data mining is association. This approach allows patterns to be derived from the frequent item sets in the data. This tends to be useful for discovering cross-marketing opportunities and analysing customer behaviour. So-called association rules are the output of this technique, however, there can be a lot for just one dataset, therefore it can be hard to filter out the ones that do not provide added value (Ramageri, 2010).

An additional technique is called regression, in which the relationship is modelled between a dependent variable, which is explained with the help of independent variables (Ramageri, 2010).

In a regression problem, the value trying to be predicted is numeric. An example of this is to predict house prices in the future (Sumiran, 2018).

Clustering is another method that focuses on identifying similar objects. It allows correlations and distribution patterns in data to be determined. A use case for clustering is to form groups of customers based on their purchasing history and look at the attributes they have in common (Ramageri, 2010).

3 Python

Python is a very useful and powerful programming language that is beginner-friendly due to its simple and easy-to-read syntax. The interpreter needed to develop code in this language and all the standard libraries is open-source and available free of charge. Python has a lot of different use cases ranging from software engineering, internet protocols and operating system interfaces. However, its usefulness does not stop at this point. The language has a vast variety of third-party modules that enable the use of Python in a lot of additional scenarios. These modules, which are also

called packages or libraries, can be found in the Python Package Index (PyPI) repository (Python Sofware Foundation, 2022a).

NumPy is a commonly used library that is the base for a lot of other data analysis modules. It provides the tools required to work with numerical data and is thus the core of scientific computing in Python since it also powers many other modules such as pandas, SciPy, scikit-learn and others. The package contains features such as multidimensional arrays, matrix operations and mathematical functions that can be used on these objects (NumPy Developers, 2022).

More information about NumPy is available in the paper 'Array programming with NumPy (Harris, et al., 2020).

Pandas is a very important package for this article. This library provides a huge data analysis toolkit. Its data structures enable users to work with relational and labelled data. Pandas is good at dealing with errors and missing data and also offers the possibility to split or merge datasets. Pandas has aggregation features such as the 'group by' functionality. The package allows users to load and read data very intuitively since it supports flat files, Excel files and databases. It also offers tools specifically needed for time series analysis (Python Software Foundation, 2022).

Further information about the pandas library is available in the article 'Data structures for statistical computing in Python' (McKinney, 2010).

An important thing to note when using packages are dependencies. A lot of the features in modules depend on other packages. Pandas, for example, has a direct connection with NumPy. This means that it is also necessary to install these packages in order to use the preferred module. Recommended dependencies can sometimes also be encountered that are complementary to the toolkit of a library. Pandas, for example, does not have any features that enable plotting and visualisations, therefore Matplotlib is an optional dependency to solve this (The pandas development team, 2022).

In the next chapter, the authors of this paper also used the scikit-learn library. This allows predictive data analysis with the help of pre-made machine learning algorithms. Scikit-learn includes functionalities such as classification, clustering, regression, dimensionality reduction (reducing the number of variables), model

selection (comparing models), and preprocessing (transformation of data) (Scikit-learn developers, 2022).

For an overview of the scikit-learn package and its features, you can read the paper 'Scikit-learn: Machine Learning in Python' (Pedregosa, et al., 2011).

Some papers also mention the subdomain of data mining called web mining. This functionality is enabled by the Beautiful Soup module. Its main purpose is to pull data from HTML and XML files and as such is a great tool for web scraping (Richardson, 2020).

4 Data mining with Python

This chapter focuses on the exploratory data analysis and development of a machine learning model for an airline. The data is based on passenger satisfaction surveys and can be found in the appendix of the paper titled 'Investigating airline passenger satisfaction: Data mining method', although the authors mention its origins as being the Kaggle machine learning and data science community (Noviantoro & Huang, 2021).

Apart from the libraries mentioned in the previous chapter, we will also be using Seaborn and Matplotlib for drawing visualisations.

For further reference on the Seaborn package, please refer to the paper 'Seaborn: Statistical data visualization' (Waskom, 2021).

Since visualising data relies heavily on Matplotlib, you should also give the publication 'Matplotlib: A 2D graphics environment' a read (Hunter, 2007).

Let's now put ourselves in the role of an airline company. Of course, the company's goal is to have satisfied customers, therefore it collects feedback from them in the form of satisfaction surveys. They are asked multiple questions mostly based on their flight experience and a general satisfaction evaluation which is either 'Satisfied' or 'Neutral/Dissatisfied'. The next stage of the process is to obtain insights into these people and see any potentially interesting patterns. This process is done with the help of some Seaborn visualisations in Python. The main focus is to look at the satisfaction ratios within different attributes. For example, 'How do customers rate

the flight based on the class in which they travelled?' The age factor can then be taken into account and younger and older passengers and their opinions can be compared.

Since the dataset contains 24 columns and around 130,000 rows, it is obviously not possible to extract all the available knowledge in this paper, since that would involve writing an entire paper on its own.

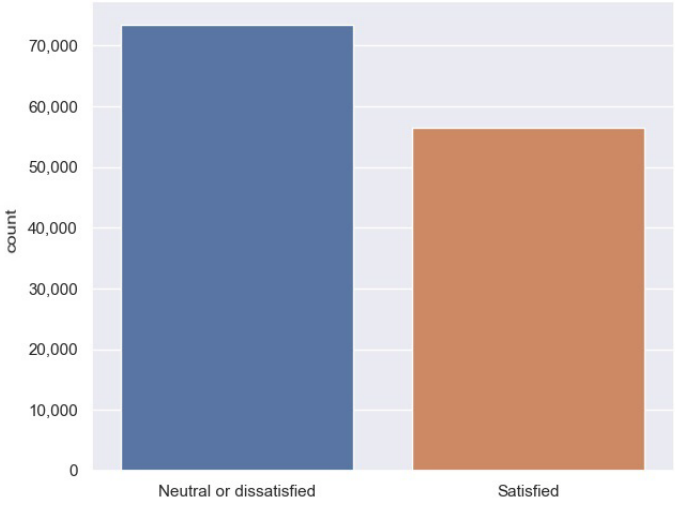

Figure 2: The count of Neutral/Dissatisfied and Satisfied passengers

Figure 2 shows the number of satisfied and neutral/dissatisfied customers. The number of satisfied customers is lower, albeit not significantly so, therefore the balance of the dataset is completely acceptable for future work.

The dataset is divided into male and female genders. There is a slightly higher ratio of females, but the difference is minimal. The satisfaction levels of both groups are practically identical, therefore there is no difference in the general rating of the flight between men and women. Passenger satisfaction can also be measured based on the class in which they travelled. There is a noticeable negative perception when it comes to economy and economy plus travellers since the service is probably not as high quality as in business class.

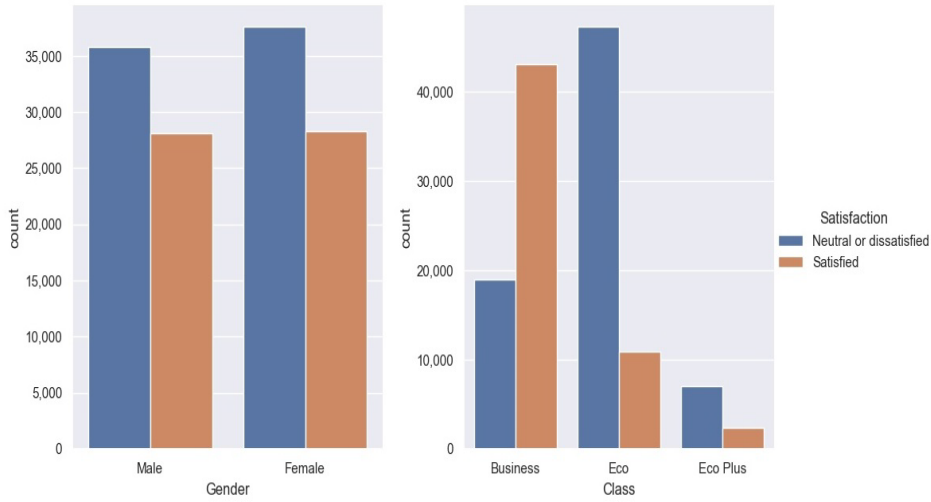

Figure 3: Satisfaction rating counts based on gender and travel class

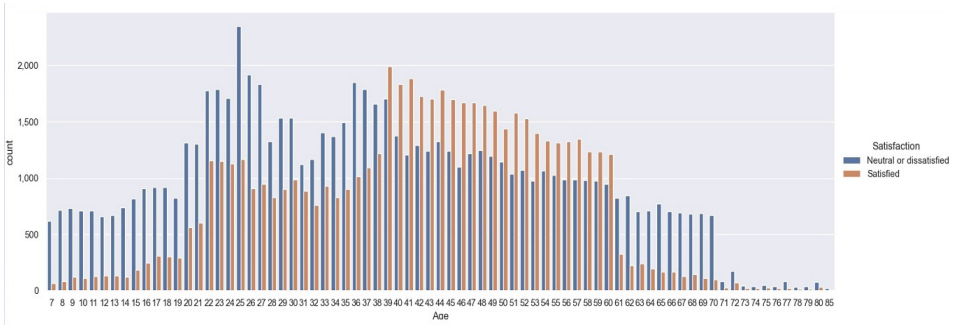

Figure 4: Satisfaction counts based on age

The figure above shows the age distribution of customers as well as their general opinion on the flight. The results show that middle-aged people tend to be less critical compared to their younger and older counterparts, since the satisfaction levels rise significantly at age 40 and also decrease quickly from age 60 onwards.

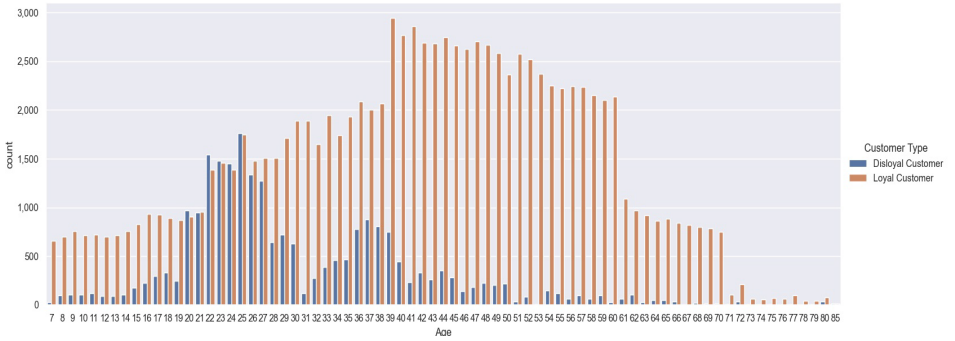

Figure 5: Number of loyal and disloyal customers and their age

In terms of age, it is also possible to check how loyal customers are. The loyal customers group tends to be larger. An interesting pattern that emerges is that younger passengers are on average less loyal than older ones.

After the visualisation part, further examination of the data can be carried out to find the importance of the attributes using a correlation matrix. For the purposes of this process, it is necessary to convert the variable types of some attributes from text to categorical/ordinal values. An example of this would be type of travel which has the possibility of 'Personal Travel' and 'Business Travel'. These values can be encoded as a 0 and a 1.

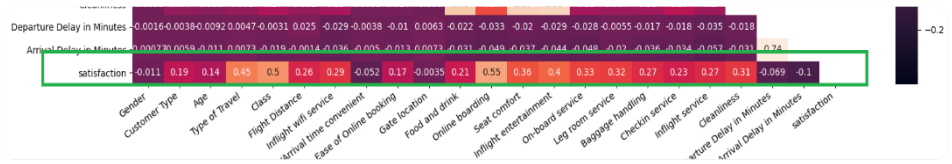

Figure 6: Lower part of the correlation matrix with the satisfaction attribute highlighted

Once the data transformation part has been completed, the lower part of the correlation matrix can be displayed. The Spearman correlation was used for this calculation. According to the visualisation, the most important attributes for satisfaction tend to be class, type of travel, online boarding and inflight entertainment.

However, one issue arises. Since some variables (such as satisfaction where 1 = 'Satisfied' and 0 = 'Neutral/Dissatisfied') are categorical while others are ordinal (for example the Wi-Fi service is labelled as a score from 1-5), the results of the correlation matrix might not be the most reliable source of information. In order to address this issue, the authors created a decision tree machine learning model to classify passengers into satisfied and dissatisfied groups and to then extract the attributes (in this case features) that have the biggest impact on the evaluation.
All that remained was to create the model with the help of the scikit-learn library. The dataset was split into training and test data. The x and y values of the training data were input into the model (with x being the independent variables and y the target variable – customer satisfaction level). Once the model had been created, it was easy to use the .predict() method and to assign the independent variables of the test set as the parameter to predict the y values in the test set. Once complete, the output was documented in the form of a confusion matrix to evaluate the results.

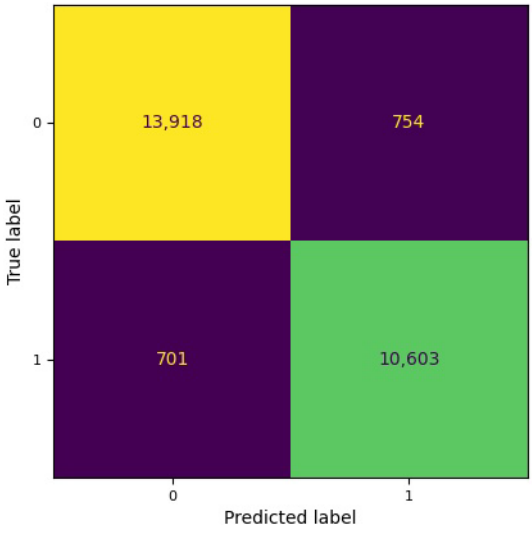

Figure 7: Confusion matrix of decision tree

The confusion matrix displays the output of the machine learning model. The top left quadrant are the true negatives while the true positives are shown in the lower right quadrant. The violet quadrants are misclassifications. There is a relatively small number of misclassifications compared to the whole test dataset, therefore the accuracy, recall and precision of the model are high.

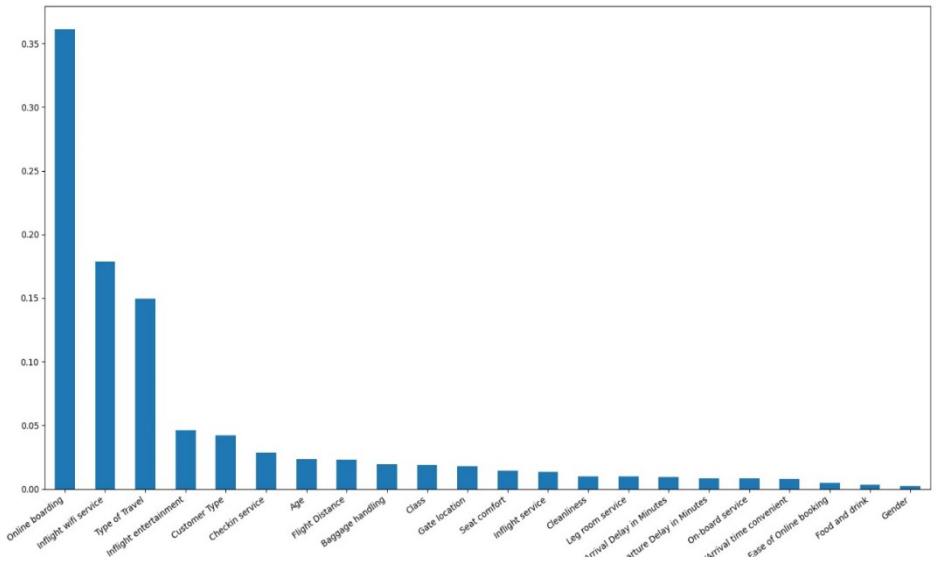

Figure 8: Feature importance of the decision tree model

The final task is to display the features that the model uses to classify the objects into groups and place those attributes on a scale to find the most significant ones. According to the model, the most important attributes are online boarding, inflight Wi-Fi service, and type of travel (business or private travel). The task of the airline at this point would be to improve the aspects on which they have an influence. For example, they cannot control whether or not a passenger flies business class, but they can improve the online boarding experience if it increases satisfaction.

5 Conclusion

This paper focuses on data mining and the knowledge discovery process. The authors defined all the necessary terminology and looked at some common techniques that are used by data mining experts. There is a wide range of tools that can be used to accomplish the same data mining task, but for the purposes of this research the authors concentrated on the Python programming language. The main advantage of Python is that it is free and it has a huge community of developers with a lot of documentation to make the learning process easier. While doing data mining with Python is a 'hard coding' approach, the syntax tends to be easy to read and, with the help of libraries, a lot of the work is already done for the user.

The second part of this paper is empirical. Based on the theoretical concepts of the knowledge discovery process, the classification data mining technique, and the Python packages that were described, the authors set up a case study to gain new insights into the customers of an airline. It was found that younger passengers tend to be less loyal and more critical of the services, which is also the case for economy and economy plus travellers. This makes sense, since business class usually offers the best service, therefore customers are more satisfied as a consequence. The results show that online boarding, inflight wi-fi service and type of travel tend to be the most important factors when it comes to the overall opinion of the flight. Therefore, the output of this research is that some patterns were discovered, and a machine learning model was used to predict traveller satisfaction and also help discover important areas that can be improved to make the customer experience as enjoyable as possible.

An idea for further research would be to do an expanded exploratory data analysis to discover more relationships in the data. Additional machine learning models could also be produced in order to compare the results, which would provide greater reliability and accurately predict the most important features of a satisfied passenger.

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Issues of the Implementation of ERP in Manufacturing Companies

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Abstract An enterprise resource planning (ERP) solution is a system that combines business functions with the management and organization of data and information. Its purpose is to facilitate the flow of information between all business functions within an organization and to manage the organization's connections with external stakeholders. Proper information management helps an organization to connect organizational units, which further encourages the process of communication and the immediate exchange of information between members of the organization, thus leading to improved organizational processes and better decision-making at all levels. It is important to be aware of the complexity of implementing an ERP solution. Without the support of top management, a proper business plan and vision, business process transformation, effective project management, user involvement, and education and training, organizations cannot reap the full benefits of such a complex system. For implementation to be successful, it is crucial to consider the critical success factors. Identifying these factors is important as it allows companies successfully implement an appropriate ERP solution. The purpose of this study is to discuss the implementation of ERP solutions in the manufacturing industry. The manufacturing industry has discovered the effectiveness of ERP, however, it also faces some challenges in its implementation.

Keywords:
ERP,
implementation,
critical success factors,
manufacture,
companies

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1 Introduction

Enterprise Reseurce Planning (ERP) solutions have a diverse range of powerful and scalable features. Among other things, they can be used to create and maintain a large database that allows different departments to collaborate with real-time synchronisation. By computerising workflows, managing information and providing real-world insights into ERP solutions, they simultaneously increase productivity, reduce potential errors and ultimately promote higher profitability. ERP solutions are great for reducing costs, and by improving collaboration they can significantly increase efficiency, leading to high-quality services and enabling a company to stay competitive (Matendea & Ogaob, 2013).

Today, many public and private organisations around the world are implementing ERP solutions to replace outdated information systems that are no longer compatible with the modern business environment. However, the transition process is a difficult and challenging one. Additionally, the transition to an ERP solution requires training, the development of new procedures and data conversion. The introduction is very beneficial for companies, therefore it is crucial that it is carried out properly. It is important to be aware of and understand the critical success factors in implementing ERP solutions. Critical success factors are those variables or circumstances that are necessary for a positive result of the implementation of an ERP solution. Identifying these factors is important as it allows companies to focus their efforts on building their capacity to meet the critical success factors and consequently successfully implement an appropriate ERP solution.

Understanding the critical success factors in deploying ERP solutions is a challenge for many organisations around the world. An ERP solution enables an organisation to integrate all its primary business processes, thus increasing efficiency and maintaining a competitive position. However, if an ERP solution is not successfully implemented, the anticipated benefits of improved productivity and a competitive advantage may not materialise. For manufacturing companies, an ERP system can solve many challenges and deliver valuable benefits, such as cost reduction, streamlining processes, managing growth and gaining a competitive advantage, therefore it is important to find the right solution and consider the critical success factors during implementation.

There are many studies on success factors in managing ERP solution projects. The results vary according to the participants, the scope of study and the industry. However, some recurring factors seem to play a key role regardless of the context of the project. In the following section, the authors of this paper have described ERP solutions and their functionalities. Later, they provide an overview of the implementation of an ERP solution and the critical success factors for its implementation. They also elaborate on the importance of implementing ERP solutions in manufacturing companies.

2 ERP solutions

Companies use ERP solutions to manage and integrate important parts of their business. Many ERP solutions are important to businesses because they help them plan resources by integrating all the processes needed to run their businesses into a single system. ERP solutions offer a unified system solution that integrate enterprise-wide processes. Such solutions allow users to interact within a single interface, share information and collaborate with each other (Anderson, 2022).

ERP solutions are designed around a single, defined data structure (schema), which usually has a common database. These fundamental constructs are then interconnected by business processes driven by workflows between business departments, connectivity systems and the people who use them. Simply put, an ERP solution is an information solution for connecting people, business processes and technologies in a modern company. The solutions also ensure that these data fields and attributes are displayed on the correct accounts in the company's general ledger, so that all costs are properly monitored and presented. A key principle of an ERP solution is central data collection for wide distribution. Instead of multiple standalone databases with an endless list of unrelated spreadsheets, ERP solutions bring order to chaos, so that all users can create, store and use the same data obtained through shared processes. With a secure and centralised data warehouse, everyone in the organisation can be sure that the data is correct, up-to-date and complete (Oracle, 2022).

ERP solutions are defined as information solutions with the ability to provide an integrated set of business applications. They have a common process and data model that encompasses comprehensive business processes at the operational level, such as those found in finance, human resources, distribution, manufacturing, services and the supply chain. ERP solutions automate and support a range of administrative and operational business processes across multiple industries, including business areas, customer-centric aspects, administrative aspects, and enterprise asset management aspects (Gartner, 2022).

ERP solutions can be divided by installation or size. Modern ERP solutions can be installed in several ways: in a public or private Cloud, on-premise, or in various hybrid scenarios. ERP solutions are not just for leading global companies; they are designed for companies of all sizes - large, medium and small companies (see Table 1 for an example). Industry- and company-specific functionalities can also be chosen to meet unique business needs.

Table 1: Leading global providers by company size

Large companies	Medium companies	Small companies
SAP	NetSuite	Deltek
Oracle	Sage	Acumatica
Microsoft	Infor	Syspro

Data source: (Advice, 2022)

ERP solutions offer many functionalities for companies trying to improve business efficiency. Providers of these solutions are constantly updating their solutions to offer the fastest and most reliable services. As the name suggests, the main goal of an ERP solution is to manage the various sources of ERP within a company to ensure their cost-efficiency. They are also designed to use all resources efficiently. These solutions work especially well for tracking and managing data, such as a company's capacity for production, inventory, purchasing, sales, finance, payroll information, purchase orders and more (Davidson, 2021).

3 Implementation of ERP solutions and the critical success factors in their implementation

Companies often learn about ERP solutions early on, however, due to their rapid growth, they have little time to buy upgrades. Companies that are in the process of choosing an ERP solution must pay special attention to ensure that it covers as many aspects of the business as possible. In the research process, it is important to calculate the cost and time of deployment for each location, branch or building and to consider whether some branches may need a less powerful regional ERP solution in addition to the parent company's software. It is also necessary to bear in mind that the implementation of an ERP solution throughout the company requires training in all departments. Small- and medium-sized enterprises (SMEs) can benefit greatly from an ERP solution that streamlines processes from delivery to sales and reduces the overall cost of the software. As with many other things in the market, it is important to weigh up pricing models in terms of features and potential return on investment. Cloud subscription solutions (Software as a Service; SaaS) have become established in the market in recent years, which is great news for SMEs that cannot justify the one-off cost of a standalone software licence. For SMEs, it would be wise to ensure that the ERP solution they contract is usable and friendly to as many departments as possible. However, these companies may not need as broad a coverage as larger companies (Advice, 2022).

The deployment of ERP solutions is usually divided into six main phases, which can take several months or in some cases even years. The process must begin before deciding which solution to buy, and continue even after the introduction of the selected ERP solution. These phases may overlap and vary slightly depending on the solution provider. In general, however, companies will follow the following six phases, which are described in more detail below (Caldwell, 2020).

The main factors that were revealed as a result of the literature review, and which were found to be key to the successful implementation of an ERP solution are (Sternad Zabukovšek, Tominc, Štrukelj, & Bobek, 2020): management support; project management; employee involvement; clearly defined scope of the project; business process optimisation plan; existing platforms, systems and data.

Management support – It is important that management agrees with the ERP solution project. Projects are successful if they work on the basis of a single set of facts with the data is stored in a single database. This provides the company and its customers with the same view of the state of the project (Sunrise Technologies, 2022).

Project management – Project management includes planning, organisation, scheduling, resource provision and schedules that determine the beginning and end of deployment. The project manager sets up a project team for structure and control, which is in charge of running the project plans (Dunaway, 2022).

Employee involvement – The ERP deployment team must be made up of the best employees from across the organisation; people who know the current processes down to the final detail. These internal resources must be able to understand the general needs of the company and must be entrusted with key responsibilities and decision-making powers. The introduction of ERP solutions is changing the way people work and no one likes change in principle. It is important to provide enough time to train people on how to use new solutions and procedures (Sunrise Technologies, 2022).

Clearly defined project scope – A well-defined and written scope of work can mean the difference between a failed project with disastrous results and a very successful project with great benefits. The scope of the project is the basis for the project requirements and the resources to be used (Sunrise Technologies, 2022).

Business process optimisation plan – One of the most expensive aspects of deployment is customisation. Funding sources need to be well developed to avoid major financial difficulties along the way. A contingency plan should be prepared to address deficiencies or budget overruns to minimise project timetables and logistics. Budget overruns are certainly more than an exception to the rule. Most budget overruns are due to unforeseen or underestimated fees, staffing or technical problems. If companies evaluate these problems and prepare for any unforeseen measures prior to introducing an ERP solution, the costs and duration of the project can be reduced (Sunrise Technologies, 2022).

Existing platforms, systems, and data – The company's existing platforms, systems and data are the lifeline for implementing an ERP solution. The implementation strategy must address how the environment of the older system will be handled in conjunction with the new ERP solution. The data may need to be converted for use in an ERP solution, it may be necessary to develop interfaces for linking data from an older system, and to set configuration rules for operational transaction processing. Switching from existing systems can be one of the most difficult challenges in deploying ERP solutions. High detail, thorough planning and careful implementation are required to ensure a smooth transition of the systems (Dunaway, 2022).

4 Implementation of erp solutions in manufacturing companies

ERP systems for manufacturing companies, whether discrete or continuous, bring business processes together with technology. Manufacturing companies have traditionally operated by focusing on the following integrals (Whitehouse, 2021):

- ERP software for manufacturing companies
- product data management
- design, planning, and implementation
- automatic data collection
- compliance management
- lean processing
- total quality management
- advanced planning and design
- product lifecycle management

Businesses can gain control over all these aspects to optimise their performance. Simply put, ERP solutions help companies to grow proactively by bridging the gaps from customers to suppliers and from suppliers to employees (Whitehouse, 2021).

Among the major reasons that manufacturers invest in ERP solutions is to leverage more data, manage critical aspects of the manufacturing process, utilise resources effectively, and make stronger strategic decisions. There are many different types of manufacturing ERP solutions available on the market, however, most of them

include a core set of features that support front-office, back-office, and shop floor operations, including (Picard, 2021):

- order management
- inventory management
- customer relationship management
- warehouse management
- supply chain management
- finance and accounting

Manufacturing companies are looking for standalone solutions that can be used to retrieve data anytime, anywhere, with full scalability and without burdening internal resources. They are looking for ways to control risk by assessing critical data without affecting their freedom to adapt. They are extending their requirements to their users' handheld devices. They are looking for business intelligence. Companies want to provide a platform that enables closer integration between customers and suppliers and the production process. Manufacturing operations are more profitable with ERP solutions. When a manufacturing company is looking to increase its return on investment (RoI) and is looking to transform its business, upgrade its processes and assess its readiness to adapt to change, it is the optimal time to consider implementation of an ERP solution (Whitehouse, 2021).

According to Khan & Anwar (2019), the most important critical success factors for the implementation of ERP soluctions in manufacturing companies are: top management support and commitment; business process re-engineering; effective internal and external communication; employees and stakeholder participation; performance monitoring, evaluation and feedback; competency of project teams and the balanced use of external and internal consultants; a well defined project budget; an empowered decision-making, reward, recognition and motivation system; trust and cooperation between partners; organisational structure; steering committee; business discipline; rules, norms and values; project management; change management and others.

5 Conclusion

Organisations are implementing ERP solutions to adapt to today's demanding and competitive business environment and to achieve the ability to plan and integrate enterprise-wide resources, thus shortening lead times and better responding to customer requirements. An ERP solution refers to an information system used to design and manage all key processes of the supply chain, production, services, financial and other processes of an organisation. ERP solutions can be used to automate and simplify individual activities in a company or organisation, such as accounting and purchasing, project management, customer relationship management, risk management, compliance and supply chain operation. Providers may offer a software-as-a-service (SaaS), while some offer locally installed solutions or hybrids.

ERP solutions can be used to efficiently communicate and integrate business processes to enable data flow between applications, typically through shared on-premises or Cloud databases. ERP solutions effectively support business processes if properly implemented. Failure to implement ERP is common, therefore it is important to be aware of the importance of the critical success factors. Some of the identified factors are a lack of support from the top management of the organisation, clear project definition, inefficient user training, lack of a qualified project team, lack of effective communication, an unclear business plan and vision, a lack of detailed project planning, and lack of effective change management process.

This aim of this study was to identify the functionalities, challenges and business functions of ERP solutions in the manufacturing industry. The authors found that in order to achieve their goals, manufacturing companies needs to upgrade their information technology to improve their productivity. The critical success factors identified above form the basis for determining the effectiveness of the implementation of ERP solutions in manufacturing companies and provide guidance for further improvements. In addition, the analysis shows that the adoption of an ERP solution is effective in automating overall business processes and improves productivity and performance in the manufacturing industry.

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STRENGTHENING GUESTS' PERCEIVED VALUE THROUGH RESTAURANTS' INNOVATIVENESS, CREATIVITY, SUSTAINABILITY AND LOCAL FEATURES

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Abstract This research deals with a rarely discussed topic: upscale gastronomy. The field is under-researched due to the restrictions imposed by restaurant owners who primarily do not allow researchers to have direct contact with their guests, thus assuring them an undisturbed, private atmosphere. Despite this fact, the authors of this study were successful in assuring partners within upscale restaurants (among them holders of Michelin stars and holders of other awards) who agreed to cooperate. The aim was to verify the relationships between innovativeness, creativity, sustainability and local features as important competences of upscale gastronomy. The reliability, convergence and discriminant validity of the scales were tested by using exploratory and confirmatory factor analyses. The results confirmed that a) innovativeness and creativity could potentially be an important antecedent of the perceived sustainability of upscale restaurants, b) innovativeness and creativity also influence the level of included local features in upscale gastronomy, and c) if guests perceive a restaurant as more sustainable and more related to its local environment, they also perceive the upscale restaurant as having higher value. In this study, sustainability and local features played a mediating role in the impact of innovativeness and creativity on perceived value.

Keywords:
upscale gastronomy, innovativeness and creativity, sustainability and local features, competences and perceived value, restaurants

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1 Introduction

Gastronomy is a medium for expressing local cultures (Hjalager and Richards, 2002). According to Ruiz de Lera (2012, p.116) '*gastronomy is no longer just about food and cooking; it has become the latest fashion and a widespread subject of conversation… It is an intercultural and intergenerational movement that has become a global phenomenon thanks to massive media coverage.*' Many destinations actively promote themselves as gastronomic destinations, offering creative and local gastronomy as their prime attractions (Getz et al., 2014). Today, gastronomy is a key pull factor in renowned tourism destinations; several countries and regions already issued their strategies for gastronomy tourism development two decades ago (Lebe and Milfelner, 2006).

The dimensions of innovativeness and creativity are described as crucial competences of restaurants by Jin et al. (2016) and Kim et al. (2018). Hallin and Marnburga (2007) state that competences are more than just one out of several tourism resources and that these resources only become competitive by developing competences consciously and systematically.

This study tested the interconnectedness of selected restaurant competences, namely innovativeness, creativity, sustainability and local features, and their impact on the perceived value of upscale restaurants. Additionally, since some of the scales were used for the first time, their reliability, convergent and discriminant validity were tested using the confirmatory factor analyses.

2 Literature review

Innovativeness and creativity

The terms 'innovation' and 'innovativeness' differ significantly, although their use in literature related to business and hospitality is often interchangeable; '*innovation* focuses on new elements or a new combination of traditional elements in a firm's activities, while *innovativeness* refers to a firm's capability to be amenable to new ideas, services and promotions.' (Kim et al., 2018, p.86). Mulej (2007) argues that innovation is a sum of an invention (idea) *and* its successful commercialisation, since it denotes both the process of making a novelty and its successful placement.

Similarly, *creativity* and *innovation* have frequently been used interchangeably in literature. However, they are far from being the same: creativity focuses on the generation of new and novel ideas, whereas innovation is the implementation of creativity (Lee et al., 2019), and diversity is seen as the main resource for creativity (Richards and Wilson, 2007).

The authors of this study have come up with the term *creative-innovativeness*, which they did not come across during the literature review. It combines both creativity and innovativeness into one term, widening the concept of important restaurant competences.

Sustainability and local features

Tourism businesses have realised that acting sustainably can raise their profitability and satisfy their customers. It has been noticeable for quite some time that consumers are increasingly choosing sustainable, green offers that value local culture and the environment. According to Dolnicar (2015, p. 140), sustainable tourists '*are believed to cause less, or at least wish to cause less, environmental harm when on vacation.'* Sustainability is incorporated in environmental protection policies, while local features are reflected in the use of locally produced ingredients, the inclusion of traditional local recipes, and employment of the local workforce.

Ljunggren (2012, p.64) states that restaurants that offer high-quality menus can gain a significant competitive advantage by using locally produced food. Since the leading upscale restaurants need to offer excellent quality, they predominately place their trust in local produce and ingredients, focusing their menus on regional specialties and traditional recipes, which make their dishes unique. This means that the chefs not only need knowledge of the culinary traditions, but they must also be creative and innovative to merge the traditional, local and new into dishes that satisfy the most demanding clientele.

Sustainability and local features are conceptualised as restaurants' competences that lead to and support the gastronomic competitiveness of the destination as a whole, comprising a critical number of upscale restaurants, so that such a destination can be labelled a gastronomic destination. To assess the quality of innovativeness and creativity in upscale gastronomy, the authors of this study concentrated on three

selected elements and tested their competitiveness levels. These were the staff, the restaurant's visual appearance, and the presence of culinary trends on the menu. The staff represent the intangible part of the innovative and creative gastronomy on offer, whereas the restaurant reflects its tangible dimensions of innovativeness and creativity, while the openness to current trends is closely linked to staff competences.

3 Hypotheses development

Creativity and innovation are crucial for the restaurant industry since they are both components of the innovation process (Lee et al., 2019). The literature review shows that restaurants' creative-innovativeness has been mostly focused on five innovation types: product, service, process, management, and marketing innovations (Hjalager, 2010), where almost all, to some extent, relate to the staff creative-innovativeness, including innovations on sustainability trends. Hence, the authors of this study hypothesise:

H1: Staff creative-innovativeness positively impacts sustainability and local features.

Restaurants should develop a new range of skills, going beyond the traditional, and develop experience, creativity and innovation, where creating authenticity is a question of innovative and creative storytelling (Richards, 2012). Creative resources are more sustainable (Richards, 2014) and creativity has become increasingly significant in rural areas (Cloke, 2007). Upscale restaurants situated either in urban or rural environments, together with entertainment, have increasingly utilised creativity in their marketing strategies (Richards and Wilson, 2007). H2 was thus based on the aforementioned:

H2: Restaurant creative-innovativeness positively impacts sustainability and local features.

The concept of green consumption and environmental protection is a growing trend in restaurants (Gössling et al., 2011), mostly accomplished through innovative and creative practices. Research into creative and innovative restaurant trends encompasses innovation in restaurant management (Lee et al., 2016), restaurant innovativeness (Gagić, 2016), innovative organisational culture in restaurants (Jogaratnam, 2017), innovative capabilities in terms of developing new dishes, using

modern equipment and traditional recipes, and updating menus with information about the calorie count, saturated fat, the origin of ingredients, etc. (Otengei et al., 2017). Hence, the following hypothesis was set:

H3: The creative-innovativeness trend positively impacts sustainability and local features.

The increased demand for locally sourced and produced food fosters sustainable restaurant operation (OECD, 2012). In literature on sustainability in restaurants, sustainability was linked to local features in the context of gastronomic destination creation (Yurtseven and Karakas, 2013), sustainable rural tourism (Sims, 2010), strategies of 'locality' and sustainability for food tourism (Su, 2012), as well as the use of local ingredients (Schmitt et al., 2017). H4 was thus based on the aforementioned:

H4: Sustainability positively impacts local features.

Sustainability has not yet been explored extensively in connection with perceived value. Previous research has revealed: (1) how consumers perceive restaurants with green attributes and how they influence their behavioural intentions (Sarmiento and El Hanandeh, 2018), (2) that sustainability implementation positively contributes to competitiveness and consumer satisfaction (Cantele and Cassia, 2020), and (3) the role of customer behaviour in forming perceived value in restaurants (Kim and Tang, 2020). Accordingly, the H5 hypothesis is as follows:

H5: Sustainability positively impacts the perceived value of restaurants.

Local features have also not yet been explored extensively in connection to perceived value. Since local food is perceived as healthy, Kim et al. (2013) researched how the perceived healthiness of food in restaurants influences value, satisfaction and intentions to revisit. Konuk (2019) investigated the role of the perceived food quality, the perceived value of price fairness, and customer satisfaction on consumers' intentions to revisit organic food restaurants. On this basis, the authors set the H6 hypothesis.

H6: Local features positively impact the perceived value of restaurants.

4 Methodology

Data collection using the final sample

Data was collected by handing out printed self-administered questionnaires in 12 upscale restaurants in two cross-border destinations, both well-known for their superior gastronomy, namely in western Slovenia and the northern Italy region of Veneto, as well as in the bordering region of the Slovenian and Croatian Littoral. The criterion for inviting the restaurants to cooperate in this research was their ranking as the most exquisite gastronomy providers in their destination; most of the participating restaurants are today either included in the Michelin Guide and/or have been awarded the Gault Millau label.

Sample characteristics

A total of 338 questionnaires were completed. Three of the questionnaires were not included in the sample due to missing data, which resulted in 335 valid questionnaires and the size of the *restaurant-guests sample*. The gender ratio of the sample was balanced with 51% female and 49% male respondents. Most of the respondents (41.8%) were between 35 and 49 years of age. The sample was multi-ethnic with respondents coming from three continents: Europe, Asia, and North America. Most of the respondents, however, were Europeans; the two predominant nationalities were Slovene (29%) and Italian (20.9%).

Reliability, convergent and discriminant validity of the scales

In the first phase, exploratory factor analysis (EFA) was performed and some items were eliminated due to lower loadings and convergent validity issues. Confirmatory factor analysis (CFA) was then deployed. The authors began the CFA process by including all the items in the research. During the process, some additional items were excluded, one by one, considering the modification and the fit indices. The measurement model was evaluated by using the following indices: the chi-square statistic (χ^2), the root mean square error of approximation (RMSEA), the goodness of fit index (GFI), the comparative fit index (CFI), the normed fit index (NFI), and the Tucker-Lewis index (TLI). The model was evaluated according to the following cut-off criteria: RMSEA<.08 GFI>.90, CFI>.90, TLI>.90, IFI>.90, as proposed by

representative authors in the field (MacCallum et al., 1996; Hu and Bentler, 1999; Byrne, 1994).

Structural equation modelling was performed with the maximum likelihood (ML) estimation. First, the measurement model with five constructs was tested. An overall fit assessment of the measurement model yielded a significant chi-square value ($\chi^2(125) = 309.44$), which indicated a non-perfect fit. However, according to Bollen (1989), additional fit indices should be used, since the χ^2 may be an inappropriate standard when dealing with a complex model and with a specific sample size. The following indices were calculated for the general model: GFI= 0.913; RMSEA=0.066; CFI=0.945; TLI=0.933; IFI=0.946. All were inside the suggested intervals (as described above).

All the indicator loadings reached from 0.542 to 0.956. Apart from two items, they all exceeded the suggested value of 0.6. Composite reliabilities reached from 0.698 to 0.897. They are all inside the suggested intervals (higher than 0.6), meaning that the scales are reliable. Average variance extracted (AVE) values varied between 0.504 and 0.748, also reaching the suggested threshold of 0.5. This indicates that the convergent validity can be supported for all constructs.

The discriminant validity was then assessed using two procedures. First, the Fornell and Larcker (1981) test was deployed, calculating the correlations between the latent constructs and comparing them to the square roots of AVE. All square roots calculations of AVE are higher than the correlations between the constructs, and all correlations are statistically significant at $p<0.01$, supporting the discriminant validity. According to Henseler et al. (2015), the heterotrait-monotrait (HTMT) ratios of correlations should also be calculated, since this is a more restrictive test for assessing the discriminant validity. All the HTMT ratios of correlations are below the suggested threshold of 0.85.

5 Results

The parameters in the structural model were estimated using the ML estimation procedure. The model demonstrated a good fit of the data: $\chi^2(175) = 408.53$; GFI= 0.903; RMSEA=0.062; CFI= 0.941; TLI=0.930; IFI=0.942. All indices, except χ^2, which was significant, were in appropriate intervals. In the initial model, the direct

path from the trend creative innovativeness to the sustainability was proposed. Since it was statistically non-significant it was removed in the final model, which resulted in a significant improvement of the overall model fit.

The results confirmed that staff creative-innovativeness (γ_1=0.261; p<0.01) and restaurant creative-innovativeness positively influenced sustainability (γ_2=0.206; p<.001). Staff creative-innovativeness (γ_3=0.393; p<0.01), and restaurant creative-innovativeness (γ_4=0.369; p<.001) also had a positive and statistically significant impact on local features, meaning that the H1 and H2 hypotheses were confirmed. The path from the creative-innovativeness trend to local features was significantly negative (γ_5=-0.233; p<0.05), while the path to sustainability was non-significant, therefore the H3 hypothesis was rejected. In contrast, sustainability significantly and positively influences local features (β_1=0.285; p<.001), therefore the H4 hypothesis was confirmed. Additionally, the paths from sustainability (β_2=0.152; p<.001) and local features to perceived value (β_3=.0245; p<.001) were positive and statistically significant, therefore the H5 and H6 hypothesis were also confirmed. Except for the path from the creative-innovativeness trend to local features, all the paths were positive, as predicted by logical deduction and previous findings. The results are shown in Figure 1 below.

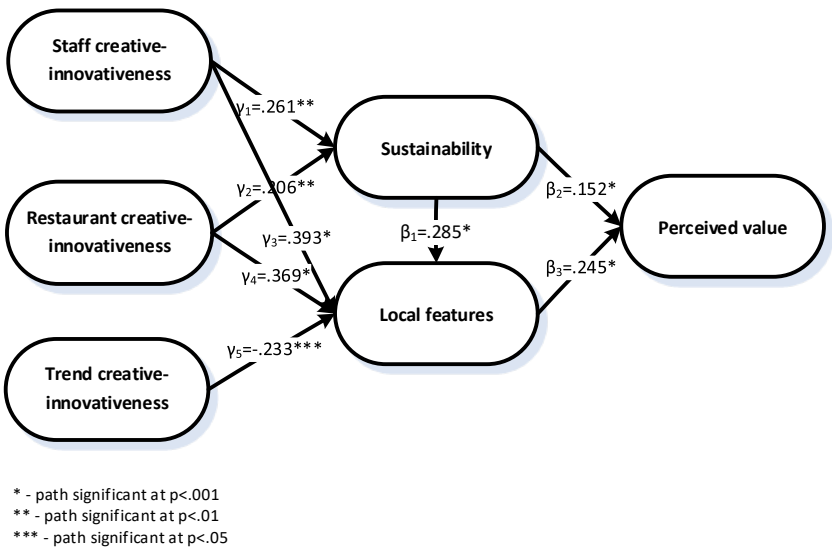

Figure 1: Structural model and standardised regression paths

6 Conclusion

First, innovativeness and creativity could potentially be an important antecedent of the perceived sustainability of upscale restaurants. In this context, staff creativity and novel approaches seem to be of importance, while testing the trends in this study's model showed no influence on sustainability. Innovativeness and creativity are known as important competences in achieving competitive advantages in the field of tourism (Ljunggren, 2012; Keller, 2005). This study suggests that they can also have a significant impact on guests' perception of sustainability. When viewed from another perspective, it can be ascertained that upscale restaurants that adopt innovative and creative approaches also implement them by way of offering more sustainable services.

Second, innovativeness and creativity also influence the level of local features included in upscale gastronomy. The impact of staff and restaurants' creative-innovativeness on local features is the strongest impact in the model, which implies that innovative and creative approaches in gastronomy incorporate the inclusion of local features into tangible and intangible elements of their offer. At first glance, it might appear unexpected that the creative-innovativeness trend has had a negative impact on local features. This can be explained by considering global trends as a potential for hindering the inclusion of local features in the gastronomic offer.

Third, if guests perceive a restaurant as more sustainable and more related to its local environment, they also perceive the restaurant's range of food and services as of higher value. The inclusion by restaurants of more sustainability measures as well as more local features can possibly create a higher perceived value for guests of upscale restaurants. Previous research in the field (Chen and Chen, 2010; Prebensen and Xie, 2017) reports that a higher value usually leads to higher satisfaction and that satisfaction positively affects both the profitability and the company's overall performance in the hospitality and tourism sector (Sun and Kim, 2013; Hwang and Zhao, 2010; Wu and Liang, 2009). In this study, sustainability and local features played a mediating role for the impact of the innovativeness and creativity on perceived value. Based on the above, it can be inferred that all the aforementioned concepts have the potential to create a sustainable competitive advantage.

6.1 Limitations of the study

The common method variance can have an effect on the research findings: in this study, this might be in the way that some illusory correlations related to the consistency motifs may affect the results. The answers from each respondent were taken at the same time and in the same place, therefore systematic covariation cannot be excluded. Additionally, since this study deals with guests of upscale restaurants, the need for social approval may cause individuals to present themselves in a favourable light, regardless of their true feelings about an issue or topic (Podsakoff et al., 2003), and their answers may be overrated.

Further limitations are the rather small sample, and the focus on the local environments of only three selected countries (Slovenia, Italy, and Croatia).

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Does it Pay Off? Tool-supported Profitability Analysis of Alternative Drive Technologies

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Abstract The Corona crisis led to a variety of challenges in the logistics sector due to volatile demand and changes in demand behavior, as well as strong cost increases. In this respect, there is increasing pressure to reduce these costs in the future through innovative solutions. For road freight transport, the question arises as to whether alternative drives can achieve the goal of cost reductions and also have positive effects on climate protection. Logistics service providers are therefore not only faced with the problem of selecting a specific technology (e.g. Battery Electric Vehicles or Fuel Cell Vehicles) but above all with the problem of economic efficiency and evaluation of climate impacts. The aim of this project is to support the selection of alternative drives in corporate practice with a pragmatic practical approach. The Excel-based tool is characterized by the use of a direct costing based approach with fixed and variable costs as well as the structured collection of basic data (e.g. energy prices) and sample vehicle data for comparisons. As initial results of the case studies conducted shows, it can be stated that there are already use cases in which an alternative drive offers economic advantages over conventional combustion engine vehicles.

Keywords: alternative drive technologies, calculation tool, case study, profitability analysis, logistics

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1 Introduction

The dramatic consequences of the COVID-19 crisis for the logistics sector are exemplified by a report that Amazon expected estimated increases in spending on shipping and fulfillment of over 53% in the year 2020 (Rösch, 2021). This reveals that the coronavirus pandemic has further exacerbated cost pressures in logistics. In addition to vehicle depreciation, the main cost driver in road freight transport is energy consumption.

The dominance of diesel-based forms of transport in the logistics sector remains high. Statistics show that as of the year 2021, there was a 93.7% share of diesel lorries in Germany (Kords, 2022). If the emission volume of road freight transport is assumed to be 50 metric tons (Mt) of CO_2 equivalent per year (Jöhrens et al., 2022), 46.9 Mt CO_2 of this per year are attributable to diesel-powered vehicles, which corresponds to a consumption of approximately 17.7 billion litres of diesel per year. The share of this consumption of diesel thus amounts to approximately 6.5% of the estimated total greenhouse gas (GHG) emissions in Germany for 2021 (BMWI, 2022). Against the backdrop of climate policy goals and the growing social awareness of environmental protection, it is essential that the share of alternative drive technologies must increase in the future as a part of CO_2 change management.

The aspect of economy has dramatically worsened since the beginning of the war in Ukraine (24 February 2022), as the price of diesel fuel has risen sharply over a short period of time since then. According to an evaluation by Europe's largest motoring association – the German Automobile Club (ADAC) – the price of diesel reached a peak of 229.2 Euro cents per liter on 15 May 2022 (ADAC, 2022b), an increase of 33% in the period since the start of the war in Ukraine. Comparing the average diesel price from 2018, 2019 and 2020 of 122.7 Euro cents (en2x, 2022) with the peak on 15 March 2022, this corresponds to almost a doubling – 86.8% to be precise. This considerable additional burden on freight transport amounting to several billion euro underlines that, in addition to climate protection, economic reasons are also strong drivers for the increased use of alternative drive technologies in logistics.

In recent years, viable alternatives to diesel motors have been brought to market maturity through research that is open to all technologies. In addition to the problem of selecting a specific technology (e.g. battery electric vehicle (BEV), hybrid or fuel cell), fleet operators are above all facing the problem of determining economic viability. This issue is particularly relevant on the one hand due to the application area of logistics, which can be characterised as highly competitive, while on the other due to the difficulties of carrying out a proper analysis of the economic viability. The authors of this paper are referring to a pragmatically practical approach that is intended to support the selection of alternative drive technologies in business practice.

The challenges of an economic analysis of alternative drive technologies are manifold. In addition to the main problem of selecting one or more calculation methods based on business economics, there is also a need to take a dynamic approach. The focus of this period-related analysis is, among other things, the development of energy prices and the estimation of residual values at the end of an asset's economic lifetime. In addition, there are economic policy framework conditions, which include, for example, the granting of subsidies. Transaction costs must also be taken into account. Depending on the selection of a technology, the search for a charging facility, e.g. for BEVs, can be counted among these costs. Profitability analyses are simplistically limited to paid costs or quantitative aspects, although alternative drive technologies require a broader perspective. First and foremost, there are qualitative factors that defy precise valuation. One example is the quality of a workshop that can carry out professional repairs or maintenance on vehicles with alternative drive systems. This point becomes relevant for logistics companies that are not located in the immediate vicinity of conurbations.

An Excel tool is used to support the profitability analysis of alternative drive technologies. This tool is characterised by the use of a direct costing approach with a distinction between fixed and variable costs, the consideration of a maximum planning period of fifteen years, the structured collection of basic data (e.g. fuel and other energy prices), environmentally relevant data such as CO_2 conversion factors (Tank-to-Wheel (TtW) and Well-to-Wheel (WtW)), and numerous example vehicle data for vehicle comparisons. The benefits of the tool lie in the automatic generation of a cost comparison with graphical support (e.g. break-even chart), the short training period, and the possibility of extending or modifying the tool with little

effort, e.g. by integrating different scenarios for energy prices. This functionality distinguishes the tool from the main economic efficiency calculators available on the internet (e.g. ADAC 2022a; Kostenrechner 2022; Stromdrive 2022); it thus represents a universal template. A major advantage over other studies on economic efficiency (e.g. Hacker, F., von Waldenfels R., Mottschall, M., 2015) is the possibility of entering up-to-date data (e.g. vehicle acquisition values), general conditions (e.g. the granting of subsidies) and planning data for energy prices. In order to broaden the perspective to include qualitative aspects, the tool includes a scoring model (Bertram and Bongard, 2014).

The applicability of this tool is continuously tested within the Master's Degree in Logistics course at the Ludwigshafen University of Business and Society by using it as a template for case studies. In addition to the short training period, the possibility of mapping and analysing different scenarios (e.g. with regard to energy price development) with little effort has proven to be particularly advantageous. The vehicle models and data used in the case studies can be accessed in an integrated database of the tool. As the initial results of the case studies conducted show, it can be stated that there are indeed already use cases in which an alternative drive technology offers economic advantages over a diesel vehicle. This confirms the expectations relating to the cost advantage of e.g. battery trucks compared to diesel trucks (Jöhrens et al., 2022).

2 Parameters of the economic analysis

Data for certain parameters are required for the profitability analysis. The tool differentiates between basic data, which is independent of the vehicle, and vehicle data. The basic data includes the start year of the analysis, the analysis period (economic life), the annual mileage and the respective energy prices in the analysis period. In the case of the vehicle data, in addition to recording the manufacturer, drive technology designation and model name/type designation, the cost parameters are divided into fixed and variable costs according to the direct costing principle. The total costs as an addition of these cost parameters are also referred to as total costs of ownership (TCO) in existing literature (Jöhrens et al., 2021; Wietschel et al., 2019).

The selection of parameters for the economic efficiency analysis is largely based on relevant sources (Hacker, F., von Waldenfels R., Mottschall, M., 2015; Jöhrens et al., 2022; Jöhrens et al., 2021; Wietschel et al., 2019). Committed to the approach of the pragmatic-practical use of the tool, the number of parameters were limited to a manageable level. Therefore, cost items with a low value were omitted, e.g. lubricants. From the point of view of cost relevance, an attempt was made to concentrate on costs that are as relevant to decision-making as possible. For this reason, financing costs, costs for drivers (personnel costs), trailers, lorry trailers and fleet management are not included. Discounting of future costs using an economic interest rate was also omitted. This concerns the current status of the tool and does not exclude any later extensions. The processing of case studies resulted in additional cost components that are taken into account in the tool. In concrete terms, taken into account means that the corresponding collection of basic and vehicle data (e.g. vehicle performance in km per year, diesel price per litre and average diesel consumption of a vehicle) leads to the automatic calculation of costs (in the example case, fuel consumption in euro per year). To simplify the data collection, lump sum values for variable and fixed costs can also be recorded. In addition, the authors of this paper developed a proposal to give a uniform definition to the parameters of an economic efficiency analysis in terms of their naming (parameter name) and dimensioning (parameter unit). This would make it easier to compare results of different economic efficiency calculations. The respective calculation of cost values is performed in various calculation modules, each of which is created as a separate worksheet tab of the Excel tool.

3 Case study

The application of the tool is continuously tested with case studies within the Master's Degree in Logistics course at the Ludwigshafen University of Business and Society. The case studies are based on practical tasks and allow the use of lorries of all vehicle classes. In the 'craftsman case study', the annual mileage adds up to 17,480 kilometres. The starting year is 2020, and the period under consideration is six years. Citroën vehicles serve as comparison vehicles, once as Jumpy in the diesel version (Vehicle 1) and as ë-Jumpy in the BEV version (Vehicle 2). Both the diesel and electricity prices are expected to rise steadily, with a stronger increase in the diesel price.

Table 1: Case study energy prices

Energy		2020	2021	2022	2023	2024	2025
Diesel	Euro/litre	1.12	1.17	1.20	1.23	1.26	1.30
AdBlue	Euro/litre	0.70	0.70	0.70	0.70	0.70	0.70
Power	Euro/kWh	0.22	0.23	0.25	0.25	0.26	0.26

The following vehicle-related values were taken into account for the economic efficiency comparison:

Table 2: Case study cost components

Cost components	Parameter name	Parameter unit	Vehicle 1	Vehicle 2
Vehicle				
Loss in value as a residual variable	P_depreciation	Euro/p.a.	3,212.50	3,635.67
Net list price	P_list_price	Euro	25,700.00	40,250.00
Activatable extras/accessories	P_cap_extras	Euro		2,310.00
Grants/subsidies	P_grant_subsidy	Euro		9,000.00
Loss in value in %	P_residual_value	%	25 %	35%
Resources				
Energy:				
Fuel consumption diesel	P_fuel_consumption	Litre/100km	4.90	
AdBlue	P_AdBlue_consumption	Litre/100km	0.20	
Power	P_electricity_consumption	kWh/100km		27.00
Vehicle inspection, tax and insurance				
Main/exhaust gas inspection, safety inspection	P_veh_gen_inspection	Euro/p.a.	120.00	53.50
Vehicle tax	P_veh_tax	Euro/p.a.	290.00	
Vehicle insurance	P_veh_insurance	Euro/p.a.	1,450.00	1,659.00
Maintenance				
Maintenance, service and care	P_veh_maintenance_repair_care	Euro/100km	5.50	4.40

After the data has been entered, all the further calculations are performed automatically. Various charts are available for visualising the results. The 'TCO' chart shows the comparison of the average total costs per km.

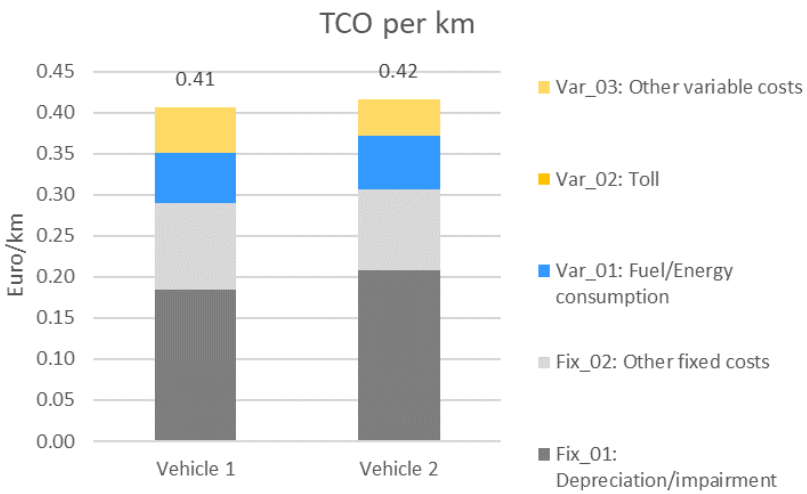

Figure 1: TCO case study

On the one hand, the disproportionately large share of fixed costs can be seen resulting from the relatively low mileage per year, while on the other, the TCO for both vehicles is virtually on a par with 0.41 Euro/km for Vehicle 1 and 0.42 Euro/km for Vehicle 2.

The 'break-even analysis' chart shows when a vehicle represents a better alternative in terms of cost.

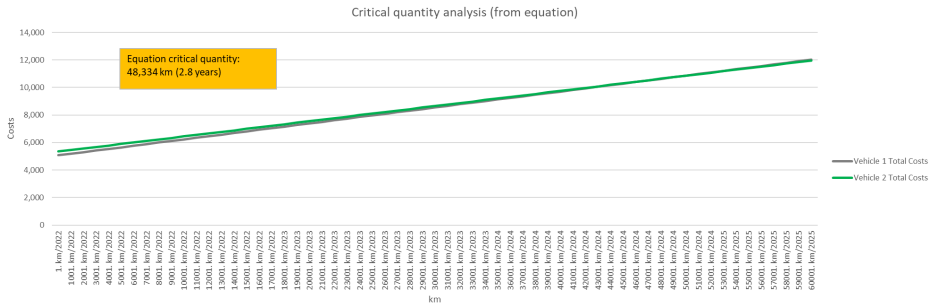

Figure 2: Break-even analysis case study

The linear function equations are derived from the average values, from which the break-even point is calculated at 48,334 kilometres; a mileage that is reached after approximately 2.8 years. From this point on, Vehicle 2 has a cost advantage over Vehicle 1. The tool also calculates a break-even point based on the actual annual costs. This calculation results in a slightly higher mileage value of 54,001 kilometres (approximately 3.1 years) for the present case.

A particular advantage of the tool is that the recorded data can be changed to reflect changing framework conditions. As an example for the present case, the assumption is made that the subsidy halves to EUR 4,500 for the BEV and the diesel price would remain constant at EUR 2.30 per litre.

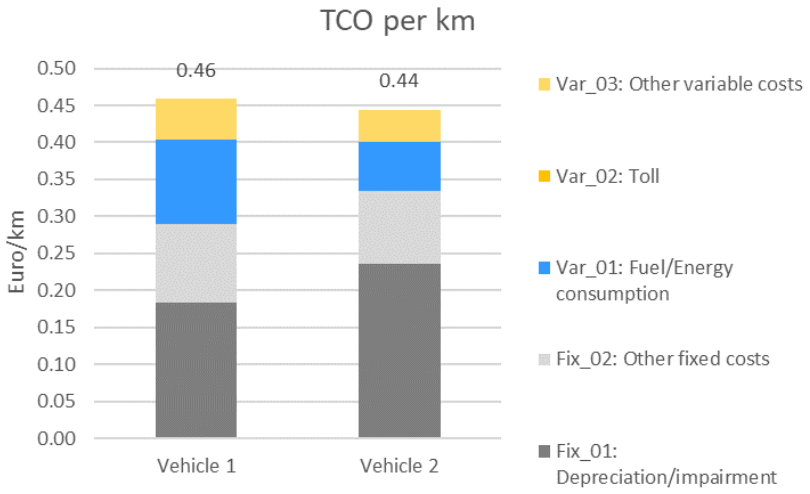

Figure 3: TCO case study with changed framework conditions

Due to the changed framework conditions, Vehicle 2 is now the more economical alternative.

4 Summary and outlook

Using the tool presented in this study, it is possible to subject two vehicles to a practice-oriented economic comparison without much effort. The primary purpose is to identify when vehicles with alternative drive technologies offer economic

advantages over conventional combustion vehicles. Furthermore, the GHG emissions are determined to also enable a sustainability comparison. In addition to quantitative factors, qualitative factors can also be used for evaluation purposes as part of a scoring model. Against the background of the current political and economic policy developments at the beginning of 2022, it can be assumed that it will be much more difficult to plan essential framework conditions in the future. In this respect, this tool offers numerous opportunities to use data from alternative scenarios and to examine their effects. Energy price scenarios are likely to play a particularly prominent role in this respect.

The goals for further expansion of the tool are extended functionalities for the processing of scenarios, the expansion of the GHG section in the direction of lifecycle analysis and the inclusion of further vehicles in the vehicle database.

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The Impact of Home-based Work on Stress at Work and Burnout During the COVID-19 Pandemic in Slovenia

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Abstract This study examines the relationships between home-based work, stress at work and burnout among workers during the COVID-19 pandemic in Slovenia. Mediation analysis was conducted to test the proposed relationships. The study includes 446 employees from 56 organisations. The results support the proposed hypotheses and show that employees who constantly worked from home experienced higher levels of stress and consequently burnout than employees who did not or rarely worked from home. In addition, the results show that stress at work mediates the relationship between home-based work and burnout experienced during the COVID-19 pandemic. This study contributes to the discussion of the relationship between home-based work and stress at work during the COVID-19 pandemic. The research findings have important implications for managers considering home-based work arrangements for their employees after the COVID-19 pandemic.

Keywords: stress at work, burnout, home-based work, COVID-19 pandemic, workers

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1 Introduction

A large body of scientific research confirms the negative effects of stress on human physical and mental health (Epel et al., 2018; Cohen, Murphy & Prather, 2019; Alessi & Bennett, 2020). In the occupational context, prolonged chronic stress resulting from the demands of the work environment can lead to burnout, a syndrome characterised by severe exhaustion, negative attitudes toward work, and severely diminished work performance (Maslach, 2003; Maslach & Leiter, 2016). During the COVID-19 pandemic, many companies and organisations had to make an abrupt change and adopt work-from-home practices as part of their efforts to curb the pandemic, which was a completely new way of working for many employees who previously had little or no experience of working from home. Home-based work can be beneficial for both organisations and their employees. It is known to increase work autonomy, satisfaction and productivity (Lamovšek, Černe & Kaše, 2020; Tavares, 2017). However, research also emphasises the negative effects on employees' work-life balance, feelings of isolation and communication barriers (Gajendran & Harrison, 2007; Allen, Golden & Shockley 2015; Adamovic, 2022). In the crisis caused by the COVID-19 pandemic, which created unique conditions for workers in many industries, working from home can lead to even more negative consequences, reflected in higher levels of stress at work and burnout. In this paper, the authors examine the relationship between stress and burnout across different home-based work arrangements and test which condition leads to the lowest levels of stress at work and burnout among employees.

The aim of this study is to shed light on the relationships between home-based work, stress at work and burnout during the COVID-19 pandemic. A better understanding of these relationships can help in appropriate measures being taken to improve working conditions, reduce stress at work and burnout and improve employee well-being and satisfaction, which will have a positive impact on organisational performance. The main objectives of this study are to assess the level of stress at work and burnout among employees engaged in home-based work during the COVID-19 pandemic, and to assess how the frequency of home-based work affects the level of stress at work and burnout among workers during the pandemic. A survey study was conducted in Slovenia in 2021 involving 446 employees from 56 organisations. Mediation analysis using the PROCESS macro for SPSS by Hayes (2021) was conducted to examine the proposed relationships between home-based

work, stress at work and burnout. This study contributes to the literature on home-based work, by acknowledging that the crisis caused by COVID-19 negatively impacts the well-being of employees who work from home. This paper also contributes to the literature on stress by suggesting that home-based work is one of the conditions that can lead to increased stress and burnout in certain situations. The results of this study are important for management practice when designing jobs for regular work from home in the post-COVID-19 period.

2 Theory overview

2.1 Stress and burnout at work

Stress can be defined as a real or interpreted threat to a person's physiological or psychological integrity. A person experiences stress when they feel that the demands of the environment are greater than their ability to meet, mitigate or modify them (McEwen, 2010, pp.10-11; Buheji & Jahrami, 2020, p.10). Stressors trigger a stress response in a person (Monaghan & Spencer, 2014, p.409). Stress itself is not defined as something inherently positive or negative. Consequently, the perception and interpretation of stressors are subjective and differ from individual to individual depending on factors specific to the person or the environment in which they live (Nesse, Bhatnagar & Young, 2010; Jamieson, 2018; Ord, Stranahan, Hurley & Taber, 2020). Individuals are most often confronted with stressors of psychological and social origin, which may also stem from the work environment (Nesse, Bhatnagar & Young, 2010). 'Work-related stress is experienced when the demands of the work environment exceed the workers' ability to cope with (or control) them.' (European Agency for Safety and Health at Work, 2012, p.1).

Existing literature identifies several factors that cause work-related stress in individuals. The Job Demands-Resources Model posits that stress is a response to an imbalance between the demands of the work environment on the individual and the resources available to the individual to meet those demands (Schaufeli & Taris, 2014). The Person-Environment Fit Theory assumes that strain is the result of a mismatch between the worker, their interests, skills and abilities, and the characteristics of the work environment, its demands and/or others involved in the work process (Van Vianen, 2018). The Job Demands-Control-Support Model explains that stress arises in individuals when they have limited influence over

decision making in the work process, which includes control over the performance of their own tasks. Later, the dimension of social support was added to the theory, which refers to the positive or negative impact of interpersonal relationships in the work environment on individuals (Karasek, 1979; Fila, 2016). According to the Effort-Reward Imbalance Model, a negative emotional reaction and stress in an individual is caused by a mismatch between (perceived) high effort and low reward in the work environment (Siegrist & Li, 2016).

Regardless of whether an external stressor is perceived by an individual as positive or negative, a chronic experience of stress ultimately has a negative effect on the individual (Achor, Crum & Salovey, 2013). Stress can not only negatively impact human physical health, causing or exacerbating numerous physical diseases (Yaribeygi et al., 2017), but also human mental health (Epel et al., 2018; Cohen, Murphy & Prather, 2019; Alessi & Bennett, 2020). Chronic exposure to work-related stress that is not successfully managed can lead to burnout. Today, burnout is: '[...] one of the most widely researched consequences of chronic and severe stress in employees in a wide range of different professions.' (Childs & Stoeber, 2012, p.347). It is most commonly conceptualised as a multidimensional occupational phenomenon that includes a stress response (severe exhaustion), mental disengagement from work (cynicism), and negative perceptions of one's abilities (reduced professional efficacy) (Maslach & Leiter, 2016; Schaufeli, 2018). The stress caused by the circumstances of the COVID-19 pandemic has been associated with feelings of burnout in individuals (Yıldırım & Solmaz, 2020). The term 'pandemic burnout' has been used to describe various negative states and feelings, such as exhaustion and anxiety, resulting from the stressful circumstances of the pandemic and the measures taken to contain it (Queen & Harding, 2020).

2.2 Working from home during the COVID-19 pandemic

When the World Health Organization declared COVID-19 a pandemic on 11 March 2020, (World Health Organization, 2020), and Slovenia followed suit a day later (Government of the Republic of Slovenia, 2020), governments around the world took drastic measures to contain the spread of the disease, which included new forms of work, including home-based work (International Labor Organization, 2020a). Employers and employees had to adapt to this form of work, which was completely new to many. Home-based work – a form of telework that was intended

as a temporary, short-term solution – later became the new normal for many workers (International Labor Organization, 2020). In July 2020, nearly half of workers in the European Union (48%) reported working from home at least some of the time, including more than a third (34%) who worked exclusively from home (Eurofound, 2020).

Telework can be defined as: '[...] the use of information and communications technologies (ICT), such as smartphones, tablets, laptops and/or desktop computers, for work that is performed outside the employer's premises.' (Eurofound & International Labour Organization, 2017, p.3). It was first developed in response to the desire to eliminate commuting time and later enabled the virtualisation of work, which today allows workers to work anywhere outside the traditional office on an employer's premises, at home or in any other location that has internet access and suitable equipment (Messenger, 2019, p. 4-8).

Home-based work has several positive effects on workers. It can have a positive impact on employee job satisfaction (Lamovšek, Černe & Kaše, 2020), work-life balance, and employee productivity (Tavares, 2017). Employees who work remotely 1-3 days per week have particularly high productivity (Pearce II, 2009). It can also help increase employees' sense of autonomy, which is positively associated with better objective performance (Lamovšek, Černe & Kaše, 2020; Gajendran & Harrison, 2007). In addition, on average, employees are able to concentrate better when working from home, which could be related to less frequent interruptions and more privacy (Montreuil & Lippel, 2003).

Home-based work also has some negative consequences for employees. Studies show that, on average, the workdays of those who work from home are longer than those of workers who work on an employer's premises (Eurofound and International Labor Organization, 2017), it can lead to presenteeism (Tavares, 2017), and can increase role ambiguity (Sardeshmukh, Sharma & Golden, 2012, p.202). Remote work can also lead to a breakdown in interpersonal relationships and communication barriers in organisations and can create feelings of social and professional isolation among employees (Gajendran & Harrison, 2007; Allen, Golden & Shockley 2015; Adamovic, 2022). This can lead to increased levels of stress at work. In fact, Toscano and Zappalà (2020) classified social isolation when working from home as a work requirement that increases stress, which negatively

affects employee performance. The first hypothesis for this paper is thus derived from the above reasoning:

Hypothesis 1: Home-based work is positively related to stress at work.

The results of the study conducted by Vander Elst and co-authors (2017) showed that respondents who worked from home several days per week were more likely to report lower levels of social support from their colleagues, which was associated with higher levels of stress, emotional exhaustion, cynicism about work and lower engagement at work – all of which are symptoms of burnout. This suggests that working from home could also lead to increased burnout due to the stress of working from home. This leads to the second and third hypotheses:

Hypothesis 2: Home-based work is positively related to burnout.

Hypothesis 3: Stress at work mediates the relationship between home-based work and burnout in such a way that home-based work increases stress at work, which in turn increases burnout.

The proposed relationships are summarised in Figure 1.

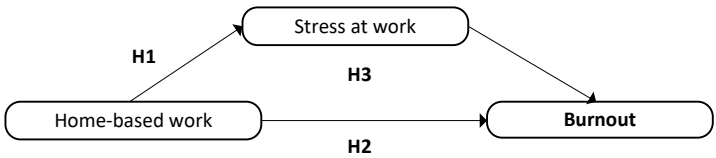

Figure 1: Framework of relationships between home-based work, stress at work and burnout

3 Methods

A quantitative study in Slovenia was used to test hypotheses about home-based work, stress at work and burnout. In general, Slovenian workers cite their workplace as the most common source of stress (National Institute of Public Health, 2018) and Slovenian workers are among the most burnt out in the European Union (Schaufeli, 2018). With estimates suggesting that 20-25% of workers in developed economies could work remotely 3-5 days per week in the future (Lund et al., 2020), the situation in Slovenia could worsen.

A total of 446 workers from 56 companies participated in an online survey during the months of March and April 2021. The majority of respondents were women (79.3%). The respondents were between the ages of 23 and 72, had an average age of 42.5 years (SD = 10.47), a high level of education (50% with a university degree) and an average working life of 17.3 years (SD = 11.03). Most of them (37.3%) lived in a partnership and took care of at least one child. The majority (56.5%) had an office job, with an average distance between home and work of 19.7 kilometres (SD = 22.95). The majority of respondents (70.6%) had never worked remotely prior to the COVID-19 pandemic.

Established scales from existing literature were used to assess the variables. The Perceived Stress Scale (PSS) (Cohen, Kamarck & Mermelstein, 1983) was used to measure respondents' stress at work experienced in the past 12 months. It was translated into Slovenian and modified for the context of the work environment. Respondents rated 10 items on a 5-point rating scale (0 – never, 1 – almost never, 2 – sometimes, 3 – quite often, 4 – very often). An example of an item is 'At work I get upset about things that happen unexpectedly'. The Cronbach's α is 0.865. The sum indicates the level of stress employees experience at work on a scale of 0-40. A score of 0-14 represent low stress, 14-26 moderate stress, and 27-40 high stress.

Burnout was measured using the Burnout Assessment Tool (BAT) for self-assessment of burnout experienced in the past 12 months (Schaufeli, De Witte & Desart, 2020). The Slovenian version of the questionnaire was used, with some items slightly modified to adapt them to the purpose of the study. Respondents rated 23 items on a 5-point rating scale (1 – never, 2 – rarely, 3 – sometimes, 4 – often, 5 – always). An example item is 'I feel physically exhausted at work'. The Cronbach's α is 0.938. The average of respondents' answers reflects their risk of developing burnout on a scale of 1-5. Scores of 1.00-2.58 indicate no risk of developing burnout, 2.59-3.01 indicate a risk of developing burnout, and 3.02-5.00 indicate a high risk of developing burnout.

Home-based work during the COVID-19 pandemic was measured using a single statement in which respondents indicated whether they: 1 – did not work from home, 2 – worked from home 1-2 days per week, 3 – worked from home 3-4 days per week, 4 – worked from home all the time, and 5 – other, indicating exactly how many days per month they worked from home in the last 12 months. Three

categories were then formed: never or rarely working from home (3 or fewer days per month), regularly working from home 1-4 days per week, and constantly working from home. Mediation analysis was conducted using the PROCESS macro for SPSS (Hayes, 2021) to test the effects of home-based work on stress at work and burnout (Model 4 template for PROCESS). Two dummy variables were created for the home-based work categorical variable, the first for home-based work 1-4 days per week and the second for permanent home-based work.

4 Results

The means, standard deviations and correlations are shown in Table 1. On average, respondents perceived a low level of stress at work (M = 13.53, SD = 5.85) and a low risk of burnout (M = 2.26, SD = 0.57).

Table 1: Descriptive statistics

		M	SD	1	2	3	4	5	6
1	Age	42.47	10.47	-					
2	Gender	0.79	0.40	0.014	-				
3	Education	4.94	1.24	0.181**	-0.134**	-			
4	Home-based work	1.2	0.68	-0.179**	0.051	0.141**	-		
5	Stress at work	13.53	5.85	-0.049	0.099*	0.112*	0.124**	-	
6	Burnout	2.26	0.57	-0.102*	0.042	0.081	0.133**	0.748**	-

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

Based on respondents' answers to the PSS questionnaire statements, during the COVID-19 pandemic 54.13% of respondents experienced low stress at work, 44.13% experienced moderate stress at work, and 1.74% experienced high stress at work. The results of the BAT showed that 71.81% of the respondents were not at risk of burnout during the COVID-19 pandemic, while 19.38% were at risk of developing burnout and 8.81% were at high risk of developing burnout. The results also showed that 34.9% of respondents worked from home all the time during the pandemic, 49.3% worked from home 1-4 days per week, and 14.9% never or rarely worked from home. Home-based work was found to be positively correlated to stress at work ($r = 0.124$, $p < 0.01$) and burnout ($r = 0.133$, $p < 0.01$). In addition, stress at work and burnout were found to be highly correlated ($r = 0.748$, $p < 0.01$).

Mediation analysis (Table 2) first tested the effect between home-based work and stress at work (Model 1). The results show that employees who regularly worked from home 1-4 days per week experienced relatively more stress at work than those who did not work from home or rarely worked from home (3 or fewer times per month) (b = 1.537, p = 0.07). However, the results were not statistically significant. Compared to those who did not work from home or worked rarely from home, those who worked from home all the time also experienced relatively more stress (b = 2.025, p = 0.02). The results were statistically significant. This partially confirms hypothesis 1.

Mediation analysis also tested the total effect of home-based work on burnout (Model 2). The results show that employees who regularly worked from home 1-4 days per week experienced a relatively higher risk of burnout than those who did not work from home or rarely worked from home (b = 0.150, p = 0.06). However, the results were not statistically significant. Compared to those who did not work from home or rarely worked from home, those who worked from home all the time were also relatively more likely to experience burnout (b = 0.211, p = 0.01). The results were statistically significant. This partially supports hypothesis 2.

Table 2: Results of mediation analysis

Variables	Model 1	Model 2	Model 3
	Dependent variable: Stress at work	Dependent variable: Burnout	Dependent variable: Burnout
Intercept	9.792** (1.688)	2.099** (0.163)	1.392** (0.113)
Working from home regularly (1-4 days a week)	1.537† (0.833)	0.150† (0.081)	0.039 (0.054)
Working from home all the time	2.025* (0.846)	0.211* (0.085)	0.065 (0.057)
Age	-0.042 (0.027)	-0.004† (0.003)	-0.001 (0.002)
Gender	1.608* (0.679)	0.051 (0.066)	-0.065 (0.044)
Education	0.568* (0.232)	0.033 (0.022)	-0.008 (0.015)
Stress at work	-	-	0.072** (0.003)
F-value	4.602**	3.051*	97.597**
R^2	0.050	0.033	0.571

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

Furthermore, mediation analysis tested the direct effect between home-based work and burnout (Model 3). The results show that those who regularly worked from home 1-4 days per week did not experience more burnout on average than employees who did not or rarely worked from home (b = 0.039, p = 0.46). The results also show that those who worked from home all the time did not, on average, experience more burnout than employees who did not or rarely worked from home (b = 0.065, p = 0.26). However, those who experienced more stress at work were more at risk of burnout (b = 0.072, p < 0.00).

To test the mediation effect, the relative indirect effects of home-based work on burnout through stress were tested. The results show that employees who regularly worked from home 1-4 days per week experienced relatively more stress at work than those who did not work from home or rarely worked from home, which consequently led to increased burnout. However, the results were not statistically significant (b = 0.111, 95% CI: -0.009 to 0.231). The results also indicate that employees who worked from home all the time experienced relatively more stress at work than those who did not work from home or rarely worked from home, which consequently led to increased burnout. These results were statistically significant (b = 0.146, 95% CI: 0.019 to 0.273). This partially supports hypothesis 3.

6 Discussion and conclusion

This study makes an important theoretical contribution to the literature on home-based work by finding that regular home-based work under conditions of extreme crisis caused by the COVID-19 pandemic negatively affected employees' well-being by increasing stress at work and the risk of burnout. This adds to research findings that working from home can lead to higher levels of stress due to isolation, lack of social contact and social support (Gajendran & Harrison, 2007; Allen, Golden & Shockley, 2015, Adamovic, 2022) and that working from home may be associated with some dimensions of burnout (Vander Elst et al., 2017). This study also shows that there is a mediation effect of stress at work between home-based work and burnout, suggesting that employees who worked from home all the time were at higher risk of stress at work, which in turn led to a higher risk of burnout. The research findings further contribute to the literature on stress at work and show that home-based work is one of the conditions that can lead to increased stress and burnout in certain situations.

The research findings also offer important empirical implications for management practice. Current job design practice emphasises the designing of jobs for the post-COVID-19 times and creating flexible work arrangements that include regular home-based work. The results of this research show that employees who did not work from home during the COVID-19 crisis, or only rarely worked from home, experienced the least stress and burnout compared to those who worked from home all the time. This suggests that, under certain conditions, working from home can lead to higher levels of stress and burnout, which can in turn reduce employee satisfaction, engagement and motivation at work (Maslach, 2003; Maslach & Leiter, 2016). Therefore, when designing jobs, these negative effects should be offset at an early stage to minimise stress and burnout and increase employee productivity at work.

This study has certain limitations. The survey was conducted under the circumstances of the COVID-19 pandemic, therefore the survey results show the extent of stress at work and burnout among Slovenian employees under these particular circumstances. The participants were not randomly selected from the full range of demographic variables, therefore the results cannot be generalised for the entire population. In addition, the results are based on the respondents' self-assessment, which means that the results are not entirely reliable due to possible biased answers, and can only serve as an estimate of the extent of stress at work and burnout among Slovenian employees. It should also be noted that the questionnaire used was relatively long, which may have resulted in less concentration and thus inaccurate responses, which was also reflected in the occasional non-response by participants. Recommendations for future research include a broader study of workplace stress and burnout among employees on a sample representative of the general population. The authors also recommend that a longitudinal study is conducted to measure the impact of home-based work on levels of stress at work and burnout among employees in the post-COVID-19 period. In addition, they propose that the moderating effects of various job design characteristics on the relationships studied should be examined, such as task, knowledge and social job characteristics.

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How to Make Health Organisations More Agile During the Pandemic? Challenges of Managing Entrepreneurial Behaviour

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Abstract The COVID-19 pandemic has put health systems around the world under the ultimate pressure, unseen in the modern age. The main purpose of this research is to investigate how to make health organisations more adaptable in the pandemic circumstances, more precisely how the internal organisational climate affects entrepreneurial initiative on a daily basis. Entrepreneurial initiative thrives in an organisation with an organisational culture based on values promoted by entrepreneurial management, highlighting the possibility of individual initiative, through appropriate compensation mechanisms, given the organisational context and time constraints. During the pandemic year 2020, we conducted a pilot study as part of more comprehensive research, in which data were collected from primary care health centers in Serbia. The Corporate Entrepreneurship Climate Instrument (CECI) was used in order to estimate and evaluate the internal environment and overall propensity toward entrepreneurship. The instrument encompasses five relevant determinants that influence employees' entrepreneurial activities: management support, work discretion, time availability, rewards/reinforcement, and organisational boundaries. The value of the research is reflected in the creation of empirically and theoretically substantiated evidence about the relevance of these factors for creating a favourable internal organization climate, thus allowing a more flexible and creative health service.

Keywords: entrepreneurial behaviour, innovation, management support, organisation climate, health organisations

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1 Introduction

As a powerful reminder that we live in a highly complex and unpredictable world, the COVID-19 pandemic imposed many challenges on organisations, particularly health organisations. For these organisations, effective responses to the pandemic have required departures from many conventional practices. At the same time, it can be observed as an opportunity for healthcare managers to transform their organisations for a future of unpredictable surprise as well as an opportunity for various innovative solutions (Lyng et al., 2021). It further implies the need for the appropriate organisational support for innovation and entrepreneurial initiative. Therefore, the main purpose of this research is to investigate how the internal organisational climate affected entrepreneurial initiative in health organisations during the pandemic.

The authors of this paper found inspiration for their research in the principles of agile business. The primary orientation towards customer needs delivered through constant improvement of customer experience, highly adaptive and responsive strategies, iterative but continuous progress and momentum are crucial for the quality of health service. Agile business supports relentless and sustainable innovation and progress, and teams are empowered to deliver results through trust and cooperation. Bureaucracy is minimal and direct interpersonal communication is encouraged, while the best results emerge from teamwork and a high degree of autonomy (Perkin, 2020, p. 48). Entrepreneurial initiative thrives in an organisation with an organisational culture based on values promoted by entrepreneurial management, highlighting the possibility of individual initiative, through appropriate compensation mechanisms, given the organisational context and time constraints. Encouraging entrepreneurial behaviour implies the following elements of organisational climate: management support, work discretion, rewards/compensation, time availability, and organisational boundaries. In order to truly reshape the health system, there is a need to abandon the perception of linear change and take a more sophisticated approach, reevaluating embedded assumptions about structures, processes and management. It is necessary to understand how to scale agile principles to support lasting organisational change and innovation and go deeper into the fundamental aspects of organisation. There is a need to rethink and reinvent organisation, how it operates and how it is managed.

According to the research purpose, the authors of this paper formulated the following research question.
RQ: What is the nature of mutual relations between selected aspects of the entrepreneurial organisational climate?

This paper is structured as follows. After the introduction, the first section elaborates the main aspects of employees' entrepreneurial behaviour. The second section is devoted to research methodology, i.e. the sample, measures and research results are presented and discussed. Finally, relevant implications and conclusions are derived and recommendations are provided for further research studies.

2 Key determinants of employees' entrepreneurial behaviour

Agile methodologies initially arose in software development, but very quickly they proved usable and revolutionised the way business in general is perceived, especially in terms of the culture and leadership context. The principles of agile methodologies are fully compatible with building an entrepreneurial organisation, thus prioritising a more balanced understanding of customer needs. Priority is also put on the adaptation to and responsiveness of daily operations, the abilities of teams to create value, the recognition of time in tracking velocity and progress, and the appreciation of team autonomy and the role of management in removing barriers to entrepreneurial endeavours. All employees have a responsibility for organisational entrepreneurial behaviour, but in most cases entrepreneurial management plays a key role, encouraging new value creation through innovation (Erić Nielsen, Babić, Stojanović-Aleksić, & Nikolić, 2019).

Management support (MS) is crucial in encouraging employee innovativeness (Ritz, Neumann, & Vandanabeele, 2016; Erić Nielsen, Stojanović-Aleksić, & Zlatanović, 2019). The interdependence between managerial support and entrepreneurial activities is stronger at higher organisational levels (Hornsby et al., 2009). When top management clearly promotes an entrepreneurial strategic vision, employees have more courage, orientation and moral justification to behave entrepreneurially (Ireland, Covin, & Kuratko, 2009). There must be a consensus about dominant logic, implying consent about expectations, signalising which opportunities are important, which behaviours are appropriate and which results are valuated (Dess et al., 2003). Top, middle and operational management have different responsibilities and roles

initiating and implementing entrepreneurial activities (Floyd & Lane, 2000). At the strategic level, managers are putting effort into identifying effective ways to create new or redefine existing business. The middle management proposes and develops entrepreneurial ideas aiming to improve an organisation's competitive position. Operational management is focused on how an organisation's core competence can be used in the process of exploiting opportunities.

Work discretion (WD) is related to the freedom, flexibility and opportunity to initiate entrepreneurial activities (Lumpkin, Cogliser, & Schneider, 2009). It is the paramount for taking advantage of the unutilised potentials of organisation, identifying opportunities outside the core competence and new venture development. Entrepreneurial initiatives are often driven by the autonomy of employees who are positioned at lower levels of hierarchy. They enable creative ideas and are very fruitful in problem solving beyond the cognitive and organisational patterns (Erić Nielsen, Stojanović-Aleksić, & Zlatanović, 2019).

Rewards/compensation (RC) – Management support is essential and implies connecting the compensation system to the new venture performance, sending an adequate message to all employees and acting as incentive (Hisrich, Peters, & Dean, 2008, pp.75-76). Employees have different needs and preferences, hence it is important to understand the influence of both material and intangible factors on their satisfaction and motivation. Intangible factors correspond to Herzberg's motivational factors and the characteristic of internal (intrinsic) motivation (Yussof, Kian, & Idris, 2013). In public sector, it is evident that *intrinsic rewards* are one of the *main* factors that influence the *motivation* of an *employee* (Houston, 2000). These motivational factors are often dependent upon job characteristics and the quality of the work environment, which create inherent satisfaction if the employee has affection for the job and a high level of motivation (Deci & Ryan, 2008). Accordingly, the following factors of intangible motivation are the most common: a) challenging and innovative task, encouraging creativity, independent problem solving (in response to the need for self-realisation); b) authority delegation, control of resources, promotion (in response to the need for power); c) cooperation, teamwork, sharing resources and information, good interpersonal relationships (in response to social needs); d) prestige, reputation, promotion (in response to the need to achieve status) (Slavković, Pavlović, & Simić, 2016). The basic and most important single factor of material motivation is salary, however, others are also

significant, e.g. working conditions, job security, bonuses and incentives, and other factors that have instrumental component (Irshad, 2016). Other relevant factors of employee satisfaction are work-life balance and flexible working hours (Habib et al., 2017).

Time availability (TA) – Some authors argue that innovation is unlikely to happen if there is not enough time for experimentation (Hornsby, Kuratko, & Zahra, 2002; Kuratko, Morris, & Covin, 2011). Additionally, the teamwork process slows down the processes of decision making, because teams need more time to process information and act. It further implies that '*their job structure should be carefully designed in order to provide them with the time required so they can be involved into entrepreneurial activities in addition to fulfilling their day to day routines in order to achieve short and long term organisational goals.*' (Baskaran et al., 2018).

Organisational boundaries (OB) – These boundaries might be interpreted differently. They are normally analysed in the context of bureaucracy, when the decision-making process is time consuming and approvals are only provided on the basis of top-down management, which is considered a significant entrepreneurial barrier (Kuratko, Morris, & Covin, 2011). Boundaries arise between different units and departments, but also can be found inside the team if some team members or the leader try to impose and influence other members' behaviour.

3 Research methodology

For the purposes of this study, the authors conducted pilot research as a prologue for more comprehensive empirical research in the public sector by analysing a sample of healthcare organisations/centres operating in central region of the Republic of Serbia. The research was designed to analyse the relationships between defined variables, as well as the correlation between them and categorical variables, such as gender, age, work experience and educational level. The research encompassed five variables that were used to measure the agility and entrepreneurial climate of health organisations: management support (MS), work discretion (WD), rewards/compensation (RC), time availability (TA), and organisational boundaries (OB).

All participants were informed in advance about the academic nature of the research and received guarantees about the anonymity of data and confidentiality of results. The data was gathered between June and September 2021 under a special operating regime due to the pandemic circumstances. The questionnaire encompasses d demographic section and 26 statements to be filled out by both medical and non-medical staff. A total of 120 questionnaires were distributed, and 80 valid questionnaires were obtained, thus additionally corroborating the discretional participation in the study. A 5-point Likert scale was used, ranging from 1 (strongly disagree) to 5 (strongly agree) and it was specified which statements correspond to each of the analysed variables.

The Corporate Entrepreneurial Climate Instrument (CECI) was used to measure organisations' entrepreneurial environment. The instrument was originally developed by Kuratko et al. (2011) and improved by other authors (Hornsby et al., 2002; Hornsby et al., 2009). In this study, the authors selected questions from five organisational factors that should be recognised in promoting entrepreneurship inside an organisation (see Hornsby et al., 2002), therefore the final questionnaire consists of 26 items. **Management support** (MS) was measured using nine items, some of the examples are as follows: *The organisation easily and quickly applies new solutions initiated by employees; In the organisation, management encourage ideas to improve business; There are several ways in an organisation for employees to receive support for the realisation of an idea; Management supports experimental ideas/projects; Managers encourage employees to discuss their ideas with colleagues from other organisations, etc.*

Work discretion (WD) was measured using six items, including: *I can freely decide at work, without the obligation to consult with anyone; I am allowed to try new ideas in my workplace; I am responsible for the way I do my job.*

Rewards/compensation (RC) was analysed based on four items: *My manager helps me get the job done and resolve potential disputes; Rewards depend on my innovative proposals and ideas; My manager expands my authority if I have done a good job; My manager will praise or reward me if my performance at work is above average.*

The four items used to measure **time availability** (TA) are: *In recent months, I have been so overloaded with work that I haven't had time to think about new ideas; I always have enough time to complete all activities; My job leaves me with no time to think about more broad organisational issues; I always find time to solve urgent problems, together with my colleagues.*

Finally, **organisational boundaries** (OB) were analysed using three items: *In recent months, I have strictly followed established business processes and procedures; I have no doubt about what I am supposed to do at work; There are clear standards for evaluation of my work performance.*

Data were analysed using the SPSS statistical package. The reliability analysis showed high values of Cronbach's alpha coefficient for all the observed variables: management support (MS) with a value of 0.855, work discretion (WD) 0.838, rewards/compensation (RC) 0.742, time availability (TA) 0.877, and organisational boundaries (OB) with a value of 0.810. Based on these results, it can be concluded that the measurement scale is reliable and further analysis can proceed.

Sample characteristics were identified based on the demographic data collected from the second section in the questionnaire. The gender distribution is in favour of women who account for a total of 69%, while the remaining 31% were men. In terms of age structure, 40% of the respondents are under the age of 40 years, 31% of respondents are between the age of 41 and 50 years, and 29% of the respondents are over the age of 51. The majority of respondents (41%) have more than 20 years of work experience while approximately one third have less than 10 years of work experience. The dominant group in the sample – around 50% – are employees with a high school degree, while 27% of respondents completed vocational education and 23% higher education.

4 Research results

The results of the non-parametric correlation analysis are shown in Table 1. Based on Spearman's rho coefficient, a strong positive correlation is identified between management support (MS) and the other observed variables: work discretion (WD), rewards/compensation (RC), time availability (TA) and organisational boundaries (OB). A strong positive correlation was identified in the mutual relationships between the variables of work discretion (WA), rewards/compensation (RC), time

availability (TA), and organisational boundaries (OB), with a correlation coefficient above 0.5. This represents the response to the research question.

Table 1: Correlation analysis

	MS	WD	RC	TA	OB	Gender	Age	Work experience	Educational level
MS	1								
WD	0.529**	1							
RC	0.544**	0.674**	1						
TA	0.527**	0.767**	0.660**	1					
OB	0.594**	0.840**	0.843**	0.762**	1				
Gender	0.131	0.063	0.077	0.083	0.025	1			
Age	-0.064	-0.122	-0.077	-0.035	-0.069	0.922	1		
Work experience	-0.139	-0.205	-0.142	-0.133	-0.163	0.036	0.895**	1	
Educational level	-0.106	0.079	-0.081	-0.063	-0.059	0.027	0.037	0.010	1

A strong positive correlation was identified between two categorical variables: work experience and age. The results of the correlation analysis indicate that there is no statistically significant correlation between the observed variables and categorical variables, as well as significant sample homogeneity. Even though no statistically significant relations were identified, it is interesting to note that in the majority of the analysed pairs between the observed variables and categorically variables, the correlation coefficient is negative, indicating the inverse relationships.

5 Conclusions

The paper points to the importance of the agility and the need for adequate organisational support for new ideas and entrepreneurial behaviour in general, particularly for health organisations during the pandemic. The results of this pilot study demonstrate strong mutual relations between the key elements of entrepreneurial behaviour, such as management support, work discretion, rewards/compensation, time availability and organisational boundaries. Thus, this paper contributes to the body of knowledge relating to the challenges of managing entrepreneurial organisations during the pandemic with an emphasis on health organisations. The practical implications relate to the top managers who are primarily focused on monitoring the current operations and maximising performance. In an entrepreneurial organisation, they take responsibility for the emerging initiatives and help them to move forward. One of the biggest challenges for strategic management is how to balance beneficiaries' requirements and

successful ongoing operations with innovations that unproven yet potentially crucial for viability. While managing current operations, a new track for the future should be set.

In addition, the authors of this paper are of the belief that managers should pay equal attention to all aspects of entrepreneurial behaviour, however, it is more important to take into account their mutual relations. It is recommended that managers and practitioners establish incentives and a compensation system in order to communicate their entrepreneurial vision and strategy, highlight flexibility in strategy implementation and become a role model in promoting employees' innovative behaviour. If managers perceive themselves as innovative, willing to take risk and experiment, the rest of the organisation will follow.

However, this pilot study has the following limitations. The sample size is not adequate to derive more general conclusions indicating the need to expand the sample within future research. Additionally, only mutual relations of the key aspects of entrepreneurial behaviour were explored without their influence on organisational performance. This, therefore, would be an important avenue for future research.

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Abstract The purpose of this paper is to compare and present the theoretical findings of established authors with recent articles and literature on the topic of sustainable procurement and its impact on doing business. The goal of this paper is to connect theoretical knowledge of the above-mentioned topic with consumer attitudes towards current sustainability issues in trade as well as to analyse the introduction and impact of sustainable procurement in business based on a practical example. In this example, the author's goal is to determine the effects of the introduction of the sustainable procurement model and its consequences on the social, economic and environmental aspects of doing business. Objective conclusions were reached that will help people from different fields to assess and understand the impact of sustainable procurement on doing business. This decade is crucial for balancing economic, environmental and social aspects, especially after the sobering period of the COVID-19 crisis, which highlighted several problems, including the issue or rather lack of the sustainable aspect of doing long-term business in both the public and private sectors.

Keywords:
sustainable procurement, sustainable development, responsible purchasing, triple bottom line, business

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1 Introduction

It is a known fact that purchasing plays an increasingly important role in companies' activities, mainly due to the desire of business owners to maximise profits. Companies can achieve the latter most rapidly through improved purchasing conditions, without raising the final price of products for their customers or consumers, thus remaining competitive in an increasingly competitive market. However, over the past year it has been noticeable that companies are largely no longer able to maintain the low sales prices of their products and services, mainly due to increased purchasing costs, which companies often convert into higher selling prices in the desire to maintain their margins. Purchasing prices have increased due to individual speculative purposes, the rising prices of various energy sources, higher labour costs and the increased rarity of certain goods. The rise in inflation in the post-corona period has also been created by the reopening of societies, countries and economies combined with various existing expansive monetary policies and low interest rates, which are expected to start rising in Europe by the end of the year.

In the current situation in which the economic situation is unpredictable, the social sphere is increasingly turbulent and financially unequal, and the environmental situation is unsustainable in the long run, the author of this paper believes that it is necessary to start a broader discussion and implementation of sustainable procurement in public and private organisations, as the latter, unlike 'regular' purchasing, not only covers the economic but also the environmental and social aspects. Organisations need to see the sustainability aspect as their competitive advantage and a way of upgrading the company's reputation in the public eye. The general goal of a sustainable business strategy is to positively impact the environment, society or both, while also benefiting shareholders (Miller, 2020).

2 Literature review

Sustainable procurement is most often defined as a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of not only generating benefits for the organization but also for society and the economy whilst minimising damage to the environment (DEFRA, 2006). Procurement is considered sustainable when organisations broaden the basic framework by meeting their needs for goods, services, works and utilities in a way that achieves value for money and not only

promotes positive outcomes for the organisation itself but also for the economy, environment and society (Betiol, 2015). This framework is also known as the triple bottom line (TBL). Over the past few decades, the concept of sustainability has become a strategic goal for many global organisations (Agrawal, 2018). The integration of sustainability concepts such as TBL in the procurement process is called sustainable procurement. According to Walker (2009), sustainable procurement is consistent with the principles of sustainable development, such as ensuring a strong, healthy and just society, living within environmental limits, and promoting good governance.

Sustainability-oriented actions and studies in business strategy have been increasingly receiving significant attention over recent years (Islam, 2016). Many authors today believe that sustainable purchasing needs to become a competitiveness factor as it happens with quality, cost, speed, dependability, flexibility and innovations. Sustainable procurement builds on the principles and good practices of 'traditional' procurement and considers additional factors to maximise the social, environmental, and economic benefits for the procuring organisation, its supply chain and society (UNEP, 2012). Sustainable procurement is a peculiar mechanism for the optimal integration and implementation of the horizontal goals of environmental, social and economic development in public and private procurement, along with the main goal the highest quality at the lowest price (Glas, 2017). According to Silva (2021), as sustainability becomes a mainstream business practice and logic, the social and environmental requirements will go beyond 'sustainability' market niches, while also cascading from large organisations to reach small- and medium-sized enterprises (SMEs). The noticeable emergence of sustainable venture capital firms and the consequent upsurge of sustainability-related start-ups is likely to change business ecosystems. In doing so, firms will need simple rather than simplistic approaches to respond to sustainability challenges.

Below the author has briefly summarised the framework of TBL. This is a sustainability framework that examines a company's social, environment and economic impact (Elkington, 2018). Miller (2020) explains TBL as a business concept that posits firms should commit to measuring their social and environmental impact in addition to their financial performance rather than solely focusing on generating profit, or the standard 'bottom line'. It can be broken down into 'three Ps': profit (economy), people (social), and the planet (environment). In contrast, Slaper (2011) states that TBL is an accounting framework that incorporates

three dimensions of performance: social, environmental and financial, differing it from traditional reporting frameworks as it includes ecological and social measures that can be difficult to assign appropriate means of measurement. The three pillars of sustainable development - environmental, economic and social are usually considered as having the same importance (Gu, 2020). However, there are approaches where the environmental component is recognised as the main and uncompromising element of sustainable development. The idea is that the social and economic components not only affect the environment but they cannot exist without it. After all, for example, the environmental policy will have an economic and social impact and vice versa (Malolitneva, 2019). For example, procurement in which the choice is made for non-recyclable plastic products not only has a negative impact on the environment but also on people in the future, for example, by contaminating the food chain. Therefore, it also affects the social pillar (Choy, 2013).

3 Theoretical framework and discussion

Below, the author has focused on the Nielsen survey (2018) in which the company attempts to provide its clients with valuable insights into consumer behaviour and marketing information by collecting data that measures what consumers watch and what they buy. According to the 2018 study, many U.S. consumers have been touting their desire for more sustainable products for years, and sales data shows that they are using their spending power to effect the change they want to see in the world. Nearly half (48%) of U.S. consumers say they would definitely or probably change their consumption habits to reduce their impact on the environment. Perhaps even more important is the finding that these consumers are putting their money where their values are, spending USD 128.5 billion on sustainable goods. Since 2014, thanks to these consumers, sales of sustainable products have increased by nearly 20%, with a compound average growth rate four times larger than conventional products (3.5% vs -1.0% comparatively). In 2018, sales of products with sustainable attributes made up 22% of the total commercial goods trade.

A large gap can be observed between generations when it comes to sustainable purchase intent. When surveyed, millennials (those born between the years 1981 and 1996) are twice as likely (75% vs. 34%) as baby boomers (those born between the years 1946 and 1964) to say they are changing, or probably will change their habits to reduce their impact on the environment. Let us not forget that millennials are taking over the leaderships of the largest and most influential corporations,

indicating a major leap in the mindset around the issue of sustainability. Younger generations are also more willing to pay more for products that contain environmentally friendly or sustainable ingredients (90% vs. 61%) or products that have social responsibility claims (80% vs. 48%). Millennials are also more likely than baby boomers (53% vs. 34%) to say they would be willing to forgo a brand in order to buy products that are environmentally friendly. By following sustainable trends, especially by the younger generations, we can be moderately optimistic about a better, greener future. Given that the purchasing function itself is integrated into the strategic orientations of the most trendsetting companies, its task is also to identify the wishes and priorities of consumers in certain age groups, geographical areas in combination with purchasing power and so on. It must be emphasised that purchasing, in cooperation with the marketing function, also has the power to set and popularise certain trends, not just follow them. In a limited store growth environment, consumers continue to choose sustainable products over conventional options, making sustainability a consistent growth opportunity for manufacturers. According to the Nielsen report (2018), companies need to evaluate their product portfolios and then understand the impact of ingredients and the level of scrutiny that consumers apply to the products they purchase. Consumer sentiment is shifting towards 'Healthy for me and healthy for the world', and this is influencing sales of sustainable products across multiple categories.

This paper also focuses on the impacts of sustainable public procurement study (UNEP, 2012), a highly cited publication containing eight case studies of sustainable public procurement. In this contribution the author focuses heavily on a USA study on sustainable waste transport procurement. Let's first cover some basic information: the procured service was waste transport that took place in the metropolitan regional government of Portland, the so-called Metro, with more than 1.5 million residents at the time. According to the UNEP (2012), in 2007 Metro decided to secure a long-term contract to transport solid waste from its transfer stations to a disposal site up to the Columbia Gorge, seventy miles away from Portland. Starting in 1989, Metro contracted a haulage firm to provide the service, however, over the years, the contract became hard to manage due to corporate restructuration and buyouts, and the fact that the haulage firm was no longer locally owned but rather part of a larger national corporation based near Chicago, Illinois. Moreover, the firm faced environmental issues due to the lack of investment in maintenance, the acquisition of new technologies, and the replacement of worn-out trucks. The procurement process for a more sustainable service provider started two

years before the end of the on-going contract, thus synchronising the process with the overall institutional needs and assuring a smooth transition.

Metro began a dialogue with the local community by connecting people and sharing the decision-making process to discuss the social aspects of waste transport. Public meetings were organised with community groups, neighbourhood associations and environmental advocates in order to determine what was important in the selection process of a new contractor and to give a voice to their concerns and priorities. The criteria to be met was determined, according to which individual applicants were evaluated. The criteria contained a maximum total of 100 points, with the cost aspect accounting for 45 points, operational considerations (such as sustainable flexibility of the system, adapting to changes in technology, fuel supplies, etc.) accounting for 25 points, environmental impacts (such as a reduction of NOx and SOx emissions, carbon dioxide emissions and other greenhouse gases and particulate matter in the Metro area) accounting for 20 points and socioeconomic impacts (such as noise and traffic effects on neighbourhoods, improving mobility, stronger implementation of local suppliers as well as the condition that half of the employed truck drivers should be from the local county) accounting for 10 points. All three of the previously mentioned items from the TBL model are integrated in this scoreboard. Walsh Trucking, located in Gilliam County, was the firm selected for the award of the 10-year contract. The environmental results show that the contract has had the following positive impacts: the selected firm transported the same loads and travelled 3.9 million miles per year to haul solid waste from Metro, compared to the 5.7 million miles with the previous contractor. The significant reduction is partly due to the larger payloads of the trucks used by the current contractor (larger trailers), therefore reducing greenhouse gas (GHG) emissions by 2800 teqCO2 (a 14% reduction compared to the previous contractor). In terms of fuel efficiency, all the lorries from the new provider are equipped with automatic idle shutdowns after 5 minutes to conserve fuel. This system has had an impact on fuel savings and GHG emissions. In terms of fuel savings, there has been a 5% reduction in fuel consumption as well as a 5% reduction in GHG emissions, equivalent to 460 kgeqCO2. All the lorries use B5 fuel containing 5% biodiesel and a newer engine standard, thus further reducing GHG emissions by 460 kgeqCO2. All the lorries respect the standards of the United States Environmental Protection Agency (US EPA) standards concerning NOx emissions and particulate matters. In terms of NOx emissions, an estimation based on the truck manufacturer data shows a reduction of 60.9 tonnes of NOx, equivalent to a 95.6% reduction compared to the

previous contractor. As for particulate matters, the newer equipment has reduced emissions by 1.2 tonnes, which equates to a reduction of 80% compared to the previous contractor. In addition to the previous positive impacts described above, all trucks are equipped with automatic air systems to keep the tyres at maximum air pressure, which extends mileage, hence increasing fuel efficiency and therefore further reducing emissions. After focusing primarily on the environmental aspect, there is now also a need to cover more of the socioeconomic results and impacts. Thanks to the new waste contract, out of the 52 drivers recruited, 39 drivers were recruited locally, thus having a positive impact on unemployment in the Metro area. According to the UNEP (2012), since 2010 the waste transport contract has contributed to the economic revival of the region. Gilliam County receives USD 1.75 per ton of solid waste (+ USD 0.45 for each ton of special waste), reaching USD 2,492,835 in 2010. The funds are redistributed to cities, social funds and public projects, thereby returning the investment to society. The framework and selection methods used to determine needs were definitely a key element in making this sustainable purchase a success in terms of economic and environmental sustainability as well as the involvement of city residents, thereby including the social aspect. A clearly defined framework was critical in coming up with an 'out of the box' solution, tailormade in order to satisfy all stakeholders. Even though stakeholder engagement makes sense when thinking in terms of sustainability, this is too often underestimated.

4 Conclusion

Sometimes societies think that sustainability is just a frivolous marketing concept, as they accuse many corporations of making even bigger profits at the expense of sustainability promotions. Two of the most high-profile scandals of this kind occurred in 2015 (Volkswagen) and 2019 (H&M), which may justify individuals' doubts about the transparent promoting of sustainable products. However, there is clearly great potential for companies to communicate such a sensitive topic more transparently in their promotional campaigns. It has become clear that consumers, especially millennials, are willing to pay more and are willing to give up certain brands and habits for the wider good. Public companies and private corporations must also play their fair part when addressing the impacts that those consumers have on supply chains and areas where their businesses invest. Simply put, the consumer must know, with the ability to verify the facts, what they are contributing to 'a better world' when buying a sustainable product or service.

Through theoretical and practical findings, the author of this study discovered that the driver of sustainability, as such with its strategic function, is indeed sustainable procurement. The latter implements social, environmental and economic aspects into the process with the TBL. The defined purpose of this article was fulfilled by comparing the various views and opinions of established authors and experts in the field of sustainable procurement and supply chain. The goal of the paper was met by analysing and interpreting the Nielsen survey from 2018, where it was shown that millennials are more responsive to changes in consumer habits than other generations. Even more so, they are generating many of these sustainability changes in trade as they are becoming key consumers with strong purchasing power and are taking over leading positions in various corporations. By analysing a sustainable waste transport procurement case, the importance of determining a transparent way of scoring potential service providers was underlined, with an emphasis on sustainability and cost-effectiveness. The right approach, such as that chosen by Metro, is proof that service providers can have a beneficial impact on all three key aspects in the sustainable procurement system, namely the environmental, economic and social aspects. The synergy of theoretical knowledge and practical implementation of such processes shows the ability of the sustainable procurement function to cooperate with companies and organisations without harming any of the TBL functions. The author of this paper is of the opinion that the best practice would be to ensure sustainable procurement in the future by implementing a sustainable policy that increases profitability in the long term through the creation of added value, economies of scale as well as reputation of the company/institution and brand differentiation. Companies need to evaluate their product portfolios and then understand the impact and the level of scrutiny that consumers apply to the products they purchase. It is clear that innovative companies are proving time and time again that it is possible to do well by doing good. Consumer sentiment is shifting toward 'Healthy for me and healthy for the world', and this is influencing the sales of these products across multiple categories.

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Critical Success Factors of Document Management Systems Considering the Maturity of the Organisation

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Abstract The paper addresses the introduction of paperless business, which is one of the important steps for organisations to accelerate the implementation of business processes, achieve better control over documents and ensure safer operations. The basis for the transition to paperless business is a good information solution called Document Management System(s) (DMS), which allows users to work more quickly, easily and save time. At the same time, there are many examples of unsuccessful or partially successful implementation of DMS in all areas of business information solutions. The key purpose of this paper is to evaluate the critical success factors and to what extent they affect paperless business as well as to evaluate the extent to which the implementation of paperless business is influenced by an organisation's maturity. The authors of this paper researched the critical success factors when introducing DMS in connection with the assessment of the maturity of an organisation. Since the field of DMS is highly present and to date relatively little research has been carried out, the authors believe that research in this field will contribute to more successful implementation and use of DMS by organisations and to reducing the number of unsuccessful or partially successful implementations.

Keywords: document management system(s) (DMS), maturity, critical success factors (CSF), digitalisation, paper-less work

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1 Introduction

Digitalisation trends are key for companies to remain competitive. Every organisation that introduces a digital way of doing business uses different methodologies to introduce modern business models, systems and processes to facilitate the work of employees and speed up existing processes. Advances in this area allow organisations to transform the entire business of the organisation so that they start generating higher revenues, are more efficient and are much more competitive on the market (Sternad Zabukovšek et al., 2021).

The development of various information technologies enables faster and more efficient generation of various documents. The modern environment forces organisations to increase efficiency, therefore the digitisation of as many documents as possible is crucial. This was the main reason why organisations began to realise that the only way they can maintain and increase their successful operations is through reorganisation of work and changes in business, which requires better management of information and processes (Šverko, 2006). Documents are certainly the basis of almost every process, therefore the management of documentary systems also means the management of the organisation's processes (Jakovljević, 2003). Today, one of the effective ways to manage an organisation's documents is the use of Document Management System(s) (DMS), as this allows paper to lose its importance. The use of DMS supports the organisation as well as the employees in the efficient management of structured and unstructured data (Šverko, 2006).

However, a lot of business information solution implementations (including DMS) have not been successfully implemented in the past (Sternad Zabukovšek et al., 2021). It is not all about the processes, but also the people (employees), their attitude towards the organisation, the environment and the maturity of the organisation, which is transforming and changing its work processes. The implementation of a DMS can only succeed if employees accept the changes as positive, as something they understand and they are thus unified. In this paper, the authors examine the critical success factors (CSF) of the implementation of DMS and the impact of the organisational maturity level on the CSF of the implementation of DMS.

2 Document management system

The amount of documentation in organisations is increasing from year to year, as each document represents the beginning and end of a particular process. Paper documents are often stored in drawers, shared archives or in-office cupboards. Duplication of copied versions of documents is also a frequent occurrence, as different processes require the same documentation, which leads users to reprint documents, even though they are already stored in archives. This method of storing documentation is very time-consuming and, above all, wasteful. The organisations Pricewaterhouse Coopers, Gartner Group Consultancy, Laserfiche, and eCOPY, Inc. esearched paper document management in companies and obtained the following statistical facts (Zebec, 2010):

- Employees spend almost 70% of their time processing paper documents.
- At least 15% of paper documents are incorrectly stored.
- The number of documents is growing by at least 25% every year.
- The cost of storing documentation in paper form is almost 7 times higher than the cost of storing it in electronic form.
- Most companies do not have copies of documents, which means permanent destruction in the event of an accident.
- Processes that work with paper documentation are more difficult to adapt to legal requirements.
- On average, 90% of documents are mixed.
- Organisations make an average of 19 copies of the same document.

Document Management Systems (DMS) are electronic document management information systems that monitor documents throughout the lifecycle of documents from their creation to archiving (Hrašovec, 2011). A DMS is an information system that enables the capture, management and storage of data. The key task of a DMS is to make it easier for users to use and access information quickly and efficiently. It also allows the easy flow of documents within the organisation and long-term storage of documentation (Odobašić, 2016).

Documentary systems are divided into two groups (Sutton, 1996):

1. Archival documentary systems, which are exclusively limited to document management. This means that they capture documents, equip them with metadata, archive them and enable basic search and viewing (Bjork, 2003).
2. Systems for electronic management of documents and processes named DMS enables, in addition to everything that the archival documentary system enables, the creation of documents, editing documents, tracking changes and managing the course of events.

The DMS process supports the capturing, storing, managing and sharing of documents. Capturing documents represents the entry or processing of received documentation. If the documents are not in electronic form, they must be converted to electronic form (scanning). Once the documents are scanned, conversion to a text document is required, followed by indexing. The document is then saved to the DMS. Sharing of documents means defining a security policy, i.e. access to documents, which includes rights, how long the document will be kept, traceability of the document, etc. Storage is the final stage in the whole process. DMS allows the storage of large amounts of data, which can be defined as access rights and retention period (Hrašovec, 2011).

DMS is a very complex project that requires the involvement of many people and a huge amount of time. The key to the successful implementation of a DMS project is a competent and thoughtfully chosen project manager, correctly selected participants (both internal and external experts), the appropriate method of implementing a DMS, as well as an appropriately chosen digitisation strategy.

Above all, a project that covers the entire organisation must be well planned. In the beginning, it is necessary to prepare a project charter document, which includes all the key project information, i.e. the starting points of the project, project organisation, project timeline by individual phases, financial plan of the project, project supervision, the team that will lead the project, and project supervision.

Raynes (2020) pointed out that for the successful implementation of a DMS project, the following basic guidelines should be considered: clear definition of the project objective; the project team should not be too large and should include members with knowledge and experience in all necessary fields; a clear definition of responsible persons; clearly defined deadlines for project implementation; a clear definition of financial resources; the project must not be too large (the project must be divided into individual phases); and the implementation of a DMS must not be outsourced, as the outsourced organisation does not know the internal system, the needs of the users, the work of the organisation and its culture.

A very important challenge of the implementation of a DMS for an organisation is to adapt it to the existing information systems. Adaptation is not only a systemic change but also a change in the organisation's existing processes to make it DMS compliant. According to the Association for Information and Image Management (AIIM), 50% of implementations are unsuccessful and the main reasons are (Patel, 2010):

- Incomplete implementation, which allows only partial use of the DMS.
- Users do not want to use the DMS at an advanced level (full functionalities) or do not know how to use it. Therefore, users must be involved in the implementation of the system very early.
- Incorrect classification of documents, therefore it is important to harmonise the organisation's system and DMS.
- Problems with the integration of information solutions because they are not compatible with each other.
- Information solutions are often implemented in stages, therefore the system technology must be modular.
- The people performing integration are not sufficiently trained to work with new technology.
- The process was not properly and fully described during the preparation for the DMS implementation.

Many of the unsuccessful or partially successful implementations of DMS could be prevented. This can be achieved through by sufficient preparation prior to implementation of the system, the early involvement of users in the implementation of a DMS, correctly defined compatibility of the organisation's system with the DMS, a good project manager and experts in system integration and understanding, as well as good DMS management, etc.

3 Critical success factors

Critical success factors (CSF) come from an organisation's strategic goals and mission and are important because they show what the key goals are and how to achieve them, i.e. the factors that determine the success or failure of the organisation (Mind Tools Content Team, 2021). Tanis and Markus (2000) state that success is defined through the person who defines it. For managers, success is the timely completion of a project, while for users, success is a smooth business. The authors believe that success is defined primarily through business results.

Esteves-Sousa and Pastor-Collado (2000) researched the CSF of implementation of a Enterprise Resource Planning (ERP) business information solution system and classified them into the four following groups of CSF:

- strategic factors, which are: ongoing leadership support, effective management of organisational change, determining the scope of the project, appropriate project team composition, business process redesign, appropriate role of the project sponsor, user cooperation, trust between partners
- tactical factors, which are: dedicated collaborators and consultants, good communication, formalised project team, appropriate training method, preventive problem solving, preventive troubleshooting, appropriate use of consulting services, the project team has appropriate powers
- organisational factors, which are: an appropriate strategy for the implementation of an enterprise resource planning (ERP) solution, avoidance of technically demanding system adjustments, the appropriate version of ERP

- technological factors, which are: appropriate configuration, software, knowledge of the existing version of ERP

ERP systems support operations at the operational level and are the main information system in most organisations. A substantial amount of research has been done into the CSF of the implementation of ERP (Sternad Zabukovšek et al., 2021), while research into the CSF of the implementation of DMS is rare. One of the studies connected to the CSF of DMS is by Downing (2006), who identifies the following critical success factors of the implementation of DMS: (1) transparent implementation of DMS, (2) users' expectations, (3) focus on users and processes, (4) education of users, (5) a holistic view of the project, (6) understanding change, and (7) proper communication.

Although Downing did not expose top management as one of the most critical factors of the implementation of DMS, a lot of other researchers in the field of implementation of business information solutions point out that extended top management support is one of the most important factors (Sternad Zabukovšek et al., 2021). Therefore, a project will only be successful if it has a project sponsor in the ranks of the top management. This sponsor must be fully committed to this function and must know how to properly communicate it. The worst thing that can happen is if the sponsor is a project manager who only leads the project but does not believe in it. When analysing the CSFs, the authors of this paper also researched the connection between the implementation of a DMS, the CSF and the maturity of an organisation, because they believe that the maturity of an organisation also influences the implementation of a DMS and its CSFs.

4 Maturity of the organisation

Maturity can be defined as a state, fact, or period of maturity (Oxford Dictionaries, 2022). Blondiau, Mettler, & Winter (2016) state that maturity models are recognised as a tool to demonstrate the gradual and systematic development and/or improvement of an organisation's overall skills, processes, structures or conditions. According to Helgesson, Host, & Weyns (2012), it is the organisation that decides what improvements it will implement, which is one of the reasons why maturity models are used when process changes are implemented. In other words, maturity models are used as a multi-stage planning tool to determine which improvements

need to be implemented into the process and when. In 1986, at the request of the US Department of Defense, the Carnegie Mellon University Institute of Software Engineering developed a performance maturity model based on the principles and practices of perfect quality originally developed by Crosby (1979). Since then, maturity models have become an important tool for assessing the excellence of business processes, while at the same time offering the possibility of improving them (Roglinger et al., 2012). Cronemyr & Danielsson (2013) state that maturity models are beneficial for organisations, especially in terms of understanding their current level of maturity, and offer organisations the opportunity to further develop their processes.

The most often used maturity models (MM) are the Process and Enterprise MM (PEMM), the Capability Maturity Model (CMM), and the Capability Maturity Model Integration (CMMI). The specialty of the PEMM model is that it differs between the maturity of the organisation and the maturity of the process (Hammer, 2007). The CMM model has been built to help developers choose strategies to improve processes by determining their current process maturity and identifying the most critical issues to improve the quality of their software and process as such (Paulk et al., 1993). The CMMI model is the successor of the CMM model and is designed to improve and evaluate processes to develop much better products (Sekulovska, 2014). Most of the maturity models have four to five maturity levels/phases that an organisation goes through in its development.

From this research, it can be concluded that knowledge of the organisation's maturity levels, as well as knowledge of CSF, is key to the successful implementation of a DMS, as this is the only way to assess what is crucial for the success implementation.

5 Conclusion

Organisations that strive to meet their needs without compromising the needs of future generations and those that focus on their business policy in addition to the basic concern for profit are able to more quickly accept the introduction of change in the organisation, and they are more aware of the importance of digitalisation, not only for the benefit of the organisation as such but also for its employees and the environment.

Those organisations are increasingly striving for digitalisation, as they have found that this is the only way to be competitive in today's market. Paperless business is crucial for any business nowadays, not only to reduce costs but also to enable work from different locations, to store documents in one place, and to control access to documentation. The implementation of a DMS allows organisations to have documents in one place and makes it easier for users of the system. It also requires good preparation, which includes a well-prepared strategy, as well as the active participation of users (Šverko, 2006). Organisations are therefore working hard to implement DMS. The field of DMS is very broad, however, to date it is still relatively unexplored, as the authors found only one CSF survey for the field of DMS (Downing, 2006).

When implementing innovations, organisations often mainly focus on change at the process level but often forget about employees, i.e. users. Users are the key to the successful implementation of DMS in organisations (Downing, 2006). It is therefore important to include them in the desired change at a very early stage, as this is the only way they will feel a part of the whole change. Only users who can unify with a change will eventually be able to successfully use the desired system.

This research shows that synergies between the CSF, the phases of the maturity model, and the success of the implementation of DMS are visible, however, to date this field has not researched in detail. The authors therefore believe that there is a big gap for the successful implementation of DMS which needs to be explored.

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Business Intelligence Management and its Impact on Economic Security

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Abstract This paper describes the influence of business intelligence management and economic security at all levels of the business sector. The paper reflects the analysis of various data, literature reviews and organisational statistics. Based on the data comparison, the paper provides formulas, indicators and recommendations to bring managerial levels closer to business intelligence management. In the modern era, states' top priorities are areas of political power and balance, diplomatic influence and mediation, guarantees of economic growth, military and defence policies. The main principle is not to stagnate in the optimal phase of state but rather to keep up continous improvement.

Keywords:
business intelligence, economic security, organizational security, management, security measures

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1 Introduction

The global digital revolution has led to growing demand for information, which is a precondition for further corporate success (Medhat, Khedr & Haggag, 2013). Gathering and managing information remains the main task for managers to this day. Business intelligence is a proven analytical tool that is widely used in both organisational security and marketing strategies (Djerdjouri, 2019).

The impact of business intelligence management on economic security has yet to be explored. Modern corporations are still trying to use a proven and classic method that is not dynamic over time (Azeroua, Business Intelligence, 2018). Managers need to understand that implementing business intelligence in organisations is not only a key guarantee of corporate success but also of economic growth and economic security (Coissard, Delhalle & Seiglie, 2010). In the countries of the post-Soviet space, the afore mentioned direction has not been scientifically researched. The study of business intelligence management requires a constructive approach and a detailed description in order to be adequately represented in scientific circles. Georgia and the Republic of Lithuania can become pioneers in this regard. Although corporations in Georgia are trying to move to an innovative management model, the basic elements of organisational directions are unexplored. Companies in the Republic of Lithuania are in a leading position in this regard, as managerial self-motivation and organisational readiness are higher.

The modern world has begun reformist approaches to information access, i.e. the formation of public institutions, changes in economic policies and technological innovations.

Several theories objectively explain the commercialisation of intelligence and the formation of economic security. To counterbalance this, it is necessary to turn to the second theory, according to which post-communist privatisation was envisioned from the outset as reaching beyond the economic sector and into the core of the secret control apparatus (Los, 2005).

2 Intersection between economic security and business intelligence

At present, the main priorities of management are internal organisational power and balance issues, the impact of marketing and strategic moves, service providers and financial stability guarantees, investment and market policies. The solution to these problems is not to stagnate in the optimal phase of the quality of the organization, but rather to constantly develop and make progress. The main task of this paper is to establish the main links between business intelligence and economic security and also to determine whether it is necessary to scientifically reflect the great role of management for the proper functioning of both systems.

There are differing views on the relationship between business intelligence and economic security. One group of scientists believes that incorrect economic security systems have played a crucial role in the origin of business intelligence, and all the illegal actions associated with it are the result of shortcomings in economic security (Bodislav, 2016) (Negro & Mesia, 2020). The second group of researchers believe that business intelligence is derived from the management of a company (Clary, 2018) (Nourani, 2020). It has such an impact on the economic security system that the formation and specificity of the latter are related to the intensity of business intelligence.

They argue that there is no connection between business intelligence and economic security or, if there is, there has only been a small change in the 21st century. The aim of this paper is to establish the validity of the reasoning, which is both a rational view of the grains, i.e. economic security and business intelligence express symbiotic integrity and vice versa.

From the outset, it is necessary to understand the two uses of science, economic security and business intelligence.

2.1 Economic Security – definition and its relevance to management

According to the British scientist Barry Buzan, 'economic security is closely linked to the corporate resources of private organisations operating in the state', and the blurred vision of this union obscures the economic security of post-Soviet countries (Buzan, 1984). According to other sciences, economic security is linked to a state's defence capabilities, social consensus, environmental protection and equal

development within a country's regions and other territorial-administrative units (Tetruashvili, 2006). At its core, the task is to eradicate poverty by guaranteeing the creation of internal and external stability. Simply put, this direction is a set of complex strategies, the successful implementation of which contributes to the role of the country in the region and the international arena. Economic security is not clearly defined in terms of prospects, however, two stages of escalation can be distinguished – short-term and long-term. In the short term, significant economic development values are considered, e.g. buildings, roads, infrastructural patterns, etc., while long-term ones are more socio-political, e.g. evidence-based policy, future development strategy, crisis management and/or prevention etc. It is clear that the share of the state in the formation of economic security, as well as the share of the higher echelons of the multi-sector, must be colossal (SMELIK, 2020). According to the International Labor Organization, economic security consists of basic social security, which is determined by access to the basic needs of infrastructure, health, education, information and social protection, and corporate security.

If corporate management is applied to this theory, it can be formulated as follows: an educated and qualified staff carries less risk of business intelligence, and it is the starting point for corporate security. Below the author of this paper discusses the different variants and types of business intelligence, although it should be noted that based on the above theory, a strong pillar of business intelligence is erudite employees in management. From the various aspects included in this paper, the impact of business intelligence elements on the economic security system can be discussed, although consideration has also been given to how the above theory can be applied in a managerial perspective.

2.2 Types and understandings of business intelligence

The scientific definition of business intelligence is still being refined. In terms of content, business intelligence is a set of managerial data, a kind of information system that provides past, present and predicted information about the company and its environment. Business intelligence can also use other data sources, in particular to analyse and evaluate the corporation environment (Skyrius, 2020). Business intelligence management enables a corporation to overcome major problems and challenges that classical analytical forms cannot match. These challenges may be related to a company's marketing strategy, financial fluctuations, internal organisational security and the growth trends of loyal customers (Howson,

2007). The product of business intelligence is to combine data from different sources and identify key elements that are impossible to assess from individually considered sources of information. Business intelligence can be considered as part of information technology, however, in most cases the latter is a broader analytical mechanism in which all the management links of an organisation are involved (Laursen, 2016).

The historical perspective of business intelligence management dates back to the second half of the 20th century and has become part of managerial strategy and the decision-making process. Unlike the speed of other technological development, business intelligence has long been established as an independent integral.According to experts, the more the integration of the three main components of management into a business intelligence application, the more in demand it will be in the latter market. These three components are the organisational value system, the utility component, and the management geometry that characterises a particular corporation. This reinforces the assumption that business intelligence will become an integral part of management in businesses of all sizes.

Thus, business intelligence and economic security are two interdependent elements, therefore the starting point for management is to find the intersection points of the two disciplines mentioned above. Below a systematic analysis and well-known practical examples are described in order to shed more light on the impact of business intelligence on the economic security model. Statistics show that the share of spending on business intelligence is directly proportional to digitalisation. In this paper, the author discusses financial models that are effective or ineffective in financing business intelligence and organizational security.

3 The Main Theoretical Findings and Analysis of Business Intelligence Components

Against the background of the aforementioned information, the author has provided conclusions and prospects to solve the research task. Business intelligence and economic security are the latest disciplines, however, a thorough study of these disciplines provides an effective management system that produces two results – a corporate system that will be unique, and from a state point of view, business intelligence will have a positive impact on the economic security system.

In studying business intelligence, the following types of managerial problems are encountered. From time to time, business intelligence becomes part of intellectual property that cannot be seen as innovative. There are two reasons for this. Firstly, companies do not want to make the system public because it puts them in a strong position in the market, and secondly, in the event of failure, the company's prestige is not compromised.

Academic circles refrain from examining the above two issues from one perspective, as there is no evidence-based corporate policy and therefore no research that rationally explains the positive or negative impact of business intelligence on economic security.

Thus, by systematic study of business intelligence, general principles and indicators have been obtained that can measure the business intelligence system introduced in a company. Additionally, against the background of the information provided, the research may explain the shortcomings and dimensions of the various business intelligence systems.

Business intelligence management refers to each employee at the organizational level. From the example discussed, it is possible to model how business intelligence can be implemented in a company. To this end, there are two main types of data – human resources as analysts as the executive of business intelligence, and the system that provides the processing of specific information (White, 2019) (Power, 2021).When looking at historical and modern data, the two aforementioned factors are equally effective, although the digital aspect is system-oriented.

The historical perspective shows that business intelligence was created as part of the military sector to assess and prevent risk. Its main task was to control and protect information for the security of local and international assets (Watson, 2009). The formation of business intelligence was motivated by the influence of Hakluyt, which can also be conveyed as a theory of modern understanding. Hakluyt was a pioneer who was not the first to receive information but rather to process and draw conclusions (Herzog, 2008).

Over time, business intelligence has transformed into the private sector and the classification of functions has become more diverse (Deraman, Yahaya, Abai & Hamdan, 2019). More precisely, while in the classical category its main task was to protect and control information, in the modern form, elements can be found such as strategic testing, knowledge management and economic security.

The strategic control structure is built on familiar management matrices (Herzog, 2008). The cycle begins by identifying information needs, gathering tailored information and disseminating information. In the middle phase of the cycle, the SWOT matrix, the Porter's five, the structural analysis method and the reverse and prospective analysis methods are used to verify the information (Maharjan, 2019). It is important to note that strategic control is a large-scale process that is not static. Companies from developing countries, such as Georgia and the Republic of Lithuania, can create a strategic control document in the short term, where business intelligence is a monthly report.

Reputation management relates to business intelligence, both in terms of software and human resource management. It includes the creation of an algorithmic axis, as well as the control of documentation, the recording of inter/intrapersonal case management, and the influence of managerial links. Business intelligence can also assess the risks that the collapse of a company's reputation could pose (Anušić, 2021).For example, if a company was to categorize and prioritize risk events for its reputation, the business intelligence function would be to calculate a specific threat.

There are different approaches to the economic security factor. First, it should be noted that business intelligence management economically studies tangible and inviolable factors. Based on the experience of the United States, the formation of economic security in a company is based on several indicators – security audit, security plan, independent security staff and high awareness of employees (Yu & Chang, 2020).

At present, business intelligence management is an optimal tool for overcoming challenges for medium and large companies. For example, Coca-Cola attempted to document human resources, which increased significantly during operations, and managerial resources were allocated through barriers. After the transition to the business intelligence platform, the form of internal communication was resolved – 260 hours per year were saved (Software, 2020).

4 Conclusions

Based on the above, it can be concluded both the external players (direct competitors), as well as internal players involved (employees) can be a threat to business intelligence. Both are aimed at the destruction of the company's position on the market and, in some cases, the propaganda produced by the local government, which serves private interests, can be considered as acting under the cover of direct competitors. This cannot, however, be a grounded opinion, as it is necessary to accept the fact that both internal and external factors are used to influence companies through different tactics. Therefore, proportional factors should be considered when implementing organizational business intelligence management policies.

The development of artificial intelligence and its proper formation in a multi-sectoral environment contributes to the strengthening of information security. With proper algorithms and programming, the system itself will be able to identify threats motivated by human, technological and external factors Even the most effective business intelligence structure requires consideration by multiple players (Somasekaram, 2013). Accordingly, the creation of legal bases and circular systems should be based on the principles of cooperation, and the advantage of this is that the threat will be identified from different perspectives (Ahishakiye, 2018). Different sectors of developing countries need to take care of knowledge specialization. Personnel with high visibility and low probability of risk are directly proportional to the challenges facing information security and are thus mutated, therefore each aspect must be considered in order to respond quickly and effectively.

Based on the above facts and analysis, it can be said that business intelligence largely involves the analysis of data to generate information, while it is possible to draw clear parallels between business intelligence management and information management. From an analytical point of view, business intelligence management clearly distinguishes between data analysis and data science as a whole. As was learned from the Coca-Cola case, business intelligence primarily relates to analyzing, processing and describing past data, while data science is a predictive mechanism. Simply put, business intelligence creates a picture of corporate data that clearly identifies key risks and threats. Based on this, data science makes financial and strategic predictions.

In terms of information management, business intelligence creates a product and valuable information that is delivered to the appropriate management link.

The main theoretical findings can be divided into two directions – academic and professional. As can be learnt from this information, business intelligence is still in the process of refinement and development. Since there is a lack of research in this area, academic circles should be interested in this area.

There is a lot of room for further research in the area of business intelligence management, which will allow a better understanding of what practices are required to have a positive impact on economic security. Business intelligence is increasingly in demand and is largely based on innovation. In this regard, the corporations of the post-Soviet space countries can become pioneers, which will be spread at the regional level on the principle of the domino effect.

The second finding is the assimilation of economic security with business intelligence. Each component of economic security is reflected in the impact of business intelligence management. For example, since one of the indicators of economic security effectiveness is revenue security and innovation, the practice of integrating business intelligence allows transactions to be conducted in a secure environment and data to be processed quickly.

Companies in market economy countries always try to manage production efficiently, i.e. to increase profits with less resources and costs. If the principle of the economy is the balance of the demand and supply chain, business intelligence allows companies in the state to measure the economic environment and become indicators of the macroeconomic framework.

Business intelligence is not only a tool for organizational analysis, but also a source of security management. Economic security also includes transactional security, which business intelligence can provide.

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How the Pandemic Has Impacted CSR and Employee Volunteerism in the SME Sector

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Abstract Social and economic sustainability has become a crucial issue in the corporate sector over recent decades, both in large and small- and medium-sized enterprises (SME). The shock caused by the global pandemic has prompted SME players to rethink their operations. It has motivated them to develop sustainable processes to ensure their long-term economic and competitive presence in the market. The aim of this article is to provide a literature review of operational areas that can be examined and developed from the scope of Corporate Social Responsibility (CSR), which is a concept relating to understanding a business being part of society. Another scope underlined is employee volunteerism as an essential part of CSR activities. However, restrictions due to the COVID-19 pandemic have rewritten enterprises' willingness to help and ways of providing such help. This paper provides a preliminary study of how employee volunteerism might work in the extraordinary COVID-19 situation. This study is a review article, which has been written to bring together and summarise the results/conclusions from multiple original research articles/studies. The authors of this study aim to provide practitioners with an overview to help them adapt to today's rapidly changing environment.

Keywords: CSR, employee volunteerism, global pandemic, SME, sustainability

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'Employee volunteerism is what
the best companies do and
is good for business – inside and out.'
(Cycyota et al., 2016)

1 Introduction

The last to years were one of the most difficult on record in recent economic history, and the COVID-19 pandemic was not just the most significant healthcare challenge of this century. Nevertheless, the pandemic caused mass unemployment or reduced working hours on the labour market and disrupted the economy (some sectors were highly affected, e.g. tourism) and the educational system. Many Europeans worried that the pandemic would lead to job losses, social injustice and lower environmental, health and data protection standards. The younger generation also feels that their contact with people in other countries cannot improve their quality of life (Schubert & Turnovsky, 2018). Unemployed people find it very difficult to find work, while enterprises face severe skills shortages. Research economists have examined the issue from different approaches to identify the causes and make recommendations for European states to successfully tackle the problem (ILO reports).

According to the International Labour Organisation (ILO) (Kapsos, 2021), the effects of the recent COVID-19 pandemic totally confused standard labour market assessments, mainly in relation to classic productivity indicators. The impact of the COVID-19 pandemic on the global economy resulted in an uneven increase in labour productivity. The world's output per hour worked almost doubled to 4.9% in 2020 compared with the long-term average annual rate of 2.4% registered between 2005 and 2019. While this effect has driven up average productivity significantly, overall it has resulted in fewer working hours and extremely unequal damage to the corporate environment. The pandemic resulted in a significant and rapid shift in the composition of employment between 2019 and 2020. For example, the summarised working hours from 26 countries measured by ILOSTAT shows that smaller enterprises experienced more significant declines in working hours than larger enterprises.

Meanwhile, restrictions in force due to the COVID-19 pandemic resulted in development battles such as poverty or inequality. Full recovery it likely to take many years and is going to require massive efforts throughout the world. Those who are the most vulnerable in this social and economic uncertainty need more help and volunteering may become more crucial, with an increased number of people volunteering to help. However, the ILO (Ganta, 2020) stated that global estimates of the number of people who performed volunteer work during this period are not available. Indeed, looking at the past five years, the highest number of searches of the Google index for the word 'volunteering' – in various languages – was registered in March and April 2020. Even though many of those who searched for volunteering opportunities may not have been able to carry out the activities they wanted to due to COVID-19 restrictions or illness, volunteering during a pandemic may affect different demographic groups and encourage people who would not normally volunteer to help (Mak & Fancourt, 2020). Some may have more time and energy available to volunteer, whereas other people, for example young children who are unable to go to school or older people who are at increased risk of illness, may have failed to engage in certain volunteer activities. At the same time, formal or organisational volunteerism has struggled with many problems. Governments focused on the healthcare sector and managed economics. Formal or organisational-based volunteerism can be described using the so-called third-party market model, where the three participants are government, corporations and educational institutes (Haski-Leventhal et al., 2010). Usually, the 'giants' of the third-party volunteerism model are responsible for organising and managing volunteer activities, however, in this case their reaction times seemed to be slower than that of individual volunteers. The competitive sector protected its employees and stabilised its business activities. In addition, the non-profit sector has been slow to wake up from the first hit. The aim of this systematic review is to provide a better understanding of how employee volunteerism could work in the extraordinary COVID-19 situation.

2 Corporate social responsibility

Sustainability can be characterised by the three pillars, namely social, economic, and environmental aspects. Enterprises need to consider their social, governmental and environmental interests. The former is strongly related to CSR, which, as it is often used in business today, can be primarily described in business terms. Although many major global companies strive to integrate value-based corporate governance into

their everyday management practices, this attitude still prevails among managers of SMEs, despite changes and developments. An increasing number of enterprises are beginning to realise that their business (the world of business, profit and work) is not a hermetically sealed area but rather it is closely interconnected and in constant interaction with its (natural and social) environment (Lindgreen, 2009). In this context, the objectives and values of enterprises managed by responsible and committed managersinclude social, human rights and environmental aspects and profit maximisation to achieve sustainable growth (Lichtenstein et al., 2004). The stakeholders of a company are the individuals or groups that influence the organisation's functioning and vice versa. The organisation engages stakeholders and aligns their interests to reduce risks and increase benefits (Peloza & Shang 2011). Stakeholders are shareholders, investors, employees, consumers, competitors, suppliers, civil society, government and the corporate environment. Today, when HR professionals in enterprises face severe challenges in finding and retaining the right employees, it is inevitable that corporate and HR professionals are aware of the criteria that may be important for future employees.

There are many areas of corporate social responsibility, but it can be essentially divided into internal and external corporate activities. Internal activities can include those that strengthen employees' emotional attachment to the company and enhance the value of the corporate image. Activities such as training, communicating a safe workplace and change management fall into this area. The external corporate dimensions reinforce the company's brand equity, customer relationships and customer image. This includes activities related to environmental protection, campaigns with partners and suppliers, activities organised in the company's micro-environment or smaller municipalities, etc. (Lim et al. 2018). Sustainable finance can support organisations in improving their response to environmental, social and governance challenges. A resource-based approach, such as the human resource sustainability model, is essential for SMEs. How to design and manage a marketing strategy or how to make a company 'greener' is of equal importance. Many operational areas are affected by the transition to sustainable development.

There are many different interpretations of the CSR phenomenon, yet there are several common points that are widely accepted:

- It is based on voluntarism, i.e. it is undertaken and implemented voluntarily by enterprises, according to objectives and methods of their own choice and at their own pace. Therefore, CSR should continuously be assessed beyond the relevant basic legal requirements. Howeverm it should not be seen as a substitute for the existing legal rules because CSR complements rather than replaces them.
- It builds on the three dimensions of sustainable development (Purvis et al. 2018), i.e. enterprises integrate environmental and social aspects into their decisions and economic objectives and considerations.
- It relies on stakeholders, i.e. enterprises, to understand their expectations and act on them in their day-to-day activities.
- It permeates the whole company, i.e. it is present in all its processes, functions and activities as a fundamental approach.
- There is no one-size-fits-all solution; each company must develop its response to the challenges according to its industry, size and geographical location.
- As it is a long-term concept, it requires conscious, planned action rather than ad hoc measures to achieve long-term goals.
- It can also deliver short-term results.
- Credibility is the key to its success, i.e. only talk about actual action. It strengthens competitiveness, as the business objectives remain the same, only the method differs.
- Organisational learning is necessary. It leads to a change in the company's behaviour and the individuals who make it up. It can also mean a renewal of values, beliefs and attitudes.
- Effective communication between stakeholders is an essential condition for CSR.
- Stakeholders also need to be appropriately trained, practised and skilled in CSR.
- It is a process of continuous renewal, in which feedback and self-reflection play an essential role.

It should not transfer existing public tasks to the private sector.

- It is a global issue, and therefore its dimension outside the EU (i.e. developing countries) may be the most challenging problem (Kun 2008, Győri 2010).

In terms of the first characteristic, volunteerism is a fundamental part of CSR on the corporate level and is essential for the wider voluntary sector. Employee volunteering as a practice of CSR is a good solution for both the company and the employee (Cycyota et al., 2016). The environment primarily influenced the attendance and intensity of voluntary activity due to the effects of the pandemic. Most volunteers are of working age; indeed, a lot of them are employed. Therefore, voluntary activities can be a part of everyday work. Employee volunteerism programmes are an important and essential part of CSR at the company level and firmly frame this activity, whereby employee volunteerism could associate each participant's interests and improve their values.

3 Employee volunteerism

The question arises as to why a profit-oriented company might be interested in a voluntary action without any profit. Baines (2014) observed the flow-on benefits to businesses of engaging in the non-profit sector: (1) at the internal level, this relationship may facilitate attracting employees, staff retention and employee engagement; (2) it is assigned with company purpose and values; (3) it will enhance customer loyalty and brand enhancement and opens new markets. Furthermore, the realignment of roles and participants in the volunteering sector requires stronger relationships and sectoral strategies among the government, competitive sector and non-profits. This contribution may positively influence each participant's reputation and strengthen the bonding between them. Kolnhofer and Nagy (2020) listed the advantages and disadvantages of employee volunteerism. Based on their work, below the authors of this study have summarised the positive and negative impacts.

Table 1. Advantages and disadvantages of employee volunteerism,
based on Kolnhofer & Nagy (2020)

Positive impacts	Negative impacts
Employee's view	
– Enhances positive feelings and attitudes. – Facilitates time management, communication and creative thinking style. – Supports attitudes towards work, organisational commitment and job satisfaction. – Provides more of a sense of belonging to a team. – Strengthens team relationships and provides new opportunities for social networking .	– The volunteer activity might be not beneficial for well-being on a personal level. – It might be time-consuming (feeling of wasting time) and costly. – It might have a negative social aspect, the stereotype is of typical people with higher income and higher education who can afford to provide support for those in need. – The new environment might have negative affects, such as mobbing or bullying.
Employer's view	
– Teams may have a rising number of anecdotal and case examples of business impact from employees involved in service and social-good programmes. – Better employee attendance, which reduces absenteeism, helps recruit and retain talent. – Increases employee engagement and long-term loyalty. – Helps to identify rising leaders and attract and recruit better potential candidates. – Supports strategy clarification thus ensuring a clear vision and a more effective strategy. – Builds trust with stakeholders to keep in contact, and sharing information creates a positive reputation and image. – Commercial and social benefits create a positive halo effect, i.e. better engagement with the public and improved reputation. It improves reputation brand perception for new customers and increases brand loyalty. – Strengthens social capital through new networking and relationship development (new sales options), even recruiting new employees. – Provides a further opportunity to win market share from competitors.	– Lack of a conscious and meaningful CSR strategy and a helping role might trigger social apathy, insensitivity (lack of responsible thinking and activity) and selfishness. – It might result in so-called preselection and schemes, whereby an organisation only selects those applicants who demonstrate shared organisational values based on personal traits and who fit into its voluntary and involuntary turnover. – Costly; every CSR involvement requires ongoing investments. – Overloaded marketing aspectsmay lead to a loss of reputation. – A universal and untailored campaign may be useless and ineffective. – Over repeated programmes may confuse the core values and mislead communication about the company's mission.

In addition to the internal and external benefits of employee volunteerism, it also plays a crucial role in the CSR strategy. (Cycyota et al., 2016). While CSR is becoming a mainstream issue for many bigger businesses, most of the research relating to CRS addresses large enterprises rather than SMEs. As Perrini et al. (2007) found, SMEs are also approaching CSR, however, compared to large enterprises, they have a different profile that should still be explained in terms of their familiarity and consciousness of CSR. Their results suggest that neither SMEs nor large enterprises seem to support community volunteering in Italy. Seemingly, the larger the enterprise, the more it undertakes formal CSR strategies. However, the SME sector might not be so concerned about employee volunteerism, but it is still involved in community problems at a local level. According to Lukka (2000), the most popular area was cash donations, followed by sponsorships and donations of goods and equipment. Half of his sample indicated that employees were involved in a community activity.

Even big enterprises have faced severe challenges attracting and retaining new or existing workers in this extraordinary period. A well-designed programme of CSR activities can significantly attract and motivate the new generation. For Generation Y and Z, a prospective employer's importance to corporate social responsibility is increasingly important in the job search (Cho et al., 2018). The voluntary contribution of young people is an essential basis for a CSR programme and a significant opportunity for employers. Cho et al. (2018) suggest that the four main motives that attract Generation Z are 'value', 'career', 'learning' and 'self-esteem', each in relation to CSR. The importance of employee volunteerism in promoting sustainable economic development and social inclusion is increasingly recognised by communities and national governments. On the other hand, participation in volunteering has been found to be an excellent reference and training phase for those individuals seeking jobs, thus recruiters highly value these activities.

4 CSR and employee volunteerism in the post-COVID era

Companies are playing a key role in resolving social problems, including pandemics. The contribution of enterprises in pandemics can be performed through corporate social responsibility, therefore it is useful and necessary, and was especially so in the recent COVID-19 pandemic. However, CSR policies in response to COVID-19 are created by organisations but are implemented by individual employees. People

throughout the world were heavily engaged in working together and supporting each other in various ways during the critical COVID-19 period filled with fear and uncertainty. After spontaneous community-level volunteer actions, as was expected, organisational volunteerism is slowly returning to local and national levels. However, this return must be carefully planned and firmly implemented into CSR activities because simply the creation of a new employee volunteer programme does not guarantee its success. Leaders should respond to the COVID-19 pandemic in order to support their vital stakeholders, including internal (employees) as well as external (consumers and communities) stakeholders and society (Mahmud et al., 2021).

Aguinis et al. (2020) provided a theoretical work about CSR and employee volunteerism in relation to the COVID-19 pandemic. They found that, if a enterprise is involved in CSR, the decision-makers need to know that embedded CSR (e.g. CSR that incorporates the core competencies of the organisation and is aligned with the company's strategy, routines and operations) is only linked to positive results if properly implemented by both the company and its employees. In contrast, peripheral CSR (i.e. CSR that is not integrated into the company's strategy, routines and operations but is based on initiatives such as donations or volunteering) may produce unwanted or unpredictable, mixed results. Employees involved in peripheral CSR might view it as symbolic or selfishly motivated by their employers, they might be sceptical of the organisation's claims, or they might feel that CSR is motivated by pure self-interest in profit (Aguinis et al., 2020).

Numerous NGOs received donations from enterprises prior to the pandemic. These donations have decreased by approximately 44%, which is an obvious outcome of an economic recession. This loss can also be explained by the lack of necessary infrastructure and client-facing programmes, thus leading to cmain events being cancelled and regular updates being hindered regular. Moreover, the prompt implementation of new health and safety procedures. As for enterprises that suffered from economic shortages and were hit hard by COVID-19, monetary donations are obviously not such an urgent issue now. Nevertheless, lockdowns and restrictions rewrote the normal working structures and hours, which can be explained by sudden stops or slowdowns in working activities.

Consequently, if enterprises lend a helping service in the form of pro bono or skilled volunteerism, this could prove to be the perfect match. Pro bono or skilled volunteerism means that the employee's professional skills are offered in service to a community partner (Dempsey-Brench & Shantz 2021). These new collaborations may result in both private and public engagement and create new HRM routines, practices and measurement metrics (in terms of recruitment). Volunteer activities serve as the best field in which to practice and develop skills, increase motivation and engage participants. Why could this not happen under the umbrella of CRM? Employee volunteering activity may be the best reference and entrance ticket to the competitive sector when the market is fully ready to be back to normal. In addition, volunteering provides a shielding effect for volunteers to prevent them from being isolated in hard times, providing that safe and secure work is secured in parallel (Kolnhofer-Derecskei & Nagy, 2020).

Practical managerial implications can be summarised into the following to-do list:

- Objectives of employee volunteering programmes and their communication must be clear and aligned with the strategy and close to the enterprise's mission.
- Employee volunteerism is not a marketing tool. Not every object of volunteerism need be linked to a enterprise's positioning or product. It is more about common beliefs, values and mission.
- Bringing into line with employees' motivation; employee volunteerism is not an external reward. Employees must be involved and engaged in participating in the programme.
- Each campaign must be unique, well prepared and carefully planned. Shared goals and common metrics are crucial. It is not a must do, rather it aims to generate enthusiasm.
- Employee volunteerism is a joint action among the competitive sectors (both employees and employers), governments and NGOs (Haski-Leventhal, 2010), where the responsibilities and successes of each achievement must be shared withm and clearly communicated to, every participant.

The authors of this study agree with the following notion suggested by Mahmud et. al (2021, p.13), 'This study reveals that people, government, business leaders and nonprofit organisations have already come together to support vulnerable people throughout the globe with the critically essential world needs during this pandemic period.'

5 Discussion and conclusions

Enterprises may face more and more environmental and economic problems in the future. It is essential to prepare for these in advance by building a strategy to respond quickly to sudden changes. This is not only in the interest of enterprises but also of workers. A well-thought and detailed corporate CSR strategy can play a significant role, supporting employers and employees in sustainable operations and supporting areas of life where it is needed through volunteering. For future research, the authors of this study would aim to provide the SME sector with methodological support to help it develop sustainable operations and urge enterprises to cooperate in critical situations. A possible guideline for these changes may be the 2030 Agenda for Sustainable Development aligned with the 17 main Sustainable Development Goals (SDGs) defined by the United Nations.

This systematic review serves as a possible starting point for forthcoming empirical research where appropriate methods may provide deeper understanding of how and why the SME sector reacts to the current political and social circumstances, such as the war in Ukraine, where Hungary, as neighbouring country, must also lend a stronger helping hand (WHO, 2022). The initial reactions show that while volunteers and charity organisations are doing their best to meet people's immediate humanitarian needs, Hungarian companies must collaborate with charity organisations and establish long-term partnerships in form of employee volunteerism.

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Artificial Intelligence Effects on Inventory Planning of Sensitive Products

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Abstract Pharmaceutical companies invested heavily in research and development, nowadays their funds are mostly allocated in the supply chain management. Inventory forecasting using AI focuses on optimising supply chain processes and mitigating operational risks related to the treatment of sensitive products. The purpose of this research is to comprehensively examine the processes and important factors that influence the implementation of forecasting and optimising inventories. The objectives identify data sources, examine data information flows, review appropriate forecasting models and analyse inventory optimisation-related metrics that could be applied in manufacturing companies. In this paper, the authors review the latest literature in the areas of sales forecasting, inventory optimisation and related forecasting models and metrics, with special emphasis on AI models. The literature review includes publications of scientific research results as well as reports on the development results of the applied inventory optimisation solutions in the industry. The research results will be useful for conducting applied research in a selected company, addressing the complex issue of managing a supply chain, as well as the production and storage of perishable materials and products. Results will be useful in research aimed at improving the forecasting of the inventory of sensitive products and consequentially increasing business efficiency.

Keywords:
inventory planning, manufacturing optimisation, sales forecasting, artificial intelligence, pharmaceutical industry, supply chain

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1 Introduction

The development of technology has enabled individuals and companies to collect and use huge amounts of data in their operations. The data collected are often unstructured, thus efforts are made to structure it as much as possible and provide it to the relevant users in real-time in the form of information. For a smooth flow of information, it is necessary to establish mechanisms, technologies and processes in a company that detect important data and distribute it properly to the departments involved (Kubinaa, Varmus, & Kubinova, 2015; Weißhuhn & Hoberg, 2021).

Successful pharmaceutical companies deal with very sensitive products, thereby they place great emphasis on optimising supply chain processes. The products must be placed on the market as quickly as possible so that they are not subject to temperature fluctuations during excessive storage, which could pose a risk to product quality. Prolonging storage or shipping increases the likelihood of product damage or decay, which can endanger consumer health and at the same time increase the manufacturers' costs due to a market recall (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021; Shapiro & Wagner, 2009; Shah, 2004).

At the same time, storage capacities for pharmaceutical products are very expensive, as specific and durable storage temperature conditions must be safeguarded. As a result, pharmaceutical companies strive to forecast inventory levels as much as possible by applying artificial intelligence (AI) models to accurately predict inventory levels of raw materials and finished products. Lack of product quantity on the market can pose a serious threat to human health in the pharmaceutical industry. On the other hand, excessive inventory levels can have a financial impact on the production company, as the products are discarded after the expiry date (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021). Inventory fluctuations can have legal consequences (lawsuits and restitutions) and negatively affect market investors (Fahimnia, Tang, Dearzani, & Sarkis, 2015).

The CRISP methodology (Wirth & Hipp, 2000) reduces the probability of failure of an artificial intelligence project by ensuring that each important perspective is addressed during the process. It consists of six major steps:

1. Business Understanding
2. Data Understanding
3. Data Preparation
4. Modelling
5. Evaluation
6. Deployment

In this paper, the authors examine the first three steps, providing a valid framework for modelling and evaluation, which may lead to the solution deployment. Special focus is placed on examining the effects of these steps on the usability of artificial intelligence and its effects on business performance.

This research examines the processes and factors that significantly influence inventory planning within the supply chains of sensitive pharmaceutical products. Important factors include data on the customer, product, sales, orders, logistics, and deliveries (Mahya & Mafakheri, 2020; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021) and data-related processes. Based on well-prepared input data, the researchers focus on the metrics and flows of forecasting and optimising the inventory of sensitive products in the pharmaceutical chain. Special emphasis has been placed of late on the use of artificial intelligence in forecasting models. In existing literature (Achamrah, Riane, & Limbourg, 2021; Hiassat, Diabat, & Rahwan, 2017), approaches for prediction are found using neural networks, machine learning, deep learning, etc.

The paper continues with background research on inventory forecasting processes, factors and metrics, where the complexity of the preparation of research input data and metrics for forecasting inventory movements in supply chains are highlighted in more detail. The third chapter describes a proposal for the concept of a forecasting model through input data proposals and associated metrics based on artificial intelligence methods. Finally, the effects on the operation of companies are examined as well as the indirect effects on society and the environment, especially in the case of the use of limited quantities of perishable ingredients and products.

2 Background

Factors influencing inventory forecasts have been addressed by many authors. They address data content in the first part and the processes and models of inventory forecasting in the second part.

2.1 Critical factors for inventory planning

When forecasting inventory, it is necessary to observe the slightly broader issue of planning the entire supply chain, which includes suppliers of raw materials, production sites, logistics and, finally, users. Instead of separate approaches and models of department management (sales, purchasing, logistics, finance, etc.), the strategy of directing the operation of the supply chain should be comprehensively controlled (Shapiro & Wagner, 2009; Hiassat, Diabat, & Rahwan, 2017).

A company's supply chain is thus subject to a wide range of factors and risks that need to be monitored to ensure efficient management of the company's operations. Risks of a systemic nature are difficult to predict and monitor, as the company has limited or no influence on them and it is difficult to detect them in time. These include environmental risks, uncertain product demand, supply disruptions, sudden changes in regulations across countries, legal and bureaucratic changes, catastrophic unforeseen events (for example, earthquakes, large-scale fires, disease epidemics/pandemics, wars, etc.), infrastructure disruptions, etc. (Baghalian, Rezapour, & Farahani, 2013). In the pharmaceutical industry, the primary production of an active substance is particularly demanding. Carrying out chemical processes often requires a certain time span. In addition, different phases of manufacturing are usually carried out in multiple locations, for instance, the location where active components are manufactured may be geographically distant to the secondary production and packaging of the product for shipment to the market, which prolongs the time and complexity of the product preparation process (Shah, 2004).

Non-system risks are easier to control and more tied to the operation of the company itself. These include the well-coordinated operation of the functions of the entire company (Baghalian, Rezapour, & Farahani, 2013). Based on the latter, companies strive to reduce operating costs per unit of product sold (Ouyang, Yeh, & Wu, 1996).

The physical and chemical data of the product determine the manufacturing and storing of products (Mahya & Mafakheri, 2020; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021), These data can be accessed from the product specifications and by taking measurements, which contain relevant information on the product, quality, ingredients, shelf life, storage temperature conditions, etc.

The next data group is past performance data from a company's ERP system, which include data on sales history and demand for each product (Mahya & Mafakheri, 2020; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021). Some authors also calculate the uncertainty of the quantity of urgent demand, fixed costs with orders and the average annual demand for the product (Meng, Guo, & Zhang, 2021; Ouyang, Yeh, & Wu, 1996).

The sales and production planning data are to be included in the model, i.e. short-term production plans and long-term plans for product demand or the so-called production plan, as well as the plan realisation data (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021; Mahya & Mafakheri, 2020).

Inventory planning is additionally influenced by the resources available to plan the production process (Shapiro & Wagner, 2009; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021). These include data on the capacity and limitations of the production process and assessments of the associated risks (Shapiro & Wagner, 2009).

Company-wide inventory and cost data serve as information for managing inventory levels, setting company policies and internal company information flow (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021).

Logistical data on storage, transport and return flow must also be taken into account when planning an inventory. Serialisation data make it easier to monitor logistics flows and manage the quality levels of products entering the supply chain (Mahya & Mafakheri, 2020; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021; Shapiro & Wagner, 2009). This technology enables monitoring of storage costs at the level of the product item throughout the entire lifetime up to the end users (Ouyang, Yeh, & Wu, 1996).

Supplier data and contracts between them are more difficult to access and thereby less frequently used in research (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021; Mahya & Mafakheri, 2020).

Some researchers focus on customer data and activities of the latter. The latter can be obtained from web search cookies, phone calls, home and clinical use of prescriptions, etc. Acquiring this data can be ethically questionable and should comply with the international standards for personal data management (Shapiro & Wagner, 2009; Mahya & Mafakheri, 2020; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021).

In part, it is possible to monitor the changing requirements of users and the efficiency of a company's capital usage (Achamrah, Riane, & Limbourg, 2021; Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021). An important factor is the monitoring of contracts between governments and producers within data on state reserves (Meng, Guo, & Zhang, 2021). Researchers also pay attention to environmental data as well as data on outbreaks of recurrent diseases, statistical information from population change databases and others (Nguyen, Lamouri, Pellerin, Tamayo, & Lekens, 2021).

With the ever faster operation of companies with short delivery times, key data on the preparation of active ingredients is required to determine the ability to deliver on time and avoid the cost of penalties and delays in the event of late or cancelled deliveries (Hiassat, Diabat, & Rahwan, 2017; Ouyang, Yeh, & Wu, 1996).

2.2 Inventory forecasting processes and models

Inventory forecasting processes can be defined as a function of the average product flow, to balance costs as efficiently as possible and the movement of storage capacity with an optimal inventory (Shapiro & Wagner, 2009). Market requirements are addressed by providing the shortest possible delivery times and the best possible adaptation to customers in a changing market to ensure the efficient operation of the company (Achamrah, Riane, & Limbourg, 2021).

A basic method for monitoring the level of inventory is the minimum-maximum method, where the critical limits of inventory products are determined. When the inventory of a particular product falls below the set limit, the order is executed up to the maximum capacity of the inventory (Shapiro & Wagner, 2009).

Some authors prefer to associate the optimisation of storage capacity with forecast sales models, such as ARIMA (Autoregressive Integrated Moving Average). Sales planning is the basis for optimising production, purchasing, logistics and efficient people management. Time series analysis and trend searches can lead to effective predictive models based on the detection of autocorrelations of integrated averages in data (Ramos, Santos, & Rebelo, 2015; Fattah, Ezzine, Aman, El Moussami, & Lachhab, 2018). The use of the DEA (Data Envelopment Analysis) method is often mentioned for analysing the performance scenarios of individual units with an emphasis on improving the input data for the supply chain results optimisation (Habibifar, Hamid, Bastan, & Azar, 2019).

One of the most challenging tasks for any industrial company with a large product mix is the creation of a robust production schedule to augment the manufacturing managers, thus enabling dynamic experimentation and validation of products, processes and system design and configuration. (Mourtzis, 2020) provides insights into the history and state of the art trends of manufacturing simulation support. (Kaylani & Atieh, 2016) propose a discrete event simulation approach. They evaluate the credibility of the generated schedule by measuring the utilisation of resources, identifying bottlenecks and throughput, and evaluating the impact of each item in the product mix on these performance measures.

Some companies use forecasting approaches in which they prioritise high-reward customers. This means that when entering requirements into the system, they reserve a certain part of the inventory for 'urgent' customers, which increases the 'total reward (Cheung, Ma, Simchi-Levi, & Wang, 2022). In this case, it is not only the realised price that is relevant but also the risk management for individual business scenarios (Baghalian, Rezapour, & Farahani, 2013).

In the state-of-the-art literature, researchers mention the method of genetic algorithms over the initial population of input data. In the first step, it is necessary to place the chromosomes, i.e. perform coding on the traceability of products from the manufacturer to the end-user. This is followed by initialisation, whereby the full capacity of the warehouse is utilised. In the third step, an optimisation simulation is performed with the help of linear programming, taking into account the market laws. The next phase is the change of priorities between products and customers, which leads to a circular loop of finding the optimal choice. The key is to evaluate the overall performance of care for the best possible use of a company's resources. Several selections are then made, whereby options with lower costs for the company are put in the foreground. The selected option is also checked later during the new generation of products (Achamrah, Riane, & Limbourg, 2021; Hiassat, Diabat, & Rahwan, 2017).

The trend in existing literature focuses on machine learning and, consequently, a subset of deep learning. The latter is useful when dealing with large volumes of complex data. It is used to identify matches within the given input data and is often used in combination with neural networks (Achamrah, Riane, & Limbourg, 2021).

The use of neural networks that mimic the properties of biological neurons in the nervous system during the analysis of input data is also becoming more common. It allows the approximation of complex relationships between input data using nonlinear functions. Some authors use it to capture the time series of several nonlinear variables (for example, in sales). The method is also effective for a small set of historical data, due to the rapid change of products while adapting to situations in the pharmaceutical market (Zedeh, Sepehri, & Ferveresh, 2014).

3 The model

In this research, the authors have examined the application of AI models in inventory planning. The first three steps of the CRISP methodology have been examined:

1. Business Understanding
2. Data Understanding
3. Data Preparation

At the current stage, a conceptual analysis will be applied, thus opening the door for a more detailed physical modelling and examination of the applied AI-based predictive models in a business case.

3.1 Business Understanding

Even though inventory planning can be regarded as an isolated business process that can be easily optimised, it is closely integrated with the sales predictions and optimised manufacturing processes on the one side and the supply chain on the other side, bundled together with the company's business goals and performance measurement. This research addresses multiple closely related business processes, sales prediction, manufacturing simulation and optimisation, and inventory planning. For the application of AI to provide the expected business effects, single processed processes need to be examined from the perspective of how to augment people in charge of planning and optimising the processes to clearly elaborate the pivot points in which they need additional support. In addition, it is also important to identify how to format it and, most importantly, how to upgrade communication and collaboration between these managers to enable them to cope with the dynamics of the environment and utilise the organisational and process limitation.

In inventory management, AI can help clarify inventory plans, thus improving direct communication with related business users: manufacturing managers on the one side and direct suppliers on the other. Even though the focus is on communication with the direct business nodes, the systemic goal is to improve communication in the whole supply chain: from understanding the customers' expectations, sales

predictions and manufacturing plans on the sales side to a better understanding of the capacities and limitations on the procurement side of the supply chain.

3.2 Data Understanding

Based on the literature review from Chapter 2.1, the authors propose eight groups of input data. These are inventory, data on past sales, orders received, long term contracts, production facilities with processes and costs, production properties and components, occupancy of warehouse and logistics.

Inventory data should contain data on the state of inventory movement of an individual product in a certain previous period in the warehouse.

The next group is historical product sales data, which includes data on sales volume to each partner.

The third group collects sales plan data. Short-term plans can be obtained from corporate ERP systems, while long-term plans need to look at indicative sales plans in the future.

The fourth group of data are long term contracts, which cover regular customers with known quantities of materials.

The next two groups represent data on products that can be obtained from a company's ERP system or product specifications. The characteristics of production and possible incompatibilities of simultaneous production of products at the same production location are also important. Storage data are also important to ensure appropriate storage conditions.

It makes sense to obtain data on the occupancy of each part of the warehouse according to the classification of the product, i.e. by separating drug warehouses, room temperature warehouses and cold chain.

The last group includes logistical data on the mode of transport and the possibility of providing appropriate temperature conditions. It also makes sense to include the potential risks of damage or malfunction of products during product distribution.

Information about product release dates is also included. This group also covers the specifics of the plans in the ERP system. Restrictions on the packaging and registration of medicines and the possible need for quarantine when importing the product should be highlighted at this point, as well as cover for emergencies (fires, floods, periods of respiratory diseases, etc.) and consequent time fluctuations in sales of individual products.

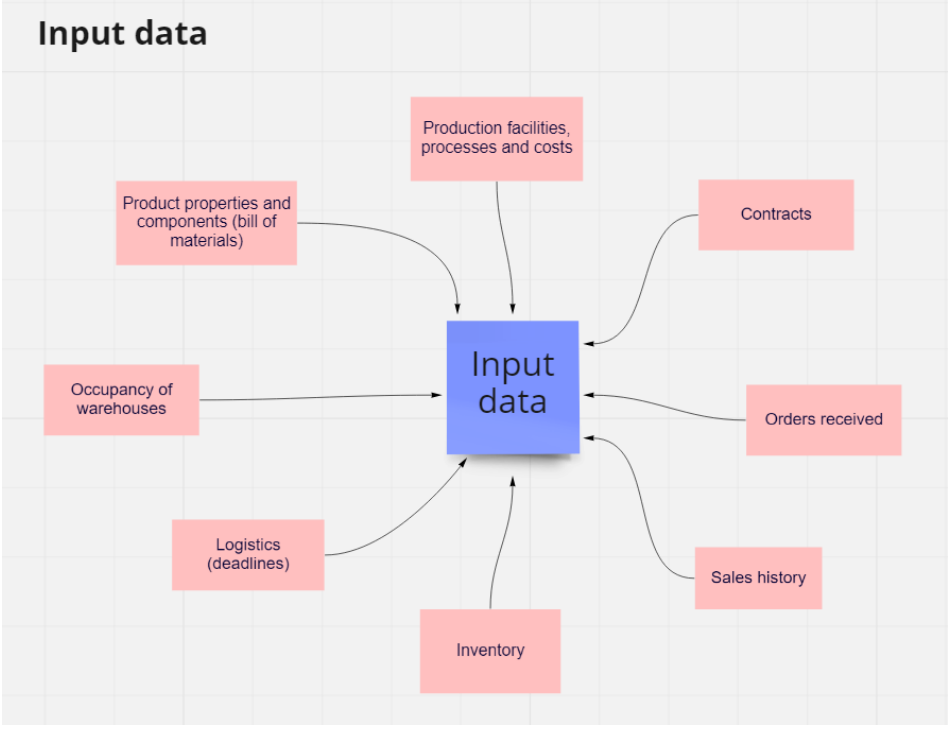

Figure 1: Proposed input data
Source: own.

3.3 Data Preparation model (the process)

Before preparing the forecast inventory model, a series of preparatory data models were prepared to dynamically link sales forecasts with production and storage capacity constraints and those related to the acquisition and gradual preparation of final product components.

The process model consists of three parts. The first part focuses on the forecast sales model with a combination of predicting time series using algorithms such as ARIMA (Zhang, 2003), upgraded by the long-term contractual orders and received/confirmed orders taking into account the current inventory in a company's logistics centre. Based on the sales forecast, the manufacturing processes can be simulated, taking into account production capacities, the understanding of processes and the costs stored in a company's ERP system (Klemm, 2021). The manufacturing simulation model is the basis for inventory planning (ibid.). Data are required on occupancy, types of warehouses, products from specifications, etc. The result of the raw material is active support in preparing procurement orders and managing manufacturing processes to fulfil users' requests.

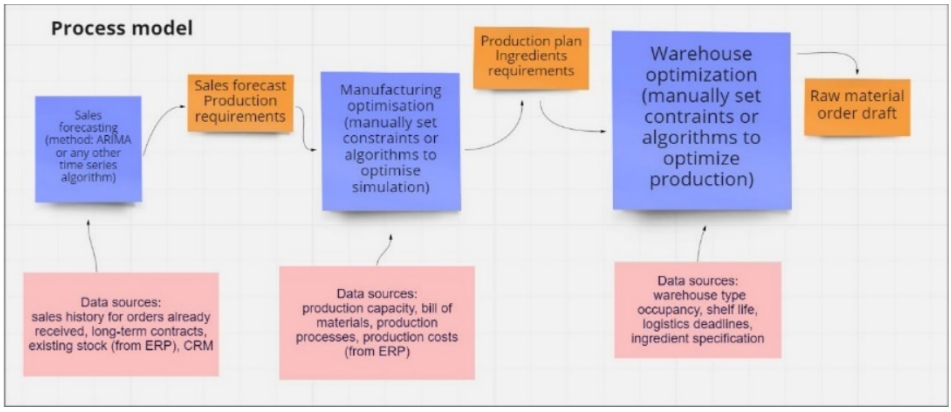

Figure 2: Proposed process model
Source: own.

4 Conclusion

The planning of supply chain storage capacities is a multifaceted problem combination of multiple interconnected segments in a dynamic environment. Business users need to coordinate and cooperate in sales forecasting, management simulation and procurement planning for optimal process execution. Particular attention should be paid to the data preparation phase, which is crucial for successful results in all stages of modelling. Data can largely be obtained from a company's ERP system and product specifications. Each segment needs to provide business

users with the information required for communication with the other business users. Sales need to provide a trustworthy sales plan based on sales forecasting while manufacturing managers deliver requests for raw materials based on the production simulation to be processed by warehouse managers to issue the appropriate procurement orders. The final product of the modelling process – the procurement order of raw materials – is the foundation for directing the production and distribution of products process.

A good and well-coordinated supply chain will thus enable lean operations of the entire organisation, bring users a better supply of products, improve a company's financial results and reduce risk exposure. An improved planning process means that society will also benefit from higher-quality products. The products will therefore be exposed to reduced risk of failure in the period between production to reaching the end-user and will be delivered on time and without any damage. The environment and decision-makers will gain insight into the need to bring together key stakeholders in the event of global crises and the resulting disruption to the timely supply of adequate raw materials.

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UTILITY-BASED RESOURCE ALLOCATION UNDER UNCERTAINTY

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Abstract Due to the COVID-19 pandemic, societies have recently become aware that all decision-making processes are made under huge uncertainty. Since the worldwide situation cannot be compared to any other in the past, it is hard to apply any of the typical descriptions of uncertainty based on historical data. In this paper, the authors try to show how to use expert knowledge of the unknown values of systems parameters to optimise their operation through appropriate allocation of resources and also consider the systems that may be modelled by using the utility theory. Production plants and computer networks are examples of such systems. The authors have modelled the uncertainty with the formalism of uncertain variables and proposed a new approach to the problem of optimising resources with uncertain parameters. A method to solve such a defined problem is also discussed.

Keywords:
uncertainty, optimisation, allocation, production, manufacturing

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1 Introduction

Many systems, such as manufacturing systems, transport systems, information systems and computer networks, need the appropriate allocation of resources in order to operate effectively. To optimise the operation of these systems, it is crucial to know their parameters. Unfortunately, precise values are usually not known in advance and instead some additional descriptions may be available. For example, the probability distribution may be given. However, this is only possible if reliable historical data is available. When faced with a unique situation, one approach is to try to utilise expert knowledge, if available. In this paper, the authors introduce a possible approach for such a case.

2 Deterministic resource allocation problem

2.1 Mathematical model

Let us consider the resource allocation system that transforms resources into goods. Assume that the system consists of *J* parallel plants that share resources. The system produces *I* different types of goods. *L* different resources are available and the amount of the *l*th resource available is given by C_l. The a_{ijl} transformation coefficient indicates how much of the *l*th resource is used by the *j*th plant to produce one unit of the *i*th good. The income from selling particular goods depends on the utility and the 'willingness-to-pay' coefficient w_i. The utility depends on the amount of goods that are produced and can be modelled with an iso-elastic function $\varphi(\sum_j x_{ij})$. It is also assumed that there are some demands in relation to the minimal amount of each of the goods D_i.

The aim of this paper is to determine $x = [x_{ij}]$, i.e. the amount of each good *i* that will be produced in each plant *j* in order to maximise the total income. Furthermore, no resource constraints may be violated and the demand requirements must be fulfilled. This decision results in the appropriate resource allocations, i.e. the amount of the *l*th resource that is allocated to produce *i*th good in the *j*th plant may be calculated as $a_{ijl}x_{ij}$.

2.2 Problem formulation

The problem under consideration may now be formulated as the following optimisation task.
Given: $a_{ijl}, C_l, w_i, \varphi$

Finding:

$$x^* = \arg\max_{x \geq 0} \sum_i w_i \varphi\left(\sum_j x_{ij}\right) \tag{1}$$

such that:

$$\sum_i \sum_j a_{ijl} x_{ij} \leq C_l \quad \text{for } l = 1, 2, \ldots, L \tag{2}$$

$$\sum_j x_{ij} \geq D_i \quad \text{for } i = 1, 2, \ldots, I. \tag{3}$$

2.2 Lagrange function and Karush-Kuhn-Tucker conditions

To solve the optimisation problem (1), the Karush-Kuhn-Tucker (KKT) conditions may be considered (for more details see e.g. (Gasior and Orski, 2014)). Thus, the Lagrange function must be introduced:

$$L(x, \lambda, \mu) = -\sum_i w_i \varphi\left(\sum_j x_{ij}\right) + \sum_l \lambda_l \left(\sum_i \sum_j a_{ijl} x_{ij} - C_l\right) + \sum_i \mu_i \left(D_i - \sum_j x_{ij}\right). \tag{4}$$

The Karush-Kuhn-Tucker conditions have the following form:

$$\frac{\partial L(x,\lambda,\mu)}{\partial x_{ij}} = 0 \quad \text{for } i = 1, 2, \ldots, I, j = 1, 2, \ldots, J, \tag{5}$$

$$\lambda_l \frac{\partial L(x,\lambda,\mu)}{\partial \lambda_l} = 0 \quad \text{for } l = 1, 2, \ldots, L, \tag{6}$$

$$\frac{\partial L(x,\lambda,\mu)}{\partial \lambda_l} \leq 0 \quad \text{for } l = 1, 2, \ldots, L, \tag{7}$$

$$\lambda_l \frac{\partial L(x,\lambda,\mu)}{\partial \lambda_l} = 0 \quad \text{for } l = 1, 2, \ldots, L, \tag{8}$$

$$\frac{\partial L(x,\lambda,\mu)}{\partial \mu_i} \leq 0 \text{ for } i = 1, 2, \ldots, I, \tag{9}$$

$$x_{ij} \geq 0 \text{ for } i = 1, 2, \ldots, I, j = 1, 2, \ldots, J, \text{ and } \lambda_l \geq 0 \quad \text{for } l = 1, 2, \ldots, L. \tag{10}$$

Therefore, taking into account the Lagrange function form given by (4), (5)-(10) may be rewritten in the following form:

$$-w_i \varphi'(\textstyle\sum_j x_{ij}) + \sum_l \lambda_l \left(\sum_i \sum_j a_{ijl}\right) + \mu_i = 0 \text{ for } i = 1, 2, \ldots, I, j = 1, 2, \ldots, J, \tag{11}$$

$$\lambda_l \left(\textstyle\sum_i \sum_j a_{ijl} x_{ij} - C_l\right) = 0 \text{ for } l = 1, 2, \ldots, L, \tag{12}$$

$$\textstyle\sum_i \sum_j a_{ijl} x_{ij} - C_l \leq 0 \text{ for } l = 1, 2, \ldots, L, \tag{13}$$

$$\mu_i \left(D_i - \textstyle\sum_j x_{ij}\right) = 0 \text{ for } i = 1, 2, \ldots, I, \tag{14}$$

$$D_i - \textstyle\sum_j x_{ij} \leq 0 \text{ for } i = 1, 2, \ldots, I, \tag{15}$$

$$x_{ij} \geq 0 \text{ for } i = 1, 2, \ldots, I, j = 1, 2, \ldots, J, \text{ and } \lambda_l \geq 0 \quad \text{for } l = 1, 2, \ldots, L. \tag{16}$$

The $\varphi(\sum_j x_{ij})$ are so-called iso-elastic utility functions, which means they are continuous, increasing, strictly concave and twice differentiable. Thus, the problem given (1) is a convex optimisation problem, therefore the KKT conditions are necessary and sufficient for optimality. Nevertheless, it is usually difficult to analytically solve the set of equations and inequalities given by (11)-(16), therefore many numerical methods are usually applied.

3 Uncertain variables

To model uncertainty, uncertain variables may be used. This is especially useful when the possible values of the unknown parameters cannot be deduced from the historical data but are based on expert knowledge. A detailed introduction to the formalism of uncertain variables may be found in Bubnicki (2003). The authors of this paper have limited it to only the most important aspects.

The uncertain variables are based on the multi-value logic. Therefore, it is not possible to say whether or not the particular property Ψ, being the logic proposition, is true. Instead, the degree of certainty that the given property is satisfied has been described $v[\Psi]$. For the uncertain variable denoted by $\bar{b}$, two fundamental properties are introduced:

- $\bar{b} \cong b$ which means $\bar{b}$ is approximately equal to b
- $\bar{b} \,\tilde{\in}\, D_b$ which means $\bar{b}$ approximately belongs to D_b

The certainty degree $v(\bar{b} \cong b) = h(b)$ is given by an expert for every value b and $h(b)$ is called certainty distribution. Introducing uncertain variables, the following definitions must be also given:

$$v\left(\bar{b} \,\tilde{\in}\, D_b\right) = \begin{cases} \max\limits_{b \in D_b} h(b) & for \quad D_b \neq \emptyset, \\ 0 & for \quad D_b = \emptyset, \end{cases}$$

$$v\left(\bar{b} \,\tilde{\notin}\, D_b\right) = 1 - v\left(\bar{b} \,\tilde{\in}\, D_b\right),$$

$$v\left(\bar{b} \,\tilde{\in}\, D_1 \vee \bar{b} \,\tilde{\in}\, D_2\right) = \max\{v\left(\bar{b} \,\tilde{\in}\, D_1\right), v\left(\bar{b} \,\tilde{\in}\, D_2\right)\},$$

$$v\left(\bar{b} \,\tilde{\in}\, D_1 \vee \bar{b} \,\tilde{\in}\, D_2\right) = \begin{cases} \min\left\{v\left(\bar{b} \,\tilde{\in}\, D_1\right), v\left(\bar{b} \,\tilde{\in}\, D_2\right)\right\} & \text{for} \quad D_1 \cup D_2 \neq \emptyset, \\ 0 & \text{for} \quad D_1 \cup D_2 = \emptyset. \end{cases}$$

4 Resource allocation problem for an uncertain case

It must be stressed that the precise values of some parameters may not be known in advance.

For instance, how much customers are willing to pay for the achieved utility may not be known. The number of available resources may also not be known in advance, since it is not always possible to ascertain whether all the supplies of resources will be on time or if the full capacity of the devices required for production will be available. Finally, the precise values of resources that are need to produce one unit of a good may not be known. It is sometimes possible to predict these values based on historical data. However, such data may not be available for cases covering incidents such as the COVID-19 pandemic or war, which may have a huge impact on the plant under consideration. In such cases, expert opinion is the only reliable option. Below, an approach for such a case is described.

Let us now consider the most general case, for which a_{ijl}, C_l, w_i are the uncertain parameters and there is an expert who describes their knowledge of the possible values of these parameters in terms of the certainty distributions h_{aijl}, h_{Cl}, h_{wi}, respectively. If any of the parameters (i.e. p) value (p^*)) are precisely known in advance, the following distribution may be assumed: $h(p) = 1(0)$ for $p = p^*$ (otherwise) without loss of generality.

The classic approach cannot now be directly applied. Thus, the optimisation problem is usually formulated differently. The first option is to maximise the certainty index so that the constraints are fulfilled and the objective function must not be less than the given threshold α. The other option consists of finding a solution for which the threshold α is maximal and the certainty index of fulfilling the appropriate requirements is not less than the given minimal acceptable value v^* (Gasior, 2008). Note that in both cases, additional user input is required.

In this paper, the authors propose a different approach to the optimisation problem by introducing the certainty index that the KKT conditions are approximately satisfied, which is denoted as follows:

$$v\left(\left(\forall_{ij} - w_i\varphi'\left(\sum_j x_{ij}\right) + \sum_l \lambda_l\left(\sum_i\sum_j a_{ijl}\right) + \mu_i \cong 0\right)\right.$$

$$\wedge\left(\forall_l \lambda_l\left(\sum_i\sum_j \bar{a}_{ijl}x_{ij} - \bar{C}_l\right) \cong 0\right) \wedge \left(\forall_l \sum_i\sum_j \bar{a}_{ijl}x_{ij} - \bar{C}_l \lessapprox 0\right)$$

$$\left.\wedge\left(\forall_i\ \mu_i\left(D_I - \sum_j x_{ij}\right) = 0\right) \wedge \left(\forall_i\ D_i - \sum_j x_{ij} \leq 0\right)\right) \triangleq v(x,\lambda,\mu),$$

and by then maximising it for non-negative x_{ij} and λ_l, i.e.:

$$x^*, \lambda^* = \arg\max_{x\geq 0, \lambda \geq 0} v(x,\lambda,\mu)\,.$$

Let us introduce an auxiliary notation:

$$v\left(-w_i\varphi'\left(\sum_j x_{ij}\right) + \sum_l \lambda_l\left(\sum_i\sum_j a_{ijl}\right) + \mu_i \cong 0\right) \triangleq v_{ij}^{(1)}(x,\lambda,\mu),$$

$$v\left(\lambda_l\left(\sum_i\sum_j \bar{a}_{ijl}x_{ij} - \bar{C}_l\right) \cong 0\right) \triangleq v_l^{(2)}(x,\lambda,\mu),$$

$$v\left(\sum_i\sum_j \bar{a}_{ijl}x_{ij} - \bar{C}_l \lessapprox 0\right) \triangleq v_l^{(3)}(x,\lambda,\mu).$$

It is also notable that:

$$\left(\forall_i\ \mu_i\left(D_i - \textstyle\sum_j x_{ij}\right) = 0\right) \wedge \left(\forall_i\ D_i - \textstyle\sum_j x_{ij} \leq 0\right) \quad (17)$$

may be either true or false. Therefore, the certainty index $v\left(\left(\forall_i\ \mu_i\left(D_I - \sum_j a_{ijl}x_{ij}\right) = 0\right) \wedge \left(\forall_i\ D_i - \sum_j a_{ijl}x_{ij} \leq 0\right)\right)$ may be either 1 or 0 respectively. Any solution is valid for the certainty index equal to 0, therefore in this paper, the authors are only interested in cases where the certainty index is greater than 0, hence (17) are considered as constraints.

The problem formulation may now be rewritten as:

$$x^*, \lambda^* = \arg\max_{x\geq 0, \lambda \geq 0, \mu \geq 0} \min\left\{\min_{ij} v_{ij}^{(1)}(x,\lambda,\mu), \min_{l} v_{l}^{(2)}(x,\lambda,\mu), \min_{l} v_{l}^{(3)}(x,\lambda,\mu)\right\} \tag{18}$$

such that constraints (14) and (15) are satisfied.

Instead of solving the problem (18), an equivalent problem may be formulated.

Finding:

$$x^*, \lambda^*, \mu^*, v^* = \arg\max_{x\geq 0, \lambda \geq 0, \mu \geq 0, v^* \in [0,1]} v^*$$

such that:

$$v_{ij}^{(1)}(x,\lambda,\mu) \geq v^*, \forall_1 v_{l}^{(2)}(x,\lambda,\mu) \geq v^*, \forall_1 v_{l}^{(3)}(x,\lambda,\mu) \geq v^* \text{ for } i = 1, 2, \ldots, I, j = 1, 2, \ldots, J,$$

$$\mu_i\left(D_i - \sum_j a_{ijl}x_{ij}\right) = 0 \text{ for } i = 1, 2, \ldots, I, \text{ and } D_i - \sum_j x_{ij} \leq 0 \text{ for } i = 1, 2, \ldots, I$$

According to the properties of the uncertain variables, the introduced certainty indices may be determined as follows:

$$v_{ij}^{(1)}(x,\lambda,\mu) = \max_{w_i, a_{ijl}:\ -w_i\varphi'(\sum_j x_{ij}) + \sum_l \lambda_l(\sum_i \sum_j a_{ijl}) + \mu_i = 0} \min\{h_{wi}(w_i), \min_{ijl} h_{aijl}(a_{ijl})\}, \tag{19}$$

$$v_l^{(2)}(x,\lambda,\mu) = \max_{C_l, a_{ijl}:\, \lambda_l(\sum_i \sum_j a_{ijl} x_{ij} - C_l)=0} \min\{h_{Cl}(C_l), \min_{ijl} h_{aijl}(a_{ijl})\},$$

(20)

$$v_l^{(3)}(x,\lambda,\mu) = \max_{C_l, a_{ijl}:\, \sum_i \sum_j a_{ijl} x_{ij} - C_l \le 0} \min\{h_{Cl}(C_l), \min_{ijl} h_{aijl}(a_{ijl})\}.$$

(21)

The following procedure may be applied to solve the formulated problem:

1. When trying to solve the deterministic version of the problem (1) for the values of unknown parameters, expert opinion is the most certain. If this solution is available, it is also the solution to the uncertain problem (18). Thus, the procedure stops.
2. Determine (19), (20), (21) using e.g. the method given in Gasior (2008).
3. Substitute the certainty index in (18) and solve the optimisation problem using the methods given in e.g. Boyd et al (2004).

5 Numerical example

Let us consider the following simple numerical example based on the assumption that there is a company with one factory ($J = 1$) that produces two types of products ($I = 2$), and there is one crucial resource type ($L = 1$). The factory consumes one unit of the resource to produce one unit of each product type ($a_{111} = 1, a_{211} = 1$). Due to some agreements, the company must produce at least 50 units of the first product and at least 60 units of the second product ($D_1 = 50, D_2 = 60$). The company may sell more products of each type and its income may be calculated using the following function: $w_1\varphi(x_{11}) + w_2\varphi(x_{21})$ where x_{11} and x_{21} are the amount of the first and the second product respectively. The precise value of the available resource (C_1) and 'willingness-to-pay' coefficients (w_1, w_2) are not known in advance. Instead, the possible values of these parameters are given by the expert in terms of the triangular certainty distributions h_{C1}, h_{w1}, h_{w2} with the following parameters: $C_1^* = 100, d_{C1} = 20, w_1^* = 10, d_{w1} = 1, w_2^* = 20, d_{w2} = 2$

(compare e.g. (Gasior, 2008)). The aim here is to determine x_{11} and x_{21},which solves (18).

Solution:

1. Note that even for minimal demands (i.e. for $x_{11} = 50$, and $x_{21} = 60$), there is no feasible solution for the deterministic version of the problem $for\ C = C_1^* = 100, w_1 = w_1^* = 10, w_2 = w_2^* = 20$. In such a case, the resource constraint (2) is not satisfied, since $50 + 60 - 100 > 0$. Thus, the procedure must be continued.
2. The certainty indices (19), (20), (21) have the following forms: $v_{i1}^{(1)}(x, \lambda) = h_{wi}\big((\lambda_1 + \mu_i)x_{i1}\big)$, $v_l^{(2)}(x, \lambda) = h_{C1}(x_{11} + x_{21})$, and $v_l^{(3)}(x, \lambda) = \frac{C_1^* - (x_{11} + x_{21})}{d_{C1}}$ respectively.
3. Therefore, the optimal solution to the problem (18) is: $x_{11} = 50$, $x_{21} = 60$, and $v^* = 0.5$.

6 Conclusions

In this paper, the authors considered the problem of resource optimisation under uncertainty. They showed how to model the uncertainty using the formalism of uncertain variables and proposed an approach consisting of a maximisation certainty index that approximate fulfils the necessary and sufficient conditions of optimality (KKT) for the formulated problem of resource allocation problem and also discuss how it should be solved.

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Leadership Competency Framework for Industry 4.0 in the Post-COVID-19 Scenario

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Abstract There is no single and ultimate leadership competencies framework, although expectations are evolving for such a framework, as can be observed in both scientific articles and reports on competencies for Industry 4.0 (I4.0). The aim of this study is to identify the leadership skills perceived as essential for I4.0 and describe the changes in the leadership skills curriculum caused by the spread of SARS-CoV-2. The author collected data from purposely drawn samples of nurturing leader process owners using in-depth individual interviews. A total of 26 programme owners from 22 large economic entities, in which the leadership development programmes (LDPs) operate, participated in the research. Qualitative data analysis was used to establish the effect of COVID-19 on the competencies for I4.0. Data indicate that the design of LDPs did not pay attention to the determinants of the economic environment known as I4.0, however, the LDP curriculum reflects the concepts and theories considered contemporary. However, the pandemic has affected the perception of a leader's role as a caregiver. Therefore, the competencies added to the curriculum focus on building and maintaining positive relationships. Qualitative research does not allow for broad generalisations. Sample size, context of large companies, and perceptual data are additional limitations.

Keywords: competences, leadership development, Industry 4.0, curriculum, semi-structured interviews

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1 Introduction

There is no single and ultimate leadership competencies (LC) framework. Although expectations for such a framework are evolving over time (Babatunde, 2021), leadership skills are considered necessary, as the Industry 4.0 (I4.0) environment means more responsible tasks and flat structures (Kannan & Garad, 2020). In general, competencies are a combination of knowledge, skills and attributes (Ruel et al., 2021). Hecklau et al. (2016, p.2) defined this as a 'set of skills, abilities, knowledge, attitude and motivations an individual needs to cope with job-related tasks and challenges effectively.' Leadership competencies are the knowledge, skills, abilities and attributes that leaders must possess to perform their jobs proficiently (Imran et al., 2020).

There is growing interest in learning the competencies necessary for I4.0 (Chaka, 2020; Hariharasudan & Kot, 2018; Kipper et al., 2021). This is motivated by the need to cope with new technologies and processes for human resource management (Hecklau et al., 2016) and the perception of a managerial role in which the focus is placed on the leadership role (Güleryüz & Duygulud, 2020). Leadership and social influence are considered the sixth out of the 15 top skills for 2025 (WEF, 2020, p.36). These are perceived as emerging skills, i.e. ones in high demand among the companies surveyed from various industries such as Advanced Manufacturing, Agriculture, Food and Beverage, Consumer, Digital Communications and Information Technology, Education, Energy Utilities & Technologies, Financial Services, Government and Public Sector, Health and Healthcare, Manufacturing, Mining and Metals, Oil and Gas, Professional Services, Transportation and Storage. All these industries, as well as the automotive industry, were identified as those in which current skills are the focus of existing reskilling or upskilling programmes.

The objective of this study is to identify clusters of competencies considered crucial to playing a leadership role in the I4.0 environment. The study is the first of its kind to investigate the development of competencies through participation in leadership development programmes in large firms operating in Poland. It utilised traditional subjective research methods, such as interviews conducted in 14 different sectors, to elicit the information required to provide substantive findings that advance understanding of the perceived required skills.

The study contributes to the advancement of research in the field of competencies for I4.0 by providing a perspective of the leader process owner on the development of leadership competencies using the methods of data collection and analysis mentioned above, thus filling gaps in existing literature and research.

2 Theoretical background

To identify research areas, an initial systematic literature review (SLR, Petticrew & Roberts, 2006) was performed in three bibliographic and bibliometric databases for this research proposal. The advantage of the SLR is the reduction of authors' biases related to the presentation of the problem under study, which may not necessarily correspond to the views of the researchers, since the selection of articles is determined by criteria previously selected from the wide range of those offered by bibliographic-bibliometric databases. Additionally, the set of articles that were analysed for the current study can be easily completed at a later date because the selection criteria remain universal across the entire set of databases. The main disadvantage of SLR is that it excludes articles that did not reach certain publications due to the criteria adopted. As such, they were broadly defined to obtain as many studies as possible, tentatively even loosely related to leadership competencies that are expected to be critical for the future. All the results have been limited to peer-reviewed scientific articles written in English. The aim was to deepen and compile knowledge in thematic areas of leadership competencies for the Fourth Industrial Revolution (I4.0).

To embed the selected issue into the leadership area, the initial search was limited to verification of the content of the topic, i.e. title, abstract or keywords, which constitute social sciences in the field of business and management studies and report the results of empirical and theoretical research. To explore the undertaken problem, additional conceptual limitations on the topics are also included. First, synonyms for leadership competencies were used. These include leadership 4.0, digital leadership, and leadership and social influence. Second, synonyms such as Industry 4.0 and the Industrial Internet of Things were employed. Third, to encompass as many results as possible, two terms – competencies or skills – were used to refine the search. The search strings yielded 9 articles in Scopus, 4 articles in Web of Science (Clarivate Analytics publisher server), and 62 articles in EBSCO. These articles provided results from the following research databases: Complementary Index (22), Directory of

Open Access Journals (12), Business Source Ultimate (10), The Belt and Road Initiative Reference Source (9), Academic Search Ultimate (7), ScienceDirect (5), MEDLINE (3), Supplemental Index and Springer Nature Journals (2 in each), and 1 per OpenAIRE, BazEkon and Sociology Source Ultimate. The initial SLR search allowed for the selection of scientific articles corresponding to the research project. These were further selected on the basis of their abstracts, which were the best for the research problem located in the business and management studies. This yielded 38 papers. The final stage of selecting the appropriate literature on the subject was to read each of the selected articles. The enlisted competencies were clustered into authenticity, cognitive skills, communication skills, digital leadership skills, influencing skills and the propensity to take risks.

Authenticity includes self-awareness, transparency and relationship with customers/ subordinates (Güleryüz & Duygulud, 2020; Helming et al., 2019; Kwiotkowska et al., 2021; Sousa et al., 2019). Cognitive skills cover critical thinking, identification of downstream consequences, key causes/problems, analysis of operations, problem solving, social perceptiveness, system perception, solution appraisal and system evaluation (Guzmán et al., 2020; Juhro et al., 2019; Mumford et al., 2007). Communication skills include language skills such as active listening, reading comprehension, speaking, and writing (Guzmán et al., 2020; Juhro et al., 2019; Mumford et al., 2007). Digital leadership deals with digital knowledge, the use of digital tools in their function, digital vision and digital communication (Dash et al., 2019; Imran et al., 2020). Influencing skills include negotiation, persuasion, motivation and conscientiousness (Guzmán et al., 2020; Juhro et al., 2019; Kwiotkowska et al., 2021; Mumford et al., 2007). Propensity to take risk refers to the ability to deal with change and includes decision making (Juhro et al., 2019; Sousa et al., 2019). Other personal competencies refer to active learning (Guzmán et al., 2020; Mumford et al., 2007), agility, breakthrough, visionary (Juhro et al., 2019), failing fast (Imran et al., 2020), intuitiveness and sensitivity (Kwiotkowska et al., 2021). The social competencies considered important for I4.0 are emotional intelligence, social intelligence (Juhro et al., 2019), empowerment (Imran et al., 2020), and teamwork (Sousa et al., 2019). Given the fact that the literature query was set in the leadership context, managerial functions also appeared. These include coordination and in general management of customer complaints, financial resources, material resources, personnel resources and diverse teams (Mumford et

al., 2007; Sousa et al., 2019). The need for a proper personal image was also highlighted (Sousa et al., 2019).

In addition to the characteristics specifically mentioned, numerous articles refer to a general concept of leadership. In addition to the term leadership competencies (Shevyakova et al., 2021), conceptual articles employ general terms such as leadership skills, digital leadership skills and disruptive leadership (Dash et al., 2019; Güleryüz & Duygulud, 2020; Kannan & Garad, 2020; Shet & Pereira, 2021). Additionally, scholars who conducted theoretical research of the competencies considered necessary for I4.0 (Chaka, 2020; Kipper et al., 2021) identified some articles referring to leadership, in which, however, these skills are mentioned as a general concept (Aziz Hussin, 2018; Carter, 2017; Hariharasudan & Kot, 2018; Hecklau et al., 2016; Motyl et al., 2017).

3 Methods

The research project underlying this article is based on interpretative assumptions. The findings are based on data collected during the COVID-19 pandemic in 2020 through individual in-depth interviews with nurturing leader process owners. A total of 26 programme owners from 22 large economic entities, in which the leadership development programmes (LDPs) operate, participated in the research. Qualitative data analysis was performed in five stages: compiling data in a database, open coding, selective coding, interpretation, and conclusion (Yin, 2011). Further details on the adopted methodology can be found in Majczyk (2021).

4 Findings and discussion

To build a silhouette of a leader in a large company, nurturing leader process owners used 107 characteristics. Most of them were applied once. The most cited are shown in this study.

4. Communication skills

In general, the findings of the study support the assumption of the importance of communication skills for future leaders. However, this was narrowed down to active listening and speaking (Guzmán et al., 2020; Juhro et al., 2019; Mumford et al., 2007). The interviewees indicated that a leader would be expected to have the ability to actively listen, formulate and ask questions, define and concretise a goal, and be able to present objectives. In addition to building and giving feedback, constructive criticism and the ability to criticise and praise, one would also be expected to conduct meetings and conversations, including negotiating, evaluating, recruiting, firing and motivating. In addition to one-on-one conversations, these include public speaking. Effective persuasion should also include tailoring messages to appropriate levels, if only when cascading ideas downward. In turn, the ability to communicate in foreign languages is expected to facilitate work in an international environment.

4.2 Openness

Openness is a diverse concept that addresses properties such as the ability to deal with change, active learning and teamwork (Guzmán et al., 2020; Juhro et al., 2019; Mumford et al., 2007; Sousa et al., 2019). In the research, when building the profile of a leader, the following characteristics were pointed out: openness to innovation; thinking outside the box; openness to new trends, opportunities and change; the ability to respond quickly and adapt to the pace of development of the company and the market. The openness to new solutions was also mentioned, because challenges are perceived as opportunities and potential and the world as a source of knowledge. Openness to inclusion and diversity (understood as combining people with different characteristics, competencies and experiences), understanding the other party, other people's ideas and debate, i.e. openness to people, is supposed to facilitate the management of a diverse team. Openness to cooperation and integration in teams should be based on kindness. Openness to feedback, learning from the ecosystem, creating links and sharing learning is supposed to support personal development as well as the development of others around.

4.3 Knowledge

One of the surprising findings of the study was that the interviewees did not consider digital knowledge (Dash et al., 2019; Imran et al., 2020). Although data collection occurred a few months after the declaration of the pandemic, it did not influence social perception. However, this can be interpreted as e-leadership or digital leadership, which did not appear in leadership development programme curriculums managed by the interviewees and/or is not a popular concept in these companies, or the fact that the interviewees did not associate any links between knowledge and digital skills, despite the fact that the digital context was raised by four of the interviewees. They did, however, mention the necessity to possess technical knowledge, expert knowledge and knowledge of the work topic, as well as of the business and solutions of other departments. While a leader is not expected to have ready-made solutions and answers to all the questions, they must ask good questions. At the same time, a leader should have knowledge of managing a team and leading people with expertise.

4.4 Ambition

Challenging the status quo, striving to be better, beating the competition, moving upward and beating the bar are all manifestations of ambition. However, in the literature review, it is not considered as an I4.0 competency. In the eyes of nurturing leader process owners, however, leaders should be known for their determination and the constant search for ways to do better, i.e. their characteristic moderate satisfaction with the results achieved to date. They must fight to the end. However, in the event of failure, which can happen to anyone, they should get up and move on. The need for development refers both to the leader themself and to the improvement of others. These ambitions should serve both the team and the customer.

4.5 Networking

The next, albeit not the last, competency most often mentioned is relationship building, which is supported in existing literature (Sousa et al., 2019). On the one hand, interdependence and cooperation with the team, other people and stakeholders in the organisation makes it possible to engage others in achieving their

goals, while on the other, it allows the sharing of good practice. Building relationships in business is supposed to be facilitated by the satisfaction of working with others, the trust shown, the appreciation of the employee, and the awareness of the impact on others.

5 Conclusions

The key competencies for leaders operating in the reality of the I4.0 economy are not unified. Sets of propositions often do not even find a common denominator. A study of nurturing leader process owners who are directly responsible for the vision and implementation of leadership development programmes also identified a range of competencies that are both people and business-oriented, those that are personal and social, those that are focused on individual or other development, and those that are performance and organisational climate-oriented. However, the most popular ones, such as communication skills, openness, knowledge and relationship building, are supported in existing literature on leadership competencies for I4.0. The only characteristic that should characterise contemporary leaders working in large companies that has not gained support in existing literature is that of ambition. However, this expectation may be explained by the specifics of the Polish market, as well as the culture, which is characterised by individualism, the focus on achieving fast results and masculinisation.

Although this study extends the understanding of the leadership skills crucial for I4.0, qualitative research does not allow generalisations. The sample size, the context of large companies and the perceptual data are additional limitations. Future research should consider the potential effects of the mentioned competencies. Another important issue to address is the influence of the cultural environment on the effectiveness of a chosen set of leadership competencies.

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GENERATION Z THROUGH THE PRISM OF MANAGEMENT

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Abstract The main theme of this article is to examine how the characteristics of Generation Z will be reflected when members of this generation are in leadership positions. The authors will touch on situations that have been experienced during growth and which have influenced the formation of the behavioural pattern of and established values of Generation Z. Emphasis will also be placed on communication and the way younger generations communicate. The authors of this article are interested in how this generation behaves in the workplace, while the central research problem is to evaluate how young people will behave in leadership positions. The aim of this article is to determine the characteristics and behaviour of Generation Z and how these characteristics and behavioural patterns will reflect in leadership positions. The exploratory method was used in the research, because it is still a relatively unexplored problem and it allows methodological deviations. A descriptive method was also used, on the basis of which the authors determined the current state or characteristics and already proven facts of Generation Z. The cognitions of the article highlight the discussion on how Generation Z will behave in leadership positions.

Keywords:
Generation Z, workforce, values, communication, leadership, leading, generations, technology, management

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1 Introduction

Generation Z is the generation born after the abolition of communism and the superior growth of China in terms of the global economy and is considered to be the most ethnically diverse generation. Between 1995 and 2010, a new generation of young people was born, who will soon displace the previous generation of millennials in the labour market. Members of this generation are already quite active in the labour market and are also entering the global consumer scene. For the most popular generation, it can be said without hesitation that it is a generation with specific goals and perspectives in the field of education and career. They are very aware of how to distinguish and define success in their private life and success in the workplace (Gomez et al., 2020). This is a generation that, unlike previous ones, is most focused on goals and success and is ethically and morally oriented, but at the same time is very prone to depression and anxiety and under constant stress (Schenarts, 2020; Pichler et al., 2021). Nonetheless, the young generation is fighting for the equality of all and defending speech democracy (Pichler et al., 2021).

The consequences of the great financial crisis they witnessed put them on real ground. Given the fact that many of their parents may have lost their jobs and were pushed to the brink, Generation Z also has an interest in education. Enrollment in study programmes increased sharply among members of Generation Z. The great financial crisis and related factors have helped Generation Z to develop frameworks of behaviour and views on work (Tolstikova et al., 2021). They have also been hit hard by the coronavirus crisis, which has caused many older people to lose their jobs – whether full-time or students – which has resulted in major financial deficits. It is not uncommon for them to value financial independence more than personal satisfaction (Kirchmayer & Fratričová, 2018).

Generation Z's entry into the labour market will be rapid and profound, and their efficiency and multi-tasking capability will quickly prove useful in the workplace. Generation Z is the first generation not to know a world without the internet and mobile phones (Tolstikova et al., 2021). As technology has been laid in their cradle, so to speak, their interest in technology and innovations in this field is constantly growing. Modern technologies are capable and can be effectively included in any work or activity in order to facilitate the implementation of work or activities.

The emerging literature about Generation Z speaks a lot of about the characteristics of the generation, while there is a considerable lack of discussions on how Generation Z will fit into the working environment. In this context, the existing literature does not provide answers to how members of Generation Z will act and behave in leadership positions (Gabrielova & Buchko, 2021; Janssen & Carradini, 2021). This question is interesting, as this generation brings with it new patterns of behaviour compared to previous generations (Nedelko et al., 2022). Therefore, through this draft research, the authors want to outline how members of Generation Z will act in leadership positions in organisations.

2 Theoretical background

Older generations are gradually leaving their jobs, so companies will be increasingly looking to hire Generation Z. In order to introduce the new generation into organisations, it is inevitable that managers will have to understand the needs and behaviour of members of this generation in the workplace.

Looking through the prism of values, Generation Z is at the forefront of different values, therefore it makes sense to talk about different set of norms and values, which will be in the forefront with Generation Z (Schroth, 2019; Weeks & Schaffert, 2019). It is essential for managers to understand the system and the value of the values in that system. Among the most important values are money, empathy, career, tolerance, self-expression, mutual help and public recognition or position in both wider and narrower society (Tolstikova et al., 2021). It could be said that the system of values listed above is paradoxical, as it lists values that are contradictory. They value self-expression, which tends toward individualism, while at the same time valuing mutual help, which is a collectivist-oriented value. Important values include the digital environment, freedom (in the full sense of the word) and monetary success (Tolstikova et al., 2021).

Turning now to the specifics of Generation Z, its members represent a major recruitment challenge for organisations (Bulut & Maraba, 2021; Racolţa-Paina & Irini, 2021). Unlike previous generations, young people are very picky when choosing a job and are not ready to accept every job. They are aware of their knowledge and skills, and they want to work in a company with which they will be able to identify. They tend to switch jobs because they believe there is always someone who will appreciate them more and pay them better for their efforts. Some

organisations have started to introduce career personalisation in order to employ the generation that is inevitable for all employers, as they are convinced that this will make it easier to attract members of Generation Z and keep them in the workplace. However, this solution contradicts the older generations, who have been established in companies for some time. The fact is that the salary for Generation Z is extremely important, however, other benefits are also important, such as a good work-life balance, etc. Thus, organisations should satisfy employees and offer them adequate pay and the other benefits required by Generation Z. It is therefore essential for employers to understand the behaviour and goals of members of Generation Z, as they want to be treated differently in the workplace than previous generations (Gomez et al., 2020).

Members of Generation Z may have problems in jobs that require more communication, as they are used to communicating through information and communication technology. They prefer to keep relationships and communication behind the walls of the worldwide web (Schroth, 2019). Such a way of communication may be questionable in the workplace, as many problems need to be solved live, i.e. face to face. As a result, Generation Z may lack communication skills on both the verbal and non-verbal side.

Regardless of the form of the problem, young people in companies will prefer to use wire communication, hence managers should gradually introduce and present other method of in-company communication and state the reasons why communication through information and communication technologies is not suitable for use (Schenarts, 2020; Tolstikova et al., 2021). It is also important that managers properly present the forms of formal and informal communication and when is the right time to use them. Emphasis should be placed on informal communication, where it is necessary to properly explain which components are inappropriate and illegal. In written communication, it is necessary to clarify when and how uppercase and lowercase letters are used, and it is necessary to emphasise the sense of using emoticons, which young people use almost instead of words.

It makes sense that members of Generation Z prefer to work in organisations whose values and behaviour are in line with that of their private lives, in terms of ethics, morals and social responsibility (Bulut & Maraba, 2021). Adolescents will remain loyal to a company that provides adequate pay and job security. It is teamwork that

may cause them problems, as they are basically not team-oriented and prefer individual work, as they like to be independent in their work (Gomez et al., 2020).

3 Generation z in organisations

Generation Z is still largely being educated and is therefore only just entering the labour market. Members of this generation are convinced that they have inherited values such as loyalty, responsibility and goal-orientation from their parents, however, they are nevertheless very different from previous generations (Schroth, 2019). Intergenerational differences in organisations can be poorly accepted, but Generation Z undoubtedly brings them to companies, therefore their arrival is a big challenge for human resources management departments.

As members of Generation Z are entering into organisations, sooner or later they will also start to work in managerial positions (Gabrielova & Buchko, 2021). Therefore, an important management challenge is how to successfully integrate Generation Z into leadership positions and balance possible differences that may occur with the different leadership preferences of this generation.

As previously mentioned, Generation Z is an extremely educated generation that successfully implements modern technology to its advantage and at the same time uses it as the main communication channel (Janssen & Carradini, 2021). Due to the work experience gained by members of this generation when studying, they are extremely self-confident and consequently also rank high in companies. They want to be in management positions because they find it harder to transfer authority and they think it makes sense that they are sufficiently experienced and suitable candidates for management positions, given their work experience and level of education. Since members of Generation Z are creative and see solutions to problems, they work best when they are alone in the workplace.

According to current data, 67% percent of the members of Generation Z want their careers to have a greater and more significant impact on the world, which reflects the fact that they want to assert themselves in higher positions in organisations. They want to reach this status through social networks, and the consequence of this desire is the modern profession of an influential person. They are careful when managing their private and brand profiles. A special characteristic of members of Generation

Z is that they feel obliged to settle their duties and debts. They are independent and constantly looking for ways to prove themselves (Schenarts, 2020).

4 Discussion

The authors of this paper would like to emphasise that very little is known about Generation Z and it is almost impossible to merge its members into one mould. The fact is that Generation Z represents a new workforce that will replace the older generations, and it is one on which the labour market depends. Since little is known about the current generation, this is a big problem for managers, as they will have a hard time figuring out how to please and keep this extremely ambitious and capable, yet at the same time demanding, generation in companies. It makes sense that managers are expected to start working on developing a Generation Z employment strategy and motivators to retain such young employees.

This is a generation that expects good pay from employers, the possibility of promotion, the relationship between work and private life, trust and job security. All these expectations seem reasonable given the current situation and the time in which the pace of life is accelerating. However, problems may arise when a large number of individuals think they deserve such working conditions because they have a high opinion of themselves, while they are extremely selfish (Schenarts, 2020). The question therefore arises as to whether, as managers or leaders, members of Generation Z will meet the expectations of their subordinates in the same way they do towards employers and organisations. It is questionable whether in the roles of superiors, members of this generation will meet the current expected needs and desires of subordinates.

Based on the findings to date in relation to the characteristics of Generation Z, it can be affirmed that, on the one hand they most likely have good organisational and managerial competencies and would be good leaders in this regard, while on the other, they have no sense of fellow human beings and are selfish, as they would most likely not be well received by subordinates (Bencsik et al., 2021; Gabrielova & Buchko, 2021). Since members of this generation are impatient, they want to rise to leadership positions in an extremely fast time, which can hinder them.

The negative qualities listed above, such as impatience, selfishness, excessive self-confidence and a great desire to advance, are most often a burning issue in leadership positions. The problem is not only non-acceptance by employees, but also in terms of leadership and management. Every manager needs to be confident, albeit within normal limits, as excessive self-confidence can blind a person. Selfishness can be a problem especially when negotiating, either with business partners or with employees. Selfishness is the enemy of drive, as such a manager would find it difficult to compromise. Doing business and solving problems can quickly weaken a company's business. Managers must take time to tackle some of the problems in companies and identify and weigh up all the possibilities to solve the problem without grabbing the first fairly favourable solution.

Another issue to this end is communication, which is inevitable in managerial positions and must be as clear and formal as possible, and often also face to face. As previously mentioned, Generation Z prefers to avoid live communication. The COVID-19 crisis has also helped members of this generation to them escape from direct communication, as a result of which people lost physical contact for a long time and only socialised via the internet or classic phone calls, which further paralysed their communication skills.

5 Conclusions

The main aim of this draft paper was to highlight the issue of how members of Generation Z will act and behave when they are in managerial positions. Based on the authors' research, it can be emphasised that Generation Z is extremely demanding. Previous generations were happy to have a job, whereas members of Generation Z do not value jobs and tend to change jobs quickly if the working conditions do not suit them. It can be concluded that Generation Z, like every generation, has both positive and negative characteristics. Ingenuity and creativity are welcome in leadership, while research to date shows that these characteristics are not outlined as very important for the considered generation. This could hamper successful leadership. Given the above findings, it is right to ask whether this new generation is really ready to take over the highest hierarchical levels in organisations. This draft paper offers a next logical research step, i.e. to empirically examine how the characteristics of Generation Z relate to their characteristic leadership style.

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HEALTH AND SAFETY AT WORK IN TIMES OF REMOTE WORK

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Abstract In recent years, there have been upheavals and a change in the way work and tasks are performed. Employees and companies have had to become much more innovative and adaptable to be able to survive, despite the changes brought about by the global situation. During the COVID-19 pandemic, matters took a turn for the worse, as most companies carried out teleworking to ensure health and safety at work, while companies continued to provide a safe working environment. The personal responsibility of individuals is not only to ensure their own health but also to meet the requirements of health and safety at work, thus families had to adjust and adapt around work in such a way as to meet these requirements. In this paper, the authors describe three important components that marked work during the COVID-19 period: remote work, health and safety during teleworking, and personal responsibility. Through three main topics, the authors provide answers to questions about work that affects health and safety at work, while also covering the findings of statistics from the field of work performance and the importance of personal responsibility in ensuring health and safety at work during remote work.

Keywords:
remote work,
health and safety at work,
personal responsibility,
COVID-19,
teleworking.

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1 Introduction

Remote work is a work arrangement in which an employee works outside the office. Such work arrangements became necessary during the COVID-19 pandemic, as employee health and safety was endangered. In this article, the authors highlight remote work, the personal responsibility of employees and, above all, health and safety at work during remote work.

The problem of health and safety at work during remote work is that the responsibility for securing safe working environments mostly falls on the employee. Although they are responsible for complying with the requirements, the responsibility lies with the manager. When the responsibility falls on the employee, it is due to the fact that most of the time they did not acknowledge the importance of the risks that their working conditions have on their health. Managers must provide employees with appropriate working conditions while empowering them with skills to promote health and safety at work, such as ergonomics, healthy lifestyles, etc.

In this paper, the authors explore the importance of telework, the legal regulations for such work, the limitations and advantages and the effects that this form of work has on the personal responsibility of employees and health and safety at work. The authors are particularly interested in whether teleworking neglects occupational health and safety.

2 Literature review

2.1 Remote work

Remote work, whose many definitions differ according to geographical and regulatory context, is a relatively new phenomenon that has developed in parallel with the advent and development of new communication and information technologies (EU OSHA, 2021) (Savić, 2020).

Businesses began introducing remote working in the 1970s and to date several studies have examined the effects of remote work or related concepts such as working from home and virtual work. Although most research has focused on employees, Bloom et al. (2015) found that it is also becoming more common for

managers to work from home from time to time: the proportion of managers in the US, the UK and Germany allowed to work remotely at normal times is almost 50% (Stoker et al., 2021).

For the most part, remote work is legally defined in national legislation, which defines what remote work is, who performs it and what the responsibilities are of those involved, i.e. the employer and employee. In addition to complying with current legislation, it is also important that companies introduce rules for teleworking and that all participants are aware of them. Remote work management is certainly different than office work. It is also important that all those involved are aware of the responsibility they have to carry out their work effectively and to ensure health and safety at work.

2.1.1 Performance in remote work

Working remotely mostly causes two types of problems for employees. The first is whether managing work from home is useful in terms of increasing productivity and profitability, while the second is that work-life balance often deteriorates (Bloom, Liang, Roberts & Ying, 2015).

Employee digital skills are an important factor in employee performance at work from home. Eurofound (2020) data show that employees with stronger digital skills are better positioned for work needs from home during crisis situations. However, digital skills are not so self-evident, as there are big differences between member states of the European Union (Eurofound 2020).

2.1.3 The effect of COVID-19 on remote work

In 2020, the global COVID-19 pandemic had a major impact on global economies and suddenly triggered a sharp increase in the number of people working from home. In the current crisis, remote work is generally considered to be an effective way to restore and maintain the functioning of entire sectors (EU OSHA, 2021).

The impact of COVID-19 extended to all industries. Those that have already been heavily digitised (OECD, 2019), including information and communication services, professional, scientific and technical services and financial services, have consequently achieved much higher levels of remote working – on average more than 50% of employees.

Remote work in the European Union (EU) prior to the pandemic was 5.4% in the 15-64 age group. According to Eurostat (2021), at the time of the COVID-19 pandemic, as many as 37% of all EU employees moved to working from home. Data from the Slovenian Labour Inspectorate, published by RTV Slovenia in 2022, show that in 2019, i.e. before the spread of coronavirus, 2,037 workers were registered as working at home, while by the end of 2019 this figure had reached 217,428. This means that more than 100 times more workers were working from home prior to the epidemic than before it.

2.2 Safety and health at remote work

An employer is equally responsible for ensuring safety and health at work for an employee working on its premises as it is for an employee working at home or in another location outside the employer's location. In doing so, it must pay particular attention to (Ministry of Labour, Social Affairs and Equal Opportunities, 2020):
working environment (lighting, noise, thermal conditions, etc.) work equipment stress and mental well-being the fact that the employee works alone (in the event of an accident at work) other risks in workplaces at home (risk of slipping and falling, manual handling of loads, danger of electric current, etc.).

Existing literature reports extensive evidence of how physical risk factors can affect the health and well-being of workers. In modern workplaces, occupational risk exposure is often more associated with the way work is organised than with the nature of work (Litchfield et al., 2016) and more with the work environment (EU-OSHA, 2013) than with specific physical, biological and chemical substances. The damage is therefore often more mental than physical.

In terms of health and safety at work, it should be noted that conducting risk assessments, regardless of the actual job, is the responsibility of the employer. However, assessing a home working environment is difficult, and it is also difficult for inspection bodies to inspect private premises. Therefore, in terms of risk

assessment, remote work is still a 'grey area' for several reasons (EU-OSHA, 2008; ILO, 2018). This means that this new way of working, which has only recently become widespread, involves complex governance issues and legal aspects.

A growing number of companies are offering employees the opportunity to work (a few days a week or a month) from home or remotely. It seems very likely that this trend will continue (Kłopotek, 2017). Sometimes the way of working remotely depends on the characteristics of the profession itself and only a percentage of all duties can be performed remotely. In addition, employment agencies report that about 85% of job seekers appear to be more likely to stay with an employer if flexible work is available (Twentyman, 2010; Grant et al., 2013).

The commonly mentioned benefits of teleworking include: schedule flexibility, no interruptions, and time savings while driving (DeSanctis, 1984). However, studies on telecommuting show that reducing travel to and from the workplace is not the main incentive for this form of work (Bailey and Kurland, 2002). The benefits of teleworking may also include meeting family requirements or a desire to reduce social contacts (Olson et al., 1995). Working from home also means flexible working hours or a less formal atmosphere (Olson et al., 1995). Home workers also report high levels of satisfaction (Wheatley, 2012).

2.3 Personal responsibility

A socially responsible company has an advantage over its competitors due to increased productivity and competitiveness, improved reputation and company image, as well as significant cost savings due to the loyalty and motivation of its external and internal stakeholders (Gorgenyi-Hegyes et al., 2021). An internal occupational health and safety responsibility is established when workers and managers assume responsibility for acting effectively against the bane of work injuries and occupational diseases. Organisations should relearn the best way to take responsibility for occupational health and safety to promote healthy growth and greater productivity (Ndjoulou et al., 2015).

As is so often said, change means first starting within ourselves. Due to the great impact managers have and the responsibilities they carry, they have a particularly important role in being the first to make a change and are thus role models (Mrak Hendrickson, 2020). Personal responsibility means each individual must accept

responsibility for their thoughts, words, behaviour, decisions, mistakes, well-being effort and influence. Although the term personal responsibility seems to be simple and easy to understand, it actually requires a very high state of involvement and readiness. By entering the field of strengthening one's personal responsibility, a person changes and consequently causes changes in other people and society. The importance of personal responsibility can be expressed in private or in public, at home or at work (Rauter, 2020).

Based on the knowledge and mastery of all three dimensions of personal sovereignty, individuals are more easily and effectively able to act responsibly and accept responsibility for their actions. Personal responsibility (Hrast, Rauter, Lešnik Štefotič, 2018) is the ability to take responsibility for one's thoughts, decisions, actions and similar. Personal responsibility primarily means being responsible for what you think, say, decide and do, as well as working on yourself, your knowledge and developing own skills, not blaming others for situations and circumstances, and choosing a life that respects your values, purpose and your way of life. However, it must always be placed in a social context and through interactions with others.

2.2.1 Personal responsibility as part of care for health and safety at work

The development of health awareness as a social sustainability factor can be implemented on the following three levels: state or governmental level, corporate level, consumer level (Toussaint et al., 2021).

The ultimate target of occupational health and safety law is to protect workers in all occupations, from occupational dangers or harm to which they are exposed by virtue of the nature of their occupation or the state of their working environment. The doctrine of occupational health and safety hence hinges on the assumption that the employer has ultimate authority and control over the workers' working conditions or workspaces, and therefore has legal responsibility to ensure the health and safety of those workers (Orazulike, 2015).

Employees also need to understand and have an insight into their responsibility in the company and their responsibility to themselves. They need to understand that their health, safety and well-being are part of their personal responsibility. This allows employees to understand that, to a large extent, their future health and safety also depends on themselves not on their superiors and other employees.

3 Methodology

For the purposes of this research, the authors formulated three hypotheses, which are listed below. The hypotheses discussed are:

- H1: Prolonged teleworking can have a negative impact on employee health and safety.
- H2: Teleworkers are less likely to be infected with COVID-19.
- H3: Teleworkers show a high degree of personal responsibility for health and safety at work.

In this paper, the authors examined existing literature and other sources and describe the impact of teleworking on occupational health and safety. The method of the descriptive approach of research was used, whereby existing literature and data was analysed from the field of research with the help of description, compilation, comparison, analysis and synthesis.

The expected result of the research carried out is a review of the impact of remote work on the health and safety of employees and the impact of this on the personal responsibility of employees.

4 Discussion

A review of existing literature showed that there are many advantages and disadvantages of teleworking, however, it also showed there is a link between health and safety at work and the personal responsibility of employees and managers.

The hypotheses were confirmed or refuted on the basis of the conducted research. Below the confirmation or refutation of the hypotheses are shown.

- **H1: Long-term remote work can have a negative impact on employee health and safety.**
  - Confirmed
  - Explanation: Although research reports positive effects of remote work, long-term regulation can be bad for employees if rules and guidelines for remote work and preventive measures for health and safety at work are not set within the company. The personal responsibility of employees to follow the guidelines and be responsible for their health plays an important role, as they are aware of the long-term consequences that can result from poor healthcare in the workplace.

- **H2: Teleworkers are less likely to be infected with COVID-19.**
  - Confirmed
  - Explanation: Employees who worked remotely had less physical contact and formed so-called 'bubbles'. As a result, most companies introduced remote work where possible.

- **H3: Teleworkers show a high degree of personal responsibility for health and safety at work.**
  - Confirmed
  - Explanation: Employees showed a high degree of personal responsibility during COVID-19 in terms of adhering to the measure to prevent the spread of infection by limiting contact. Due to no longer having to commute from home to work, employees were, on average, left with more free time, which many individuals spent outdoor, thus positively taking care of their mental and physical health. Problems arose when employees were unable to distinguish between working and leisure time, where burnout due to remote work could have occurred.

5 Conclusions

Through an integrative review of existing literature, the authors of this paper wanted to confirm the research question. They looked for links between health and safety at work and remote work. The key theoretical insights include the awareness that remote work in many companies was key to curbing the spread of coronavirus.

Employees also had a high degree of personal responsibility in avoiding being infected with COVID-19 infection when working remotely. Thus, companies had less absenteeism due to illness and were able to continue work without interruption. It is notable that problems with health and safety at work can be caused by a poorly arranged workspace, for which both employers and employees are responsible. It was also found that due to remote work, employees had more time to improve their mental and physical health, however, some had trouble separating work from leisure, which can lead to burnout.

The authors are therefore able to confirm the hypotheses, thus suggesting that remote work is a sensible measure to curb the spread of disease, while showing that individuals with personal responsibility play a major role in maintaining their own health while working from home. Companies or organisations that want to be attractive to the new workforce must be prepared to introduce working hours that also allow for part-time work while at the same time strengthening personal responsibility for maintaining safety and health at work.

For a broader overview of the advantages and disadvantages of remote work and the impact on occupational health and safety, it would be necessary to study more literature and include more domestic data in order to make a comparison between remote work in Slovenia and the international environment. The amount of empirical research and results related to personal social responsibility in companies – especially in the field of the promotion of workplace health – is limited, albeit constantly increasing, both nationally and internationally. For further research the authors propose a continuous review of measures and literature in the domestic and foreign environment.

The personality of individuals – first and foremost the employers and employees in companies – is key to achieving business success and individual performance and satisfaction. Strengthening health must be a priority for companies, as a healthy employee brings many more benefits to the company in the long run, as well as competitive advantages in the company's reputation. As previously mentioned, it is the responsibility of the employer to provide working conditions that ensure health and safety in the workplace. At the same time, it is important that companies begin to actively raise awareness among employees about the importance of looking after their health, which is the key to a quality and long life. The personal responsibilities of managers and employees are key to achieving this.

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SUSTAINABLE PROCUREMENT: THE REQUISITE INTERNATIONAL BUSINESS STRATEGY

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Abstract This paper explores the foundation, concept, benefits and mechanisms for implementing sustainable procurement. To achieve the purpose of this research, the author reviewed the key findings of relevant studies and observed them in the context of the current turbulent global geopolitical, economic, social and environmental circumstances. The author claims that sustainable procurement influences the extent and benefits of sustainability implementation in the whole supply chain. Successfully encouraging suppliers to implement sustainability aspects into their production or service activities/processes accelerates a company's enforcement of sustainability into the whole supply chain, which triggers positive impacts on its value chain creation. Considering the higher stringency of international regulation on sustainability compliance, the positive impacts of sustainability implementation in procurement and supply chain contribute to a company's higher global competitiveness. Additionally, sustainable procurement shows a company's adherence to social responsibility for current global challenges. This research implies that sustainable procurement is a requisite international business strategy.

Keywords: sustainability, supply chain, procurement, sustainable procurement, international business strategy

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1 Introduction

The extensive current international social, political and economic turbulence has caused severe disruptions in global supply chains. These disruptions have brought the rationality of the global character of contemporary supply chains into question. They have also shown that supply chains function as the veins of the economy and society (Ivanov, 2020). They can quickly transform from an accelerator of cost advantages to the factor of a company's survival. Therefore, companies from developed economies have been particularly forced to integrate innovations into various activities of their supply chains.

As one of the essential activities of a supply chain, procurement has been gradually transformed from a company's function for cost reduction to a process that has the leverage and responsibility to create value and influence the environmentally and socially responsible use of resources in companies. Recent procurement creates new business opportunities through cooperation and joint development with suppliers, networking and different, creative thinking about purchasing categories. It is increasingly recognised as a source of competitive advantage for innovative companies.

Since companies' business partners, including investors and customers, demand more scrutiny and transparency around sustainable products and practices, companies' supply chains and procurement processes are becoming key areas of their innovative efforts to drive sustainability. The adherence to sustainability pillars in numerous countries triggers significant changes in companies' international procurement practices. Hypothetically, sustainable procurement is becoming a requisite international business strategy.

The goals of this paper are, firstly, to introduce the foundation, concept and benefits of sustainable procurement. Secondly, to discuss the mechanisms and tools for implementing sustainability aspects into procurement and supply chains, and thirdly, to present the preferred incentives that could encourage suppliers to participate in their customers' sustainability initiatives. The key research question is to find out the urgency of sustainable procurement in international business.

2 Defining and arguing sustainable procurement

As the network of manufacturers, suppliers and logistics providers and the set of activities responsible for acquiring and delivering goods to customers, the supply chain is output-oriented and encompasses production and distribution. On the other hand, as one of the activities of the supply chain, procurement has an input focus, supports production and emphasises the building and managing of relationships with suppliers. As a preliminary procurement activity, sourcing is responsible for defining the need for purchase, screening and selecting suitable suppliers, as well as negotiating the most favourable contract terms (Arbuzova, n.d.). It takes a strategic approach, aims to minimise costs, creates vendor and supplier relations, builds supply channels, and makes the flow of supplies possible. Procurement is responsible for placing orders, making payments and managing contracts. Instead of who provides the supplies, which is the sourcing task, it focuses on what is supplied and how. It includes strategic and tactical components, manages relationships with suppliers, uses supply systems developed by sourcing, and emphasises streamlining of the flow of supplies.

Sustainable procurement refers to adopting and integrating corporate social responsibility principles into a company's procurement processes and decisions. It focuses on working with suppliers to develop environmentally and socially sustainable products. It ensures that the working conditions of its suppliers' employees are decent, that the products or services purchased are environmentally sustainable, and that socio-economic issues, such as human rights and fair operating practices, are addressed (Caldera, Mohamed & Feng, 2022; Weiss & Knopf, 2017). The United Nations (2022), for example, divides sustainable procurement indicators into twelve groups: prevention of pollution, sustainable use of resources, mitigation and adaptation to climate change, protection of the biodiversity, and restoration of natural habitats, human rights and labour issues, inclusion of persons with disabilities, gender issues, social health and well-being, total life cycle costs, SMEs in local communities, and promoting sustainability throughout the supply chain.

According to the Sustainable Procurement Barometer (SPB) 2021 (EcoVadis & Stanford Business University 2022, 12), the issue of labour and human rights will gain the highest significance among the sustainability areas that are relevant for shaping companies' procurement strategies over the next few years. It will be more critical or significantly more critical for 73% of respondents. The environmental

issue is in second place with higher or significantly higher importance for 67% of respondents. The social aspect (diversity, racism, non-discrimination, equity), however, is in third place, with higher or significantly higher significance for 61% of respondents, while business ethics (bribery, corruption, fair trade) is in fourth place with higher or significantly higher importance for 56% of respondents.

Companies expose the following possible benefits of sustainable procurement: higher revenues (new products, differentiation), lower costs (greater efficiency in resource use), risk management (compliance with laws and regulations and customer preferences) and building intangible assets (by building a socially and environmentally responsible brand or corporate image) (Wisner, Tan & Leong 2017, 110). It can also bring benefits in improving organisational standards, establishing long-term, collaborative and trust-based relationships with suppliers (Reilly, 2019), innovating technologies, raw materials and products, maintaining positive local community relations, and satisfying moral and ethical responsibilities (Sanders 2013, 382-383). In the Sustainable Procurement Barometer (SPB) 2021 (EcoVadis & Stanford Business University 2022, 45) 73% of respondents believe that their sustainable business practices have definitely (41%) or somewhat (32%) contributed to their resilience and ability to endure the COVID-19 crisis.

3 Achieving and measuring sustainable procurement

Sanders (2013, 388-390) lists three interrelated drivers of sustainability initiatives in general: 1) Legislation that companies in the industry have to comply with, 2) Industry-specific certifications that enable compliance with the aim of gaining trust and endorsements in the industry and among the public, 3) Innovation that supports the improvement of current practices in ways that contribute to sustainability. Kuik, Nagalingam and Amer (2011) discuss five essential elements for achieving sustainability goals in a company: 1) The level of commitment of the company's leadership, as well as the company's culture itself, 2) Management systems and methods for measuring sustainability aspects in a company, 3) The appropriate management of company resources, 4) Employee training, infrastructure development and a good working environment, and 5) Changes in technology (digitalisation, automation) for more straightforward implementation of sustainability strategies.

In terms of the supply chain, Hachtman (2019) lists six steps to achieve its sustainability: 1) Creation of a detailed sourcing plan, 2) Education and changes in organisational culture, 3) Encouragement and support throughout the supply chain, 4) Implementation of technological advancements, 5) Cooperation among competing organisations in the supply chain, and 6) Provision of clear objectives and definition of measurement criteria. Wisner, Tan, and Leong (2017, 113-114) list five steps on this path: 1) Establishing sustainable sourcing policies and guidelines, 2) Training employees and communicating its policies to suppliers and consumers, 3) Implementing its policies with relatively simple steps that quickly deliver benefits and results, attract customers and encourage the further realisation of a sustainable company vision, 4) Developing performance measurement system, and 5) Monitoring progress and looking for further improvements.

Parke (2019) outlines four steps to achieve sustainable procurement as a part of the supply chain: 1) Defining and communicating sustainability expectations or goals, 2) Supplier screening for sustainability standards, 3) Training of suppliers to meet the standards, and 4) Presenting the benefits of improving suppliers' processes. Additionally, to achieve sustainable procurement, a company should evaluate the sustainability performance of its suppliers (e.g. checking compliance with the suppliers' CSR code of conduct, regular assessment of suppliers' environmental or social practices (e.g. questionnaires, audits)), perform training on environmental and social issues for suppliers' employees in procurement departments and support suppliers in building their competencies about sustainability issues (e.g. corrective actions) (Weiss & Knopf, 2017).

Companies can use self-assessment in the process of evaluating suppliers. A self-assessment questionnaire can refer to specific inquiries on ecological and social aspects of the supply chain, the code of conduct and specific risks. Possible topics could be the following: responsibility for sustainability management and compliance with certificates and standards, certification in environmental topics (such as EMAS, ISO 14001), labour standards (e.g. SA 8000), adherence to non-certifiable standards (such as the principles of the UN Global Compact or ISO 26000), internal sustainability-relevant measures and management processes that prevent negative impacts on the environment and society, participation in multi-stakeholder and industry sustainability initiatives, results of the previous audits and the information on the type, extent and conductor of the audits, as well as sub-supplier commitments to sustainability (ibid., 44). The advantage of supplier self-assessment is that

companies can first implement it to understand the suppliers' strengths and weaknesses. In addition, self-evaluation raises awareness of sustainability requirements among existing and new suppliers. However, specific supplier commitments, as well as control and support measures, should follow.

The evaluation through an audit by one's own company or external third parties goes beyond the suppliers' self-assessment. This approach is recommended if there is an increased risk of violation. It is possible to differentiate between internal audits, supplier audits performed by their customers and third-party audits. Guidelines for auditing suppliers, for example, can be based on the code of conduct or the requirements of management system standards, such as EMAS. The SPB 2021 (EcoVadis & Stanford Business University 2022, 49) shows that customers are increasingly likely to continuously examine and evaluate their suppliers' sustainability practices rather than only at the initial stage of supplier selection.

The third mechanism to increase the sustainability of procurement (in addition to evaluating sustainability performance and training of employees) is to develop suppliers' capabilities by developing corrective action plans and through the long-term building of supplier competencies. Corrective action plans should define the content and timing of objectives, set indicators for review, and bind targets and rules. Short-term corrective measures should be accompanied by medium-to-long-term development of competencies among suppliers (e.g. training suppliers on relevant sustainability standards and requirements), technical support for process optimisation (e.g. for reducing emissions), implementation of supplier pilot projects (e.g. introducing environmental management systems), the performance of materiality analyses with suppliers that help to identify and prioritise the issues that matter most to a supplier's business and its stakeholders. The information from the materiality analysis and the self-assessment, in particular, should be used in selecting new suppliers and in confirming existing suppliers (ibid., 45-46).

The SPB 2021 shows that companies are encouraged to implement sustainable procurement practices primarily by compliance through contract terms (57%), followed by sustainability performance targets (43%), collaboration with customers on sustainability improvement strategies (38%), on-site audits (30%) and education of employees around sustainable practices (18%) (EcoVadis & Stanford Business University 2021, 42). This global survey (ibid., 11) also shows that in 2021, 23% of mid-size companies moderately increased their commitment to sustainable

procurement practices, and 21% increased this commitment significantly compared to 2019. These numbers were even higher for large companies (26% and 28% respectively) (ibid., 39).

The respondents of the SPB 2021 survey (ibid., 43) list the sequence of preferred options that could encourage suppliers to participate in their customers' sustainability initiatives: provision of incentives (e.g. preferred status, order volume) (24%), provision of case studies on sustainability best practices (e.g. projects to reduce energy, water, waste or packaging (18%)), integration of sustainability in requests for proposals (RFPs) (15%), creation of sustainability assessments to benchmark suppliers' practices (15%), the definition of metrics and goals for suppliers' sustainable performance (14%), training programmes in sustainability offered to suppliers (9%), provision of recognition for suppliers' sustainability performance (awards) (4%), and support in prioritising work plans for meeting suppliers' sustainability goals (2%) (ibid., 43).

In order to meet the increased demand for information on sustainability risks in the supply chain and achieve a higher level of sustainability, the company should measure the sustainability of its procurement activities (ibid., 51). To do this, it can use supplier-specific indicators, such as the share of (sub-)suppliers who have submitted a self-assessment, the proportion of certified (sub-)suppliers, the number of audits, the number of (sub-)suppliers going through a corrective action plan, the average duration of supplier relationships, and the proportion of (sub-)suppliers trained by the company's employees or third parties.

4 Discussion and conclusion

The trade war between USA and China, the COVID-19 pandemic, and the recent military attack on a sovereign European state have revealed the unpreparedness of the developed world for the negative consequences of global interdependence. Developed economies have suddenly started to experience the direct social and economic impacts of health crises and wars. Despite the enviable development level, they have shown vulnerability. European Union member states in particular have learned that it is not wise to develop too high economic dependence on geopolitical opponents. Such development orientation, argued primarily with cost advantages and based on short-sighted and reckless strategies that allow extortions, has proved to be a failure. Developed countries have shown their incapability to restrain

themselves from being endangered in their basic needs – health and safety – and to resiliently respond to economic consequences, particularly in relation to energy supply and the solidity of supply chains. These painful findings call for a geographic reconfiguration and innovativeness of their supply chains to further development, particularly when also considering the pressures of the climate change.

As a response, developed countries are currently faced with an ongoing debate on deglobalisation of their supply chains. Attempts to achieve their renewed viability are moving towards their regionalisation and diversification, notwithstanding the higher costs and their negative macroeconomic consequences. On the other hand, substituting lower price competitiveness with non-price competitive aspects demands innovations of products and higher investment in development of local and regional supply sources.

The global survey on sustainable procurement (SPB, 2021) revealed that firms increasingly recognised their innovative sustainability practices as contributors to the resilience of their value chains during the COVID-19 crisis. This research has shown that procurement, including sourcing, plays a strategic role in contributing to the sustainability of supply chains, as important parts of companies' value chains. Its activities of selection and management of suppliers represent a starting point for sustainability of the supply chain, innovation, co-creation and a foundation for progress over the whole value chain. In the paper we have described the key benefits, as well as possible activities, and mechanisms for implementing sustainable procurement initiatives that would encourage suppliers to participate in sustainability issues. Measuring procurement sustainability as a tool for achieving a higher level of sustainability has been also discussed, as well as lowering sustainability risks in a supply chain.

Particularly in developed countries, suppliers can count on tightening regulation in sustainability compliance and higher consciousness about sustainability among customers in the future. In the turbulent political, economic, social and environmental circumstances, human and environmental aspects have increased importance in value creation compared to economic aspects. Developed countries have achieved innovative leadership in this field. Their international sustainable procurement practices, resulting in socially and environmentally pristine products, are a medium for broadening the new sustainable development paradigm around the world. On the other hand, they bring competitive advantages and increase

companies' resilience in global crises. Herewith, the author of this paper can confirm the hypothesis on sustainable procurement as a requisite international business strategy.

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STUDENTS PROCEEDINGS

PREVENTION AND MANAGEMENT OF STRESS RELATING TO WORK

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Abstract The main purpose of the paper is to examine stress in the workplace, with a focus on researching stress related to age and sex. 22% of employed people in the European Union face stress. The consequences of stress are manifested in forms of sick leave, the avoidance of certain work tasks, inefficiency and reduced productivity, dissatisfaction with work and with themselves. If a person does not face up to their problems, it can lead to deep frustration, exhaustion and even burnout syndrome, which is easily expressed on a physical level in the form of psychosomatic diseases. There are strategies for overcoming stress at the individual and organisational level, however sometimes, despite these strategies and techniques, stress appears in all its forms and causes health problems, therefore it is necessary to seek medical and other professional help (psychologist, psychotherapist). The authors of this paper found that the level of stress among employees in organisations is high, women are more likely to experience stress in an 'emotional way', while men are more likely to suffer physical illnesses because of stress, and secondary school/university students are the most stressed.

Keywords:
stress at work,
stressors,
symptoms of stress,
consequences of stress,
stress management

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1 Introduction

People like to glorify successful people who are stressed. We admire them because they are able to withstand great pressure, loads and stressful situations. When someone says, "I work a lot" or "I'm under a lot of pressure" or convincingly "I can handle anything", we hear this as amazing and enviable and even take it as the right and only way to our objectives (Jerovšek, 2020).

Research shows that 80% of all accidents at work are caused by the human factor, that people under greater stress are more prone to mistakes, and that tired and tense people do not always make the best decisions. In Slovenia, up to 70% of all visits to doctors are due to stress-related illnesses (Jerovšek, 2020).

Stress affects the health of employees and psychosocial risks negatively affect the well-being of the company. Increasing psychological burdens in the business world are increasingly leading to mental illness among employees, which thus have a negative impact on the company. Promoting health at work is a fundamental approach to reducing stress at work and strengthening health and well-being at work (Šarotar Žižek, Treven, Jimenaz, Eibel & Dunkl, 2013).

The authors of this paper want to bring this issue closer to the young and older population, as the issue of stress represents increasing costs and negative consequences for individuals as well as for organisations.

The purpose of this paper is to describe the problem of stress in general and how it manifests in employees, and to present individual and organisational techniques for the prevention and management of stress in the workplace. There is a particular focus on the question of whether stress is related to age and gender.

The authors set themselves the following goals: describe stress, study stressors inside and outside of the work environment, research work stress, identify differences in age and gender in the perception of stress, identify tips for coping and overcoming stress, test hypotheses, and make recommendations for improvement.

In designing this paper, the following qualitative research methods were used in the following order: descriptive method, comparative method, compilation method and the observation method.

2 Literature review

2.1 Stress in general

The word 'stress' is used in physics to denote the interaction between a force and resistance to that force. Hans Selye was the first to include this term in the medical lexicon to describe the 'nonspecific response of the body to any demand'. Selye is known as the 'father of stress research' and his concept of stress has influenced both scientific and lay people and communities in such diverse fields as medicine, psychology, etc. (Tan & Yip, 2018).

Stress is a physiological, psychological and behavioural response of an individual who tries to adapt and get used to internal and external stimuli (stressors). A stressor, on the other hand, is an event, person or object that an individual experiences as a stress element and which causes stress. A stressor temporarily upsets an individual's balance and stress is a completely normal response to this event (Dernovšek, Gorenc & Jeriček, 2006).

There are many recognised types of stress such as positive, negative, natural, artificial, physiological, normal, chronic, exogenous, endogenous, short-term, long-term, collective, corporate, high-risk, etc.

Hans Selye and Walter Cannon were the first to deal with stress. In the early 20th century, Cannon wrote about the 'fight or flight' response. With his experiments on animals, he was the first to prove the role of the sympathetic nervous system and adrenal system in determining the physiological nature of the response to stressors. Fighting or fleeing is a person's response when they find themself in a difficult situation that they perceive as very threatening. Selye described a model more than 50 years ago that he called 'general adaptation syndrome' (GAS) and divided it into three phases (Lipp & Lipp, 2019).

2.2 Stressors

Stress is a physiological, psychological and behavioural response of an individual who tries to adapt and get used to internal and external stimuli (stressors). A stressor is an event, person or object that an individual experiences as a stress element and causes stress (Belšak, 2022).

Stressors can be divided into factors that cause work-related stress and others, such as: stressors related to physical health (health conditions), home and environment, financial stressors, work (study) stressors related to relationships, children, related to extended family, related to friends, etc. related to physical health (health conditions); home and environmental financial stressors; work (study) stressors; related to partner relationship, children; related to extended family; related to friends; etc. (Belšak, 2022).

Workplace stress occurs when the demands of the work environment exceed the ability of employees to meet (or manage) them. Stress is not a disease, however, it can worsen mental or physical health if it is severe and lasts for a long time. A certain level of pressure can improve productivity and create satisfaction while achieving goals. However, when demands and pressures become too great, they cause stress, which is bad for workers and their organisations (European Agency for Safety and Health at Work, 2020).

Factors that often cause work-related stress (National Safety Council of Australia, Victorian Workcover Authority, 2012) are long hours, high workload, changes within the organisation, tight deadlines, changes in duties, job insecurity, lack of autonomy, boring work, insufficient work skills, excessive supervision of superiors, inadequate working environment, lack of adequate resources, equipment, harassment, discrimination and poor relationships with employees or bosses.

Psychosocial risks and work-related stress are one of the most difficult challenges in the field of occupational health and safety. They have a strong impact on the health of individuals, organisations and national economies. About half of European workers believe that stress in their workplace is common, and it also contributes to about half of all lost working days (Agency for Safety and Health at Work,

2020)Based on the above, the authors of this paper formulated the following hypothesis:

- H1: The level of stress among employees in organisations is high.

2.3 Symptoms of stress

Stress reaction symptoms develop within minutes of a stressful event and last from a few hours to a few days. The initial state manifests as bewilderment. Attention is reduced, the individual may feel a little confused, as if they are not fully conscious and cannot fully grasp what is happening around them. It is a general irritation of the nervous system that prepares the body for 'fight or flight'. This is followed by withdrawal from the stressful situation or severe agitation, which can paralyse the individual for a short time (Dernovšek, Gorenc & Jeriček, 2006). The symptoms of stress can be observed at the individual level, as well as at the organisational or company level.

The symptoms of chronic stress are divided into: physical symptoms (diarrhea, chest pain, rapid heartbeat, loss of external desire, regular colds, nausea), behavioural symptoms (eating problems, sleep problems (too much or too little), distancing from other people, drug, alcohol and cigarette use, tics and other habits due to nerves (nail biting, shaking ...), shifting responsibilities, and emotional symptoms (poor temperament, inability to relax, feeling lonely, depression, sadness) (Aggarwal & Prajapati).

2.4 The consequences of stress

Individuals need symmetry between work and home life. When work commitments 'clash' with an individual's personal life, stress levels increase and productivity decreases. Work-life conflict can lead to negative consequences that benefit neither employees nor employers (Foy, Dwyer, Nafarrete, Hammoud & Rockett, 2019). Below the authors have defined the consequences at the level of the individual, organisation and society.

Stress can have both positive and negative effects on individuals. In terms of positive effects, stress can be very positive and can also greatly increase motivation for the work we do. If we are nervous, we want to do as well as we can, hence we try harder. Stress can often also give us a sense of happiness or contentment and can make us feel more confident and fulfilled (McEwen, 2009).

Stress can be a major problem in organisations, as when workers are nervous, they may be more cautious and less alert, which can lead to inadequate work performance. If workers are under significant pressure, many illnesses can occur, leading to a reduction in the workforce and a shortage of workers (Kopp, Stauder, Purebl, Janszky & Skrabski, 2009).

2.4.1 Differences in the experience of stress between men and women

Women are more likely to experience stress in an 'emotional way', while men are more likely to suffer physical illnesses because of stress. Different models of stress identify gender as an important personal or demographic characteristic that influences an individual's experience of stress (Meško, Videmšek, Štihec, Meško Štok & Damir, 2010). Based on the above, the authors formulated the following hypothesis:

- H2: Women experience higher levels of stress than men.

2.4.2 Differences in the experience of stress based on age

Pre-school children are the least stressed as they are not yet aware of the situations around them. They are followed by pensioners who no longer need to worry about work, school or childcare. Secondary school/university students are the most stressed, as they have to deal with school and out-of-school issues on a daily basis, or full-time employees with families, who have many worries at once and are under constant stress (Aldwin, 1991). Based on the above, the authors formulated the following hypothesis:

- H3: Younger people experience higher levels of stress than older people.

2.5 Managing and overcoming stress

Stress is usually considered a negative phenomenon. Companies today are constantly implementing stress management techniques to reduce the impact of stress and constantly need to ensure that employees are stress-free (Bansal, 2018). There are different techniques and strategies at an individual and organisational level.

At an individual level, there are various techniques that can be used to manage stress. These include discussing various stressful events and problems, education and various coping methods, learning new skills and identifying stress symptoms such as increased heart rate, sweaty palms and stomach pain. Some strategies are more appropriate for use in certain circumstances than others. There are also relaxation techniques, such as meditation yoga and taking part in sports, which result in better productivity and quality of work. It is important to make sure you get enough rest and sleep and eat a healthy diet. A healthy mind is a healthy body.

At the level of the organisation, the type of stress management measure depends on the stressor in the work environment. If the cause of stress is the nature of the job itself, a redesign of work should be considered, in particular to improve the content and the characteristics of the work (Treven, 2005).

Management strategies determine success or failure in the workplace. Several different organisational approaches or strategies can be used to overcome stress (European Agency for Safety and Health at Work, 2020):

- Talk to your employer and union representative or any other employee representative if you think there are problems. If you are unable to speak directly with your employer, your union representative may do so on your behalf.
- Working atmosphere; try to convey constructive ideas on how the situation could be improved, creating a favourable organisational climate.
- Set priorities for your work, and if there is too much work, suggest for yourself what you might want to skip, decide on, or pass on to someone else without imposing too much extra work on others. It is about flexible work planning and design.

- Talk to your supervisor or union representative or any other employee representative if you feel you cannot handle things and make suggestions on how to improve the situation.
- If you want more diversity, look for new work assignments that you could do. If in doubt about preventive measures in your workplace, request relevant information. Follow the relevant company policy, if available.

3 Discussion

The authors of this paper had enough literature and resources available, however, the limitation that emerged was the time constraint of writing a seminar paper. The hypotheses they set were tested by analysing professional research online, articles, publications and professional books.

The authors limited the research to some aspects of stress that are considered important and worth mentioning. The hypotheses were not tested through our own research but rather through existing professional literature, thus only the theoretical part was tested rather than the empirical.

In this paper, the authors sought answers to previously set hypotheses. The results showed that the first hypothesis – The level of stress among employees in organisations is high – is confirmed, namely the workplace is the environments because individuals spend a large proportion of their daily lives there. Therefore, organisations need to work to alleviate the stress of their employees by organising simple activities to define culture, customs and companies, which, consequently, will influence employees. Employees need to feel comfortable and accepted in their workplace, which will lead to positive benefits. However, the environment in which an employee works is important, because it affects their financial stability or personal success, therefore, companies must take this into account in order for employees to be successful in their work. People devote a lot of energy and thoughts to what is important to them, which is a recipe for reviving stress.

The second hypothesis – Women experience higher levels of stress than men – was confirmed, since there are already visible differences between the sexes throughout the history of women. This is largely derived from scientific research based on a survey showing real-world statistics. Of course, it is important to note that there are

differences between the sexes between the reasons for stress itself and stressors. It is hoped that in future the level of stress felt by women will reduce.

The last hypothesis tested was – Young people experience higher levels of stress than older people – which was also confirmed. Due to various developmental changes in the requirement in the field of life, adolescents are exposed to the highest probability of experiencing stress, while on the other hand, adolescence is crucial in creating effective and constructive ways of coping with stressful situations.

4 Conclusion

This article describes stress in the workplace and there is no doubt that stress is present in every environment and period of our lives, regardless of age, status or general characteristics of the individual. Stress is a concept that everyone interprets differently and it poses a question that is still faced by a huge number of people, whether individuals or groups in education systems, for scientific reasons, or simply to facilitate personal understanding.

Most people associate the concept of stress with something negative, although in reality it is not always the case. Sometimes stress is the factor that motivates us to create positive changes in life and go outside our comfort zone, which in turn brings positive results and better well-being.

By being aware of the advantages and disadvantages of stress and, of course, its effects, it is easier to adapt to different situations that come our way in life. Negative consequences can be health-related, such as depression and anxiety, heart problems, headaches and migraines, obesity, and bowel problems. Pregnancy and menstrual problems can also occur in women. Of course, the problems are not necessarily medical, but also behavioural disorders, avoidance of stressful events, regressive behaviour (e.g. fiddling with hair, rocking, sucking fingers), increased addiction, irritability, poor self-esteem, learning difficulties (decreased concentration, forgetfulness, irrationality, poor judgment, and difficulty thinking (impaired imagination).

By understanding stress and at the same time understanding how much energy we will gain and save by avoiding negative stress when we find ourselves in stressful situations, we defend ourselves against potential negative consequences. However, in order to avoid stressful situations when we are already experiencing stressful situations, it is important to adopt preventative measures to prepare for stress. This can be in the form of various hobbies such as sports, reading, watching TV, socialising with friends and, of course, knowing our own limits to avoid burnout.

In today's environment, it is difficult to avoid stress, as we are exposed to it at every turn. It is suggested that each individual should seek help immediately when they feel the pressure of stress and immediately look for the causes of it. It means a lot to express our feelings and to be able to talk to our employer about the issue. Our health should be our priority, however, for the most part this is not the case in the 21st century. Every company should integrate systemic management and stress prevention at all levels into the system and constantly fight for the well-being and protection of workers.

The practical advice the authors would offer managers, employees and policy makers is that relationships at work are key, as they are always a potential source of stress. Tolerance towards co-workers, mutual respect and, in the long run, assertive communication are ways of achieving a better organisational climate and greater efficiency of the organisation, as well as one's own satisfaction and a less stressful life in already demanding jobs.

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ERGONOMIC ARRANGEMENT OF THE OFFICE WORKPLACE

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Abstract The main aim of this paper is to introduce the importance of ergonomic design of the office workplace and its impact on employee health. The discussion is based on the knowledge that a properly ergonomically designed office has a posivite impact on individual health. Ergonomics is the interdisciplinary study of workloads and the search for relief when the workload causes discomfort or even exceeds the permissible limit. An ergonomically incorrect office can cause a number of accidents and health problems for individuals. The aim of ergonomics is to adapt work to the potential and needs of people in the workplace, to ensure their safety and health. It is important to know the correct positioning of the elements in the office space, i.e. chair, desk, screen, mouse, keyboard. Proper regulation prevents health problems and increases employee satisfaction, productivity and engagement. This paper should also trigger questions about how to increase the knowledge and uptake of ergonomics in the workplace.

Keywords:
ergonomics, health, productivity, workspace, employees

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1 Introduction

Within the current economic working environment there is increasing talk about correct ergonomics and its impact on employees. In recent years, the subjects of ergonomics and working from home have become familiar to many. Working from home has become increasingly popular, especially during the COVID-19 pandemic. There are many advantages to working from home, however, there are also some disadvantages, one of which is the incorrect ergonomic design of the workspace at home.

Office workers are exposed to many health risks. Problems can be caused by: sedentary work, prolonged static posture and forced posture due to improper workstation layout, work with frequent and repetitive hand or wrist movements, high levels of concentration and data overload, demanding work, time pressure, low levels of control over the working day and inadequate support from managers and colleagues, working in unsuitable temperatures or in draughty conditions, inadequate lighting, noise, restricted access and barriers and many more (EU-OSHA, 2007).

Every worker faces at least some static load that affects them to some extent. They are usually unaware of the negative effects and consequences of being in the wrong, often at the time comfortable, static position for prolonged periods of time and activity. For these reasons, it is crucial to choose the right work equipment that meets the ergonomic and physiological requirements of the individual (Horváthová et al., 2019).

Introducing ergonomics into the company not only mean benefits for the employees but also has many benefits for the company itself. Managers usually associate ergonomics with occupational health and safety and related legislation rather than with business performance. Ergonomics can help organisations maximise the capabilities and productivity of their workforces, make wise capital expenditure, minimise the costs of manufacturing and employee benefits, and avoid lawsuits (Joyce & Marcotte, 1996).

This paper provides rules for a precise ergonomic design of the office, leading guidelines for using office equipment to ensure a safe working environment, and recommendations for improving ergonomics in the workplace.

The structure of the paper is as follows. First, a brief theoretical overview is provided of what ergonomics is, legislation in the field of ergonomics and the problems that arise from inadequate ergonomics in the workplace. Instructions are then given for how to design an office workstation in a precise ergonomic way. Finally, the effect that working from home and improper workplace ergonomics have on employees is discussed and recommendations are made to improve ergonomics at home and in the workplace. The paper concludes with suggestions for future research directions.

2 Theoretical background

Ergonomics is the interdisciplinary study of workloads and the search for relief when the workload causes discomfort or even exceeds the permissible limit. The term means the technical or organisational adaptation of work to the worker's capabilities (Levovnik, 2014). The goal of ergonomics is to create safe, comfortable and productive workspaces (Negulescu & Doval, 2021).

In a broad sense, ergonomics can be divided into three major areas, which are physical ergonomics, cognitive ergonomics and organisational ergonomics (Levovnik, 2014).

Ergonomics deals with the three main elements of work. The first is the workers and their level of skill and effort. This is followed by the work, which is defined by the specific task or tasks to be performed and the level of physical and mental effort that is put into it, the number of movements or steps and the time taken to complete the work. The final element is the workplace, including the space, work surfaces, equipment, tools and materials needed to complete the task (Negulescu & Doval, 2021).

Ergonomics has some important benefits for both employers and employees, namely reducing costs, improving productivity and quality by reducing fatigue and frustration, and improving employee engagement as employees feel safer about their health. It also creates a better safety culture, as the company demonstrates a commitment to health and safety as a core value (Negulescu & Doval, 2021).

The legislative meaning of ergonomics was marked by the launching a programme by the Council of European Communities concerning ergonomics and health and safety at work, called the 'Framework Directive'. It defines minimum safety and health requirements for workers in their workplace. This Directive has been transposed into national legislation. It requires employers to conduct regular analyses of workstations, to draw up and adopt a safety statement, which also includes a risk assessment for computer workplaces, to inform and train workers on safe and harmless computer work, to plan daily work routines, to consult and participate with employees and take measures to protect worker's eyes and their eyesight.

As mentioned, work can carry various risks and dangers that could endanger a person's health. Health problems in the workplace can be a major barrier to a successful business. In this paper, the authors investigated which factors most influence the occurrence of various diseases in office workers (Chan, Ross, Clouthier, Fischer & Graham, 2022).

There are increasing links to the development of musculoskeletal disorders in experts with inadequate working conditions. Musculoskeletal disorders are injuries to components of the body, such as muscles, joints, nerves, ligaments, bones and the blood system. When they occur, the consequences often primarily present as damage to the work and the effects of the immediate environment in which the work is performed. The causes of musculoskeletal disorders can be physical and biomechanical, organisational, psychosocial and personal. They can work alone or in combination. Exposed factors are often the result of non-ergonomic working conditions. Many could be prevented by ergonomically designing the jobs and tools that are used in the workplace (Chan, Ross, Clouthier, Fischer & Graham, 2022).

The work environment can also be considered as one of the main factors that can affect workers' mental health. The work environment has positive effects when work provides both success for the company and contributes to personal satisfaction, however, it can also lead to negative effects caused by stressful situations, work abuse (mobbing), inappropriate work patterns and schedules, etc., which can result in changes in workers' mental health (Ahmed, Qamar & Soomro, 2022). It is crucial that organisations use strategies to promote mental health and prevent illness in the workplace, as work-related mental health problems place a heavy burden of disease on society and the economy (Hassard & Cox, 2022).

A well-ergonomically arranged workspace helps prevent health problems, improves worker productivity and, consequently, the company's operations, and also increases employee satisfaction (AGIL, 2016). Thus, it can be concluded that good ergonomic practice is beneficial for both the organisation and its employees (Rahman, Hossain & Khan, 2022).

Good ergonomic practice in the company means, among other things, a well-ergonomically arranged workspace. The choice of equipment and its installation is of paramount importance to achieve suitable working conditions. The positioning of certain items in the workplace should always be considered. One of the key elements in ensuring that people can work comfortably and efficiently is good posture. Correct posture is facilitated by the correct ergonomic design or layout of the workspace. It is important that the computer screen is placed directly in front of the worker, arm's length away and aligned with the torso, with the top of the screen at or slightly below eye level. The keyboard and mouse should be placed at or slightly above the elbows. They must be placed on a hard surface in close proximity to each other. The office chair should support the spine, as is important for it to be stable and adjustable. It should be placed at a height that allows the feet to be completely on the floor or on a footrest, with knees at a 90 degree angle. The work surface or table must not reflect or glare. It is also crucial that it is not positioned too low to ensure there is ample legroom. The size of the work surface depends on the tools needed during work. When choosing where to place a phone, it is important that it is within easy reach. When ergonomically arranging the workplace, providing adequate lighting and temperature must not be forgotten. The room should be ventilated and not too noisy. For ergonomics in the workplace to be successful, all employees need training in the best ergonomic practices for physical tasks and the use of equipment (EU-OSHA, 2007; MFMER, 2021).

Ergonomic arrangement of the workplace means that work is adapted to human physical and mental characteristics, thereby reducing the harmful effects on health. A safe and comfortably designed workplace facilitates work, reduces the likelihood of mistakes and injuries, and creates well-being. In order to enable workers to work efficiently and without excessive stress, it is necessary to provide a workplace that is tailored to the human body, mobility and, after implementation, designed so that workers can operate in a posture that is least stressful and is equipped with working means adapted to the psychological and physiological characteristics of the human

body. When designing a work system, it is necessary to anticipate future developments and design a work system accordingly (SOPS, 2014).

The COVID-19 pandemic had a profound impact on our daily lives. One of the biggest challenges in adapting to the pandemic was the transition to working from home (Okuyan & Begen, 2021). During this period, there was an increase in injuries and discomfort resulting from nationwide pressure to work from home, as millions of workers spent months working on couches, beds and kitchen counters. Laptops are a major culprit, since constantly looking down puts us in the incorrect head position, which burdens the discs and joints of the spine and causes muscle imbalance in the neck (Wilser, 2020). Several factors are important for success in the workplace, even when working from home. One of the best is the proper use of computers and keyboards (Qamar & Soomro, 2022). It is important to include different types of rests: frequent 'micro-breaks' that last only five seconds and change your posture, for example, if you are looking down at the screen, now look up at the ceiling for five seconds; then occasional 'macro-breaks' lasting three to five minutes, such as deep breathing or stretching the shoulders; and finally, a 'big workout' of at least 30 minutes, preferably in one workout (Wilser, 2020).

Some of the recommendations for improving ergonomics in the workplace include employee training, adapting the office environment, short breaks and self-observation.

3 Discussion and conclusions

In today's world of busy schedules and fast-paced lives, people often forget about the one thing that keeps us 'on our feet' and enables us to live life as we know it – our health. Although it would be logical to make taking care of our health and bodies our priority, it is too often neglected, whether due to fear, lack of time, energy, money or many other excuses. Often, we come to realise that there is a problem when it is already too late.

It is important that we take care of our health in all aspects of our lives, not only in our spare time through recreation and nutrition, but also at work. According to Eurostat (Eurostat, 2022), the average European spends 37 hours a week at work, while the average Slovenian spends between 38 and 40 hours a week. According to

these statistics, people spend almost a third of their lives at work. That is why we as individuals as well as management departments in companies should start making commitments to the well-being of our/employees' bodies, both at home and at work.

It is important to recognise that health is the most critical asset of a person and of a company. During our lifetime, people often find themselves working in different jobs, sometimes in different sectors or fields. Jobs can range from agricultural work, teaching, business management, working in beauty salons, administrative work, to professional athletes, construction workers, cleaners, media technicians, vloggers, etc. – the possibilities are endless. However, along with its benefits, every job also has risks and drawbacks that can have a negative impact on our bodies and well-being.

Additionally, considering the current economic circumstances caused by COVID-19, it is important to stress the fact that our lives have been turned upside down over the last few years. This includes changes with the timespan and environment set within our working hours. The meaning of work attire, a good office/work environment or even the job itself was almost been lost for a while. People were chained to their homes for 24 hours a day and the entire work process was moved to our computing devices in a virtual world. Consequently, this has pulled down many set scales relating to work, i.e. meetings became less formal, business dress code was lowered as a standard from business-professional to business-casual or even just casual dress code, people moved their workplaces from offices to home desks and laptops, tablets or phones, and somewhere, no doubt, to even armchairs and sofas. As time passed, comfort was becoming more-and-more important. However, there are many negative side effects to comfort, such as poor posture, suffering of the spine, shoulders and upper limbs, with additional psychological effects that should not be neglected.

In terms of the implications of this paper, the findings suggest that employees need to be encouraged to actively participate in the identification and recognition of ergonomic problems inside the company, using their observations and suggestions to help eliminate them. Managers should recognise the importance of employees' knowledge in relation to the job they are doing. Employees' experience must be used in planning, as well as in the implementation and improvement of various ergonomic

measures. To improve ergonomic efficiency in their companies, managers are advised to primarily listen to the needs of their employees, whether they are publicly expressed or just tacit wishes. It is the manager's role to know and care for their workers. With the integration of a company's workers into the process, it is possible to effectively reduce or even eliminate problems, difficulties, or shortcomings as quickly as possible. If the workers themselves are happy and healthy, their work will be much more efficient, harmonious and, of course, productive, which is a definite benefit for the company.

In summary, as previously mentioned, through the process of drafting this article, the authors identified one certain aspect – the company and its employees work seamlessly, interdependent of each other, as a complex, constantly changing and flexible system. The system is made up of several different elements that affect each other in diverse ways. Changing one element will undoubtedly have an impact on others. Therefore, problems and dangers resulting from poor ergonomics in the workplace can have negative consequences not only for people but also for the decline of the entire company. Companies need to be aware that in addition to rewards, salaries, benefits, staff trips, health and well-being also play a huge role in employee satisfaction process. Just like people and every being in this world, the company acts as a harmonious organism whose health must be nurtured in order to function well and efficiently.

Therefore, it can be concluded that the above cognitions call for deeper research about the role of ergonomics in companies. Ergonomic measures can often be relatively simple and direct. This is often enough to make workers aware of basic ergonomic principles. This means they will be able to identify many ergonomics dangers in the workplace on their own and avoid them accordingly. However, ergonomic measures may differ from each other. They aim to manage and change work tasks, improve workplace conditions, adjust work equipment, change the organisation of work, or try to influence the workers themselves. Of course, it would be best if jobs were originally planned with the worker and their capabilities in mind. It often turns out that eventually, bad planning could be much more expensive than good.

Of course, the original purpose of dealing with any ergonomic problems that may arise in a company is to improve life quality of people, but the fact is that eliminating these diseases also means better business.

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Cooperation of Employees and Employers in Occupational Safety and Health Management

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Abstract The main theme of this paper is worker-employer cooperation in occupational health and safety management. This is one of the most topical topics, since the provision of occupational health and safety is key to reducing risks in the workplace. Therefore, questions arise about how to ensure that the health and safety problem in a company or organisation is addressed by the employer and employee working together. Many companies are tackling this issue in different ways, whether through employee motivation, on-the-job training, raising awareness, cooperation, etc. Various research has been conducted on this topic, which has shown the positive results of cooperation in occupational health and safety management. This paper thus deals with the themes of employer-employee interaction, in which mutual communication, risk reduction and prevention are key. The paper then goes on to compare governance in the European Union and Slovenia. Given the situation that forced large numbers of employees to work remotely during the COVID-19 pandemic, the subject is also approached from this aspect, how employers can ensure employee safety when working from home. At the end of the paper, some examples are given of how Slovenian and foreign companies are tackling and solving the problem in practice.

Keywords: occupational health and safety, worker-employer cooperation, safer working environment, risk management, European Union, Slovenia

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1 Introduction

Employee participation is key to a safe and secure working environment. Employees must play an active role and work together with their colleagues and management to achieve improvements in their workplace. Evidence has shown that workers' cooperation with employers would bring various benefits, including a reduction in the number of fatalities and injuries at work. However, effective worker participation in this area requires several key criteria, such as legal support, management and trade union support, training and the positive quality of the workers involved (Soehod, 2008).

Workers' health has been an area of growing concern over the last two decades. The globalisation of the world economy and rapid technological change continue to change the nature of work and employment practices, exposing employees to new and serious health risks. These challenges are unavoidable in any workplace, and it is important that employers consider how they can best fulfil their legal and managerial responsibilities to promote and protect the health and well-being of their employees (Chu & Dwyer, 2012).

To a large extent, this topic depends on human awareness, as there is a danger or disease that is not foreseen. It is important that organisations ensure both health and safety at work through appropriate measures. Safety at work is paramount in an organisation, especially in manufacturing companies, where numerous accidents may occur, anywhere and anytime, during the work process itself.

The causes of accidents vary and depend on the complexity of the jobs. Therefore, it is necessary to assess the dangers and risks posed by employees. Only by doing so can measures be taken to reduce the number of accidents. Hazards at work can also be improved through education and training, as well as regular medical examinations of all members of organisations that are legally prescribed. Every employer is aware of the benefits of having employees who are satisfied and healthy in their workplace, as it ultimately contributes to business success. Unfortunately, in some companies a scenario can be witnessed in which employers do not take health and safety at work seriously. Some jobs in a company can be more stressful than others, so the employers must pay certain amount of attention to employees on these positions. If

they do not care enough this can lead to human burnout, which in turn directly affects their health of employees.

The structure of this paper is as follows. First, a theoretical insight is provided into the cooperation of employees and employers in occupational health and safety and health and a description is given of the main responsibilities of each side. Next, the differences are described between the state of this topic in European Union versus Slovenia; through research, the authors describe their findings and share their thoughts about the situation. Finally, the impact of COVID-19 is discussed and some examples of good practice are described. The paper concludes with some thought for future research directions.

2 Workers' and employers' participation in occupational health and safety management

European workers have seen their occupational safety and health levels rise in recent decades. Nevertheless, workplace injuries, illnesses and deaths continue to occur and take their toll. In order to further improve the level of health and safety in the workplace in the future, workers and management need to work closely to find solutions to common problems.

Workers who participate in occupation health and safety management (OHS) are safer and healthier, which has a positive impact on the whole organisation. The very effectiveness of worker-employer cooperation is influenced by legal requirements. Many employers in the European Union are unwilling to establish cooperation without legal requirements, and if they are willing, they generally only follow the rules that are written and enforced. This shows that cooperation needs to be properly regulated in order to have the desired effects and that the relevant body needs to be aware of its obligations. Workers' participation in OHS can best be promoted by electing representatives for this type of work. In Slovenia, however, there is more focus on good reputation than on legal requirements – as is seen later in this paper.

2.1 What does worker participation in management mean?

Workers' participation in OHS management is a simple two-way process involving workers, employers, and workers' representatives:

- talk to each other
- listen to each other's concerns
- discuss problems in a timely manner
- exchange information and views
- take on board what each other has to say
- make decisions together
- trust and respect each other

There are several reasons why workers should actively influence management decisions. The first is that workers' participation in OHS management contributes to the development of effective ways of protecting workers. If workers are involved from the planning stage of a change, they are more likely to identify the reasons for taking a particular action, help find practical solutions and subsequently act on the action taken. Workers can also participate in the design of safe systems of work and can then advise, suggest and demand improvements, thus helping to design measures to prevent accidents and work-related ill health in a timely and cost-effective manner (Health,and safety at work, 2021).

One of the key factors for good OHS management is worker involvement. Employers have a legal duty to consult employees on health and safety issues. However, they will benefit greatly by going beyond the minimum requirements. Occupational health and safety management stands a better chance of success if it encourages active worker participation and establishes a dialogue between employees and management.

2.2 Employers' roles and obligations

Employers are legally responsible for ensuring health and safety at work, which means they must take measures to protect workers from anything that could harm them. Any risks to injury or health that might arise in the workplace must be well controlled (Obligations of employers, rights and duties of workers and the self - employed, 2020).

Employers are obliged to take such preventive measures and to choose production and working methods that ensure a higher level of occupational safety and health and which will be integrated into all the employer's activities at all organizational levels. Employers must assess in writing the risks to which workers are or may be exposed at work. Once an occupational health and safety risk assessment has been carried out, the employer must draw up and adopt a safety statement with a risk assessment in writing.

Employers must also make workers aware of the risks in their workplace, how they are protected and instruct and train them on how to manage these risks. Employers must provide appropriate work equipment and ensure a safe environment in which employees can carry out their work without interruption.

This leads to the realization that employers must consult workers on health and safety issues. Employers must also promote a culture in which occupational health and safety are integral parts of everyone's role (Health and Safety at Work Act, ZVZD-1, 2011).

The following are recommendations for successful worker participation in health and safety (GOV.SI site, 2021):

- Employers must consult workers or their representatives and give them the opportunity to participate in a balanced way in discussions on occupational safety and health issues.
- Workers or workers' representatives have the right to make suggestions and to request the employer to take appropriate measures.

- National laws or practices lay down several specific requirements regarding information and consultation, as regards workers' representatives and their rights, as well as the establishment of forums such as joint safety committees.
- It is usually best to use a combination of methods and arrangements – formal and informal. The direct involvement of workers and workers' representatives should not be considered as an alternative but rather as a different option, which should be combined as effectively as possible.

2.3 The role of workers' trustees in Slovenia

The Slovenian Occupational Safety and Health Act provides the following definition: the workers' Health and Safety Officer is the workers' confidant, who has the status and role of a works council. The employer must enable workers to participate in the deliberations on all issues concerning the provision of safe and healthy work, in accordance with this Act and other regulations. This right shall be exercised by workers directly and through their trustees in the works council, in accordance with the provisions governing workers' participation in management or through the workers' health and safety representative. If a works councilor is not elected, the employer must consult all workers on occupational health and safety matters. The employer must provide the health and safety representative with a way of working and the rights applicable to the works council. The exercise of these rights must not place the worker at a disadvantage with the employer. The Labour Inspectorate monitors compliance with the provisions on workers' co-management in the field of occupational health and safety and imposes fines on employers who fail to facilitate the exercise of these workers' rights.

In Slovenia, there are three forms of workers' trustees who participate in management. Workers' councils can be elected by workers in the private sector where the employer employs more than 20 workers. Private sector employers with fewer than 20 employees are allowed to elect a shop steward. However, the workers' confidant for occupational health and safety is a confidant of public sector workers who has the status and role of a works council and is elected in the manner provided for the election of works councils in the Workers' Participation in Management Act. A workers confidant is also elected by private sector employees under the Workers' Participation in Management Act when they do not exercise their right to elect a

works council. In this case, they only participate in management in the field of occupational health and safety. Elections are a right, not an obligation, under the OSHWL, which workers in many companies do not take advantage of, particularly where there is no organized trade union. Elected shop stewards are therefore particularly scarce in micro and small companies.

Under Occupational Safety and Health Act, employers must provide appropriate forms of training for members of the works council or the health and safety officer to carry out their duties. This is not the case for the safe work training that the employer is obliged to provide to all employees, depending on the risks in different workplaces, as provided for in the employer's document 'Safety Declaration with Risk Assessment'. In fact, the Occupational Safety and Health Act provides for specific training for the effective performance of the role of the safety representative.

2.4 The role of trade unions

Trade unions are also responsible for regulating or protecting health and safety at work. In this respect, they must inform workers about injury insurance, help draw up national policies and integrate occupational health and safety principles into education programmes at all levels (Koželj, 2018).

To ensure effective occupational health and safety support for representatives, trade unions need to integrate the most important occupational health and safety issues into their strategies. The main needs and challenges are to (Menéndez, Benach & Voge, 2017):

- Improve the provisions of collective agreements on health and safety at work. At the micro level, collective bargaining should develop provisions based on the actual experience of workers and occupational safety representatives
- Inform and train workers on health and safety at work and include these issues in negotiations between workers and employers
- Add a broader social and occupational health perspective to the now purely technical and legal 'framework' of some occupational health and safety topics

- Identify how safety representatives can best influence other stakeholders in occupational health, including employers' organisations, occupational health and safety professionals and public authorities, to co-create an enabling environment for representing workers' safety and health interests
- Raise co-management to a higher level, so that safety representatives are not only informed about occupational health problems or only give advice, but also have the influence and power to negotiate them.

3 Comparison of cooperation on occupational safety and health in the EU and Slovenia

Health and safety at work is an important objective for countries, as it has a direct impact on the working, social and economic environment. Regulatory frameworks in each country are extremely important in managing the basic principles of society, including the physical well-being of its workers (Zhang, Yang, & Martinez-Aires, 2021).

Analyses of the occupational health and safety situation in Slovenian organisations have shown that there are no significant differences in the risks to which workers are exposed in the work environment compared to the EU-28 average. However, there are some differences compared to the EU-28 average. In Slovenia, the adoption of a safety declaration and risk assessment are central to occupational health and safety regulation. This is outsourced in the majority (87.1%) of Slovenian companies, which is quite different from the EU-28, where almost half of the organisations (47.3%) assess this with their own employees. Due to legislation, workplace risk assessment is more frequently carried out in Slovenia (compared to the EU-28). However, in Slovenia the main reason for implementing occupational health and safety is not to comply with legal obligations, as in the EU-28 but rather to maintain a good reputation (Kanjou Mrčela & Ignjatovič, 2017).

Slovenia also carries out risk assessments more frequently than the EU-28. This is mainly a reflection of legislation. In Slovenia, it is a legal requirement for employers to assess in writing the risks to which workers are or may be exposed at work. In Slovenia, the most important reason for addressing health and safety issues is to maintain the company's reputation, and it is over 10% higher than in other European countries. This is followed by compliance with legal obligations, which is most

important in the EU-28. Another thing that Slovenian organisations pay more attention to than the EU-28 average is regular health checks to monitor the health of employees. Slovenia is also one of the few European countries that has made the planning and implementation of health promotion in the workplace mandatory by the law on occupational health and safety. Despite being above the European average in some aspects, it is worrying to note that occupational health and safety is regularly discussed at the top management level in only 34.5% of Slovenian organisations compared to a EU-28 average of 63%. Only 37.5% of workers and management regularly discuss occupational health and safety, while the remaining 57.7% only discuss it when problems arise. The EU-28 average is 61%, which shows that Slovenia is much lower than other EU countries in this area. On the other hand, a higher proportion of workers in Slovenian organisations are involved in the design and implementation of occupational health and safety measures than in the EU-28. Only one third of Slovenian organisations have an occupational safety and health representative at work, which is significantly less than in the EU-28, where the percentage is 61.8%. The most represented sectors are services and industry. Medium and large companies are the most likely to have a health and safety representative. There are some differences in occupational safety and health between companies with and without a shop steward (Kanjou Mrčela & Ignjatovič, 2017).

As an example of good practice, the authors of this paper highlight the company Triglav Insurance, whose Triglav.smo programme and eCammpus system addresses issues such as health promotion, a safe and healthy working environment, interpersonal relations and job satisfaction. This is how the company address these issues in a holistic way, both physically at the company and remotely. This also includes Izola General Hospital, which, through its Green Cities, is working to reduce overwork and improve the mental health of its employees. Finally, there are many organisations that use the ISO45001 system to ensure health and safety at work.

4 Discussion and conclusion

This paper describes the involvement of workers and employers in the management of occupational health and safety. Health and safety are not only important in the workplace, but also in every part of our lives. It is important to be able to distinguish between what we can and cannot do, so that we do not endanger ourselves and others with whom we interact daily.

There are many key factors that have a significant impact on the results of worker and employer involvement in occupational health and safety. It is important that workers' representatives – whether trade unions or works councils – consider workers' wishes and rights, and it is the employer's responsibility to incorporate these wishes into the occupational health and safety system as effectively as possible.

Companies are looking for different ways to integrate worker and employer participation in occupational health and safety management into their business. This takes the form of employee motivation, training, awareness-raising, etc. In both the European Union and Slovenia, there has been significant progress in this area, as evidenced by the many companies that are introducing good practice in their work. In addition to the old methods of cooperation between workers and employers in the management of health and safety at work, new trends are also emerging, such as teleworking, which raises new problems and, therefore, new solutions.

In this paper, the authors discovered that cooperation between workers and employers on occupational health and safety directly affects the working, social and economic environment. They came to the conclusion that cooperation in Slovenia is higher than in European Union, which can be confirmed by the data obtained through the internet. When it comes to employee cooperation, most rules are dictated by law, as well as adequate provision for the proper functioning of workers' trustees in the companies. According to the Occupational Safety and Health Act, the employer must provide appropriate forms of training for the performance of the duties of the member of the works council or the shop steward.

Suggestions on how to improve this topic include increasing the active participation of workers in deciding how to ensure safety at work, as workers themselves know best how a job is done and are therefore often the first to see where there is room for improvement or where safety can be improved. It should also be ensured that workers are not overworked and that they have enough time to take breaks, which in turn maintains the level of concentration necessary for safe and healthy work. The final suggestion that the authors consider sensible is to incorporate sports recreation into working time, as it promotes better body mobility, which in turn reduces the risk of injury and has a positive effect on health.

The authors conclude that the system of worker-employer cooperation in the area of occupational health and safety in Slovenia is well established, however, in a context of constantly changing work circumstances, the attention of participants is increasingly needed and could be further improved. In addition to this topic, the authors recommend that further research should be conducted into the link between employers and workers in the field of occupational health and safety in relation to productivity at work.

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KEYNOTE SPEECHES

APPLYING SUSTAINABILITY KNOWLEDGE AND SKILLS TO POST-COVID CHALLENGES

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Abstract The term "wicked problems" describes urgent challenges that are ill-defined, dynamic, complex, public, and often intractable. They stem from interconnected economic, social and environmental problems. Sustainability professionals take a transdisciplinary approach to creating a more sustainable society when dealing with wicked problems like climate change, water policy, resource management, biodiversity, and sustainable development. As society adapts to the complexities of a post-COVID world, it has become increasingly important to incorporate broader perspectives in decision-making. With the many interconnected issues of health, economics, and politics left in the wake of COVID-19, the business community must examine the role of corporate responsibility in addressing these problems. Business can look to the field of sustainability science for tools to help with this. Sustainability is oriented toward problem-solving on a variety of scales, from entrepreneurial niche innovation to global accords. Sustainability expertise will tackle wicked problems evolving in the post-COVID-19 economy - the flow of raw materials through the economy and the development of social resources to address issues of justice, equity, diversity, and inclusion. Sustainability skills can be used to more efficiently acquire and use raw materials through the improved application of circular economy principles. Examples include how to use blockchain technology to create a more effective supply chain. Sustainability science also emphasises interpersonal and intrapersonal skills. These skills improve the acquisition and understanding of stakeholder perspectives, bridging differences in perspectives and vocabularies. Intrapersonal skills help to develop attitudes of community engagement and corporate responsibility, teaching how to incorporate stakeholder concerns in personal decision making. Sustainability professionals strive to build a more resilient, robust, efficient, and most importantly, effective society. A key focus is on building interactive networks and promoting community engagement and social responsibility.

Keywords: sustainability, skills, knowledge, post-COVID, challenges

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PROSOCIAL AND PRO-ENVIRONMENTAL OUTCOMES OF HIGHER EDUCATION IN THE POST-COVID WORLD

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Abstract This presentation seeks to uncover if prosocial and pro-environmental outcomes of higher education in business and economics could be associated with business school activities in the field of Responsible Management Education (RME). These could include the teaching of business ethics, Corporate Social Responsibility and related subjects, as well as business school research and different practical ways of involving business schools in showing their commitment to RME. The presentation focuses on the UN PRME (Principles for Responsible Management Education) and how their implementation could support the prosocial and pro-environmental outcomes of higher education in business and economics. Recent and forthcoming research on the prosocial and pro-environmental outcomes of higher education in business and economics is reviewed, and based on the research results, the question of the 'new normal' in (business) ethics is posed: how should business schools frame their RME-related activities in the world, and to what extent are they currently being re-shaped by the challenges of the COVID pandemic and threats to the global, rules-based international order?

Keywords:
business ethics, corporate social responsibility, prosocial and pro-environmental outcomes of higher education, business schools, higher education

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6TH FEB INTERNATIONAL SCIENTIFIC CONFERENCE:

CHALLENGES IN ECONOMICS AND BUSINESS IN THE POST-COVID TIMES

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Abstract The Proceedings of the 6th International Scientific Conference, organised by the University of Maribor's Faculty of Economics and Business under the umbrella theme "Challenges in Economics and Business in Post-COVID Times", brings together 52 contributions from authors across 18 countries. Individual articles address selected issues regarding the impact of the COVID-19 epidemic on the functioning of society and changes in the economic and business environment, as well as how society and organisations have dealt with the changed social conditions following the epidemic. In the articles, the authors present various aspects of the impact of the COVID-19 epidemic on the functioning and behaviour of society's stakeholders and the necessary changes in how they function, given the social conditions present following the end of the epidemic. The contributions also present the social experience of dealing with COVID-19, and offer possible solutions for the macroeconomic and business operations of society and organisations in a post-epidemic context.

Keywords: Economics, management, digitalization, education, law, COVID-19

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