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# Impact of the coronavirus pandemic on the functioning of companies from the perspective of employees

JEL classification: G10, G18, G30, G38, G39

**Keywords:** functioning of enterprises, pandemic, coronavirus

## Abstract

The main objective of the article is to indicate the impact of the pandemic on the Polish economy, with particular emphasis on businesses from the perspective of employees. The hypothesis is that the coronavirus pandemic negatively affected the functioning of the Polish economy. Taking up this topic is related to the various reactions of the government and European organizations to the emergence of a new threat and the significant role of health in the economy. This article is mainly empirical. The research was conducted using the method of standardized computer-assisted questionnaire interviews between March and April 2021. The questionnaire form was shared on social media in the student group and the group *Accounting – my passion* (in Polish *Księgowość moja pasja*). 120 entrepreneurs and employees (N=120) were surveyed. The negative impact of the coronavirus is perceived by almost all respondents and the mitigation instruments offered by the government are considered insufficient. It would be worthwhile to think about relief solutions in times of pandemic, the current opinion shows a negative perception of the measures introduced so far. The pandemic caused not only economic effects, but also affected many areas of people's lives, resulting in a negative perception of reality. The functioning during the lockdown was limited to the necessary minimum, therefore the quality of life was rated as average.

## 1. Introduction

Throughout history, human health has been tested many times, despite the development of medical innovations. Infectious diseases continue to pose a significant threat to social and economic life. The emergence of a global threat in the form of the COVID-19 pandemic caused by the SARS-CoV-2 virus influenced the choice of research problem. COVID-19 is an infectious disease that spreads very rapidly, it has contributed to the restriction of many civil liberties and those related to the conduct of broadly defined economic activities.

The main objective of this article is to indicate the impact of the pandemic on the Polish economy with a particular emphasis on enterprises from the perspective of employees. The hypothesis is that the coronavirus pandemic has a negative impact on the functioning of the Polish economy. Addressing this topic is related to the various reactions of the government and European organizations to the emergence of a new threat and the significant role of health in the economy.

## 2. Theoretical framework of the research

Health is of great importance in human life and society, and is an important contributor to human capital and of great significance for development. Throughout history, human health has been subjected to many tests, despite the development of medical innovations. Infectious diseases continue to pose a significant threat to social and economic life.

The COVID-19 acute respiratory disease, which has affected almost every country in the world, was caused by a new type of coronavirus, SARS-CoV-2. A rapid increase in new cases, followed by an increase in secondary outbreaks was seen in many countries around the world. The World Health Organization (WHO) declared the global pandemic on March 11, 2020 (Czech, Karpio, Wielechowski, Woźniakowski, Żebrowska-Suchodolska, 2020, 20).

This disease appeared suddenly and spread very rapidly and intensively, making it difficult to assess its impact. For more than a year, the coronavirus pandemic has continued to spread, and its negative impact can be seen in everyday life. Despite a number of tools for risk identification and analysis, it was not possible to predict the threat that led to the global crisis. An economic crisis is defined as a deep and prolonged recession (Blanchard, 2009, 25).

According to many analysts, the current pandemic can be classified as a so-called “black swan” event. The source of this term is the title of Nassim Nicholas Taleb’s book *The Black Swan. The Impact of the Highly Improbable*. The coronavirus pandemic was an unexpected and unforeseen event on a global scale, with extremely powerful consequences (Szczepański, 2020, 55). Crises are such events and cause many changes. As a result of the lockdown in the first phase of the pan-



demic, many businesses in the service or manufacturing sector ceased to exist (del Rio-Chanona et al., 2020). The duration of the lockdown was one of the key elements that negatively affected the functioning of businesses (Bartik et al., 2020). Some companies failed, while others seized opportunities to grow. According to the Central Statistical Office (CSO) data, in 2020 there were 49 fewer enterprises operating than in 2019 (17,739 in 2019 compared to 17,690 in 2020) (Statistical Bulletin, 2021). Businesses belonging to the small and medium-sized enterprise sector experienced, either directly or indirectly, the negative impact of the so-called COVID-19 pandemic shocks (PARP, 2020). Data from the Central Statistical Office (Statistical Bulletin, 2021) indicate that in the second quarter of 2020 there were one-third (31.8%) fewer registered businesses in Poland than in the same period of the previous year, and there were 19.8% more business bankruptcies than in the same period of 2019. This means that the COVID-19 pandemic has revealed worrying trends: a decline in the growth of new businesses and an increase in the number of liquidated companies. Therefore, it can be concluded that COVID-19 has negatively affected the economic situation and conditions for conducting business activities in Poland.

The decrease in the number of enterprises may be related to the uncertain situation in the country and the world, as well as numerous restrictions. In order to protect the state from the negative effects of the pandemic, the government adopted the law on special solutions related to preventing, counteracting and combating COVID-19 (Journal of Laws 2020, item 374). This act clarified the tasks of public administration bodies in preventing and combating SARS-CoV-2 infection and the spread of the infectious disease in humans. It also specified the principles of covering the costs of health care services and clarified issues in the area of child care and the granting of child care allowances to parents in the event of the closure of a crèche, kindergarten or school. Regulations were an extremely important aspect of socio-economic life (Ligaj, Pawlos, 2021, 44). In addition, the government introduced aid for entrepreneurs, called the anti-crisis shield (Journal of Laws 2020, item 695). The main objective of the anti-crisis shield was to protect the Polish economy and society from the effects of the coronavirus. The first part of the package was implemented on 31 March 2020, and as the epidemiological situation developed, subsequent solutions and amendments came into force. The objectives established by this instrument were to be achieved through a series of laws and a financial shield. Their value was estimated at over PLN 312 billion. The aid package was divided into five pillars: safety of employees, financing of enterprises, health care, strengthening of the financial system, and the public investment program. Each of them covered a different area of activity and the estimated value of the aid varied (PFR, 2021). Within the anti-crisis shield, PLN 212 billion are earmarked for measures under the five pillars described above, while the remaining amount, i.e. PLN 100 billion, is additional funding under the financial shield of the Polish Assistance Fund for Companies and Employees. The

funds are intended to support the financial liquidity of micro, small, medium, and large enterprises. The financial shield is also intended to minimize the effects of the spring lockdown and help entrepreneurs return to normality. The proper functioning of enterprises is of great importance for the economy, which is why such a large amount is earmarked for this purpose (PFR, 2021). Many businesses used this assistance to get through this difficult period.

### 3. Research methodology

The aim of this empirical study was to identify the changes caused by the coronavirus pandemic in companies. It was conducted between March and April 2021, using the method of standardized computer-assisted questionnaire interviews. The questionnaire form was shared on social media in the student group and the *Accounting – my passion* group.

The survey included 120 entrepreneurs and employees (N=120) who were first asked about their characteristics, i.e. gender, age, place of residence, place of work, number of people employed in the company, and economic sector. The respondents were from different regions of Poland.

The majority of the respondents are women, making up almost 70% of the sample. The number of men taking part in the survey is 37, half the number of women, representing more than 30% of the sample.

The largest group is made up of people between the ages of 21 and 30, which may be related to the fact they spend more time on social media, where the survey was published. The group of 21–30 year-old consisted of 96 respondents, with the second largest group being respondents aged 31–40, who make up 9.17% of the sample. There is only one person in the 61+ age group.

Most of the respondents, i.e. 54 people, live in rural areas. It is worth stressing the fact that from the large group of village residents only seven people work on a farm. Inhabitants of big cities (over 250 thousand people) are a little less numerous (37 people).

Most of the employed respondents, 81 people, declared employment in a private company. Six people, or 5% of the sample, owned a company. 26 worked in a state institution and seven in a farm, i.e. 21.67% and 5.83% respectively.

The penultimate parameter relevant to the study sample is the size of employment in the respondent's enterprise. It can be observed that contrary to other elements, the number of employees in micro, small, medium and large enterprises is comparable. Nevertheless, most respondents work in a company with a maximum of 10 employees and the fewest in a company with 50–250 employees.

In the case of farms, respondents indicated 0–10 people, probably because they run it independently with a spouse and sometimes with the help of an additional employee. Among the respondents, people working in private micro-enterprises had a significant advantage, as 29 people, i.e. about 24%, declared it. Those

employed in public institutions most often indicated medium and large entities. At the time of the survey, the company owners ran four micro enterprises and two small companies.

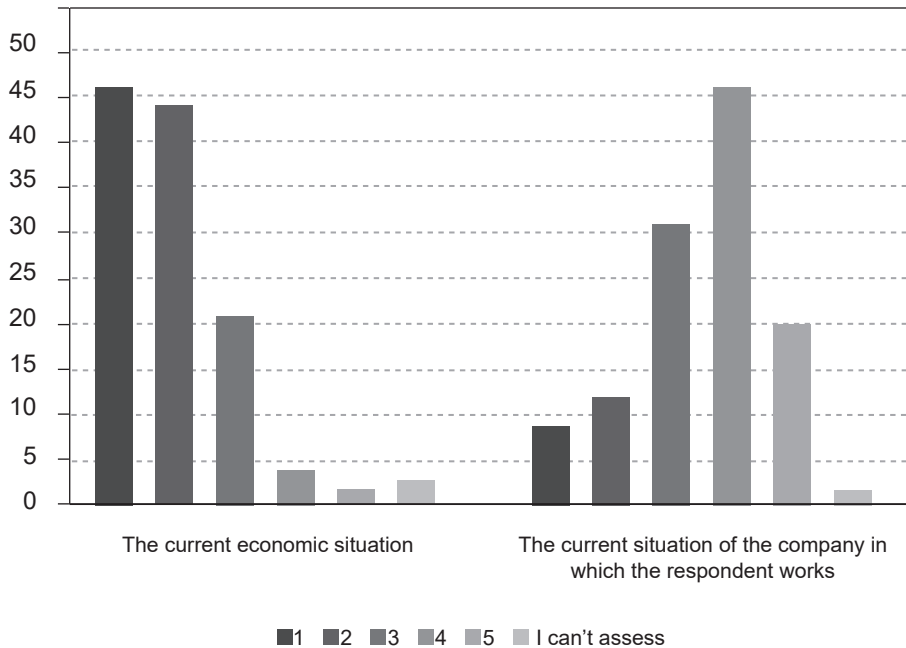
The most common economic sector was trade, with 25 people working in it, followed by finance and insurance with 14, and transportation with 10. These three economic sectors account for as much as 40% of the respondents. The lowest number of respondents came from housing and intangible utilities and forestry.

## 4. Results

Respondents agreed that the coronavirus has a negative impact on the Polish economy. As many as 94.17% of respondents gave such an answer, while the remaining 5.83% indicated a neutral impact of the pandemic on the economy. The above results indicate that the working population did not notice any benefits from the pandemic. It can be assumed that not only the employed would choose such an answer, and that measures aimed at limiting the spread of the disease are adversely affecting the activity of all sectors of the economy. The prolonged duration of the pandemic represents multi million-dollar losses for the state budget. The emergence of the disease has affected the functioning of society, in the form of a decrease in its activity. Reduced demand and restrictions in the form of lockdowns hamper economic development, eliminate jobs and may even lead to recession. The negative impact is therefore noticeable, but it is impossible to say how much the pandemic will affect the economy without knowing the duration of the lockdown.

The next question asked about the impact of coronavirus on company employment. The majority of respondents, 62.5%, indicated that employment in the company where they work remained unchanged. This included five business owners and 70 employees. According to 24.17% of the respondents, employment decreased, which was reported mostly by people employed in private companies. In the answers of the respondents the decrease of employment is more evident than the increase, however, it is necessary to emphasize the importance of the development of enterprises in such a difficult time. Almost 11% of the respondents noted an increase in employment in their company, while the remaining 2.5% answered "don't know". An in-depth analysis of the survey revealed that as many as 30% of those who said they worked in trade reported a decrease in employment. Despite the small group from government, three out of seven responded that the pandemic had affected employment in a negative way. 80% of the respondents from the transport industry, saw no change in employment, while 20% indicated an increase in employment. Surprisingly, this industry is the fifth most affected by the pandemic according to the respondents.

Another question concerned the assessment of the current situation of enterprises and the country. The respondents could express their opinion on a scale from 1 to 5, where 1 meant the lowest rating and 5 the highest.



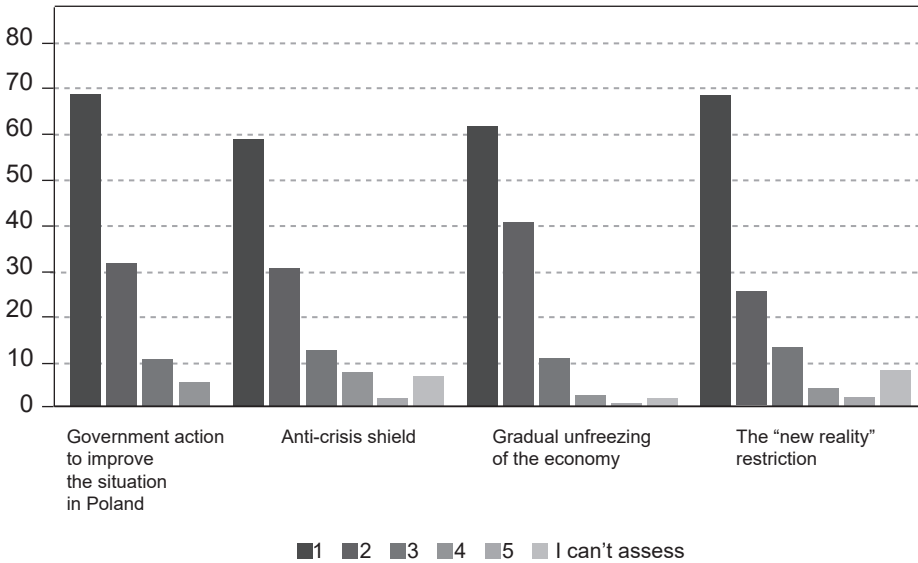
**Figure 1.** Assessment of the current state of business and the country

Source: own compilation on the basis of surveys.

The research conducted shows that the current economic situation is poor in the eyes of working people (Figure 1). As many as 75% of the respondents rated the current situation of the country at 1 and 2 points, which are the lowest scores on the scale. 17.5% of the respondents marked the answer “3”, which can be interpreted as a neutral reference to the examined topic. Only 4% of the respondents, indicated answers 4 and above, and the rest marked the answer “cannot assess”. When evaluating the current situation of the enterprises they work for, the respondents most often marked 4, the largest group being people working in large companies, followed by micro-enterprises. The distribution of answers, in comparison to the previous chart, is much more shifted towards the highest ratings. Few people, 17.5%, indicated the lowest ratings of 1 and 2. It is worth stressing the fact that the economic situation of the country is rated much lower than the current situation of enterprises.

In the next question, respondents were asked to assess the government’s actions aimed at improving the situation in Poland. It was structured in a similar way as the previous one.

Figure 2 shows the overall assessment of the government’s efforts to improve the situation in Poland, as well as the most important instruments set up for this purpose. As can be seen, the lowest rating appeared most frequently among the



**Figure 2.** Assessment of government action to improve the situation in Poland

Source: own compilation on the basis of surveys.

respondents' answers. It is worth stressing that the graphs evaluating general activities and specific solutions are very similar. According to the respondents, the support from the government is insufficient, which is evidenced by low ratings of the main aid instruments. As can be seen, the issue of enterprise support must be constantly adapted to growing problems. The actions of the government restricting the activity of the economy significantly affected the functioning of enterprises. The aim was to react quickly to the growing number of cases of COVID-19, nevertheless the society was not prepared for such drastic changes. The aid packages prepared by the government do not cover all enterprises, which is why the respondents' ratings are so low.

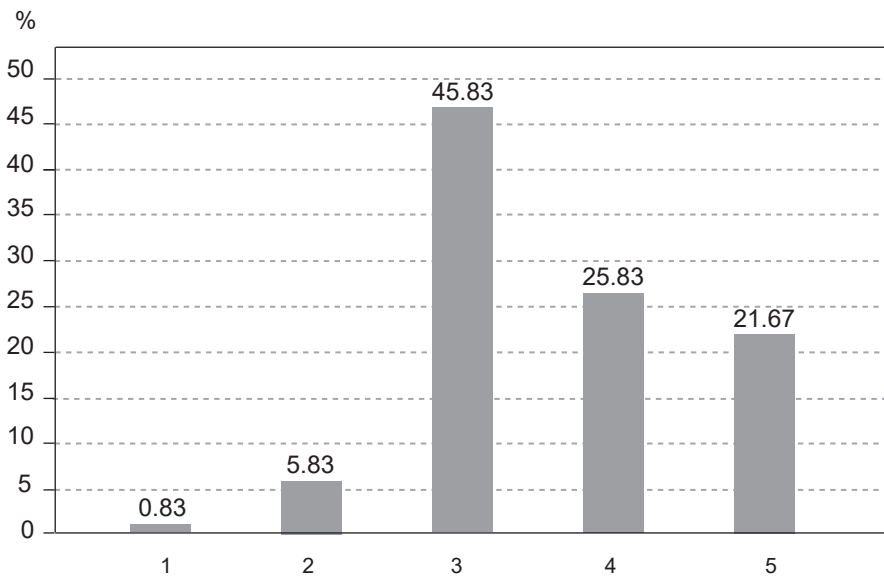
When asked about the use of government aid in 2020, the distribution of the respondents' answers is quite even. The largest number of respondents (37.5%) answered that no aid packages were used in their enterprise, followed by 34.17% who answered "don't know". Among the respondents who gave a positive answer (28.33%), the largest group are people working in private micro-enterprises. The aid tools prepared by the government are aimed at companies meeting certain criteria, despite constant extensions the support is insufficient for such a scale of the problem and therefore companies often have to cope on their own.

The next question sought to determine whether the sale of products/services had shifted to the Internet due to the pandemic.

The majority of respondents indicated that the sales of the companies where they are employed have not shifted to the Internet due to the pandemic (55.83%),

while 15% of the respondents indicated that the products/services of their companies can be purchased electronically. 17.5% of the sample declared that some sales had been transferred to the e-commerce market and the rest were unable to answer this question. Due to the diversity of economic sectors in the survey sample, the significant prevalence of “no” answers is due to the fact that not every business can be moved online, and such a step is a big challenge for the entrepreneur and employees.

In the next question, the respondents had to rate on a scale from 1 to 5, where 1 is a decrease in price and 5 is an increase in price, how the price of products and services offered by the enterprise has changed compared to the time before the pandemic.

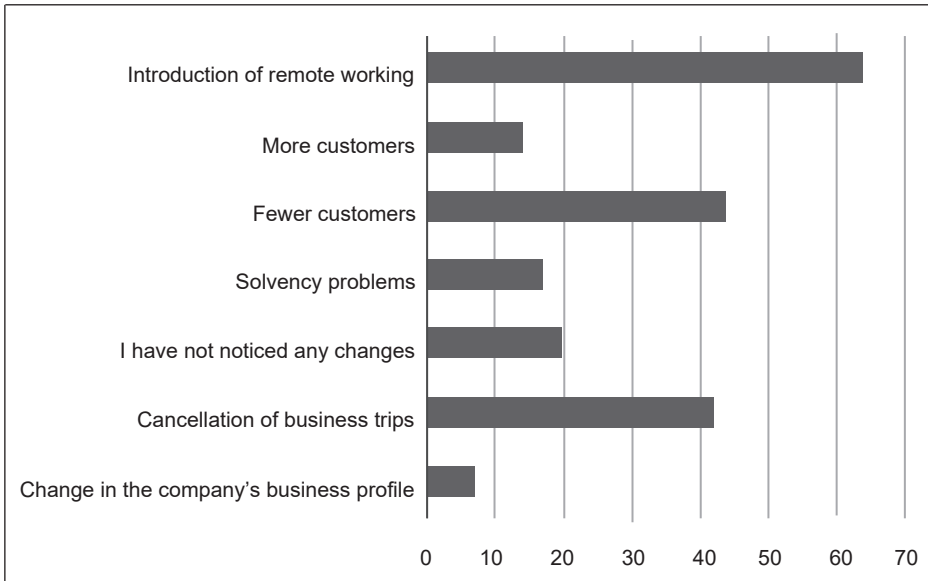


**Figure 3.** Change in the price of products/services offered by the company

Source: own compilation on the basis of surveys.

Respondents were asked to indicate how the price of services/products offered by the company has changed compared to the pre-pandemic period. In most cases (45.83%), the respondents pointed out that the price has remained the same, this is evidenced by number 3 being the most popular answer. As can be seen in the graph significantly more people believe that prices have increased than decreased. 21.67% of the respondents noticed significant increases and 25.83% indicated that prices increased to some extent. Increases are declared by many sectors of the economy, among others due to adaptation to sanitary guidelines and new taxes (Figure 3).

In the next question, the respondents were asked to indicate the most visible changes resulting from the epidemiological situation.



**Figure 4.** Changes in the company caused by the COVID-19 pandemic

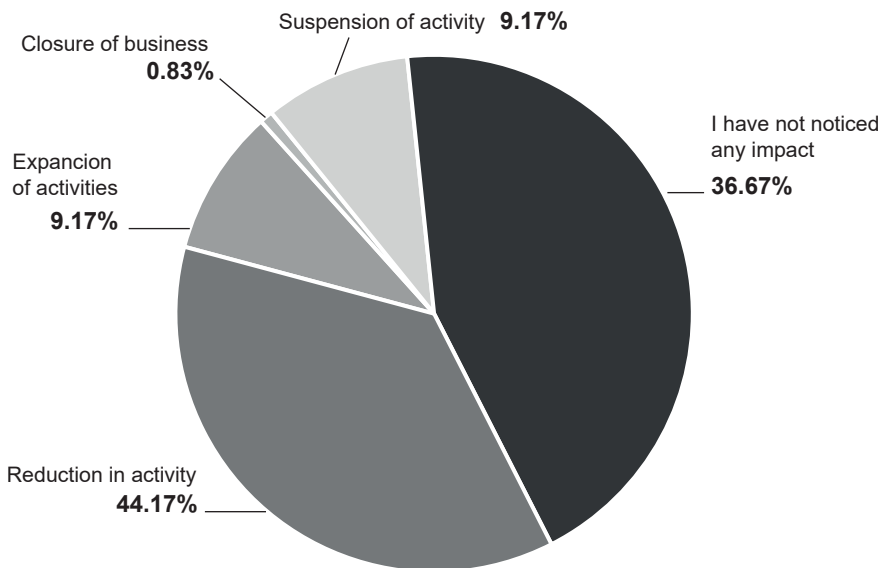
Source: own compilation on the basis of surveys.

Most people, more than half of those surveyed, cited the introduction of remote working as a change in the company caused by the COVID-19 pandemic. As a result, the balance between personal and professional life has been significantly disturbed. It should also be noted that as a result of this change, the productivity of employees, may be reduced, influenced by isolation, the lack of a suitable place dedicated exclusively to work and sometimes non-standard working hours. Despite the initial disadvantages of remote working, it is highly likely that some companies will continue to use this method of service provision after the pandemic. Farther down the chart was the answer “fewer clients”, with a similarly popular response indicating the cancellation of business trips. 14 respondents indicated an increase in the number of customers. The respondents’ answers show that one in six companies has solvency problems and less than 6% indicated a change in business profile. Additionally, this question allowed for an open answer, which was used by two respondents, who indicated the following changes: the reduction of the number of full-time employees and less or no loads to the European Union. The survey showed that the changes caused by the coronavirus in Poland are of a diverse nature.

In the next question, the survey participants were asked to indicate the impact of the pandemic on the company they work for.

Figure 5 shows the impact of the pandemic on businesses in 2020, according to those who are employed. The largest number of respondents indicated a reduction in activity, largely related to the nationwide restrictions on running a business. A large group of respondents (36.67%) marked the answer “I have not noticed any impact”. Suspension of business and expansion of business represent the same result. Only one person indicated business closure as an impact of the pandemic.

As it turns out, despite the lack of adequate support from the government, companies largely intend to continue operations, with as many as 95% of the respondents giving this answer. The remaining 5% chose “I don’t know”, while none of the respondents marked an answer that the enterprise does not plan to continue its activity.



**Figure 5.** Impact of the pandemic on businesses in 2020

Source: own compilation on the basis of surveys.

The survey found that 56.67% of working people see an increase in the cost of doing business. 35% of the respondents answered “hard to say” and the remaining 8.33% indicated no change in costs due to the pandemic. It is worth noting that the government restrictions have made it more difficult to run business, therefore, among the companies there were some whose revenues decreased and fixed costs remained unchanged, such a situation is a big challenge for those running their business. The rising costs are passed on to consumers, resulting in ever higher prices for products and services.

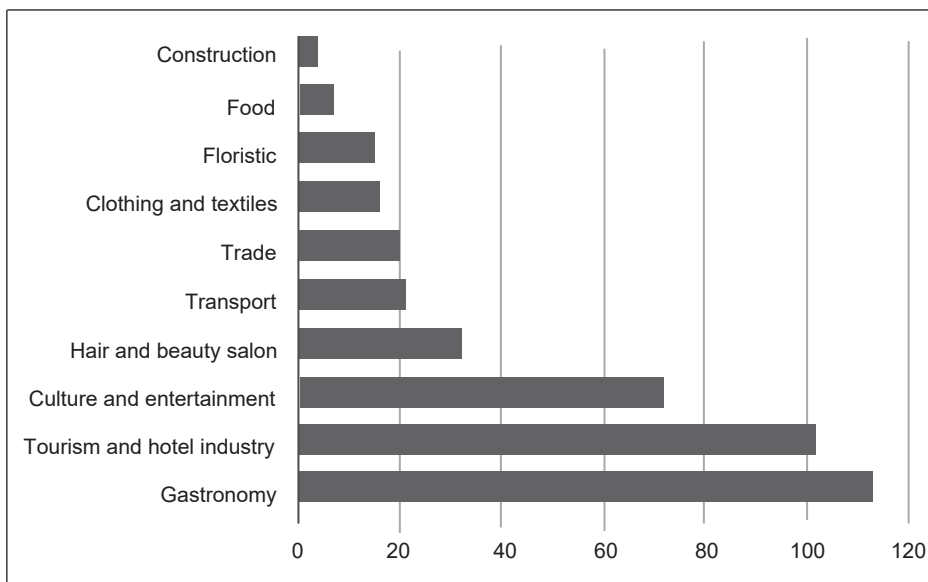
Nearly half of those surveyed said that the pandemic did not affect their business profits in 2020. A large proportion of the respondents, as many as 1/3, did



not respond to the above question, choosing the answer “difficult to say”. 20% of the respondents indicated that the pandemic had a positive impact on company profits. The increase in profits during the pandemic is facilitated by the possibility of moving sales to the Internet, and thus reaching a larger group of customers, better organization of work and the sector which is particularly popular at the moment, including the pharmaceutical industry, production of disinfectants and hygiene products.

In the next question, respondents were asked about their financial situation during the pandemic. The majority of respondents – 54.17% – are people whose financial situation did not change during the pandemic. Those who declared a change constitute 38.3% of the surveyed sample, among them 67.4% reported an increase in earnings, while the rest stated that their income from work decreased. Additionally, 7.5% of the respondents marked the answer “difficult to say”. The worst scenario from the point of view of a working person is the loss of employment, however, a situation may arise in which an employee performing the same duties receives a lower salary. The survey shows that 63% of the respondents answered that the employment in the company has not changed, however, among these people almost 20% noticed a change in the financial situation in the form of a lower salary.

The question asked respondents to mark the industries they felt were most affected by the coronavirus. They were able to select several answers and had the opportunity to add their own.



**Figure 6.** Industries most affected by the pandemic

Source: own compilation on the basis of surveys.

The results of the survey proved that many industries are affected by the coronavirus. The most popular answer was the catering industry, which was cited by as many as 94% of respondents. This is due to the fact that catering establishments have been subject to restrictions for the longest period of time and when the incidence increases, their operations are the first to be curtailed. Then the respondents chose the tourism and hotel industry, followed by culture and entertainment. The least respondents indicated the construction, food, and florist industries. In response to this question, there was an opportunity to enter a separate answer, which was used by three persons indicating the wedding, bridal and event industry.

In the next question, respondents were asked to choose which areas they thought were most affected by the pandemic. In this case, they could choose several answers.

The pandemic has had a significant impact on people's lives, with as many as 85 respondents answering that leisure and hobbies was the area most affected, followed by 69 respondents ticking health and 58 ticking friends. The lowest percentages of respondents indicated faith and spirituality and knowledge and skills. Special attention was given to entertainment and hobbies this is due to the limited functioning in these areas. Safety and health play an extremely important role in people's lives, their threats cause anxiety and stress, therefore this area was ranked second in terms of frequency.

The next question asked respondents whether they were worried about their professional future. This question was used in order to be able to link the issue of material situation with the concern about their professional future. Among the respondents, 50% answered that they were worried about their livelihood in their current situation and 34.17% were not worried. The answer "difficult to say" was indicated by 15.83% of the respondents. The survey shows a strong correlation between changes in financial situation and future prospects. Among those whose earnings have decreased as a result of the pandemic, as many as 70% are worried about their professional future. 43% of respondents with a stable financial situation are worried about how the future will look, while the same percentage is not worried about the future. Those whose earnings have increased are the least worried about their professional future.

The last question asks about the assessment of the quality of life during a pandemic. The majority of respondents about 42.5% believe that their quality of life during a pandemic is average, and 31.67% that it is quite good. 16.67% of the respondents rate their life as not very successful and 5% as unsuccessful. Only 4.17% of working people marked the answer "successful". Before the pandemic, people were able to develop their skills, gain new experiences, and meet with family and friends, such activities significantly improve the well-being and quality of life. The coronavirus has caused social isolation, which has a negative impact on people's mental and physical well-being. It is also reasonable to assume that the quality of life would have been rated much higher before the pandemic.

## 5. Conclusions

The pandemic has left its mark on the economy at the macro level. It is predicted that the COVID-19 outbreak will have major ramifications for global GDP growth (May, 2020). Due to the global outbreak of COVID-19, the global GDP is likely to be affected between 2.3% to 4.8% (ADB, 2020). Additionally, it has also been predicted that the pandemic may cause global foreign direct investment to shrink by 5%–15% (UNCTAD, 2020b). The emergence of a new threat caused by the SARS-CoV-2 virus has forced a number of restrictions in many areas of social and economic activity.

Entrepreneurs and workers noted the negative impact of the coronavirus on the country's current economic situation, but the exact impact depends on the duration of the pandemic.

The majority of respondents indicated that employment in the company where they work has not changed. As can be seen, cost-cutting in the form of layoffs was a last resort for employers. According to the International Labor Organization (ILO), almost 25 million people around the globe could lose their jobs (a loss in workers' income of up to USD 3.4 trillion) (ILO, 2020c). A more recent ILO report shows that lockdown (full or partial) measures are influencing 81% (around 2.7 billion workers) of the total global workers (ILO, 2020b).

One in three companies has moved all or part of its operations to the internet as a result of the current situation. Among those surveyed were economic sectors whose operations cannot be moved to the online world. In the face of events related to the coronavirus, many industries experience its negative effects, but it is worth noting that the e-commerce industry has gained significantly, and its development has accelerated.

Changes resulting from the emergence of the coronavirus in Poland are of a diverse nature, this has to do with the changes introduced by companies. The most frequently noticed change is the introduction of remote working, which, depending on the situation in which the employees find themselves, can be positive or negative. According to a study conducted by W. Sadecki, the overwhelming majority, nearly three-quarters (72%) of the entrepreneurs surveyed, did not have the habit of working remotely before the pandemic. 56% of respondents had remote work incidentally before the pandemic, and for 16% it was a complete novelty. After the pandemic restrictions – especially during the peak of the disease, when the restrictions were most stringent – remote work became a necessity to keep the business alive (Sadecki 2022). Lack of preparation, inadequate workplace, the disturbed barrier between private and professional life are the main disadvantages, but the flexibility resulting from this form of employment and the time saving will allow people who cannot devote all their time to work to develop. After the pandemic, this form of employment will continue to be popular and many companies will use it. Employees of small and medium-sized enterprises quickly adapted to the

new conditions and quite efficiently adopted the remote working model to their needs (Sliž, 2020).

Among the negative changes in companies, respondents noted a decrease in the number of clients, cancellation of business trips and problems with solvency. Employers and employees most frequently cited a reduction in business as the impact of COVID-19 on businesses, which is largely related to the restrictions introduced by the government.

Almost all of the businesses where respondents are employed intend to continue their operations. This is a very positive development, indicating that entrepreneurs are coping with the difficult situation, sometimes with the help of government packages.

The majority of respondents indicated that the pandemic did not affect the increase in business profits. It is worth noting that every 5th person declared that company profits increased. The time of the pandemic is a great challenge for entrepreneurs, the possibility of moving sales to the Internet, and thus increasing the number of potential customers, translates into financial achievements of the company.

Every 5th person, who declared that employment remained unchanged, had a decrease in salary. People indicating that employment decreased are more often worried about their professional future than respondents indicating no changes in personnel. A stable financial situation is important for productivity and commitment to work.

According to the respondents, the industries most affected by the coronavirus are catering, tourism and hospitality, and culture and entertainment, due to the greatest restrictions imposed on these industries. It is worth paying more attention to the risks posed by the outbreak of the virus.

A significant proportion of respondents indicated an average quality of life during the pandemic. Less social activity meant that all areas of people's lives suffered, including leisure and hobbies, health and friends. Restrictions and isolation are the main reasons for poorer well-being during the pandemic.

Government support for businesses is rated very low, benefiting selected companies that meet several criteria. Among respondents who confirmed benefiting from government support, the largest group are those working in private micro-enterprises. The reaction of the Polish government to the appearance of the virus in Poland was immediate, the closure of the economy was supposed to protect against the disease, but entrepreneurs were not prepared for such drastic changes. The aid packages are inadequate, and entrepreneurs have had to cope with the problems they encountered largely on their own.

The pandemic has not only had an economic impact, but has also affected many areas of people's lives that have a major impact on proper functioning. The majority of respondents rated their quality of life during the pandemic as average,

and half of those surveyed worried about their professional future. The emergence of the virus has worsened the quality of life.

In summary, the impact of the coronavirus on the Polish economy is significant. The situation is very dynamic and the duration and restrictions significantly determine the extent of negative changes. The invention of a vaccine and appropriate public education on this issue may limit the adverse effects. The pandemic has posed a threat to the functioning of many enterprises, but has also provided an opportunity for new solutions and innovations.

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# The impact of the COVID-19 pandemic and the war in Ukraine on tourism economy development in Cyprus and Croatia

JEL classification: L83

**Keywords:** Cyprus, Croatia, crisis, war in Ukraine, COVID-19, postpandemic situation

## Abstract

In the years 2020–2021, the global tourism economy faced a huge crisis related to the COVID-19 pandemic and its particular waves. The year 2022 was supposed to be the beginning of the reconstruction of the inbound tourism sector in the world. However, for Cyprus and Croatia, the events of February 24, 2022, called into question the continued functioning of a large part of the inbound tourism sector. The aim of this article is to answer the question: what was the impact of the COVID-19 pandemic on the size and structure of foreign inbound tourism to Cyprus and Croatia? The second aim of the article is to answer the question: what is the expected impact of the war in Ukraine on the tourism sector of the Cypriot and Croatian economies? The methods used in the article were: the analysis of statistical data and the analysis of literature.

## Introduction

The COVID-19 pandemic, which lasted for two years, had a significant negative impact on the level of international tourist movement. According to UNWTO data,

in 2020 the number of international travels decreased by about 70–80% worldwide, and in 2021 the number of international tourist travels decreased by 70–75% compared to 2019 ([www.unwto.org](http://www.unwto.org)).

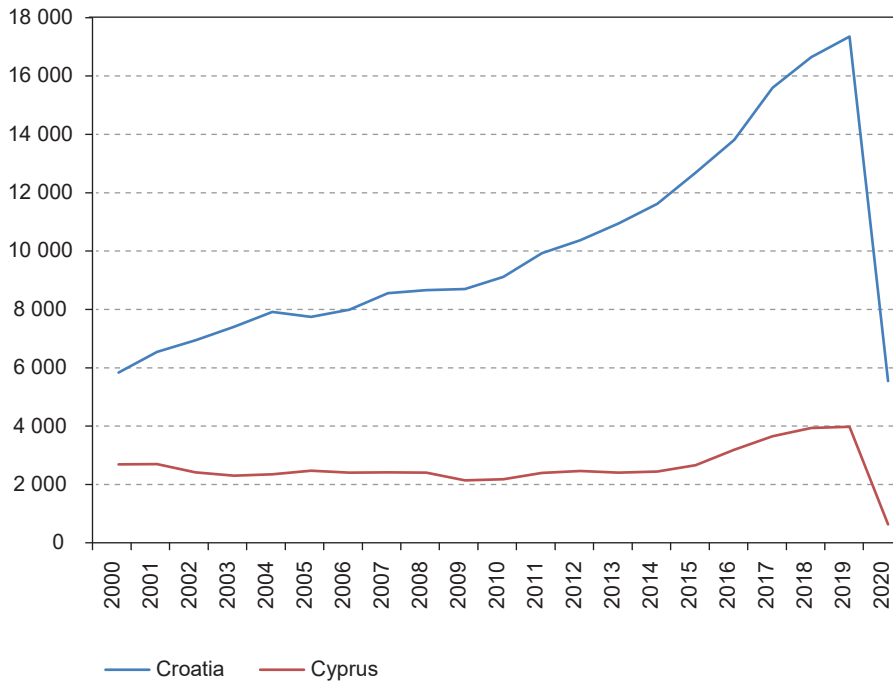
The main purpose of this article is to answer the question: what was the impact of the COVID-19 pandemic on the tourism sectors in Cyprus and Croatia? The second goal is to answer the question: what is the foreseeable impact of the war in Ukraine on inbound tourism to Cyprus and Croatia in 2022 and what are the mechanisms used to mitigate its effects?

Tourism is an economic sector that reacts strongly to various types of global crises (health, political and economic crises are also important for individual tourist decisions). The largest crises in the tourism sector in Cyprus since 2000 include the attacks on the World Trade Center in 2001 (a significant decrease in the number of tourists in 2002 compared to 2001), the global economic crisis (a significant decrease in the number of foreign tourists in 2009), and the COVID-19 pandemic (a drastic decrease in the number of foreign arrivals). In 2010, the number of foreign tourists reached almost 2.5 million (see Figure 1). Arrivals continued to increase to over 4 million in 2019, but would drop to 2 million in 2020, due to the COVID-19 pandemic (a similar level was recorded in 1996). Figure 1 shows the number of foreign tourist arrivals to Cyprus in the years 2000–2021. The reasons for choosing Cyprus and Croatia for the analysis in the article was that these countries had good rates of growth in the terms of international tourist arrivals after the global economic crisis. Comparing the years 2021 with the year 2019, the growth of international tourist arrivals for Cyprus was 68%, for Croatia 22% and the average growth of international arrivals for the European Union countries was 37% ([www.worldbank.org](http://www.worldbank.org)). Moreover, these two destinations provide the development of the same types of tourism, however, the possible means of tourist transportation are different (Cyprus is mainly accessible by plane, while Croatia also by car for European markets).

When analyzing the data in Figure 1, it can be concluded that inbound tourism to Cyprus developed with certain fluctuations in the previously mentioned crisis situations. However, the greatest effect on the tourism economy was the COVID-19 pandemic and its consequences, which took the form of drastic restrictions on international travel by introducing restrictions on international arrivals and the operation of the hotel and catering industry. In Cyprus, the decline in international travel was over 85% in 2020 (a decrease from 4.1 million in 2019 to 650,000 in 2020 and 1.9 million in 2021).

Analyzing regional aspects it can be observed that tourists from nearby countries are choosing a Croatia as a tourism destination. The number of foreign tourists visiting Croatia was increasing steadily until 2020 except for the years 2005 and 2009. The year 2020 brought a huge drop in the number of tourist arrivals (-64%), similar to other countries in the world.





**Figure 1.** Number of foreign tourist arrivals in Cyprus and Croatia in the years 2000–2021 (in thousands)

Source: own elaboration based on data from: [www.data.worldbank.org](http://www.data.worldbank.org), [www.cystat.gov.cy](http://www.cystat.gov.cy).

It was estimated that the HoReCa sector employed 50 thousand workers in Cyprus before the pandemic. The share of incoming tourism in GDP in 2019 was 13.2% ([www.unwto.org](http://www.unwto.org)), and the share of tourism revenues in Croatian GDP in 2019 was 21% ([www.seenews.com](http://www.seenews.com)). Tourism industries directly employed 86.6 thousand people (6.6% of total employment), and adding the multiplier effect (the tourism satellite account), tourism directly contributed almost 12% of GDP before the COVID-19 pandemic ([www.oecd-ilibrary.org](http://www.oecd-ilibrary.org)).

## The method used in the article

The methods used in the article were: the analysis of statistical data from the United Nations World Tourism Organization database and the World Bank database. Another crucial method was the analysis of literature, especially strategic documents of the analyzed areas such as *Croatian Tourism Development Strategy until 2020* and *Cyprus Tourism Strategy 2030*, as well as the reports on tourism markets, such as *Cyprus Tourism Market Report*.

## Previous literature

Previous literature shows that the study of islands involves many facets of analysis and that “Island Studies” continue to contribute theoretical and empirical advances to the body of knowledge (Baldacchino, Bertram, 2011; Randall, 2021). The economic and regional geography of the islands has been a contentious issue even before the COVID-19 pandemic and the recent political upheaval in Ukraine. One of the biggest tensions in the field of island studies is the debate over sustainability and development (Podhorodecka, Cobb, 2020; [www.oneplanetnetwork.org](http://www.oneplanetnetwork.org)).

This paper focuses, however, on a variety of geo-political and geo-economic issues and challenges within a nascent theoretical arena of economic geography (Sheppard, 2006), specifically applied to important tourism destinations (Stergiou, Airey, 2018). The analysis of the research will document previous literature addressing the numerous geographies applications, with a particular focus on the challenges posed for the tourism sector in Cyprus. The following analysis shows (1) the factors attracting tourists to Cyprus and Croatia; (2) the economic value-added of tourism and its contribution to local and regional development; and (3) the COVID-19 and geopolitical challenges facing the future of tourism in the Eastern Mediterranean. During COVID-19 it was confirmed that the recovery of domestic tourism in many European countries was much faster than that of foreign tourism (Korinth, 2022, 7–15). However, the crisis connected with the war in Ukraine hit countries such as Cyprus. Travel experts show that it was one of the destinations popular with Russian residents (*Cyprus tourism industry reeling from...*, 2022). However, for Croatia the biggest problem for the tourism sector is connected with the increase in oil, gas and food prices, which can also be easily seen in the prices of Croatian tourism products ([www.china-cee.eu](http://www.china-cee.eu)).

## Cyprus as a tourist destination

This island is one of the largest in the Mediterranean Basin. It has ideal climatic conditions for the development of tourism. The number of hours with the sun here is almost 3.5 thousand during the year ([www.moa.gov.cy](http://www.moa.gov.cy)) and an average of 300 days are registered here, allowing for relaxation in an optimal climate. Dry summers with temperatures around 40°C and winters during which snowfall can occur only in the mountainous parts of the island. Even in winter, the sea temperature in Cyprus is relatively high, up to 19°C (Willman, 2007, 284). Such conditions allow for the year-round development of tourism (Wiechecka, 2014, 14). Cyprus has excellent conditions in terms of location in relation to the emission markets in Western Europe. In addition, the island has excellent climatic conditions and copes well with the seasonality of tourist movement. The seasonality of tourism is not as great as in many other island territories. The tourist season may last from the beginning of May to the end of October.

Of all the small islands that have chosen to promote tourism as an economic development strategy, Cyprus has the most interesting history and geography with some positive attributes (for example, attractive Mediterranean climate), but also exhibits some challenging factors (for example, its geopolitical history with many invasions resulting in the current island partition). Often small islands have been powerless to resist larger and more powerful jurisdictions (Royal, 2001; Dunn, 2011). Frendo (1993) documents that Cyprus has been invaded at least thirteen times, leaving the island culturally, politically, and economically divided with political influence from Greece and Turkey.

The provision of small island tourism as a means of regional and economic development is often used in a small place lacking other value-added activities such as manufacturing (Seetanah, 2011). Tourist movement in the Eastern Mediterranean has increased as the regional political infrastructure has evolved with the growth of the European Union member states to its peak of 28 in 2015. The EU, like many other supranational entities, has a dynamic and flexible structure as shown by the growth to 28 members and the removal of one state (the United Kingdom) through the Brexit process in 2020 ([www.bbc.com](http://www.bbc.com)). Cyprus has an attractive Mediterranean climate for many members of the EU from cooler climates and the island's relative proximity to the whole of Europe means that the place is an important tourist destination for many Europeans ([www.worlddata.info](http://www.worlddata.info)).

Prior to the pandemic, Cypriot tourism exhibited a steady number of tourist flows. Figure 2 shows the political division with a Turkish-influenced culture and economy in the northwest and a Greek-influenced culture and economy in the southeast.

## Croatia as a tourist destination

Croatia has an ideal climate for the development of tourism. The seaside regions are among the sunniest in Europe. The Dalmatian coast has excellent conditions: high temperatures in the summer, many hours of sunshine (approx. 10 hours of sunshine per day) and a long bathing season in the Adriatic Sea (from June till October). Unfortunately, the beaches are not sandy, but pebbly and rocky (Kajfasz, 2008, 4–8). Along the coastline, there are 1,185 picturesque islets ([www.chorwacja.lovototravel.pl](http://www.chorwacja.lovototravel.pl)). Croatia has not only environmental conditions for tourism development but also cultural values (Split, Zagreb, Dubrovnik, Hvar, Rijeka). Croatia, which in the past 20 years has experienced several severe crises, including an armed conflict, is in the process of finding its position in the European tourism market (Rettinger, 2010, 451–461). The aim of the research by T. Škrinjarčić (2018) was to empirically assess the sources and the level of effectiveness of the tourism industry in the Croatian regions. The author took into account economic and environmental conditions. For Croats, there is a nostalgia for a rich past and a beautiful country that they were proud of (Goulding, Domic, 2009, 85–102). In their re-

search, M. Konecnik and W.C. Gartner (2007, 400–421) also found that Croatians perceived the image of Slovenia differently from the German market. Slovenia and Croatia, Bosnia and Herzegovina proclaimed their independence on March 1, 1992 (Causevic, Lynch, 2011). B. Algieri, A. Aquino, M. Succurro (2016) showed by a comparative study that the southern EU countries – Croatia and Greece have a greater competitive advantage in tourism than the northern and central EU countries (Algieri, Aquino, Succurro, 2016, 248). In the former Yugoslavia before the conflict, Bosniaks, Croats and Serbs lived together in many territories, especially in urban areas, and most of the marriages were mixed (Causevic, Lynch, 2011, 785, after Malcolm, 1994). According to I. Kožić (2019), Croatia is a small tourism-oriented Mediterranean region with extraordinary growth in the tourism sector before COVID-19 (Kožić, 2019, 168–170).

In 2002, Croatia started to become an emerging tourist destination, ranked 22nd in the top 25 countries with 20.3% of GDP spent on travel and tourism in 2010 (Randell, 2021). In addition, Cyprus was ranked 25th on the list with 14.3% of GDP spent on travel and tourism. The global economic crisis in 2009–2011 affected tourism activity in Croatia similarly to other Mediterranean tourist destinations. The years 2011–2016 brought a full recovery (Kožić, 2019, 169). For tourists from Western and Central Europe, Vienna and Budapest are important hubs for travel to Croatia (Kádár, Gede, 2021).



**Figure 2.** Cyprus-Turkish-influenced culture and economy in the northwest and a Greek-influenced culture and economy in the southeast. The location of Croatia

Source: Nations Online Project.

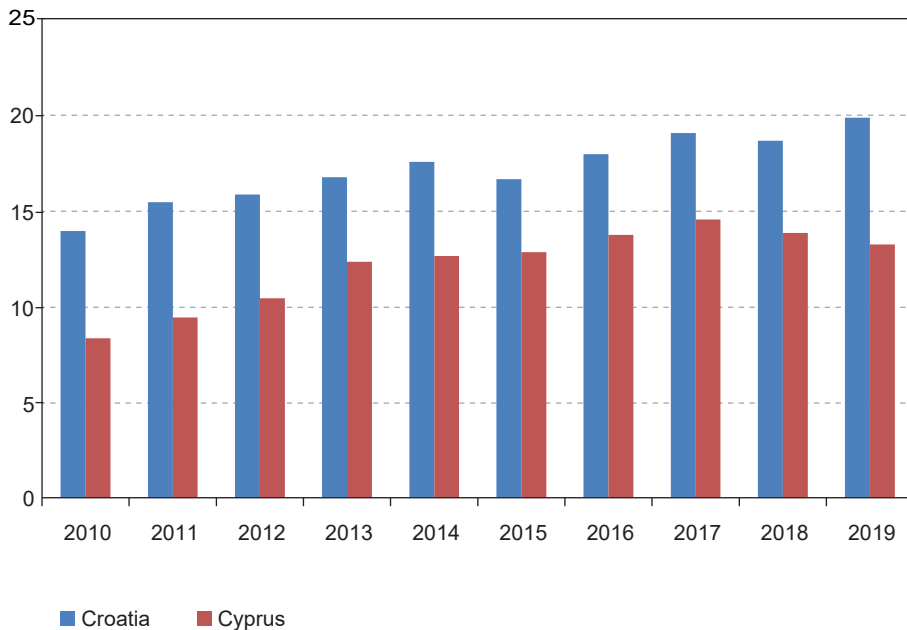
## Economic value-added for the tourism sector and the impact of crises

The tourism economy is contested with many advantages and disadvantages for island nations, but its economic impact cannot be ignored (Comerio, Strozzi, 2019;

Blake, 2009). Many studies have illustrated the economic advantages of tourism (Bruglio, Archer, et. al., 1996; Lew, et. al., 2016). This paper addresses the impact of tourist flows to Cyprus due to the COVID-19 pandemic and the political uncertainties due to Russia's invasion of Ukraine.

The global COVID-19 pandemic from 2020–2023 was particularly brutal for the tourism sector of small islands and tourism-oriented countries (OECD, 2021; Georgieva, Gopinath, 2020). For a period of time, all jurisdictions shut their borders to travel and all other economic activity. Small islands were left with almost existential concerns about food, water, and fuel supplies (Cobb, 2022). Rebounding from the pandemic shutdown is still a work-in-progress for economies, tourism, and finance (Goodell, 2020; Sandbu, 2020; Wojcik, Ioannou, 2020).

The Russian-Ukrainian war is an international conflict between Russia and Ukraine, which began in February 2022, when Russia started an invasion of Ukraine. However, the beginning of the conflict could be observed in February 2014, when Russia annexed Crimea from Ukraine (Ray, 2023). All tourist markets, which were close to the area, recorded problems with rebuilding the tourism arrivals from far away markets. The problems occurred with the Russian tourists, who were not accepted in many tourist destinations. Cyprus has been impacted by the Russian invasion of Ukraine (Hadjicostis, 2022; www.apnews.com). The pandemic



**Figure 3.** Inbound tourism expenditure in Cyprus and Croatia as a percentage of total GDP in 2010–2019 (in %)

Source: own elaboration based on UNWTO database ([www.uwnto.org](http://www.uwnto.org)).

has had an impact on tourist flows to Cyprus, where the revenue from tourism accounts for more than 10% of the economy. The invasion of Ukraine by Russia has only made the situation worse just as tourism was beginning to bounce back. In addition, the geopolitical repercussions of the invasion are impacting other nations that rely on Russian and Ukrainian visitors like Turkey, Cuba, and Egypt.

M. Hadjicostis (2022) reports that despite the Ukraine invasion, Cyprus, according to Cypriot government officials, expects more holidaymakers from other Scandinavian and Western European markets now (*ibid.*). Other European data show that a rebound is taking place ([www.schengenvisainfo.com](http://www.schengenvisainfo.com)).

## Inbound tourism in Cyprus

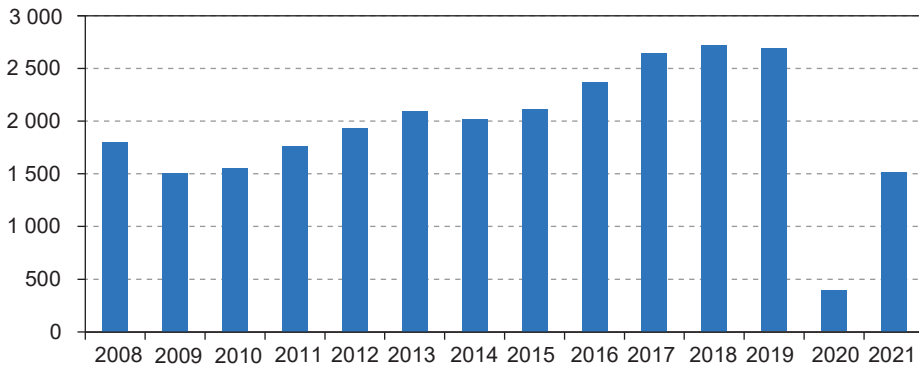
Mass tourism in Cyprus began to develop in the 1960s after the liberation of the island from British colonization. According to J. Waraszyńska (2001, 19), in 1965 foreign tourist traffic was estimated at approx. 33 thousand people. In 1972, the number of foreign tourists in Cyprus was already about 230 thousand (Wiechecka, 2017, 18 after Matras, 2005, 10). The main emission markets in Cyprus at the beginning of the first decade of the 20th century were the countries of Western Europe. The British were the most frequent visitors to Cyprus in 2013, followed by the citizens of Sweden and the Germans. In 2019, Great Britain was the most important source of tourism in Cyprus with 33.5% of the total tourist movement, followed by Russia with 19.7%, Israel with 7.4%, Greece with 4.3%, Germany with 3.8%, Sweden with 3.6%, Ukraine with 2.4%, Poland with 2% and Switzerland with 1.7% (*Tourism Statistics 2017–2019*, 2020). However, the share of tourists from Russia has been systematically increasing since 2010, while the tourist movement from Great Britain decreased significantly in 2008–2014 (from 1.2 million in 2008 to 900 thousand in 2014).

The accommodation base in Cyprus consists mainly of hotels, hostels, hotel apartments, agritourism and camping facilities, and guesthouses. In 2014, there were 798 facilities with 87.2 thousand accommodation places (*Cyprus Tourism Market Report*, 2015). In 2020, there were 814 hotels in Cyprus.

Figure 4 shows the revenues from incoming tourism in 2008–2021. It can be clearly observed that the period from 2017 to 2019 was record-breaking in terms of tourism revenues, which amounted to EUR 2.6–2.7 billion annually. The first pandemic year 2020 brought a drastic reduction in revenues to the level of EUR 400 million (a decrease of 85%). The second pandemic year has already brought a significant improvement in revenues from tourism, which amounted to EUR 1.5 billion (a decrease of 40% compared to 2019).

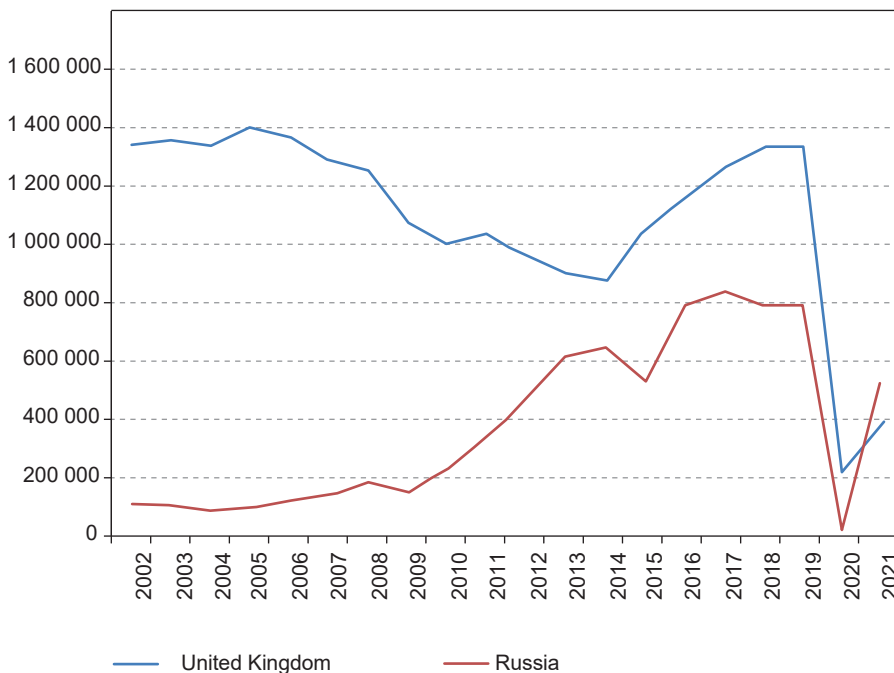
The average tourist expenditure in Cyprus before the pandemic was EUR 675. The highest average expenditure per person in 2019 was recorded in August at EUR 77, and the lowest in January at EUR 483 (*Tourism Statistics 2017–2019*,

2020). Figure 5 compares the number of tourist arrivals from Great Britain and Russia to Cyprus in the years 2002–2021. It is clearly visible that the inbound tourism from Great Britain was diminishing in importance, and this place was filled



**Figure 4.** Proceeds from incoming tourism in 2008–2021 in Cyprus (in EUR thousand)

Source: own elaboration based on data from: [www.cystat.gov.cy](http://www.cystat.gov.cy).



**Figure 5.** Comparison of the number of tourist arrivals from United Kingdom and Russia to Cyprus in 2002–2021

Source: own elaboration based on data from: [www.cystat.gov.cy](http://www.cystat.gov.cy).



with the number of tourists from Russia. The number of arrivals from Great Britain in 2005 amounted to 1.4 million, and in 2014 it decreased to 900 thousand. In 2005, the number of arrivals from Russia was at the level of 100,000 and increased to over 800,000 in 2017 (Figure 5).

## Cyprus tourism marketing

The Cypriot authorities perform appropriate market segmentation in the implementation of the promotion of foreign tourism. In the Central and Eastern European markets, they advertise Cyprus as a destination for families with children. In the Scandinavian markets, they focus on promotions among people going away for longer – ‘long stayers’, in Western Europe on people, who spend the most money on travel and on per day of stay, i.e. people in the age the age 50–59, known as the ‘Golden 50’. On the other hand, in Southern Europe, the promotion is aimed at short-term tourism – ‘short breakers’ (*Cyprus Tourism Strategy 2030 – presentation*, n.d., 11).

The main types of tourism that have been mentioned in the strategic document are recreational tourism: “sun and sea”, culinary tourism, “rural”, wedding tourism, golf tourism, “casino entertainment”, religious, “health/wellness”, cruising, conferences, festivals, sports tournaments/training (*Cyprus Tourism Strategy 2030 – presentation*, n.d., 10).

According to the strategic document, the target to be achieved by 2030 is the average value of tourist expenditure per day of stay of EUR 87, the revenues from incoming tourism should increase to EUR 4.4 billion, and the number of overnight stays by foreign tourists should increase to 47.7 million, which will be 32% more than in 2018. Cyprus also hopes to extend the tourist season and increase the number of overnight stays in the period from November to April (a planned increase of 77% compared to 2018) (*ibid.*, 7).

## Importance of the COVID-19 pandemic for the Cyprus tourism market

A significant reduction in revenues of the hotel industry (85% decrease compared to 2019) was related to the cancellation of reservations and the suspension of hotel operations due to the lockdowns. The high fixed costs of hotels that did not serve customers hit their profitability. Hoteliers tried to save themselves by lowering room prices in order to stimulate demand in the domestic market segment. Hotels tried to cut costs by reducing staff costs, suspending advertising and promotional plans. They also tried to postpone investment plans in the form of renovation and expansion of facilities (Stylianou, 2021). Employment in tourism has decreased



more than in other sectors of the economy. Thanks to measures to support temporary employment, this decline has been curbed so far. The number of employees in commerce, travel, and food services decreased by 13% in the second quarter of 2020 and by 9% for the whole of 2020 compared to 2019. A similar trend was observed for the self-employed. Working hours decreased in the second, third and fourth quarters of 2020 (15 to 20%) (*Tourism sector in Cyprus*, 2021). Cyprus is a country where not only the EMA-approved vaccines (Pfizer / NioNTech, Moderna, AstraZeneca, Johnson & Johnson) were recognized, but also the Russian Sputnik V vaccine. During the pandemic, Cyprus had its own public health policy. The Cypriot authorities divided countries as part of inbound tourism into three categories: green, yellow and red. In the case of the red category, i.e. a country in which the COVID-19 incidence rate was high, unvaccinated travelers were required to take a test before travel or at the airport, and then, three days after landing, to be isolated until the result of the second COVID-19 test ([www.gov.pl](http://www.gov.pl)).

## Importance of the war in Ukraine for incoming tourism in Cyprus and Croatia

Tourists are reluctant to rest near those who indirectly contributed to the military intervention in Ukraine. Hoteliers from all over the world report the need to isolate Russian tourists from other hotel guests. This conclusion was reached, among others, by the RIU hotel chain, which closed for the Russian market. The cooperation ended on April 13, 2022 ([www.podroze.radiozet.pl](http://www.podroze.radiozet.pl)). Even Russian tour operators point out the need to separate hotel guests – separate hotels for Russians and citizens of the rest of the world, in order to ensure a peaceful holiday. In addition, as a result of the sanctions imposed on Russia and the closure of the airspace for Russian aircraft, the possibility of leaving Russia is very limited and the number of destinations available to Russians has decreased ([www.podroze.radiozet.pl](http://www.podroze.radiozet.pl)). At a time when trips to Spain and other EU countries have been severely limited for Russian citizens, there are still such destinations as Turkey, Egypt, Tunisia, Qatar, United Arab Emirates, Thailand, India, Vietnam, Maldives, Seychelles, Sri Lanka, Indonesia (Bali), Serbia, Armenia, and Azerbaijan ([www.styl.pl/podroze](http://www.styl.pl/podroze); [www.podroze.radiozet.pl](http://www.podroze.radiozet.pl)). At the same time, it is not possible to travel directly from the territory of the Russian Federation to a Greek part of Cyprus. Of course, it is possible to travel via other countries, but for tourists who are going on a short break; this will not be a frequent option.

The Cypriot economy showed signs of growth in 2022, improving its performance compared to the previous year, but external factors are contributing to the loss of momentum, according to a report by the University of Cyprus's Center for Economic Research. The factor significantly limiting the pace of development of the Cypriot economy is the jump in oil prices in March 2022 to historically high

levels ([www.cyprus-mail.com](http://www.cyprus-mail.com)). In addition, European restrictions on the Russian energy sector will be a huge problem, as they will make ticket prices to Cyprus uncompetitive with other tourist destinations. The Cypriot Deputy Minister of Tourism pointed out that in order to make up for the losses caused by the decrease in the number of tourists from Russia, it is necessary to increase the number of tourists from other countries, e.g. from Poland, Great Britain, France, and Switzerland in the 2022 tourist season. Thanks to this, it will be possible to make up for some of the financial losses related to the war in Ukraine ([www.podroze.gazeta.pl](http://www.podroze.gazeta.pl)).

Fuel prices, which have increased significantly since the beginning of the war in Ukraine, are the driving force behind the rising prices of foreign tourism. It is essential to replace the huge market share of Russian citizens with the market of other European destinations. In May 2022, only 2,052 tourists from Russia were recorded, and in June 3,028 ([www.cytstat.gov.cy](http://www.cytstat.gov.cy)). So the share of the Russian market in total arrivals in May 2022 was only 0.6%, and in June 2022 was 0.8%. It is a huge drop compared to the whole year 2019, when tourists from Russia accounted for 19.7% of all tourist arrivals in Cyprus (*ibid.*).

Close regional impacts of the COVID-19 pandemic and the Russia-Ukraine war can be further analyzed by looking at the trajectories of tourist flows in Croatia (Table 1). In addition, Table 1 shows a small increase in arrivals from Russia to Croatia and Cyprus from 2020 to 2021. The Croatian tourism economy was not strictly dependent on Russian tourists (only 1% in 2021). This was also a hint to

**Table 1.** The tourist arrivals from Russia, annual change and the share of tourist arrivals from Russia in total tourist arrivals in Cyprus and Croatia in 2013–2021

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cyprus									
Tourist arrivals from Russia (in thous.)	608.6	636.8	524.9	781.6	824.5	783.6	781.9	27.7	519.1
Total tourist arrivals (in thous.)	2 405.4	2 441.2	2 659.4	3 186.5	3 652.1	3 938.6	3 976.8	631.6	1 936.9
Share of tourists from Russia	25.3%	26.1%	19.7%	24.5%	22.6%	19.9%	19.7%	4.3%	26.8%
Croatia									
Tourist arrivals from Russia (in thous.)	151	133	101	101	120	123	139	23	133
Total tourists arrivals (in thous.)	10 948	11 622	12 683	13 808	17 431	18 667	19 566	7 001	12 776
Share of tourists from Russia	1.37%	1.14%	0.79%	0.73%	0.68%	0.65%	0.71%	0.32%	1.04%

Source: [www.cytstat.gov.cy](http://www.cytstat.gov.cy), [www.web.dzs.hr/arhiva\\_e.htm](http://www.web.dzs.hr/arhiva_e.htm).

welcome arrivals from Ukraine, because hotel owners gave feedback that combining tourists from Russia and Ukraine is problematic. For the Croatian economy, the enormous problem was the price of energy, which resulted in high inflationary pressure on tourism services (together with entering the EURO zone).

## The Croatian tourism economy during the COVID-19 pandemic and the Recovery Resilience Facility for the tourism sector

Before the COVID-19 pandemic crisis, the Croatian economy was developing steadily. There has been an improvement in public finances, in particular a decline in public and private debt. Croatian companies became increasingly competitive. Both employment and investment levels increased, which showed the strength of the Croatian economy and its approach to EU standards (*Croatia 2022. Country Report, 2022*).

The Croatian economy has been hit hard by the crisis caused by the COVID-19 pandemic. However, data suggest that it is possible to revive the economy in the post-pandemic period. In 2020, despite unfavorable conditions and environmental challenges such as earthquake activity, Croatia achieved economic success (the earthquake was registered, among others, at the end of December 2020 in the central part of Croatia). Croatia's real GDP growth was estimated at 10.2% in 2021. Growth was mainly supported by better-than-expected performance in the tourism sector and high consumer spending (cited above).

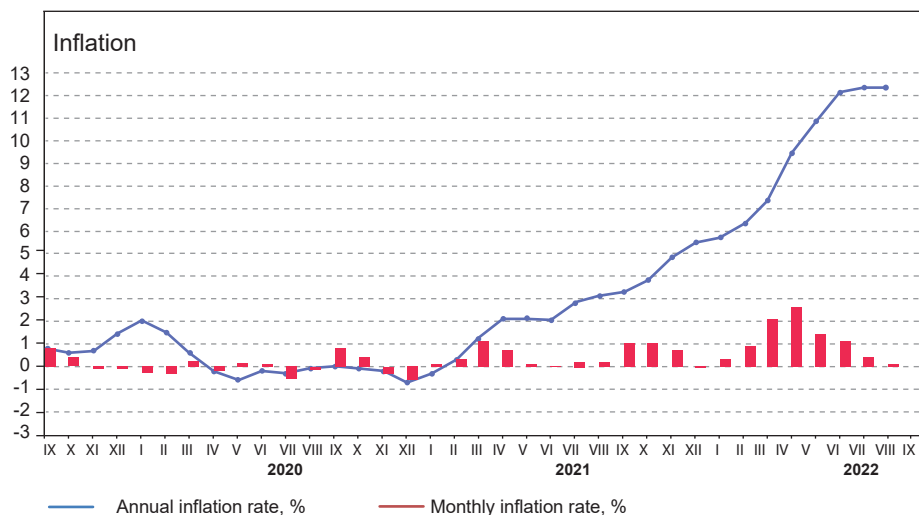
## The Croatian tourism economy and the impact of the crises

The tourism economy in Croatia is very important due to its significant share in employment and the creation of the country's GDP (Škrinjarić, 2018). The number of tourist arrivals to Croatia in the period 2006–2019 systematically increased from 9.4 million in 2006 to 19.6 million in 2019 (this is more than a twofold increase in the analyzed period).

According to the strategic document for the development of tourism in Croatia – *Croatian Tourism Development Strategy until 2020* tourism is of great importance for the Croatian economy and is a prerequisite for faster and more sensible development. The aim of the strategic activities was to ensure the future of tourism management and to encourage investors to implement their plans. The strategic document was also the basis for the creation of tourism development plans and spatial planning acts by lower administrative bodies, as well as the basis for gain-

ing access to EU funds. The main goal of the strategic document is to achieve the first place in the ranking of the top 20 tourist destinations in the world in terms of competitiveness (*Croatian Tourism Development Strategy until 2020*).

However, now the biggest challenge for the development of tourism will be to combat the pressure connected with the prices of energy on the European market. Figure 6 shows the 2021 large increase of the inflation rate connected with the public expenses during particular phases of COVID-19. In 2022 the inflation rate is even greater due to the price of energy.



**Figure 6.** Inflation rate in Croatia in 2020–2022 (in %)

Source: [podaci.dzs.hr/en](http://podaci.dzs.hr/en).

Looking at tourist flows and activity from Russia to Croatia, the data from 2013 to 2021 show steady growth until 2019 followed by a decline in 2020, and then a small rebound in 2021 (Table 1). The Croatian tourism sector is smaller than the Cypriot one, but appears to be equally nimble in its post-pandemic recovery. The National Recovery and Resilience Plan (RRF) is a European Commission response program aimed at mitigating the economic and social impact of the COVID-19 pandemic. The implementation of the program also aims to ensure that the European economy and society are more sustainable, resilient and better prepared for crises ([www.ec.europa.eu](http://www.ec.europa.eu)). Thanks to the RRF implementation, it will be possible to implement new investments, accelerate economic growth, and increase employment. Usually, Member States invest in economic development, innovation, environment, digitalization, education, and health ([www.gov.pl](http://www.gov.pl)).

## Summary and conclusions

After analyzing the statistical data and the literature, especially the tourism strategic documents of selected areas, we can observe that Cyprus and Croatia are two significant tourist destinations in Southeast Europe (Randall, 2021). Cyprus is larger for the number of tourist flows, but both places have developed robust infrastructures to promote and sustain tourism-related value-added transactions. The impact of the COVID-19 pandemic on the size and structure of foreign inbound tourism to Cyprus and Croatia was huge. The drop in the number of foreign tourist arrivals in 2020 and 2021 (compared to 2019) was -84% and -51% in Cyprus, and -64% and -34% in Croatia, respectively. Before COVID-19 in 2010-2019, Cyprus recorded higher values of international arrivals (+68%) than Croatia (+22%). However, the total number of tourists before the COVID-19 pandemic was more than 4-times higher in Croatia than in Cyprus.

It needs to be mentioned that after the global economic crisis, Cyprus and Croatia were the two countries in Europe with the highest growth rates in international tourist arrivals (Cyprus above the EU average, Croatia – close to the average). The last health crisis affected all tourist destinations in the world. Cyprus was significantly affected by the COVID-19 pandemic and its waves. Even during the individual waves of the pandemic, inbound tourism from Russia was severely restricted due to COVID-19 passports. Cyprus was one of the countries that recognized the Russian Sputnik V vaccines, which also made it possible to serve foreign tourists from this market. The decline in tourism – in the number of foreign tourist arrivals – amounted to 85% in 2020 and was higher than the global average. Cyprus started to recover quite quickly in 2021. The number of foreign tourists on the island was only 40% lower than in 2019. Before the COVID-19 pandemic, the share of tourist arrivals from Russia was increasing. In 2000 it was 5%, while in 2010 it was more than 10%. The highest rate was in 2014 (26%) and almost 20% in 2019. After the beginning of the conflict in April 2022, the only available monthly data from May 2022 and June 2022 show a drastic decrease in the share of Russian tourists in Cyprus (the share was less than 1% compared to almost 20% in regular years). However, in 2021 the share of tourist arrivals from Russia was almost 27%.

Croatia was similarly affected by the COVID-19 pandemic and the tourist flows exhibited similar tourist temporal patterns. However, when analyzing the share of the Russian market in the years preceding the war in Ukraine, it can be observed that Croatia is independent of this market.

The war in Ukraine can have two consequences. Not only the decrease in the number of tourist arrivals from Russia (the European Union is closing the border for Russian residents, except for some important reasons of travel) but also huge inflationary pressure connected with the energy crisis. However, counting the share of Russian residents among tourists the situation in Croatia is different. The

Russian tourism market in inbound tourism has a share of about 1%. So the loss of this part of the market will not have a significant impact on the tourism economy of Croatia. However, the impact of the conflict and the energy crisis resulted in a significant increase of prices in the tourism sector of Croatia. In 2021, inflation in Croatia was 12.4% ([www.podaci.dzs.hr/en](http://www.podaci.dzs.hr/en)).

The war in Ukraine has caused a huge increase in fuel prices, making foreign tourism by air more expensive. Moreover, the war is also causing enormous inflationary pressures in many countries due to the disruption of the supply chain. This is also a huge problem for the entire tourism industry in Cyprus and its international competitiveness.

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# The impact of the COVID-19 pandemic on local government cultural institutions – the productivity of theatres

**JEL classification:** H2, H7, H18

**Keywords:** performance art organizations, theatre, technical efficiency, Malmquist index value, total factor productivity

## **Abstract**

The new reality has led us to investigate the changes in productivity in public cultural institutions. The research describes the pandemic period in the theatre sector. We are investigating whether productivity changes occurred and which indicator affected them. We hypothesize that the productivity index in 2020 was most dependent on the technological change. We use the Malmquist index to show changes in productivity between 2011–2020. Our results seem to fully reflect the pandemic reality when the technological factor was of crucial importance. However, we would like to point out that technological growth alone does not bring satisfactory results in terms of productivity growth. Properly coordinated actions are also necessary for the broadly understood activities of the theatre. Depending on the organization, the impact of digital technologies may differ. The use of technology alone is not sufficient to achieve an increase in the productivity of the organization.

## **1. Introduction**

In 2020, all cultural institutions referred to as PAOs (Performing Arts Organizations) (Cultural Policies, 2020) suffered a significant loss of revenue from ticket sales and venue rentals. This was the main obstacle linked to the COVID-19 epidemic and

occurred in almost every country (Cultural Policies, 2020). Changing the restrictions guidelines and safety rules for cultural institutions – sometimes overnight – made it much more difficult for them to plan repertoire activities, leading to the cancellation of performances and educational events. The impact of the COVID-19 health crisis has led to an unprecedented slowdown in most sectors of activity, and the cultural sector is one of the most affected by the social distance imposed by the epidemiological context triggered in 2020 (Nicolescu and Dinca, 2021).

In Poland, as in all European states, the cultural scene was severely affected by the limitations of the activities linked to combating COVID-19. These restrictions were radical and covered a whole spectrum of solutions – ranging from a total ban on the actions to various limits on the number of viewers, which often conflicted with the economic costs. Highly subsidized public theatres were less likely to suspend their activities completely or partially (Krajewski and Frąckowiak, 2021).

The loss of revenue/income has posed an imminent threat to many independent artists, cultural operators, and non-governmental organizations in the cultural field. According to a study by the Austrian Institute of Economic Research, the pandemic caused cultural damage of EUR 1.5–2 billion, which represents a quarter of the annual added value (Cultural Policies, 2021). Cultural employment represented 3.7% of total employment in 2019 (Nicolescu and Dinca, 2021). Despite severely restricted activities due to the pandemic under the law(s) and based on the opinion of many PAOs, further support from public institutions is necessary for 2021 (Cultural Policies, 2021). The French arts and culture sector is one of the most affected in Europe, due to the restrictions put in place (curfew, restrictions on gatherings, etc.), but is also the most financially supported (Bourle's and Nicolas, 2021). Different countries introduced many various governmental and private support measures (Khlystova et al., 2022; Betzler et al., 2020). This should entail looking at PAOs and companies whose economic situation deteriorated dramatically during the pandemic, and which, as cultural institutions, must continue to carry out their social mission without ceasing. Making efficiency analysis a standard practice would certainly lead to an efficient allocation of artistic resources, not least in times of constraint. The limitation of the PAOs' activity translated, among other things, into:

- a significant decrease in revenue from ticket sales;
- the need to raise other sources of income/revenue;
- difficulties in organizing work due to the need to switch to teleworking (partly depending on current guidelines);
- the need to create completely new artistic and educational activities that can be carried out online in a short time;
- loss of direct contact with the audience.

Attempts were made to solve these problems, as well as the need for expression, the need to implement subsidized projects, and to arrange for the team to work by transferring the theatre to the net (Buchner et al., 2021).

This made it difficult for PAOs to carry out the most essential actions, i.e., to stage productions. In Poland, despite the restrictions on activity, PAOs still received subsidies from the organizer. All 25 theatres in the biggest cities in Poland surveyed by the authors of this paper maintained statutory subsidies, and the increase in their amount happened in 18 theatres. A decrease of 1–12% was noticed in seven theatres only.

The aim of our research is to identify productivity changes in Polish public theatres during a pandemic situation to reveal the possibilities of improving their productivity in the future. We assume that the productivity level in the time of COVID-19 is mostly dependent on the technology change. The verification of this hypothesis will be based on the productivity understood as the number of viewers during the theatre's own performances.

This is a continuation of our previous research (Galecka and Smolny, 2021). The present study extends the previous one to include the number of theatres and the research period. We hereby wish to verify the previous results. This study is consistent with the trend towards methods of optimizing public funding for cultural entities while maximizing their public service and addresses an important issue such as the impact of digitalization in the creative economy sector. The analysis is conducted in terms of theatre productivity, understood as the number of viewers and the value of the Malmquist index – TFP (total factor productivity) (Last and Wetzel, 2011; 2010). We assume that the cultural sector has used the time of isolation to create new communication channels or has intensified the existing possibilities of remote transmission. We are investigating whether this process has been uniform. Perhaps in the future, the experience gained will continue to function by continually expanding the access to culture for people excluded from participation in culture, for instance for reasons of communication.

The paper is structured as follows: the following (first) section sheds light on the efficiency of public cultural institutions. In this section, we analyze the concept of efficiency relating to the activities of cultural institutions. We also point out potential factors influencing efficiency, especially in the situation of limiting their activities. We also point out the role of technology in increasing business efficiency. The second section provides information on the data and the empirical approach; the third section presents the estimates and then places the results in the context of existing studies, especially those focused on productivity factors; the last section summarizes the main findings.

## 2. Theoretical framework of the research

Kosieradzka (2012) defines productivity as the efficient use of the system's input resources: energy, materials, human labor, capital, information, area, time, etc., in the production of goods and services that constitute its output. Farrell (1957) shows, that productivity is defined as production efficiency. Productivity indicates

the effective use of all resources without implying any production technology (Shao and Lin, 2002).

Literature on production in the performing arts is rare. There are several empirical studies related to the measurement of productivity (production technology and efficiency) of the performing arts sector from both the production and cost-function perspectives (Baumol and Bowen, 1965; Throsby, 1977; Gapiński, 1980; 1984; Zieba and Newman, 2007, Last and Wetzel, 2010; Gałęcka and Smolny, 2021). When researching the functioning of cultural institutions, one should consider organizational and economic efficiency, which are the criteria for assessing the activities of the analyzed entity and/or its individual areas. In this sense, efficiency refers to the principle of management in terms of performance (the maximization of outputs) and savings (the minimization of inputs) (Sucheck, 2020). For authors, the problem of measuring efficiency is particularly difficult for public cultural organizations (Bosso and Funari, 2004).

In research, we see two general approaches to efficiency: parametric and non-parametric. The TFP (Total Factor Productivity) Malmquist method, as well as the more common DEA (Data Envelopment Analysis), are non-parametric methods. Non-parametric methods, instead of imposing a specific functional form, allow the observed data from different companies to define the boundary using the envelope function and starting from certain probable assumptions about the production technology. The DEA method is most often used in the cultural economy (Guccio et al., 2014; De Witte and Geys 2011; Del Barrio et al., 2009; Mairesse and Van den Eeckaut 2002; Kol'vekova et al., 2019). With the help of DEA, Marco-Serrano (2006) estimated technical efficiency and cost-effectiveness in the performing arts.

Many cultural institutions, including PAO, had to evolve and switch to remote work to maintain contact with viewers. The dynamics of the impact vary significantly across creative sub-sectors and countries (Khlystova et al., 2022). Pauget et al., anticipated the current situation. They tried to describe French museums' possible future by 2030 (Pauget et al., 2021). Based on the Delphi study (from 2017–2018) with 99 experts in this field, three potential scenarios were identified. One of them was the “crash” scenario, in which institutions would have to evolve to survive. However, the online theatre is merely an account of theatre activities. There is even a term that “online theatrical reality is a prosthesis” or “online as evil” but also as a theatre without borders (Buchner et al., 2021; Krajewski and Frąckowiak, 2021). The actual theatre takes place “here and now.” Live performances, even for a small number of viewers, in the context of the foundations and mission of the theatre are more critical (Gadrey, 2002) than any virtual theatre presentation. In an artistic institution whose budget before the pandemic was approx. 40% (Gałęcka and Smolny, 2017) based on the institution's resources, it was not possible to carry out activities of the existing scale and formula without receiving financial support from the state (Thorsby, 2010; Gałęcka and Smolny, 2019). Especially in large theatres that offer performances incurring high costs of presentation,

the revenue generated by these institutions from ticket sales covers the operating costs and finances the production of new artistic events and often is also a part of fixed costs. All the more, it was necessary during the pandemic (Khlystova et al., 2022; Betzler et al., 2020). The cultural sector has been covered by various public aid initiatives. However, these funds were not considered in our calculations.

New technologies such as live streaming, Instagram TV, and others were often used in PAOs, and even artists themselves, who often used Twitch. This is not new, but especially in theatres, the pandemic expanded the available audience. Streaming platforms also enabled new methods of earning, including membership in performer channels, which allow early or exclusive access to content and virtual meetings, and paid commenting features. The Goethe Institute has offered a digital platform called “Kulturama” (2021) created out of the need to support cultural actors worldwide due to the coronavirus crisis. The fact that events with live audiences were cancelled and cultural institutions and clubs were closed, triggered existential challenges for artists worldwide (Cultural Policies, 2021). The new reality has led us to investigate the changes in the productivity of public cultural institutions. Productivity is understood as the total number of spectators per year (Throsby and Whiter, 1979; Trzeciak, 2011), but we do not distinguish between classical and online audiences – the theatre reports do not give us such a possibility. We are investigating whether productivity changes occurred, and which indicator has affected them. We think that the official publication of data does not subsume streaming, digitalization and other new forms. The research period is 2011–2020, and the critical year is the year of the COVID-19 pandemic, namely 2020.

### 3. Research methodology

In the paper all of the municipal theatres were considered. However, many theatres did not supply the financial and technical data. Some of the data did not contain the complete information necessary for the study. The research comprised the 25 municipal public theatres, which operated at least one professional theatre company and at least one permanent stage. The study included both small and large theatres in big cities (taking into account the number of stages and seats in the theatre headquarters). Ultimately, theatres from Krakow, Lodz, Bydgoszcz, and Warsaw qualified for the study. The research period covers the years 2011–2020. Productivity was tested with the use of the Malmquist index (Last and Wetzel, 2011; 2010). In the theatre, we operate on a change in productivity in 2011–2020. The adopted research period is dictated by the author’s access to archival and real data. For this purpose, non-parametric methods were used. Productivity can be measured statically against benchmarks, i.e., standard units, and dynamically, i.e., analysis of change over time. The analysis of changes over time makes it possible to compare changes in the productivity index and identify the structure of these changes. The output-oriented

Malmquist index and its decomposition were utilized for the purpose of this paper. The index decomposition gives room for a broader interpretation of results by pointing out the changes in productivity sources. The observed productivity change reflected in the Malmquist index may result from a change in the production technology (technical change – *techch*) and/or a technical efficiency change (*effch*) (Kumar and Russell, 2002). Therefore, technical efficiency is one component for determining a firm's productivity index. Technical efficiency is understood as the managerial ability to get the maximal output from available resources with the existing production technology (i.e. the given level of inputs) (Zieba, 2011). The efficiency captured in this way shows what is the real relation of effects to inputs in relation to the maximum level that can be achieved under specific technological conditions.

In other words, technical efficiency investigates how well the production process converts inputs into outputs. Technical efficiency is significantly influenced by technical change (*techch*), better use of technology – change of technical efficiency (*effch*), and the scale of the organization's operation (*sech*) (Färe et al., 1997). The scale of operation is very important. When it is too small or too large, the organization cannot achieve a comparable level of overall technical efficiency compared to the entity operating in the area of sustainable economies of scale.

Technological change (*techch*) is a measure that shows how the production possibility frontier of a decision-making unit (TFP) changes as a result of technological progress. Technological change reflects the impact of new technologies on TFP efficiency and can be positive if new technologies increase production efficiency, or negative if new technologies reduce production efficiency (Färe, Grosskopf and Lovell, 1994).

An input- or output-oriented approach can be used in establishing the Malmquist index. The output-oriented approach was used in the presented research. It was assumed the effect of the theatres' activity is productivity understood as the number of viewers (*Y*). We use absolute data because in 2020 the number of seats in theatres or the number of rooms did not have a significant impact on the online performances. The Table 1 presents the list of variables.

**Table 1.** List of variables used in the study

Output	Input
Y – Number of viewers	X1 – Own income X2 – Amount of subsidies X3 – Expenditure on salaries of full-time employees X4 – Expenditure on salaries of part-time employees X5 – Materials and Energy consumption X6 – Other expenses X7 – Number of full-time equivalents (FTE) X8 – Number of premiers X9 – Number of performances

Source: own elaborations.

The Malmquist index was defined with the use of technical efficiency measures for the t-period (Coelli et al., 2005; Färe et al., 1985):

$$M(x_{t+1}, y_{t+1}, x_t, y_t) = \left[ \frac{\frac{D^t(x_{t+1}, y_{t+1})}{D^t(x_t, y_t)} * D^{t+1}(x_{t+1}, y_{t+1})}{D^{t+1}(x_t, y_t)} \right]^{\frac{1}{2}} \quad (1)$$

where,

- $D^t(x_t, y_t)$  – technical efficiency in the t period and technology in t period,
- $D^{t+1}(x_t, y_t)$  – technical efficiency in the t period and technology in t+1 period,
- $D^t(x_{t+1}, y_{t+1})$  – technical efficiency in the t+1 period and technology in t period,
- $D^{t+1}(x_{t+1}, y_{t+1})$  – technical efficiency in the t+1 period and technology in t+1 period.

Technology is considered to be the level of technological development of an individual in a given period. When TFP is greater than, equal to, or less than one, the efficiency increases, remains constant or decreases, respectively, in period t + 1 compared to period t.

**Table 2.** Description statistics / Estimated technical efficiency, cross-sectional model

Variable description	Variable	Mean	Median	Std. dev.	Min.	Max.
Number of viewers	Y	66705.26	47184.5	9848.92	311	2404950
Own income	X1	2611407	1966815	143183.7	72876	11903151
Amount of subsidies	X2	5685741	5355550	188283.7	489500	16600200
Expenditure on salaries of FTE	X3	3890544	3760174	1763948	650559	10519334
Expenditure on salaries of part-time employees	X4	1290324	1186011	1186011	119984	4023142
Other expenses	X5	2859779	2768209	1556772	413452	8381041
Consumption of materials and energy	X6	1420998	658797.5	1618138	39366	7291738
FTE	X7	72.20102	70.325	33.21723	13.25	160
Premiers	X8	4.9448	4	3.059817	0	23
Number of performances	X9	271.252	260.5	144.2062	25	727
Number of observations	250					

Source: own elaborations.

We consider both the cost of permanent staff (full-time employees and part-time employees). Personal wages and salaries include, among others: basic wages and salaries, premiums and prizes, bonuses (e.g. for working in unhealthy conditions, for seniority, for serving in management positions), wages and salaries for working overtime, wages and salaries for time off (paid lay-offs, holidays, illness) and allowances and claim benefits. Expenditure on salaries includes the costs of all employees, i.e., both directly and indirectly linked to the “production” of performances. The costs of materials and energy inherent in the operation of the theatre



have also been taken into account. Additionally, the indicator called other costs was also included. This indicator includes, among others, expenses for external services and other costs – earnings-related contributions (statutory liabilities concerning remuneration and work outsourced on a contract basis as labour costs). Costs in a theatre are used as labour and capital input. Subsidies and own revenues constitute the theatres' important source of finance. We used the indicators: "expenditure on salaries of full-time employees" and "number of full-time equivalents (FTE)" at the same time, due to the very different pay rates per full-time jobs.

In Poland, the subsidies share in the theatre's total revenues is 60%–80% on average; this is comparable with other countries in Europe. The variables reflecting the theatres' technical conditions may be related to the number of performances of a given theatre.

Furthermore, necessary stage-design changes resulting from the repertoire change, regardless of whether the productions are new or not, lead to higher costs. Therefore, a changing number of shows per year is included as the control factor for the input requirements. In the literature, a premiere, theatrical performance (shows), or cultural experience of the viewer is the theatre service unit. There is also an indicator/concept of "usability" as a function of the number of services, the number of tickets sold (Thorsby and Whitters, 1979), or the number of viewers (Trzeciak, 2011). It is impossible to measure the effects of theatre activity in quantitative terms only – the literature repeatedly stresses the importance of qualitative criteria. Our article limits ourselves to short-term tools, ignoring the quality of services, which is often criticized. The quality of culture, however, is a more complex phenomenon that we intend to investigate next. The descriptive statistics presented in Table 2 show a significant variance for all variables.

Due to the specific activities of theatres in 2020 (online activities), the number of performances at the seat of the theatre also includes the number of online performances. Similarly, the number of viewers at the seat of the theatre in 2020 also takes into account the number of views and the number of online viewers.

Assuming a significant impact of technology on the productivity result, we also compared the productivity of theatres in 2020 against 2011 and 2019 against 2011. We wanted to check the evolution of components in the year before the pandemic and the pandemic year. We showed the financial figures for 2011 in 2019 and 2020 prices. For this purpose, we used the chain-linked price index for the following indicators: own income, amount of subsidies, consumption of materials and energy and other expenses. To make the costs incurred for remuneration more realistic, we used the indexes of the dynamics of the average wages and salaries in Poland (the average wages and salaries in Poland for section: arts, entertainment and recreation, GUS, 2020 and 2021).



## 4. Research results

Over the ten-year research period, the Malmquist index (TFP) showed various values among the theatres studied. The average value of the Malmquist index (TFP) was 1.037 (Table 3). This indicated an average productivity increase of about 3.7%. The size of the Malmquist index was affected by the change in technical efficiency (effch), the change in technological progress and the efficiency of scale. However, the technological change (techch) had the most significant impact on the average Malmquist index from 2011 to 2020. The decrease in technical efficiency was mainly caused by changes in the functioning of theatres in 2020 and 2021. The lock-in period significantly influenced the limited activity of theatres, which resulted in a low average value of the indicator (Tables 3 and 4).

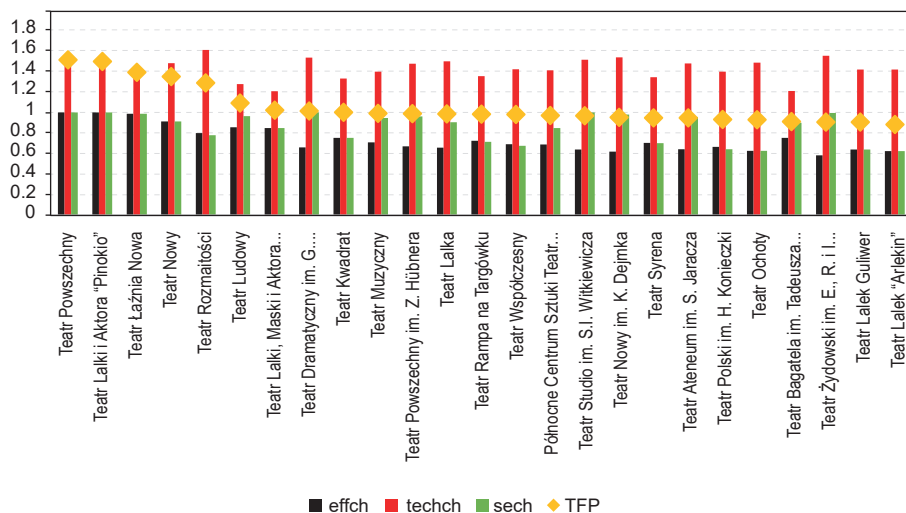
On average, the TFP index increased its value by 42%, while the technical efficiency index value decreased (-27.2 %) (Table 3). As Figure 1 clearly shows, the technology index (techch) was a significant component of productivity growth in the years 2011–2020.

**Table 3.** TFP and its components in years 2011–2020

Theatres	Malmquist Summary index			
	2011–2020			
	effch	techch	sech	TFP
Teatr Polski im. H. Konieczki	0.666	1.395	0.642	0.929
Teatr Ludowy	0.856	1.274	0.964	1.09
Teatr Bagatela im. Tadeusza Boya-Żeleńskiego	0.752	1.207	0.898	0.908
Teatr Lalki, Maski i Aktora “Grotoska”	0.847	1.204	0.847	1.02
Teatr Łaźnia Nowa	0.985	1.407	0.986	1.387
Teatr Nowy im. K. Dejmka	0.619	1.533	0.978	0.949
Teatr Powszechny	1	1.508	1	1.508
Teatr Lalek “Arlekin”	0.623	1.415	0.623	0.881
Teatr Lalki i Aktora “Pinokio”	1	1.491	1	1.491
Teatr Muzyczny	0.709	1.395	0.946	0.989
Teatr Ateneum im. S. Jaracza	0.641	1.473	0.954	0.944
Teatr Dramatyczny im. G. Holoubka	0.661	1.53	0.998	1.011
Teatr Lalek Guliwer	0.638	1.415	0.638	0.903
Północne Centrum Sztuki Teatr Komedia	0.688	1.407	0.847	0.967
Teatr Kwadrat	0.752	1.328	0.752	0.999
Teatr Lalka	0.658	1.494	0.903	0.984
Teatr Nowy	0.911	1.478	0.911	1.347
Teatr Ochoty	0.626	1.482	0.626	0.928
Teatr Powszechny im. Z. Hübnera	0.67	1.471	0.96	0.986
Teatr Rampa na Targówku	0.725	1.351	0.714	0.98

Teatr Rozmaitości	0.799	1.606	0.779	1.283
Teatr Studio im. S.I. Witkiewicza	0.639	1.511	1	0.966
Teatr Syrena	0.704	1.341	0.701	0.944
Teatr Współczesny	0.691	1.417	0.675	0.979
Teatr Żydowski im. E., R. i I. Kamińskich	0.584	1.548	0.995	0.904
Mean	0.728	1.424	0.842	1.037

Source: own elaborations.



**Figure 1.** TFP and changes in the technological index and technical index, years 2011–2020

Source: own elaborations.

The significant influence of the technological indicator is also noticeable in the years 2020–2011 and 2019–2011. These differences are important for research because they show the activity of the theatre before and during the pandemic in comparison with 2011. In particular, it is worth paying attention to the multi-fold increase in the index of technological progress.

In the years 2020–2011, the annual change in this index amounted to as much as 1828%, with a simultaneous decrease in technical efficiency by 94.2% and scale effects by 78.8% (Table 4). Due to the difficulties in the management and proper functioning of theatres, the TFP in 2020 finally increased by only 5.4% compared to 2011. The situation was different in 2019 and 2011. The impact of technology is also visible in these years, although the increase is much smaller than in the previous comparison (an increase of 44.6%). Along with the increase in technology, there is a slight decrease in the technical efficiency index (a decrease of 6.5%) and the effects of scale (a decrease of 3.2%) are visible. Consequently, in 2019, the TFP increased by 35.1% compared to 2011.

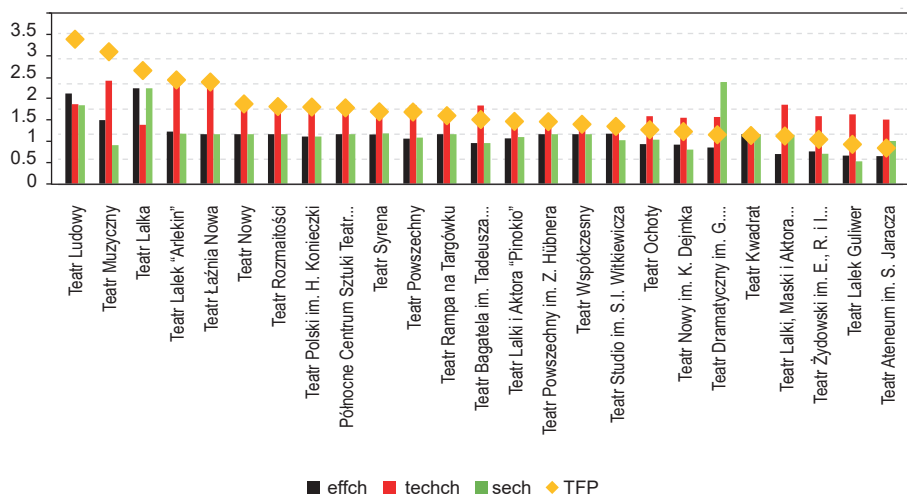
**Table 4.** TFP and its components in years 2020 vs 2011 and 2019 vs 2011

No.	Theatres	Malmquist Summary index							
		2020 vs 2011				2019 vs 2011			
		effch	techch	sech	TFP	effch	techch	sech	TFP
1	Teatr Polski im. H. Konieczki	0.026	23.65	0.018	0.613	0.911	1.582	0.933	1.442
2	Teatr Ludowy	0.246	12.14	0.722	2.992	0.917	1.369	0.943	1.255
3	Teatr Bagatela im. Tadeusza Boya-Żeleńskiego	0.077	7.488	0.38	0.574	1	2.034	1	2.034
4	Teatr Lalki, Maski i Aktora "Grotoska"	0.225	7.889	0.225	1.772	1	1.601	1	1.601
5	Teatr Łażnia Nowa	0.874	27.58	0.881	24.11	1.808	1.597	1.575	2.888
6	Teatr Nowy im. K. Dejmka	0.013	25.42	0.818	0.338	0.605	1.588	0.991	0.961
7	Teatr Powszechny	1	21.51	1	21.51	1	1.549	1	1.549
8	Teatr Lalek "Arlekin"	0.014	20.9	0.014	0.294	0.823	1.568	0.823	1.291
9	Teatr Lalki i Aktora "Pinokio"	1	28.27	1	28.27	1	0.972	1	0.972
10	Teatr Muzyczny	0.045	20.59	0.609	0.932	1	1.37	1	1.37
11	Teatr Ateneum im. S. Jaracza	0.018	18.42	0.652	0.337	1.279	2.064	0.783	2.64
12	Teatr Dramatyczny im. G. Holoubka	0.024	20.22	0.986	0.484	0.995	1.452	1.017	1.445
13	Teatr Lalek Guliwer	0.018	13.23	0.018	0.232	1	1.197	1	1.197
14	Północne Centrum Sztuki Teatr Komedia	0.034	12.48	0.225	0.428	1	1.522	1	1.522
15	Teatr Kwadrat	0.077	7.373	0.077	0.568	1	1.249	1	1.249
16	Teatr Lalka	0.023	23.45	0.401	0.546	0.951	1.62	0.951	1.541
17	Teatr Nowy	0.433	23.07	0.433	9.998	0.735	1.344	2.037	0.987
18	Teatr Ochoty	0.015	28.66	0.015	0.424	1.913	1.184	1.913	2.264
19	Teatr Powszechny im. Z. Hübnera	0.027	23.78	0.696	0.651	0.564	1.288	0.864	0.726
20	Teatr Rampa na Targówku	0.056	10.1	0.048	0.562	1.008	1.148	0.878	1.157
21	Teatr Rozmaitości	0.132	34.85	0.106	4.613	0.573	1.392	0.46	0.797
22	Teatr Studio im. S.I. Witkiewicza	0.018	28.14	1.001	0.502	0.801	1.356	0.89	1.086
23	Teatr Syrena	0.042	14.74	0.041	0.625	1.052	1.978	1.008	2.08
24	Teatr Współczesny	0.036	16.29	0.029	0.583	0.794	1.328	0.693	1.054
25	Teatr Żydowski im. E., R. i I. Kamińskich	0.008	28.49	0.956	0.224	0.66	1.356	0.61	0.895
Mean		0.058	18.28	0.212	1.054	0.935	1.446	0.968	1.351

Source: own elaborations.

The increase in productivity (TFP) results from the level of technical efficiency, technology index and scale index (Figure 2). There are cases of theatres where, despite a high level of the technological index, productivity has decreased (e.g. theatre no. 6, 17, 19, 21, 25). This means that the mere increase in the technological progress index did not improve productivity, although it certainly prevented its further decline. When trying to improve productivity, one should take into account the symmetrical growth of all components of the analyzed indicator.

Compared to previous studies conducted in a shorter period and on a smaller number of theatres, we notice that the present result shows less/weaker TFP and a stronger technological indicator – which is logical – because technological changes felt more strongly in the period 2011–2020 than only in the period 2016–2020 as it was counted in an earlier study. Additionally, a smaller increase in efficiency indicates that it is significant to symmetrically raise all indicators – a decrease in technical efficiency (request, marketing, organization) causes the impact of an increase in the technological indicator to weaken. Theatres benefit not only from the increase in technological facilities but also from technical and large-scale production.



**Figure 2.** TFP and changes in the technological index and technical index, 2019 vs. 2011

Source: own elaborations.

## 5. Discussion

The current research focuses on finance and productivity, but we consider also new concepts that would allow us to face forward into the changed social and cultural situation after COVID-19. The period of the COVID-19 pandemic is undoubtedly part of the evolution of the visual arts, following the emergence of cinematography, computer technology, and VR (Kuksa and Childs, 2014). Perhaps it is another proof that drama is an actual “collective artwork” and the “synthesis of the arts” – the Gesamtkunstwerk (Wagner, 1849). Besides, the concept had many supporters. At the beginning of the new millennium, innovative techniques such as interface design, virtual interaction, and their newly emerged forms began to be used as artistic tools (Grau, 2003), which of course also aroused opposition, thus shifting the future of theatre to television (Kuksa and Childs, 2014).

Poland, as an Eastern European country, was less prepared and burdened with multiple challenges long before COVID-19 (Cultural Policies, 2020) – fragile institutions, weak public finances, and so on. Here, we still have to answer a fundamental question: Why should arts and culture be supported in a democratic society and how best to do it (Dümcke, 2021)? In 2020, theatre was going through a painful moment that television, film, and music have already gone through. The moment when technology suddenly makes previous structures of activity obsolete. The strict pandemic restrictions on in-person theatre forced the theatres to numerous changes, and it can be said that they raised the stakes. Theatre-makers of every kind, at every scale, are filming new performances for online distribution. The pandemic has had a strong positive impact on the products and services provided by the IT industry (George et al., 2020). These changes were also visible in theatres.

Research conducted in Poland shows that the implementation of online theatre activities was often done collectively. In the early stages, even actors often took the initiative, not only inventing new activities but also carrying them out at home (Buchner et al., 2021). During the pandemic, employees faced completely new challenges. In larger theatres, additional support was provided by the legal department (contracts and licenses) and the technical department (post-production). Smaller theatres did not have in-house experts in this field (Buchner et al., 2021). This may indicate that the cultural climate in a given organization and the balance between production concerns and human-related issues play a vital role in the implementation of new technological solutions. To enhance productivity, it is important to consider the balanced development of all elements of the measured index. The organization’s internal culture can cause distorted application of technologies, that can both improve and hamper the efforts made to introduce a change (Godé, 2006; Gałęcka and Smolny, 2023).

We noticed that the productivity index increased in theatres where the decline in technical efficiency and economies of scale was less. It proves the necessity of

cooperation of all factors while maintaining the synergy necessary for the effective development of a given unit. The use of technology is not sufficient to achieve an increase in the productivity of the business. The ability to use the applied technologies also seems to be of significance. Perez-Laborda and Perez-Sebastian (2020) show that technological progress significantly increases the relative productivity of skilled rather than unskilled workers.

## 6. Conclusions

The conducted research showed a significant increase in the value of the technological progress index during the pandemic period. At this point, it should be emphasized that theatres have been using new technologies in the production of performances for years. The blockade period, however, caused a significant change. In none of the analyzed years was this growth as high as in 2020. Digital technologies have made cultural products more accessible, challenged the established business models and the copyright system, and blurred the line between producers and consumers.

It is worth examining the productivity of theatres in individual EU countries in relation to the introduced restrictions and the support provided by the state. The use of technology is not sufficient to achieve an increase in the productivity of PAOs. There are also needs for systemic solutions in the field of organization and legal regulations that adapt public cultural services to the post-COVID-19 reality (Buchner et al., 2021). Actions that use this technology thoughtfully and harmoniously are essential. The results obtained in the study seem to prove this point. Despite the increase in the technological efficiency index in all theatres (Table 4), the productivity indices were varied. Likewise, we notice different values of the technical efficiency index and the effects of scale. This also demonstrates the significant role these indicators play.

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# Risk management in diffused structures: Analysis for Shared Services Centers

**JEL classification:** G32

**Keywords:** risk management, Shared Services Centers – SSC, Global Business Services – GBS, outsourcing, lean risk management, FERMA, PMBOK, M\_o\_R, COSO, ISO 31000

## Abstract

Research background: Shared Services Centers (SSCs) are often a spin-off of corporate services to separate all operational tasks from the corporate headquarters. The primary focus of the headquarters should be on leadership and corporate governance. However, many SSCs have also been given some corporate functions. Risk management is a significant part of governance and one of its principles. The effectiveness of risk management depends on its integration into the organization's governance, including decision-making. The question is how a modern SSC manages this part of governance.

**Purpose:** This study aims to present the conditions that prove the implementation of risk management in SSCs and to evaluate the most effective risk management model.

**Research methodology:** Targeted literature review followed by surveys and a case study.

**Results:** The risk management process consists of several stages that are repeated in many models (identification and risk assessment, risk management model selection, and monitoring). Thus, it is possible to use each model in the SSC concerning the migrated processes, considering the limitations of the strategic goals definition. However, not all methods will find a potential application in risk management in the SSC, considering the most effective risk assessment.

**Novelty:** While the literature provides models that can be of use, a lack of specific guidelines has been recognized, especially regarding the risk management aspect in SSCs. In the last decade, the focus was on the expected benefits coming from standardization, ignoring the new risks in SSC processes.

## 1. Introduction

The term “risk” is derived from the Italian language (*risico*), which primarily means a project with an uncertain result. The future outcome is unknown, but alternatives can be identified, assuming that the chances of possible alternatives are known (Jajuga, 2019; Szczepański, 2016). The risk should be assessed, and appropriate actions should be taken to respond adequately.

Risk management is a range of activities that an entity needs to undertake to allow only the amount of risk that is acceptable for the business operations it conducts (Michalski, 2004). It brings risk under control and includes a range of activities connected with risk analysis, elimination, reduction, and management in a given case (Monkiewicz, 2000).

There are many definitions of operational risk, formulated in different scientific disciplines (such as economics and finance, management and quality sciences). In the most general terms, operational risk includes all types of risks occurring in an enterprise that are not classified as financial risk. Operational risk could be defined as “loss resulting from inadequate or failed internal processes, people, and systems, or from external events (e.g. frauds, inadequate computer systems, a failure in controls, a mistake in operation, a guideline that has been circumvented, or a natural disaster)” (Basel Committee, 2011; Crouhy, Galali, Mark 2014).

The Basel Committee on Banking Supervision defines operational risk as the possibility of incurring losses due to inadequate or faulty systems, incorrect procedures and methods of operation, human error, technical failures and external events. According to this concept, the following categories of risk factors can be distinguished:

- processes – a category of losses incurred as a result of errors in the procedures adopted, an insufficient number of procedures or their absence, losses in this category are not the result of intentional actions, but may be the result of human error or non-compliance with applicable procedures;
- people – the source of this type of risk are intentional or unintentional actions of former or current employees to the detriment of the employer;
- systems – refers to losses resulting from the failure of telecommunications or IT systems, including software, losses in this category are not the result of intentional actions;
- external events – refers to losses incurred as a result of the impact of external factors on entities, these may be losses caused by natural catastrophes or the activities of third parties.

The fulfillment of operational risk always consists of the loss of key resources or the loss of control over these resources, but in general, risk management encompasses (Basel Committee, 2011) the following steps, adjusted for general business activities:

1. process of identifying risks,
2. measuring exposure to those risks (where possible),
3. ensuring that an effective monitoring program is in place,
4. monitoring risk exposure,
5. taking action to control or mitigate risk exposure,
6. reporting risk exposure to senior management and the board.

A critical dilemma in the operational risk management process is whether and to what extent operational risk management should be excluded from general management and made an autonomous process. Operational risk management is carried out in two streams (Zawiła-Niedźwiecki, 2013):

1. general – a part of current management that is difficult to separate and observe, and management activities are routine reactions, situation analyses, assessments, and decisions;

2. specific – autonomous, related only to that type of risk, based on task structures, operating on an interval basis (periodic work), and focused on in-depth analysis and development of solutions that precisely address the risk.

Internal controls are typically embedded in the company's day-to-day operations and are designed to ensure, to the extent possible, that significant activities are efficient and effective and that information is reliable, timely, and complete. What is important, because operational risk management evolves and the business environment is constantly changing, management should ensure that the framework policies, processes, and systems remain sufficiently robust. Improvements in operational risk management will depend on the degree to which the concerns of operational risk managers' are taken into account and the willingness of senior management to act promptly and appropriately on their warnings.

There are many challenges to assessing and mitigating the operational risk, such as:

- the required data is not always available,
- operational complexity is growing in enterprises,
- the universe of operational risk types is expanding,
- operational risk overlaps with other risk functions (especially with financial risk).

Some of the challenges related to operational risk management are related to the organizational structure and management of the company:

- operational staff complains that monitoring and reporting take time away from their other responsibilities;
- lack of cooperation between organizational units and individuals dealing with different types of risk;
- problems connected with outsourcing certain functions or tasks of the enterprise related to risk management;

– lack of awareness of the need and appropriate procedures for coordinating the implementation of the lean management strategy with operational risk management in a company.

The above-mentioned challenges regarding the relationship between the implementation of the lean management strategy and tools, the outsourcing of chosen corporate functions (to SSCs) and operational risk management have become the inspiration for conducting research, the preliminary results of which are presented in this article.

## 2. Theoretical aspect of research: Characteristics of SSC

In the current turbulent times of high uncertainty, lack of predictability, and complex organizational structures, effective operational risk management is becoming increasingly critical. Operational risk is inherent in any activity and exists before other types of risk appear. Considering the growing number of SSCs that are willing to choose Poland (ABSL, 2021) to conduct their activities, a research gap has been noticed regarding the effective involvement of SSCs in risk management, taking into account modern management methods, mainly lean management.

Utilizing a third party to perform various tasks and services is a business practice that has existed for centuries, even dating back to Rome, for tax collection (Duffy, 2010). Officially, Adam Smith first proposed the concept of outsourcing in 1776 in *The Wealth of Nations* (Smith, 1977). In addition, division of labor and specialization is critical to optimizing productivity by increasing cooperation among groups of employees and promoting individual efficiency (Porter, 2006).

Over the last 20 years, business outsourcing has evolved from the traditional outsourcing of facilities management to the outsourcing of more administrative support functions such as information technology, finance, accounting, and human resources. In these cases, a company transfers tasks to an outside entity rather than performing them internally, most often for efficiency and financial benefits (Trocki, 2001). As Henry Ford suggested, “If there is a thing that we cannot do more efficiently, cheaper or better than a competition, there is no point in doing it further – we should hire the one who does it better than we do” (Ciesielska and Radło, 2011).

SSCs are similar to outsourcing because they are separate entities, but the existing units are not liquidated. Only certain activities and processes extracted from these units are transferred and consolidated in the centers. SSCs differ from outsourcing primarily in that the tasks are not outsourced, but handled by a specially established unit that remains within the structures and under the control of the parent company. An SSC operates as a business with full responsibility for managing its costs, quality, and timeliness of services. It has organizational independence and uses contractual arrangements (known as a service-level agree-

ment – SLA) with its internal customers to define the type, scope, and price of services provided. Moreover, an SSC provides well-defined processes or knowledge-based services for more than one unit of a company (e.g., division, business unit) with its dedicated resources (Institute of Management Accountants, 2000). In the SSC model, an independent entity is separated from the organization and is responsible for providing services to its other units. The Global Business Services (GBS) model creates a global, integrated, and centrally managed organization that provides comprehensive end-to-end services. GBS is defined as being the last, most advanced step on the SSC maturity scale (E&Y, 2022).

SSCs are a viable alternative to outsourcing, re-engineering, organizational restructuring, and other related “solutions” for costing and building service performance. Innovative structures, strategies, and solutions to complex business problems result from rapid technological progress and the pursuit of global performance standards (Institute of Management Accountants, 2000). Increasingly complex and costly support services within the organization are prime candidates for reducing costs and building efficiency. The modern marketplace and the development of the outsourcing industry have made lean management popular, not only in production but also in the area of SSCs created to outsource functions such as IT, accounting, and HR, as presented in Table 1.

**Table 1.** Traditional functions moved to SSCs

Finance	HR	IT
General ledger	Processing of salaries	Standards
Liabilities	Payroll administration	Technology/development
Receivables	Administration of benefits	Application development
Taxes	Training and further education	Application maintenance
Purchasing	Relocation services	Telecommunications
Customer Service		Purchasing hardware and software
Cash management		
Internal audit		
Insurance		
Treasury		

Source: own compilation based on: Institute of Management Accountants, 2000; Deloitte, 2019; ScottMadden, 2020.

SSCs are often a spin-off of corporate services to separate all operational tasks from the corporate headquarters. The primary focus of the headquarters should be on leadership and corporate governance. However, many SSCs have also been given some corporate functions. Risk management is a significant part of governance and one of its principles. The board and management must determine risks of all kinds and how best to control them. They must act on those recommendations to manage them and inform all relevant parties about the existence and status of risks. Risk management is part of governance and leadership, and it contributes to the improvement of management systems. As per ISO 31000:2018 (ISO, 2018), risk

management is an integral part of all organizational activities and should be integrated into significant activities and functions. The effectiveness of risk management depends on its integration into the governance of the organization, including decision-making. How is this part of governance migrated to the modern SSC? Integrating risk management requires an understanding of organizational structures and context. Considering that SSCs should be partially responsible for risks because they are managed in every part of the organization's structure, everyone is responsible for managing said risks. Integrating risk management into an organization is a dynamic and iterative process. Risk management should be a part of, and not separate from, the organization's purpose, governance, leadership and commitment, strategy, objectives, and operations.

A blurred responsibility for risks and difficulties regarding ownership, accountability, and communication characterizes risk management in diffused organizations such as SSCs. Once a process or part of it has been migrated to the SSC, it is often disconnected from the business. Due to the strong emphasis on standardization and repeatability, even transactionality, risk is usually no longer actively managed. Another common situation is the migration of the internal control of a given process to the SSC, which is fully justified, but often only increases the sense of impossibility of any change in the process due to the control requirements, including internal and external audit requirements.

On the other hand, entities such as SSCs have a considerable impact not only on what processes look like, but also on what they could look like by comparing them to best practices and drawing on the experience of people working in SSCs<sup>1</sup>. Skillful use of the potential impact of SSCs in the risk management process, in the opinion of the article's authors, could increase the effectiveness<sup>2</sup> of risk management, mainly due to the possibility of obtaining synergy with lean management. The features and stages of risk management for SSCs will be identified and discussed in detail in section 4. Results.

The basic scope of any SSC is transactional and repeatable operations, but as mentioned above, more and more corporate functions are migrated to the modern SSCs. Poland is the proper destination for more advanced functions. The development of the modern business services sector should be analyzed in a broader con-

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<sup>1</sup> According to the ABSL report (ABSL, 2022), the voluntary turnover of employees in 2021 was, on average, 15% for SSC and GBS entities. According to the Randstad Labor Market Monitor report, the employee turnover in Poland in the first quarter of 2021 was 23% (Randstad, 2021). Frequent job changers achieve a particular specialization in the knowledge of the process, often reaching the expert level (Subject Matter Expert) and naturally moving to new units where they share their expertise and look for the best solutions.

<sup>2</sup> The control function's effectiveness in risk management is the subject of a more extensive study for lean risk management.



text than just the number of employees. In addition to the quantitative development, the modern business services sector is changing significantly in terms of quality. There is a clear trend towards a more significant role for more comprehensive processes (gradual transition from back-office to middle-office), which generate higher added value. This process requires more and more resources of well-educated and experienced employees, thus attracting people with more advanced and new areas of competence and qualifications (“skills of the future”). As a result, the level of complexity of business processes is gradually increasing (ABSL, 2021).

Another critical issue in SSCs is process standardization. Ultimately, SSCs have to contribute to the competitiveness and (financial) performance of the firm. As competition shifts to the innovative business models and in relation to this, there are higher dynamics in the composite customer value proposition to be performed, changes in the customer value proposition need to be translated into (back-office) processes in a timely and effective manner. As a consequence, standardization of processes cannot be based on “best practice processes” as previously promoted by IT (enterprise systems) (Davenport, 2000), but needs to be based on modularity (Sako, 2003). Any reconstruction of the process is associated with the occurrence of additional risks. Accountability for these risks should be an integral part of every SSC. With the identification of this research need, the following hypotheses are proposed and tested:

1. Hypothesis 1 (H1): Specific conditions that demonstrate the implementation of risk management in the SSC are defined.

2. Hypothesis 2 (H2): No single, most effective model can be used in the SSC.

While the literature provides models that can be used, a lack of specific guidelines has been recognized, especially considering the risk management aspect in SSCs. It is believed that this current study contributes valuable empirical insights. When discussing risk management in SSCs, insufficient attention is paid to the ownership of processes. In the last decade, the focus was on the expected benefits of standardization, ignoring the new risks in the SSCs processes.

This article is organized to meet the research objectives as follows. Section 3 presents the research methodology in terms of procedures and methods utilized. Then, section 4 presents the results:

1. based on the review of Polish and international literature, the most common risk management models were analyzed;

2. surveys were sent to the SSC audience working in the area of lean management in October 2021 to examine the implementation of risk management;

3. a case study on the suitability of the risk management models helped formulate conclusions and future directions for the research.

Section 5 discusses the empirical findings from the analysis, conclusions, and future directions for this research.

### 3. Research methods

This study is exploratory research conducted on an issue that has not yet been investigated in Poland within SSCs. Therefore, it is descriptive and analytical from the viewpoint of the exploratory objective, including two steps. The first step entails a targeted review of the existing literature, followed by empirical research covering surveys and a case study. Both steps are explained further below.

The targeted literature review (BMJ, 2009) was conducted to evaluate current trends on the studied matter, using the Web of Science database to identify risk management models which can be further analyzed against usage in the SSC processes. The search strategy included specific keywords: “risk management model” and keywords associated with organization (Shared Services Center, outsourcing, SSC). The search was limited to studies published within the last 12 years (2010–2022) and in the management area. No language restriction was applied to the search, but only studies with an abstract written in English and full text in English and Polish were eligible for inclusion. The first search presented no results, so it was decided to remove the organization filter. A researcher reviewed all retrieved articles, and those considered irrelevant were removed. The remaining articles were further assessed to identify those studies that met the eligibility criteria. A second researcher conducted a quality check on a sample of the selected articles/abstracts, and a full-text review was conducted to determine relevance to the eligibility criteria. The literature search identified 350 records from the selected database. Records were screened, and 271 were excluded based on the eligibility criteria (articles classified as other than economics, business, business finance, and management). Non-Open Access articles (57) were screened using the title, keywords, and abstract. Full-text analysis was conducted for the remaining 22 articles and resulted in the exclusion of 14 articles that did not meet the eligibility criteria. For completeness purposes, an additional verification of available literature was conducted using Google, where an additional six articles were reviewed. A total of 14 references were included in the qualitative analysis.

The next step was to design the survey, a quantitative research method (Czackon, 2020). Because the analysis of risk management is part of more significant research connected with interdependencies between lean management and risk management, it was developed considering two groups: companies that have implemented the lean methodology and companies that have not implemented the lean methodology.

Concerning the companies that have implemented the lean methodology, the intention was to understand the following:

1. organization of the risk management process;
2. control function in risk management;
3. participants in the risk management process.

A survey was withdrawn from the second group of companies after it was confirmed that one of the companies did not implement lean management. The question on lean management / Lean Six Sigma implementation was a selection condition, which means that lack of implementation did not allow for further survey. The online questionnaire performed in the MS Forms application ran online between 17 October 2021 and 31 October 2021. This format was chosen because online questionnaires present numerous advantages in terms of cost, time, easiness of administration, data organization, and analysis (Czakon, 2020). The data file containing the responses obtained was downloaded in MS Excel format. The first section of the questionnaire was addressed to the respondents whose companies had already implemented lean management. The second section of the questionnaire consisted of general questions aimed at characterizing the respondents and the companies.

The questions asked in the questionnaire were translated into qualitative variables (nominal and ordinal) and quantitative variables with Likert-type scale questions from 1 to 5, and the implementation of lean management was measured. The study of companies was grouped according to the role of the respondent, the size of the company (number of internal units and number of employees), the years of lean implementation, the phase of lean progress, and the scope of services. Based on this, statistical tests were carried out to verify any standardization or differentiation.

Quantitative data analysis was performed using descriptive statistics to summarize the information collected, followed by inferential statistical techniques based on the graphical presentation of the data (Czakon, 2020). The statistical analysis was performed using Microsoft Excel and the Statistica application.

The population of the presented study consisted of companies operating in Poland, with SSCs established as part of international capital groups, providing services to at least 20 internal units and employing at least 100 employees. Firstly, based mainly on annual research executed by ABSL on the business services sector in Poland (ABSL, 2021), followed by additional screening on the scope of activities for selected SSCs (website visits), 128 companies were defined as meeting the research criterion. An additional search on the Internet (LinkedIn social medium) helped to collect a list of company representatives for the study. They were selected based on a position related to one of the keywords “lean management,” “process excellence,” or “continuous improvement.” The survey was fully anonymous and shared with the selected people through a private message on LinkedIn.

Considering the population size: of 128 companies in the scope of the research, a confidence level: of 90%, and a maximum error: of 5%, the sample size was defined as 87. In total, 90 questionnaires were successfully sent out, and 23 were collected with responses (a percentage of 25%). Even though the return rate of the questionnaires was low, the research results obtained with different methods are complementary. The results of the questionnaire were additionally confirmed by

the case study method. However, the conclusions of this research cannot be generalized. The main limitation of the research was the size and selection of the research sample based on willingness to participate.

The last stage of the research cycle was the preparation of a case study (Czakon, 2020; Glinka and Czakon, 2021) for a selected SSC. A case study is an in-depth research of processes in their natural environment. The selection of cases is subordinated to the presentation of the research subject. It is intended to contribute to a better understanding of the reality that is the subject of the study. A key issue was to evaluate the most effective risk management model that can be used in SSCs. A deliberate case selection was made to answer this research question. The selected SSC was established in 2011. Currently, the team consists of over 200 people. They provide business services in the areas of finance, accounting, purchasing, tax, internal control, law, and human resources and support companies located in Europe, India, Africa, and the Middle East. Lean management has been used in the capital group for decades and in the SSC area for over five years. A field study was conducted to collect data at the company's headquarters.

## 4. Results

When analyzing risk management in an SSC in terms of the scope and role of the SSC itself, it is impossible not to notice that, on the one hand, we are dealing with the concentration of processes for many entities, which provides a basis for comparison. On the other hand, processes are dispersed due to incomplete migration and local management. It is common to say that in an SSC, a basis for comparison can be found because one process (e.g., Procure to Pay – PTP, Order to Cash – OTC, etc.) can be compared across many entities. Unfortunately, in the migration process, in the absence of standardization during the “entry” of the process into the SSC, these processes are often transferred incompletely, as they were initially performed, with the promise that they will be fully standardized in the future. With such a migration scheme, one can directly talk about an increase in the level of risk when transferring the process to SSCs.

Considering the above information, it can be assumed that modern SSCs in Poland are increasingly transferring more advanced corporate processes to their responsibilities, including risk management. Risk management is most often assigned to the headquarters and there is a responsibility for it. Therefore, an attempt was made to answer the following questions:

1. What are the reasons for implementing risk management in SSCs?
2. Is it possible to choose the most effective risk management model with a limited scope of operation of SSCs?

Detailed results of empirical research in this area are presented below.

### 4.1. Targeted literature review and case study

The primary stages of this process, which are repeated in several models, are risk definition, analysis, assessment, observation, and control. The essence of risk management comes down to the continuity of this process because the exclusively continuous and constantly improved risk management process can help an organization reach its planned objectives.

This study performed a targeted review using the methodological approach explained in Section 3 to further the research purpose. Based on the review of the 14 articles sorted by the year of publication, a distinction must be made between risk management and project risk management (Trzeciak, 2021; Sidorova et al., 2022).

Risk management should refer not only to the business operations of an entity, but also be part of a broader process, namely the management of an entire unit (which means that it should refer to the decisions made by an organization, particularly those of a strategic nature). A significant portion of the risks and uncertainties that project managers face is beyond their immediate control and are symptoms of underlying weaknesses/strengths in their organizations’ capabilities. This type of risk has to be assessed and managed at a higher management level in the company. Enterprise risk management allows organizations to optimize how and where they manage risks. Project risk management should be treated as a subset of enterprise risk management. Practically all models created for project risk management should be in line with the enterprise risk management framework. Risk management principles are the central part of an enterprise management process. The risk management system is created in the form of a concept at the initial stage, and then risk management procedures are developed with their subsequent implementation.

In Table 2 the most common risk management models are presented and compared.

**Table 2.** Comparison of risk management models

Risk management stage	PMBOK	FERMA	PRINCE2 M_o_R	COSO	ISO 31000	In scope for SSC?
1a. Objective setting / Strategic goals		✓		✓		✗
1b. Scope, context, criteria					✓	✗
2. Internal environment				✓		✓
3. Risk management planning	✓					✗
4. Risks / events identification	✓		✓	✓		✓
5a. Perform qualitative risk analysis / Risk assessment	✓	✓	✓	✓	✓	✓
5b. Perform quantitative risk analysis / Risk assessment	✓					✓

6. Decision		✓	✓			✓ / x*
7. Plan risk responses	✓	✓	✓	✓	✓	✓
8a. Informing / Reporting about risk		✓		✓		✓
8b. Residual risk reporting		✓			✓	✓
9. Control risks / Monitoring	✓	✓		✓	✓	✓
10. Communication			✓	✓	✓	✓

Source: own compilation based on: PMI, 2004; FERMA, 2011; ALEXOS, 2021; ACCA, 2021; ISO, 2018.

\* Depends on empowerment given to the SSC and Service Level Agreement.

The risk management model starts with setting objectives and defining strategic goals for the organization. Although this task is not connected with risk management, it plays a critical role in driving businesses. However, two models consider this step as part of risk management: FERMA and COSO.

The internal environment sets the organization's tone, influencing risk appetite, attitudes toward risk management, and ethical values. An unbalanced board that lacks appropriate technical knowledge and experience, diversity, and strong, independent voices is unlikely to set the right tone. Although this task may seem adequate for an SSC, as the saying goes "the fish rots from the head", without the right tone at the top of the headquarters, a subordinate unit cannot be expected to oppose management practices. Risk management planning defines the initial work performed to identify the risk management approach that should be used in the program and the program-specific assessment criteria.

The next step, directly or indirectly applicable to almost all models, is risk identification. The organization must identify internal and external events that affect the achievement of its objectives. The COSO guidelines distinguish between events with a negative impact (risks) and events with a positive impact, (opportunities), which should provide feedback for strategy setting. All other models define risk identification as the process of identifying the potential sources of risks, both initially and on an ongoing basis. Once the risks are identified, the likelihood and impact of said risks are assessed to determine how to manage them. Finally, management selects appropriate actions to align risks with risk tolerance and appetite, and this stage can be seen in the four main responses: reduce, accept, transfer, or avoid.

Reporting is an integral part of an organization's governance and should enhance the quality of the dialogue with stakeholders, as well as support top management and oversight bodies in fulfilling their responsibilities. Factors to consider in reporting include, but are not limited to:

- differing stakeholders and their specific information needs and requirements,
- cost,

- frequency and timeliness of reporting,
- the reporting method and the relevance of the information to the organization's objectives and decision-making.

The purpose of monitoring and review is to assure and improve the quality and effectiveness of process design, implementation, and outcomes. Ongoing monitoring and periodic review of the risk management process and its outcomes should be a planned part of the risk management process, with clearly defined responsibilities. Monitoring and review should take place in all stages of the process. Monitoring and review include planning, gathering and analyzing information, recording results, and providing feedback. The results of monitoring and review should be incorporated into the organization's performance management, measurement, and reporting activities. The information provided to management needs to be relevant and of appropriate quality. In addition, communication with employees is required. Communicating risk areas that are relevant to the employees' activities is essential to strengthening the internal environment by embedding risk awareness in the thinking of the employees.

This case study was prepared to identify which steps can apply to the SSC and if we can talk about the actual implementation of risk management. The analyzed entity supported over 50 internal units in processing receivables, liabilities, payments, general ledger operations, and other corporate functions. The scope of the overall processes transferred to this unit was still small, as customer service or purchasing processes remained outside of the SSC. Every step was assessed against the scope of the aforementioned SSC by classifying it as in scope / out of scope. It can be concluded that the case study results identify specific steps that the SSC performs. Still, any risk management model can be used independently, mainly due to the limitations of the organizational goal setting and the tone at the top setup.

## 4.2. Surveys

Given the multidimensionality of the nomenclature in the shared survey, for systematization purposes, the authors decided to add a clarification to the survey's introduction regarding Shared Services Centers versus Global Business Services: "In the Shared Services Center (SSC) model, an independent entity is separated from the organization and is responsible for providing services to other units. The Global Business Services (GBS) model is based on the creation of a global, integrated, and centrally managed organization that provides comprehensive end-to-end services. For the purposes of the survey, GBS is defined as the last, most advanced step on the SSC organizational maturity scale."

Specifically for the survey, a key focus of the study was to identify the interdependencies between risk management and lean management in the companies



where lean management or Lean Six Sigma is implemented<sup>3</sup>. Therefore, some questions in the survey were focused more on the organization of risk management and the potential implications caused by partial implementation. In addition, these questions were asked to the people responsible for lean management in the selected companies, so further research should be conducted.

The selection condition was the lean management / Lean Six Sigma implementation question. The first few questions were focused on general information about the lean management approach. The most critical information needed for further analysis was the confirmation of lean implementation. This section of the questionnaire was only addressed to companies that practice the lean philosophy (96%, with lean management at 52% and Lean Six Sigma at 44%). Almost all respondents confirmed using this methodology for between one and three years (68%) or more than five years (23%). The levels of lean management implementation were varied. A significant portion of the responses confirmed that almost all organizations analyzed at least identified processes in the scope of the SSC (19%), created value stream maps for them (18%), created a standard process (16%), and implemented a culture of continuous improvement (16%). This specific set of questions helped to understand how mature and advanced lean management is in the SSC structures.

The next set of questions focused on the research's primary purpose of this research and examined the confirmation or rejection of the hypothesis. Based on the survey, it can be concluded that as part of the project activities, process risks and mitigating controls are discussed with representatives of the risk management team or the internal control team (53%) in almost 70% of cases. Furthermore, after streamlining processes, the number of inspections was reduced in over 80% of cases.

Measuring the effectiveness of implementation was also in the area of the research as the Authors wanted to explicitly analyze the importance of specific risk measurement factors at this stage. The most important measures for assessing the effectiveness of lean management, as reported by the respondents involved in lean management activities, were:

1. time reduction (22%),
2. creation of a standard process (19%),
3. cost reduction (15%),
4. quality improvement (14%),
5. number of potential automation opportunities (12%).

Only 5% of respondents reported a reduction of operational risk and a decrease in control activities: 4%. Nevertheless, this is a significant finding from this research, especially for risk management. The responses came from people involved in lean management, so the questionnaire was mainly about their activities. The

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<sup>3</sup> Some of the conclusions from this research have been published previously, while this article contains new, original research conclusions.



questions on risk management were only a part of a larger whole and were more aimed at checking the extent to which people responsible for lean management were familiar with the risk management process. For the following question: “Does the organization manage risk in a structured way?”, 23% of respondents answered that they did not have such knowledge. The answer to this question also shows the extent of the lack of synergy between lean and risk management activities. The second part of the questionnaire characterizes the sample distributed by the following components presented in Table 3.

**Table 3.** Summary of the respondents and the companies’ characteristics

Component	Respondents’ responses
Employing entity	82% reported being part of an SSC organization.
Location of the employing entity	Most of the respondents represent Poznań (38%), Warszawa (33%) and Kraków (10%).
Organizational level of the position in the company	Most of the respondents represent Directorial level (27%), Managerial level (27%), and Leader level (23%).
Size of the company: number of internal units	Analyzed the support of the SSC 20–50 units – 82%, 50–100 units – 9%, more than 100 units – 9%.
Size of the company: number of employees	Analyzed the SSC’s employment 100–300 people – 55%, 301–1000 people – 36%, more than 1000 people 9%
Scope of services (top 10)	Purchase to Pay (PTP), Order to Cash (OTC), Treasury/Cash and Banking, Taxes, Procurement, Internal Controls, Customer Service, Corporate Functions, Application Development and Maintenance, Internal Audit.

Source: own compilation based on received surveys.

In addition, significant differences were found in the models used for the selection of processes. Potentially the barrier to building synergy can be the place of the lean management and risk management teams in the organizational structure, as based on this empirical research, in almost 40% of the responses, no risk management/internal controls representative is taking part in the discussion. Instead, the knowledge of the people in the team and their general understanding of risk is used. It is essential to highlight that this research shows only one perspective, as the respondents represent a lean management team. Further discussion should take place with representatives of the risk management team.

## 5. Conclusions, implications, and directions for further research

As mentioned earlier, when analyzing risk management in terms of the scope and role of the SSC itself, the concentration of processes for many entities is visible.

However, processes are dispersed due to incomplete migration and local management.

The risk management process consists of several stages that are repeated in many models (identification and risk assessment, selection of risk management model, and monitoring). Thus, it is possible to use any model regarding migrated processes, considering the definition of limitations for strategic goals. However, not all methods can be applied to risk management in a SSC, taking into account the most effective risk assessment.

The scope of risk management plays an important role – focusing on material risks and those potentially significant in terms of the company's overarching goals. This article highlights the limitations of the risk management process in SSCs and defines future research directions. Based on the targeted literature review, models proposed by researchers were presented and discussed. A deeper analysis was necessary to examine how SSCs implement risk management, not only from an organizational perspective but also in terms of the extent and scope of implementation. The results of the survey shed new light on this subject, as the answers received were provided by those working in lean management. A similar discussion should take place with the risk management teams in the respective SSCs.

Specifically for *Hypothesis 1 (H1): Specific conditions proving the implementation of risk management in the Shared Services Centers are defined*, it can be concluded that there are no specified clear conditions when and to what extent the SSC has implemented risk management. This conclusion requires in-depth study, as it may be mainly due to the fact that the respondents were responsible for lean management, not risk management. This conclusion is based on the lack of answers to questions regarding risk management. For *Hypothesis 2 (H2): No single, most effective model can be used in a Shared Services Center*, it can be concluded that the case study results identify specific steps that the SSC performs. Still, any risk management model can be used independently, mainly due to the limitations of the organizational goal setting and the tone-setting at the top.

The conclusions of this research cannot become the basis for generalization; they only serve as concepts that should be considered when designing research that deepens the understanding of this phenomenon. The main limitation of this research was the size and selection of the research sample based on willingness to participate. The practical aspect of this research is related to the usefulness of this knowledge for decision-makers in organizations.

Efficient risk management is a holistic process of managing an organization. It involves all departments, functions, and processes of an enterprise, and the cooperation of all elements determines its success. Appropriate attitude of an organization's management to risk and uncertainty allows its continuous development. It is worth stressing that risk management is closely related to the value of the managed entity as a whole composed of several elements. Their good financial condition and development constitute the strategic goals of an organization. Thanks to risk

management, these goals can be achieved, ensuring the maintenance and growth of the value of the business entity.

Conclusions based on empirical research allow us to state that risk management in an SSC can be performed only partially, as it works for independent entities, because some steps are outside the scope of SSCs. Therefore, a set of conditions that can be used to assess the most effective model of risk management is, in fact, a compilation of modern existing risk management models.

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# Development of digital financial instruments and their use in the activities of entities of the pharmaceutical industry of Ukraine

**JEL classification:** G15, G23, G40

**Keywords:** digital financial instruments, embedded finance, digital economy, pharmaceutical industry, business technologies, financial results

## Abstract

The pharmaceutical industry of Ukraine is an important component of its economy and the health of its population. At all stages of its development, it was and remains the centre of innovations, where the scientific and technological potential of the region is concentrated.

Theoretical and practical aspects of the development of innovative digital financial instruments and financial support were investigated and on their basis the activities of enterprises of the pharmaceutical industry in the conditions of the digital economy and electronic commerce as the most perspective segment of the modern market in the conditions of restrictions on direct contacts and the movement of people due to measures to combat the pandemic have been studied, military actions and security of people have been studied. It was determined that financial instruments can be conditionally divided into traditional and digital. They have similar content, functions, and features, however, they have different spheres of manifestation, advantages, disadvantages, and risks. At the same time, the implementation of digital financial instruments allows to significantly save the time of entrepreneurs and customers or services; it also saves cash; simplifies administration and, as a result, it increases the profitability of enterprises, in particular, the pharmaceutical industry.

The study shows wide opportunities for the development and application of embedded finance in the pharmaceutical sphere with the aim of increasing business profitability by saving time, prem-

ises and other means of providing and implementing financial activities; and economic benefits to consumers and partners; optimization of business processes and management of activities in general; promotion of innovation, investment and integration processes.

## 1. Introduction

The current conditions of operating the enterprises require the transition to new business model processes in management, finance, and production with the active involvement of modern information technologies. Similar changes in business are inextricably linked with the phenomena of digitalization and digital transformation.

In the last decade, digital financial instruments have become more and more widespread. In response to the pandemic, most large international and Ukrainian corporations, including the pharmaceutical industry, have already accelerated investments in digitalization.

According to the outlook, more than half of the global economy will be based on digital technologies or will be influenced by them. This, in turn, will help to increase business efficiency and profitability (Haltsova, 2021). Therefore, the formation and development of digital financial instruments, and their use for financing the pharmaceutical industry business is becoming more and more relevant, gaining theoretical and practical importance.

The pharmaceutical industry of Ukraine is an important component of its economy and the health of its population. The pharmaceutical industry of Ukraine is more than a century old. It is a centre of innovation, where the scientific and technological potential of the country is concentrated. The modern pharmaceutical industry is among the leaders in spending on innovation, although it is far from being the largest branch of the economy (Darnitsa, 2021). The COVID-19 pandemic and the war in Ukraine clearly showed the importance of a strong pharmaceutical industry as a component of the healthcare system and as a factor in strengthening national security: in addition to the economic impact, the growth of pharmaceutical production has a positive effect on the standard of living of the population.

The purpose of the article is to determine the main factors in the formation of digital financial instruments and their components, as well as to identify their features, possible risks of implementation, and to justify further prospects for their use in order to increase the efficiency of the activities of enterprises of the pharmaceutical industry of Ukraine.

## 2. Theoretical framework of the research

It should be noted that the digital economy and digitalization have become a trend, a stable trend and a fundamental condition for the development of modern global

and national business. According to the outlooks of various expert groups such as McKinsey, Bain & Company (McKinsey & Company, 2022; Bain & Company, 2022), investments in digitalization will continue to grow at a rapid pace. There is no exact percentage of international business revenues based on digital financial instruments, as they cover different sectors of the economy and are used to varying degrees in different countries.

However, digital financial instruments are becoming increasingly popular and widely used in the global economy.

In recent years, this was encouraged locally by the war in Ukraine, and at the international level by unprecedented restrictions on offline work, studying, all types of activities that previously involved personal contact, accepted globally as a means to combat the spread of the COVID-19 pandemic and to ensure the safety of the population (Marmul, Chorny, Penkovsky, 2022).

In the course of research for determining the content of digital financial instrument the important tasks must be solved. First of all, it is advisable to substantiate the main categories and concepts. This will allow to define and generalize the structure and components, identify the competitive advantages and risks of digital financial instruments.

It was determined that financial instruments can be conditionally divided into traditional and digital. They have similar content, functions, and properties, but different areas of manifestation, advantages, disadvantages, and risks (Marmul, Chorny, Penkovsky, 2022; Wiśniewski, Marchewka-Bartkowiak, 2022).

Digital financial instruments are various technological solutions that allow to conduct financial transactions using the Internet (Ozili, 2018; Andrew, Stephen, 2023). They are modern financial instruments that are now widely used in the banking sector, trade, the pharmaceutical field, and other fields of activity (Figure 1).

Among such tools, the following can be distinguished:

1. Cryptocurrencies are digital currencies that use blockchain technology to ensure the security and transparency of transactions.

2. Investment platforms are platforms that allow to invest in different assets via the Internet. Investors can buy and sell stocks, bonds, funds, and other investment instruments.

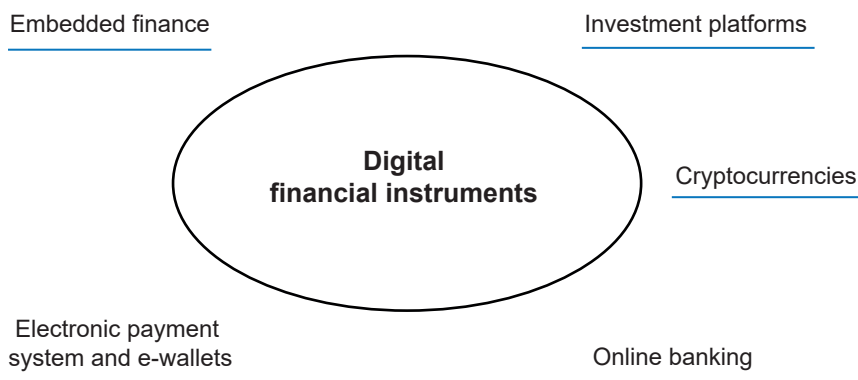
3. Online banking is a way of managing finances via the Internet. Online banking allows to check your balance, pay bills, and transfer money anytime, anywhere.

4. Electronic payment systems and electronic wallets (e-wallets) are systems that allow to pay online using bank cards, electronic wallets, and other methods.

5. Embedded finance is a new trend in modern financial technologies that integrates payments for loans, insurance, debit cards, and investment instruments with almost any non-financial product.

It is especially important for e-commerce, where profit and consumer loyalty depend on the speed of processing the transaction (Andrew and Stephen, 2023).





**Figure 1.** Structure of digital financial instruments

Source: Haltsova (2021).

Using digital financial instruments will allow businesses to be more efficient. For example, investment platforms will allow attracting new capital, and online banking will speed up payments and activate electronic document flow and reporting, which will lead to faster management decisions. The analysis of the components of digital financial instruments made it possible to highlight embedded finance as a new trend in business development, which will allow the pharmaceutical industry to increase sales through the introduction of e-commerce.

### 3. Research methodology

The methodological basis of the research are the methods of: system-structural analysis and synthesis (established the set of factors and the level of influence on digital financial instruments; determining the composition and structure of the digital economy, e-commerce, digital finance; historical and monographic (identifying the stages of development, sectoral and territorial spread of implementation of digital financial instruments); statistical and economic (to establish and analyze quantitative indicators of the status, problems, trends and prospects of the development of digital financial instruments; the effectiveness of their use in the activities of enterprises of the pharmaceutical industry).

In order to study the formation of digital financial instruments and their use in the activities of enterprises of the pharmaceutical industry of Ukraine, the state and development trends of the production of basic pharmaceutical products and pharmaceutical medications, wholesale and retail trade of pharmaceuticals is monitored (The State Statistics Service: Ukraine, 2023) (Figures 2, 3, 4).

The COVID-19 pandemic and war have made it clear that an independent and sustainable healthcare industry is imperative and urgent.



Sustainable and crisis-resistant local production of medicines is a must for the country, because the health and well-being of the people depend on it, in other words, it is a component of national security.

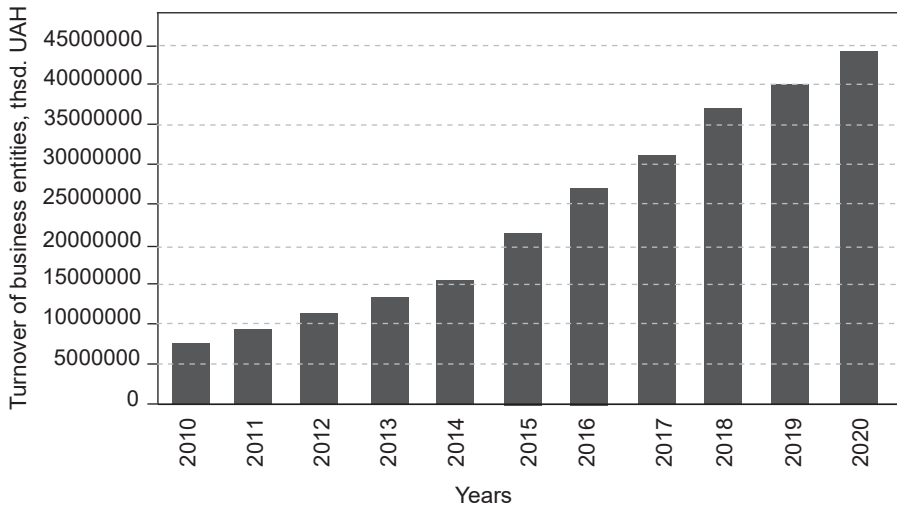
The post-war recovery of the country and the sustainable development of the pharmaceutical industry are possible only under two conditions. The first is the terms of Ukraine's victory in the war. And the second is investment in innovation and talent (Obrizan, 2022; Darnitsa, 2021).

Despite the war, there is considerable interest from potential investors looking for opportunities for cooperation.

The Ukrainian pharmaceutical industry was one of the first to adapt to the negative effects of the pandemic and the war. This is due to the high penetration of innovation in all processes. The pharmaceutical sector has the highest share of innovatively active industries among all branches of the manufacturing industry. 48% of pharmaceutical manufacturers are focused on innovation in the field of R&D, technologies and equipment, obtaining and applying new knowledge (The State Statistics Service: Ukraine, 2023). Pharmaceutical companies allocated 1.5 billion UAH for this purpose.

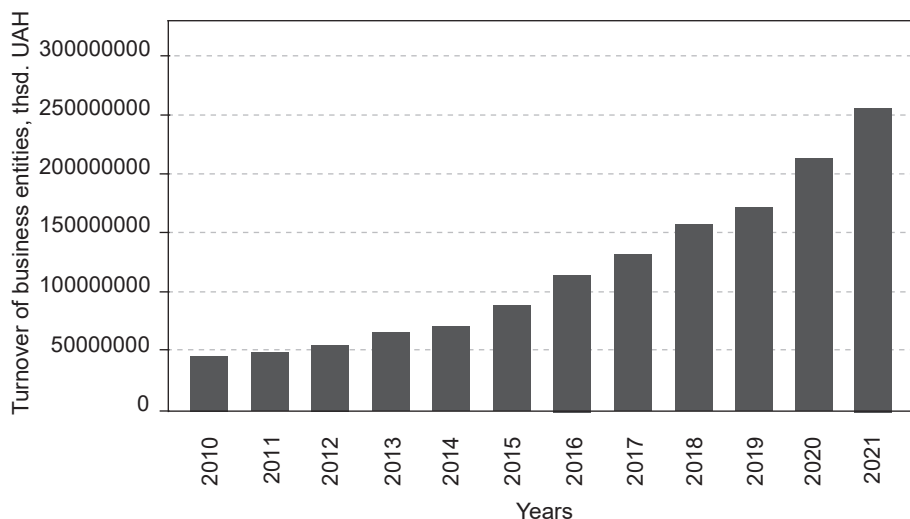
Thanks to a strong local pharmaceutical industry, the shortage of drugs has been avoided in recent years. The high level of automation and digitalization of processes allowed Ukrainian pharmaceutical manufacturers to adapt quickly to the needs of the market and ensure the production of necessary drugs.

Pharmaceutical production is one of the leaders in productivity. According to the indicator of GDP per employee – 1 million 356 thousand UAH, pharmaceut-



**Figure 2.** Turnover of business entities by type of economic activity in 2010–2020 (production of basic pharmaceutical products and pharmaceutical preparations) in Ukraine

Source: own calculations based on the State Statistics Service: Ukraine (2023).



**Figure 3.** Turnover of business entities by type of economic activity in 2010–2021 (wholesale in pharmaceutical goods) in Ukraine

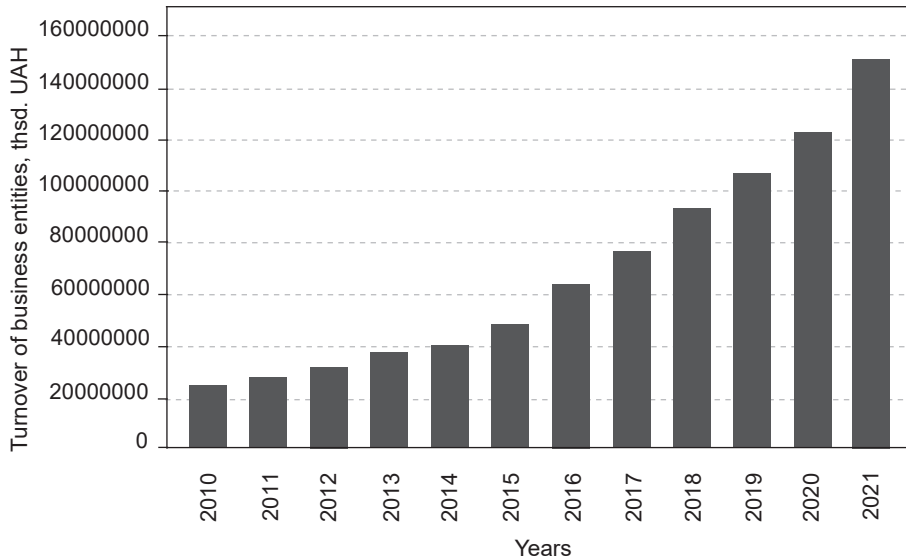
Source: own calculations based on the State Statistics Service: Ukraine (2023).

icals surpassed all branches of the manufacturing industry (The State Statistics Service: Ukraine, 2023). A high level of productivity in the pharmaceutical industry creates resources for investment in development and attracting the best highly paid personnel. According to the State Statistics Service of Ukraine, wages in this sector are twice the level of wages in the manufacturing industry.

At the beginning of 2021, the volume of the medical market was 4 billion USD, and the consumption of medicines increased to 96 USD per person per year. This is less than in European countries, but the growth rate is significant against the background of the positive dynamics of the last 5 years.

The dominant role still belongs to the pharmacy segment – 85% of the market is financed directly by consumers and only 15% by the state. A positive trend can be observed: the pharmacy market grows by an average of 12.6% every year. Under the influence of the COVID-19 pandemic in 2020, this pace slowed down to 7.9%, but the pharmaceutical sphere feels more confident against the background of other sectors of the economy (Apteka.ua, 2023).

The hospital market has increased over the past 5 years. It has grown by an average of 10.9% every year and last year reached the mark of 0.6 billion USD. The increase in the volume of sales is connected with the growth of state purchases of medicines and the centralization of these purchases thanks to the state enterprise “Medical Purchases of Ukraine”, which acts on behalf of the Ministry of Health of Ukraine.



**Figure 4.** Turnover of business entities by type of economic activity in 2010–2021 (retail of pharmaceutical goods)

Source: own calculations based on the State Statistics Service: Ukraine (2023).

Ukrainian manufacturers are gradually increasing their presence in the retail segment. The share of medicines produced in Ukraine in monetary terms has increased from 28% in 2010 to 37% in 2020. At the same time, the share of medicines sales in physical terms did not significantly decrease – to 69%, which indicates a higher rate of price growth for medicines of foreign production.

In the structure of foreign trade in medicinal products, import prevails, which reflects the general situation in the economy. Since 2015, it has increased by 79% to almost 2 billion USD, while Ukraine imported medicine mainly from European countries and India. Exports are growing at similar rates: over the past 6 years, they have increased by 68% to 235 million USD (Darnitsa, 2021). The countries of the Middle East, North Africa, and the EU remain the key regions of presence. Further geographical expansion of the Ukrainian presence of pharmaceutical manufacturers is assessed by analysts as promising, provided the integration of the legislation of Ukraine and the EU continues, as well as the elimination of barriers in the field of regulation, which significantly slow down the activities of companies and the release of new products.

Positive developments have taken place in the direction of harmonization of regulations regulating the production and circulation of medicinal products in Ukraine and the EU. The process continues in the following directions:

- digitalization of the registration of medicines and acceleration of the registration process, which will reduce the cost of bringing medicines to the market and speed up consumer access to new medicines;
- providing mutual recognition of production certification (GMP) to expand opportunities for Ukrainian companies to enter the EU market and remove barriers to the development of trade in medicines;
- acceleration of the process of coordinating clinical research protocols, which will increase the competitiveness of national pharmaceutical manufacturers.

## 4. Research results

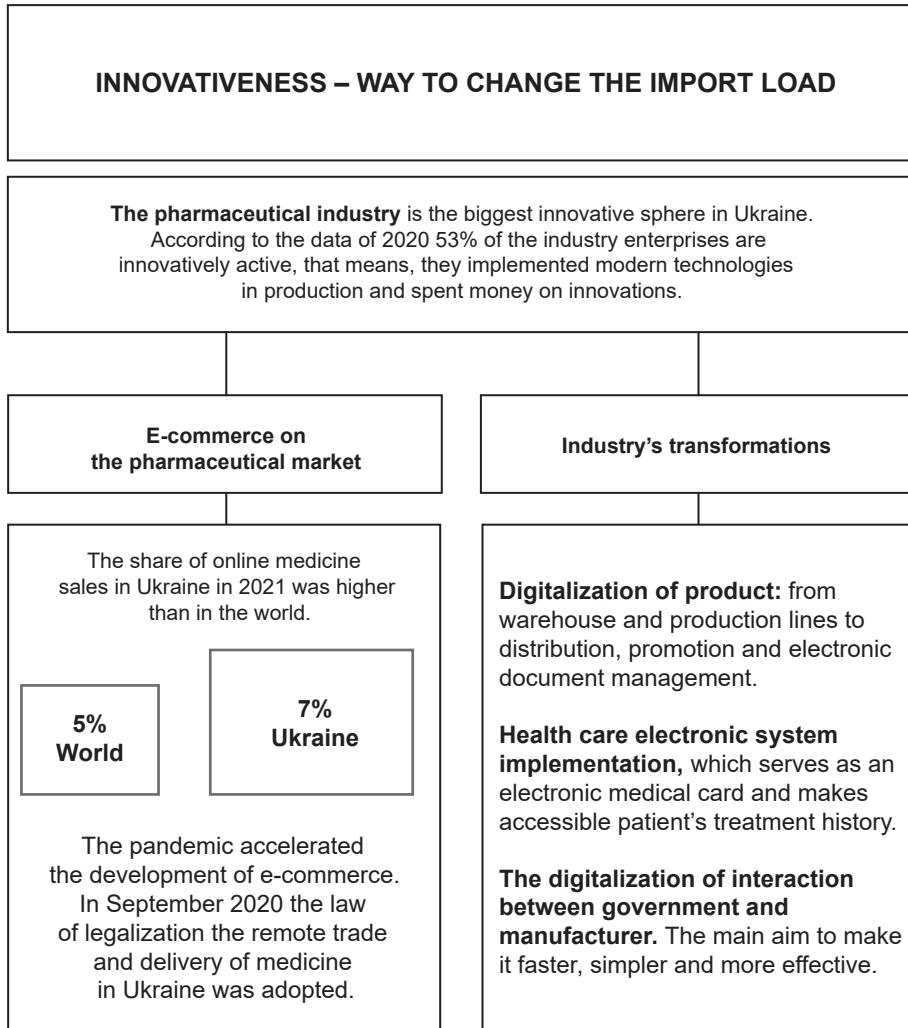
The study identifies positive transformations in the field of healthcare system digitalization and medicine production, as well as the development of the market regulation system, which stimulates its development. In particular, it is possible to note the importance of the transition to electronic prescriptions, the development of Internet trade in medicines, the digitalization of medicine production, and the introduction of electronic document management by market participants.

Thus, the pharmaceutical industry of Ukraine is one of the most innovative and continues to be actively transformed. Innovations are introduced in production, document management, and the sale of products. According to 2020 data, 53% of enterprises are innovatively active. For example, the Ukrainian pharmaceutical company “Darnytsia” has been operating a single fully robotic warehouse since 2007. The company is also actively implementing modern digitalization systems: saving drug files in the “cloud” on the OtiPharm Data Pro platform, the SMART HCM personnel management system using artificial intelligence, a modern reporting visualization system, and a new electronic document management system.

This means that the innovative capacity of the pharmaceutical industry becomes a prerequisite for the introduction of digital financial instruments based on the transformation of the industry in the directions of digitalization of production, electronic commerce, introduction of an electronic healthcare system, digitalization of interaction between manufacturers and the government (Figure 5).

According to forecasts, the share of e-commerce in the Ukrainian pharmaceutical market will grow at a higher rate than in the world and will reach 15% in 2026 (Obrizan, 2022; Darnitsa, 2021).

In terms of promoting pharmaceutical products, the main task for market participants will be to find an effective balance between offline and online communication. Pharmaceutical companies increase their investments in TV advertising every year. However, digital channels are increasingly competing with TV advertising. The activity of pharmaceutical brands in Internet promotion is actively growing from year to year, especially in the last two years. Under the influence of lockdowns, the weight of digital has also increased in the segment of drug promotion.



**Figure 5.** Prerequisites for the introduction of digital financial tools based on pharmaceutical industry innovation

Source: own research.

These measures should be aimed at attracting additional consumers of services and products through the introduction of online payments and digital financial instruments.

Since the introduction (December 2021) of the business licensing activities in electronic retail trade, the State Medical Service has issued 24 licenses, based on which 619 pharmacies carry out this type of activity. This is approximately 2.5% of the total number of pharmacies in Ukraine (Apteka.ua, 2023). This is still a small

percentage, but there is a trend of development. E-commerce in the pharmaceutical field requires new innovative digital approaches in the process of activity.

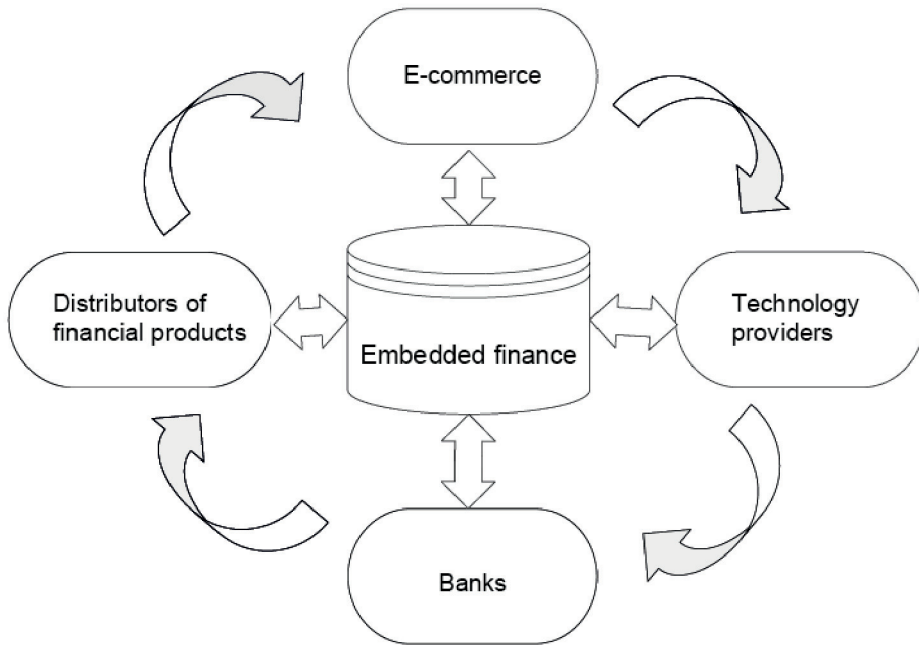
Today, business does not need to interact with a regular bank. By logging into their e-commerce or accounting platform, they can open a deposit account, order a debit card, and meet most of their financial requirements. Banks are not usually the operators of these platforms. They are mostly software development companies that cooperate with banks and technology providers to integrate financial products into a unified, convenient, and easy-to-use client experience. This new form of partnership between banks, e-commerce, technology providers, and distributors of financial products through non-financial platforms is at the heart of what has been proclaimed the embedded finance revolution. Situated at the intersection of trade, banking, and business services, payments became one of the first opportunities for using embedded finance (Figure 6).

Embedded finance reached 20 billion USD in profits in the United States in 2021, according to McKinsey's market valuation model. The market is expected to double in the next three to five years (McKinsey & Company, 2022).

Embedded finance is a financial technology included in the functionality of any non-financial digital service. That is, the financial service is only a part of a third-party service (marketplaces, insurance companies websites, pharmacies, accounting services, etc.) and it does not have the status of an independent product. Usually, embedded finance is a credit service or payment method embedded in a non-banking service: for example, BNPL (buy now, pay later) on the marketplace. The goal of embedded finance is a seamless and convenient experience of the buyer's interaction with the service when paying for goods or services. The embedded finance module is integrated into the context of the site or page: the payment takes place in the same window, and not on third-party resources, the offer of a loan is a completely logical addition to the page of an insurance company, online store or marketplace. At the same time, banks and fintech companies are still recognized as service providers. The latter plays a major role in the development of the embedded finance industry thanks to their own flexibility and ability to adapt to partners. However, banks try to keep up with suppliers and provide financial White Label solutions to large partners (social networks, marketplaces, online stores). By the way, a similar activity of banks (related to the B2B market) was named BaaS (Bank as a Service). Banks, in this case, are recognized as a developer for a large third-party platform. On the basis of the implementation of embedded finance in non-bank services from the side of both developers, the API plays a major role – it is a package of information for the integration of one service into another. It contains the necessary data libraries, instructions, implementation methods, etc.

According to data from Bain & Company, the turnover of funds through built-in finance modules will reach 7 trillion USD by 2026 (Bain & Company, 2022).

Research shows that the next generation of embedded finance will be more powerful, due to the integration of financial products into digital interfaces that



**Figure 6.** Structural relationships of further development of embedded finance

Source: own research.

users interact with every day. The possibilities are diverse: among other things, customer loyalty applications, digital wallets, accounting software and shopping platforms. For customers and enterprises using these interfaces, purchasing financial services becomes a natural extension of non-financial experiences such as online shopping, scheduling employee shifts, or inventory management. This is a more deeply rooted form of embedded financing. This is what has grown so significantly in the US in recent years.

The development of embedded finance became possible thanks to fundamental changes in commerce, the behaviour of sellers and consumers, as well as in technology. Digitalization of trade and business management has significantly expanded the possibilities of introducing finance into non-financial client experience. As much as 33% of global card payments – 50% in the United States – is currently done on the Internet, while most small and medium-sized companies in the United States rely on software solutions to manage their business (McKinsey & Company, 2022). In addition, the development of digital financial instruments expanded the range of consumers and businesses open to receiving all their financial services through digital platforms. Finally, open banking innovations supported in the European Union and the United States have helped reveal hidden demand, giving third-party fintech players access to consumers' banking data and even conducting transactions on their behalf.

Embedded finance is most likely to appear in any environment in which a critical mass of end clients (consumers or businesses) interacts in digital format frequently (often daily) with a digital platform operator, which we call a “distributor” of embedded finance. For a non-bank company acting as a distributor, embedded financing offers a way to improve quality customer service and creates a new income source without the overhead costs connected with bank management. The types of businesses that have good opportunities to offer embedded financing include retailers, also pharmaceutical sphere, software companies, online marketplaces, platforms, telecommunications companies, and original equipment manufacturers (OEMs). All of these categories have seen a high level of activity and innovation in embedded finance recently.

The research showed that there is already a demand for a number of deposit, payment, emission and credit products among the distributors of embedded financial instruments and their customers. In addition to these traditional financial products, new usage options are emerging. For example, distributors of embedded financial services offer employees prepaid cards as part of programs to access earned wages; giving sellers the opportunity to use their deposit accounts for payments with instant payments. Some of them provide just-in-time top-up debit cards for gig-economy workers to use when making purchases for platform members. Therefore, the portfolio of embedded finance products will expand as the processes of customer adaptation and product service gradually digitalize, and real-time risk analytics and services become more complex (Figure 7).

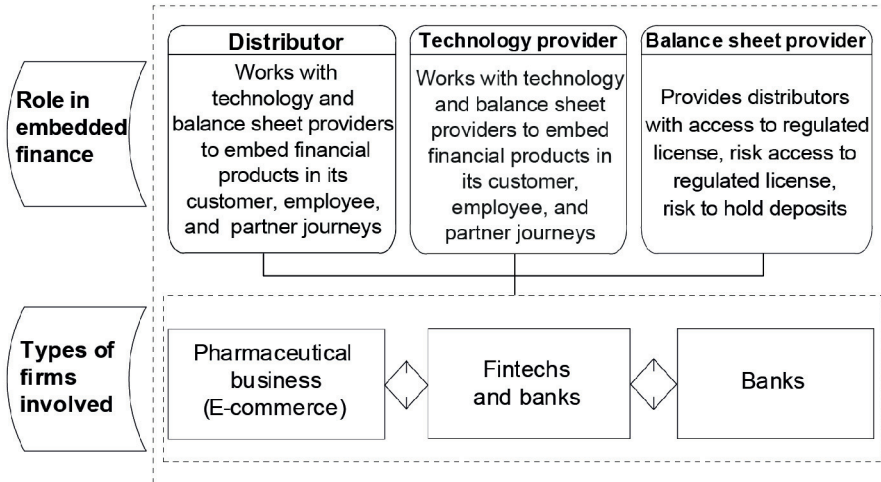
However, risk is likely to remain a restraining factor for growth, as products that require individual assessment, personal contact or regulatory waiting periods, such as commercial real estate financing, are less susceptible to end-to-end digitalization.

Technology providers (fintechs) offer a platform through which distributors can access, configure and offer embedded financial products. Some, including Marqeta, provide point solutions for certain categories of financial products, such as card issuance. Others, including Unit, Bond and Alviere, operate platforms that offer distributors several financial products, such as deposits, money transfers and loans.

Although leaders have already emerged, there is still plenty of room for new entrants in the embedded finance market. On the basis of the conducted research, we predict that the embedded finance market will grow over the next three to five years. The long-term winners are likely to be those that create the technologies, experiences, and relationships necessary for future leadership. Financial services firms and fintech companies that want to claim their rights to the business of embedded finance would do well to commit to four initiatives: choosing a strategy, creating a developer experience, creating opportunities to support distributors, and developing a support service and risk management.

While embedded finance can provide many benefits, there are also disadvantages to this model that pharmaceutical companies need to be aware of:





**Figure 7.** Development of digital financial instruments and their use in the activities of entities of the pharmaceutical industry of Ukraine

Source: own research.

1. Dependency on third-party providers. If a company uses embedded finance, it becomes dependent on third-party financial providers. In the event of problems with the provider, the reliability and performance of the product may be impaired.

2. Data security. Embedded finance may raise concerns about the security of user data as information about financial transactions is transferred between different platforms. This may create additional vulnerabilities and risks to privacy and data security.

3. Complexity of implementation. Implementing embedded financial solutions can be a complex process, especially for small companies or start-ups.

All in all, embedded finance can be a powerful tool to improve the user experience and extend the functionality of products. However, there are also certain risks and complexities that companies must consider when deciding whether to implement such solutions.

## 5. Conclusions

The creation and use of digital financial instruments have led to truly revolutionary changes in the financing of economic activity and its investment support, the implementation of settlement, credit, insurance, and other operations. Yes, it is not just about the speed, but the immediacy of their implementation, therefore, the various agreements in the field of pharmaceutical business. It is also about significant cost savings due to automation, online processes of working with financial

instruments, which eliminate the necessity to hire a large number of employees, operate premises, and their maintenance.

This conclusion is confirmed by effective digital activity as a strategic direction for the development of the pharmaceutical business in Ukraine, which has transferred a significant part of its financial operations to the online system. At the same time, it is possible to use electronic signatures, electronic registration, and receive, store and use all documents in electronic form without visiting pharmacies and hospitals. This saves time and money for both customers and entrepreneurs, eliminates unnecessary transactions, and makes organizational and administration work extremely convenient.

On the basis of the conducted considerations the benefits of embedded finance include increased customer engagement, enhanced user experience, and additional revenue streams for non-financial businesses. It allows users to access financial services seamlessly within the platforms they already use, eliminating the need to switch between different applications or websites.

However, embedded finance raises concerns related to data privacy, security, and regulatory compliance. Businesses must ensure appropriate safeguards to protect sensitive financial information and comply with relevant financial regulations.

Overall, embedded finance is a growing trend that is reshaping the financial industry by integrating financial services directly into the everyday activities of consumers.

Thus, in general, the indispensable users of digital financial instruments are supranational financial institutions and states; insurance, banking and financial institutions; pension, investment and hedge funds; enterprises, corporations, industrial and financial groups; individuals. This testifies to the broad possibilities of their application, including in the pharmaceutical field with the aim of increasing business profitability by saving time, premises and other means of providing and carrying out financial activities; providing convenience and economic benefits to consumers and partners; optimizing of business processes and managing activities in general; promoting innovation, investment and integration processes.

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# The concept of a sustainable business model: Opportunities and challenges

**JEL classification:** L200

**Keywords:** business model, sustainability, sustainable business model

## Abstract

The concept of sustainable development is considered one of the most important and urgent challenges facing humanity today. Therefore, solutions that promote sustainable business are of particular importance. The purpose of this article was to explore the concept of a business model as a potentially promising way of shaping the contribution of businesses to sustainable development. A systematic literature review method was used to identify, analyze and critically evaluate the first theoretical proposals for the concept of a sustainable business model. Fundamental differences between the proposed conceptualizations were identified, stemming from different understandings of the business model concept on the one hand, and from its embedding in different, partly contradictory approaches, to corporate contributions to sustainable development, on the other. The article adapts the holistic approach of corporate sustainability and the understanding of the business model as a representation of the essence of business including the proposition, creation, delivery and capture of value. As a result, key elements of the emerging new ontology of the sustainable business model have been identified and defined. The proposed concept of a sustainable business model primarily means adopting a different logic of business, and the basis for defining the various

elements of the business model is the reconstruction of the concept of value. The sustainability of a business model is thus referred to the extent to which this model maximizes benefits while reducing economic, social, and environmental damage, and creates value not only for the company and its customers but also for various stakeholder groups. The main part of the article is a systematic identification of the opportunities and challenges associated with the new proposal. These are discussed according to the key elements of the sustainable business model, which are: the value proposition, value creation and value capture.

## 1. Introduction

A business model (BM) is considered as a holistic conceptual tool expressing the business logic and representing the essence of business activities that propose, create, deliver and capture value (Zott and Amit, 2010; Osterwalder and Pigneur 2013). The concept of the sustainable business model (SBM) is currently being developed by researchers and practitioners (Bocken et al., 2014; Evans et al., 2017; Ferlito and Faraci, 2022). However, the proposals of SBM developed to date are embedded in different, partly conflicting, approaches to business sustainability. What is more, the discussion on the validity of the BM concept for transforming the organization into a more sustainable one, on its strengths and limitations in this respect, is very limited.

This paper explores the concept of the business model as a potentially promising framework for the contribution of business to sustainable development. The study was carried out through an extensive literature review. The conceptualizations of the sustainable business model (SBM) are discussed in the context of different business sustainability (BS) approaches, and the key elements of the emerging new ontology of the SBM are identified and defined. Finally, the opportunities and challenges of the new proposal are discussed.

## 2. Theoretical framework of the research

### 2.1. Business sustainability

Business sustainability (BS) is a complex, multifaceted phenomenon, integrating several often contradictory and conflicting aspects. There are different approaches to BS in the literature and management practice. Some researchers recognize the creation of long-term shareholder value as the essence of BS, where social and environmental concerns are important in the context of the opportunities and risks, benefits and costs, that are crucial for building this value. BS refers here to the survival and development of the organization as a system (Ihlen, 2015). This is an instrumental approach. A radically different perspective is presented by those who see the organization as “a mesoscale social artifact in need of consideration

as a possibly potent means of approaching sustainable development” (Parrish, 2007, 848). According to Dyllick and Muff (2016), a truly sustainable organization has a significant positive impact in areas which are critical and relevant to society and the planet. In this context, although the organization has to generate the profit necessary for its functioning and development, the overriding objective of the organization is a commitment to the development of the broader socio-ecological system. This is a holistic approach.

There are also intermediate approaches between the extremes of instrumental and holistic. The prevailing one is a win-win approach, the essence of which is the simultaneous, synergistic, and systematic provision of economic, social, and environmental benefits (Sekerka and Stimel, 2011). The win-win approach focuses on finding cost-effective areas for the organization which are also socially and/or environmentally beneficial (Porter and Kramer, 2011). This approach avoids a deeper reflection on the systematic responsibility of the organization; it is based on the current assumption of acting in its own interest. This brief analysis helps to emphasize that all methods, techniques, and tools developed for the formation of BS have their context, which results from the specific approach. In this paper, BS refers to the participation of the business in sustainable development and a holistic approach is adopted.

## 2.2. Business model

A business model (BM) is a crucial element of a company’s strategy. There is no universal definition of the BM, as it can be analyzed from different perspectives. The first one is the purpose of conducting economic activity, which can be simplified to either maximizing profit (in the continental model) or maximizing value for the shareholders. In this context, BM is defined as a method or description of how a company generates profits (Zott and Amit, 2010). BM is also defined as a description of a company’s operations, structure, and value creation (Slávik and Zagoršek, 2016). Additionally, BM is defined in the context of its connections to strategy or strategic management (Smith et al., 2010). The lack of a universal definition of BM means that any discussion should be preceded by an explanation of how BM is defined (Osterwalder and Pigneur, 2013, 19). The starting point for the theoretical discussion in this article is the definition proposed by Osterwalder and Pigneur (2013, 19), which states that BM is “a strategy sketch to be implemented within the structures, processes, and systems of an organization”. Finally, the definition of BM by Zott et al. (2011, 216), as a system of interdependent activities that extend beyond the firm or mechanism of actions that enable value creation, is adopted. The most important element of any BM is the value proposition, which is a set of benefits offered by the company to its customers (Osterwalder and Pigneur, 2013). Based on the value proposition, customers choose between products and of-

fers from companies. BM focused on financial results makes increasing value its key goal, taking into account all stakeholders and creating the best possible value proposition for customers. The four groups that have the greatest importance and impact on shaping BM are owners or shareholders, customers, competition, and the legal environment.

Attempts to adapt BM to the current market conditions and its continuous change have become the beginning of new directions of development. Currently, the literature focuses on the following concepts in the field of BM: business model dynamics, business model innovation, and sustainable business model.

### 3. Research methodology

The concept of a sustainable business model (less commonly “business model for sustainability”, “sustainability-oriented business model” or “sustainability business models”) is currently being developed (Bocken et al., 2014; Evans et al., 2017; Ferlito and Faraci, 2022; Neesham et al., 2023).

To define and characterize the concept of SBM, an analysis of articles, books and conference proceedings retrieved from Scopus and WoS was conducted. The words “business AND model” and “sustainab\*” were searched for in the titles of papers from 2004 to 2023, limited to business and management fields, in English (accessed March 6, 2023), resulting in 179 papers from WoS and 458 from Scopus. A detailed review of the abstracts aimed to isolate papers dedicated to defining the concept and its basic elements. A total of 65 scientific items were obtained.

## 4. Results of the research

### 4.1. Sustainable business model

The notion of sustainability in BM research is widely adopted in the way that abstracts from the contribution of business to sustainable development, only the long-term success of the business is considered. Secondly, the conceptual studies do not lead to one single, unambiguous definition of SBM. Thirdly, the papers to date are mainly reviews, with a relatively small, but from 2019 dynamically increasing, proportion of articles presenting empirical research results. Cross-sectional research results are rarely reported, and papers referring to single case studies, mainly in a European context, predominate. The empirical papers are very diverse, and often difficult to compare, as the proposed solutions cover a variety of industries (both goods and services, high-tech and mature, mainly agriculture, food, energy, water, fashion, automotive, banking and logistics), both SMEs and large organizations, start-ups and mature organizations, and are developed from the perspective of a single organization, a cooperative, a network or a supply chain. The lack of



consistency in the empirical studies is largely due to the lack of a clear theoretical basis as to the nature of the SBM concept. An in-depth analysis of the literature on the subject resulted in a selection of the most significant definitions (see Table 1).

**Table 1.** Selected sustainable business model definitions

Source	Definition of SBM
N. Abdelkafi, K. Täuscher (2016, 75)	A business model for sustainability “incorporate sustainability as an integral part of the company’s value proposition and value creation logic. As such, provide value to the customer and to the natural environment and/or society.”
N.M.P. Bocken, S.W. Short, P. Rana, S. Evans (2014, 42)	SBM incorporates “a triple bottom line approach and considers a wide range of stakeholder interests, including environment and society.”
S. Evans, D. Vladimirova, M. Holgado, K. van Fossen, M. Yang, E.A. Silva, C.Y. Barlow (2017, 605)	SBM is described with five propositions: “1. Sustainable value incorporates economic, social and environmental benefits conceptualized as value forms. 2. SBMs require a system of sustainable value flows among multiple stakeholders including the natural environment and society as primary stakeholders. 3. SBMs require a value network with a new purpose, design and governance. 4. SBMs require a systemic consideration of stakeholder interests and responsibilities for mutual value creation. 5. Internalizing externalities through product-service systems enables innovation towards sustainable business models.”
M. Geissdoerfer, D. Vladimirova, S. Evans (2018, 403–404)	SBMs are “business models that incorporate proactive multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders, and hold a long-term perspective.”
S. Schaltegger, F. Lüdeke-Freund, E.G. Hansen (2016, 268)	A business model for sustainability “helps describing, analyzing, managing, and communicating (i) a company’s sustainable value proposition to its customers, and all other stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries.”
W. Stubbs, C. Cocklin (2008, 103)	A sustainability business model is “a model where sustainability concepts shape the driving force of the firm and its decision making [so that] the dominant neoclassical model of the firm is transformed, rather than supplemented, by social and environmental priorities.”
A. Upward, P. James (2016, 106)	A strongly sustainable business model is “a systemic model of necessary and sufficient concepts that both describe and guide the business as a social system within its containing systems of economy, society, and environment.”

Source: own research.

There is a lack of common understanding of the SBM concept. First of all, as pointed out, there are significant differences in the conceptualization of BM and its key elements (Breuer et al., 2018). In this paper, BM is considered as a holistic conceptual tool expressing the *business logic* and representing the essence of business activities that *propose, create, deliver and capture value* (Zott and Amit,

2010; Osterwalder and Pigneur 2013). Therefore, these highlighted aspects are considered crucial for the conceptualization of SBM in this paper. Secondly, the proposed definitions of SBM developed to date are embedded in different, partly conflicting approaches to business sustainability. Some of them are manifestations of a win-win approach (e.g. Bocken et al., 2014; Boons and Lüdeke-Freund, 2013), while others represent a holistic approach (e.g. Abdelkafi, Täuscher, 2016; Evans et al., 2017; Stubbs and Cocklin, 2008; Upward and Jones, 2016). Only a holistic approach explicitly links the *sustainability issue* in the SBM concept to the business contribution to *sustainable development*. Therefore, the holistic approach should be the basis for conceptualizing the key elements of SBM.

In such a case, SBM means adopting a different *logic of an organization's existence*: “the purpose-driven logic” (Sternad et al., 2016), instead of “the money-earning logic” (Osterwalder and Pigneur, 2013). Thus, what is taking place is not only a redefinition of the organizational results and practices, but more importantly a redefinition of organizational commitments to the broader system. Business is perceived as a social system situated within and interconnected with the economic, social, and natural environment systems (Upward and Jones, 2016).

The *notion of value* is central to the concept of SBM. In SBMs, value refers to “the degree to which a business model maximizes benefits while reducing damages in economic, social, and environmental terms” (Méndez-León et al., 2022, 26), and is created “not just for the firm and its customers but for multiple categories of stakeholders” (Neesham et al., 2023, 2). SBM describes what value is to be created or destroyed for which stakeholders, enabling or hindering their ability to meet their needs (Upward and Jones, 2016).

SBM describes the processes of *value co-creation* with different stakeholders and *value destruction* through interactions with the containing systems. It characterizes the tangible and intangible resources and ecosystem services that the organization uses to co-create value, however, the limitations on the ultimate biophysical stocks (sources and sinks) are incorporated (Upward and Jones, 2016). The organization is considered a part of a network of interdependencies among stakeholders, and productive, long-term, and positive relationships with stakeholders are seen as a process of creating shared value (Sulkowski et al., 2018). SBMs require a systemic consideration of stakeholder interests and responsibilities for shared value creation and a value network with a new purpose, design and governance (Evans et al., 2017).

*Value capture* in SBMs requires the definition and measurement of tri-profit using a multidimensional set of units of flourishing (economic, social, environmental), as stakeholders measure success in different units, not just monetary (considering benefits and harms) (Upward and Jones, 2016).

Ultimately, two definitions of SBM can be adopted: a concise one by Upward and Jones (2016) and a more comprehensive one by Evans et al. (2017) (see Table 1).

## 4.2. Opportunities and challenges of a sustainable business model

In this section of the paper, we will focus on the challenges and opportunities of SBM development. A detailed review of the literature in this area is summarized in Table 2. Challenges are, in a sense, limitations and critical barriers to the success of a given BM. Opportunities, on the other hand, are the existing potential for further development, scaling up, utilization and dissemination. (Todeschini et al., 2017). In SBM, the (sustainable) value proposition is key. A company defines it through the decisions it makes about the products and services offered (Schaltegger et al., 2016; Boons et al., 2013). Since the value proposition in SBM should provide not only economic benefits but also social and environmental benefits to an extended group of stakeholders, defining it is all the more challenging for a company on how to balance the aforementioned benefits (Evans et al., 2017). On the other hand, defining the value proposition with these three benefits in mind provides an opportunity to expand the potential stakeholder base (Geissdoerfer et al., 2018).

A key challenge of the *value proposition* in a SBM is the company's ability to create economic, social, and environmental benefits simultaneously (Hart and Milstone, 2003; Evans et al., 2017). This is the so-called triple bottom line approach, which aims to create value by integrating these three aspects, rather than prioritizing profit solely from the company's point of view (Schaltegger et al., 2016; Boons and Lüdeke-Freund, 2013). However, integrating economic, social, and environmental aspects is quite challenging because they can contradict each other and in companies the money-earning logic often wins over the sustainability logic (van Bommel, 2018).

If the economic, social, and environmental aspects can be integrated, the company has a chance to build a value proposition based on strategies that generate sustainable value (Hart and Milstein, 2003), i.e. strategies related to clean technologies, pollution prevention, product management and, finally, a vision of sustainable development. Strategies based not only on economic but also on social and environmental aspects aim to reduce the environmental footprint, reduce poverty and eliminate inequality, distribute and consume resources equitably, reduce waste and pollution, and build civil society (Hart and Milstein, 2003). Creating sustainable value using the above strategies opens up new opportunities for product, technology, market, and process innovation (Berns et al., 2009), providing the chance for growth and access to new markets and customers (Hart and Milstein, 2003). With that said, a significant challenge for SBM, in this case, is the need to raise customer awareness of the sustainable value of the product (customer education) and to meet customer expectations. After all, not all customers are convinced by the beneficial impact of sustainable products on the environment, their increased durability and lifespan, or waste reduction (Todeschini et al. 2017). Excessive

**Table 2.** Challenges and opportunities of the sustainable business model

Challenges		
Value proposition	Value creation	Value capture
<ul style="list-style-type: none"> <li>– Triple bottom line approach (Hart and Milstein, 2003; Schaltegger et al., 2016)</li> <li>– Integrating technology innovation with business model innovation (Girotra and Netessine, 2013; Yang et al., 2017)</li> <li>– Consumer education and expectations (Todeschini et al. 2017)</li> <li>– Conflict between the previously unsustainable BM and the new SBM</li> </ul>	<ul style="list-style-type: none"> <li>– Prevailing mind-set in the company (Johnson et al., 2008; Boons and Lüdeke-Freund, 2013)</li> <li>– Limited resources (Chesbrough, 2010; Zott et al., 2011)</li> <li>– Business modeling methods and tools (Girotra and Netessine, 2013; Yang et al., 2014)</li> <li>– Aligning values along the supply chain (Battistella et al., 2018)</li> </ul>	<ul style="list-style-type: none"> <li>– External relationships (Stubbs and Cocklin, 2008; Boons and Lüdeke-Freund, 2013)</li> </ul>
Opportunities		
Value proposition	Value creation	Value capture
<ul style="list-style-type: none"> <li>– Product, market, and process innovation (Berns et al., 2009)</li> <li>– Stronger relationships with stakeholders (Gao and Bansal, 2013; Berns et al., 2009)</li> </ul>	<ul style="list-style-type: none"> <li>– Strengthened brand positioning and improved corporate image (Berns et al., 2009; Kotler et al., 2012)</li> <li>– Increased employee satisfaction, morale and retention (Berns et al., 2009; Zajac, 2010)</li> <li>– Higher productivity (Berns et al., 2009; Sekerka and Stimel, 2011; Majumdar and Marcus, 2001)</li> </ul>	<ul style="list-style-type: none"> <li>– Higher product pricing (Elfenbein and McManus, 2010)</li> <li>– Reduction of costs and risks (Lo and Sheu, 2007)</li> <li>– Increased attractiveness to investors and financial analysts (Kotler et al., 2012)</li> </ul>

Source: own research.

consumer expectations of the utility and value of sustainable products over existing unsustainable products already on the market can also be an issue (Ansett, 2007).

A major challenge for companies implementing SBM is the integration of technological innovation with business model innovation. SBM needs to be achieved not only through technological, product, or service innovation, but also through innovation of the BM itself (Girotra and Netessine, 2013; Yang et al., 2014). This requires changes in the various components of the BM concerning relationships with stakeholders, including customers and other business partners in the value chain. Business model innovation is increasingly recognized as a critical factor in achieving a high degree of social and environmental sustainability (Lüdeke-Freund, 2010).

Companies that succeed in integrating economic, social, and environmental aspects through business model innovation and sustainability in the creation of

their value proposition are likely to build stronger relationships with stakeholders (Berns et al., 2009), which contributes to the development of intangible resources and capabilities and reduces conflicts with stakeholders (Gao and Bansal, 2013).

However, at the *value creation* stage, limited resources are a major challenge for companies seeking to build SBMs. While large companies have enough potential to bypass this barrier, SMEs are unable to implement sustainability strategies due to limited financial and human resources, low efficiency of organizational structures and not very strong organizational culture, as well as insufficient knowledge and competence in business management and even lack of understanding of the SBM benefits (Battistella et al., 2018). In addition, there is a lack of appropriate incentives, from both governments and the market, and the formal and legal requirements for implementing environmental tools, such as environmental management systems (e.g., ISO 14000 series, EMAS) or social responsibility standards (e.g., ISO 26000, SA 8000), are very complex and costly (Johnson and Schaltegger, 2016).

In terms of organizational culture, the mindset that prevails in a given company is also a constraint in implementing SBM. Business rules, guidelines, behavioural norms and performance metrics dominate the mindset of companies and inhibit the introduction of new BMs (Evans et al., 2017). Existing business modelling methods and tools, e.g. Osterwalder and Pigneur (2013) and Johnson et al. (2008), are also few and rarely sustainability-driven.

Another challenge when creating value in the SBM is the need to align value along the supply chain. To do this, it is essential to build real cooperation among suppliers, as well as to implement mechanisms and ways to share knowledge, resources and skills (Battistella et al., 2018).

Companies that are able to create sustainable value within the SBM framework have the opportunity to build a distinctive, strong brand and improve their corporate image (Berns et al., 2009; Kotler et al., 2012). At the same time, thanks to their ability to collaborate in the value chain, they have the opportunity to build sustainable relationships with customers, employees, suppliers, communities, and other stakeholders, for whom interaction is a key value (Gao and Bansal, 2013). An additional opportunity is increased productivity as a result of green technologies (Berns et al., 2009; Sekerka and Stimel, 2011; Majumdar and Marcus, 2001), as well as increased employee satisfaction, morale and retention (Berns et al., 2009; Zając, 2010).

Engaging in extensive interactions with external stakeholders and the business environment requires additional efforts and is a major challenge at the *value capture* stage (Evans et al., 2017). Technological, organizational, and social factors of SBM innovation, such as the use of renewable resources, flexible work arrangements, and ethical trading, enable companies to capture value from various stakeholders, such as shareholders, employees, customers, suppliers, other business partners, as well as society, the environment, government and the natural en-

vironment (Battistella et al., 2018). This, in turn, offers great opportunities for cost reduction and minimization of economic risks (e.g., independence from specific resources, reduced risk of penalties, reputational risk management) (Lo and Sheu, 2007) on the one hand, and great opportunities for higher product valuation by the market, on the other (Elfenbein and McManus, 2010). Kotler et al. (2012) note that this kind of value capture offers an opportunity for increased attractiveness to investors and financial analysts.

## 5. Conclusions

An in-depth analysis of the literature confirms that the SBM concept is in a developmental phase. There is still no universally accepted SBM definition or consensus on its elements. The key reason for the differences in SBM concepts is that they are embedded in different approaches to business sustainability. In this paper, the holistic approach is adopted as the one that universally addresses the business contribution to sustainable development. The most promising definitions of SBM were identified as those proposed by Evans et al. (2017) and Upward and James (2016), both of which require a shift in business logic from money-earning to purpose-driven. As a result, key elements of SBM have been defined in line with these definitions, including value proposition, value creation and value capture (Evans et al. 2017; Méndez-León et al. 2022; Neesham et al. 2023; Sulkowski et al. 2018; Upward and Jones, 2016). It should be emphasised that classical business modelling methods and tools (e.g. Oserwalder and Pigneur) are not conducive to the development of SBM (Girotra and Netessine, 2013; Yang et al., 2014). This is primarily due to:

- a different understanding of the concept of value (among others, SBM requires the consideration of value co-creation and co-destruction);
- limited inclusion of human and non-human ecosystem actors in the business stakeholder group (resulting in a lack of consideration of their needs);
- setting the boundaries of the BM only within the economic system, while SBM requires viewing business as a social system situated within and interconnected with economic, social, and natural environment systems (business co-creates value with and for the wider system);
- understanding organizational performance primarily through the lens of financial performance, while SBM requires consideration of financial, social, and environmental benefits.

A fundamental shift in the understanding of the BM concept, following its transformation into a SBM, reveals the importance of recognizing the opportunities and challenges of SBMs development. The second part of this paper aims to identify and discuss these opportunities and challenges. It is extremely difficult to determine the significance of individual opportunities and challenges. On the one



hand, they are very diverse and, as a result, difficult to compare. On the other hand, they may have different significance for different types of businesses, depending on their size, maturity, sector, and even ownership type.

Although new SBM concepts and frameworks are being developed in the literature and in practice, there is little empirical validation of their understanding and applicability (limited to individual case studies). A more detailed study of the challenges and opportunities of implementing the SBM concept in companies is required. In particular, the prospect of a comparative analysis of the entire process of value proposition development, value creation and value capture, on the one hand, in companies with a mature BM and, on the other hand, in start-ups that are just searching for a replicable and scalable SBM, seems particularly promising, as the views of researchers in this field are not only different but often contradictory (e.g. Todeschini et al., 2017).

Therefore, this paper is a preparation for an empirical study of managers' understanding of the SBM concept as a whole and its core elements, and the identification of opportunities and challenges for the development of SBM in line with the holistic BS approach.

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# Development of the 3D printing market and its application in medicine

JEL classification: I190, O32, O33

Keywords: 3D printing, 3D printing market, 3D printing application in medicine

## Abstract

According to forecasts and predictions by leading analyst firms, several million 3D printers were expected to be sold annually by 2020, with consumer devices in virtually every home being the driving force.

This article aims to conduct a systematic literature review (SLR) of various applications of 3D printing in medicine. The author based his considerations on Polish and foreign literature, studying scientific articles and electronic sources. The analysis included a review of literature and online sources from 2012–2023. The author used the following professional, academic databases to gather scientific literature: Library of Science, Google Scholar, ScienceDirect, Emerald, Emis Intelligence, Passport, and Statista.

This article defines the concept of 3D printing, presents the development of the 3D printing market, and indicates market trends and applications of 3D printing in medicine.

The analysis made it possible to determine the extent of the phenomenon and to identify the main trends that are observed in the field and environment studied.

## 1. Introduction

3D printing opens up many potential medical applications, such as anatomical models for training purposes, patient organs printed from ultrasound scans, implants or surgical instruments. Polish specialists, surgeons, and cardiologists are already using 3D printing to prepare for surgery.

Hospitals and laboratories have invested in 3D printing technology hardware, software, and services. Nearly 3% of large hospitals as well as medical and research institutions already have on-site printing facilities. They print models of

the heart to help cardiac surgeons prepare for surgery, or joint components based on a natural prototype. In the next three years, one in four surgeons will prepare for surgery using 3D-printed, complete patient models (Piątek, 2018).

From the author's perspective, the analysis of the medical 3D printing market is important for many reasons. 3D printing technology has started a revolution in many fields, including medicine, which can bring many benefits and improve the quality of healthcare. Analyzing the medical 3D printing market is crucial to understanding the potential of this technology and finding new ways to improve patient care, diagnosis, treatment, and quality of life.

The primary purpose of this article is to present issues related to the development of the 3D printing market and its application in medicine.

The research problem is to determine how the development of the 3D printing market can be applied in medicine. To examine the research problem stated above, the following questions were formulated.

1. What are the latest trends and innovations in 3D printing related to medicine?
2. What are the main challenges and limitations of 3D printing in medicine?
3. What are the primary and potential benefits of 3D printing in medicine?
4. What are the prospects for the development of the 3D printing market in medicine in the coming years?
5. What are the potential limitations of 3D printing in medicine?

The research questions provided a starting point for research and analysis that will provide a deeper understanding of the research problem and contribute to the development of knowledge about the growth of the 3D printing market and its application in medicine.

The author based his considerations on Polish and foreign literature, studying scientific articles and electronic sources. The research was focused on 3D printing, while the subject of the study was the development of the 3D printing market and its application in medicine.

## 2. Theoretical framework of the research

3D printing is an additive (also known as incremental or cumulative) method, regardless of the 3D printing technology used objects produced by this method are created by building up the model layer by layer. This makes it possible to achieve effects that are difficult to reproduce using traditional manufacturing methods, such as casting. 3D printing does not require molds, making it possible to produce models of complex shapes relatively quickly and inexpensively. The variety of materials that can be used and the wide availability of the technology allow it to be used in a wide range of fields (Lesiński, 2020).

Thus, the 3D printing process enables the creation of three-dimensional objects based on a model generated in computer-aided design (CAD) software. 3D printing is part of the additive method, in which objects are created by adding elements; 3D printing creates an object layer by layer. Among other things, this is what distinguishes 3D printing from other object manufacturing technologies, such as machining, casting, or forging processes, in which material is removed from a stock component or poured into a mold and shaped using dies, presses, and hammers (Lesiński, 2020).

3D printing was known as rapid prototyping in the 1980s. Dr. Kodama filed for the first patent for the technology in Japan in May 1980, but his application was rejected. Six years later, in 1986, Charles Hull received a patent for his stereolithography (SLA) device and subsequently became one of the founders of 3D Systems, which sold its first SLA system in 1988. The next major milestone came in 1987 when Carl Deckard filed for a patent for the selective laser sintering (SLS) process. The patent was granted in 1989 and the process was licensed to DTM Inc., which was later acquired by 3D Systems. That same year, Scott Crump, co-founder of Stratasys Inc., filed a patent application for fused deposition modeling (FDM). The company received the patent in 1992 and still holds it today, while FDM is one of the most widely used 3D printing technologies (BIS Research, 2022).

In the following years (1990s and 2000s), the 3D printing market became increasingly competitive. Several companies, such as Objet Geometries, Sanders Prototype Inc., and several others, entered the market in the 1990s and 2000s; however, only three of the original companies – 3D Systems, EOS GmbH, and Stratasys Inc. are still operating as independent companies today, while others have been acquired or merged with other companies.

An important year in the development of 3D printing was 2000, when the 3D printing market showed tremendous growth, the first 3D-printed kidney was printed, but it took another 13 years to achieve a successful transplant.

The first high-resolution color 3D printer was introduced by Z Corporation in 2005, and 3D Systems produced the first 3D-printed prosthetic limb in 2008.

A critical stage in the development of 3D printing came in 2009 when the FDM patent went public, leading to a drop in the price of FDM 3D printers and increased innovation in FDM 3D printers. More and more 3D printing materials are being developed every year, and companies are looking to seize the opportunity to gain market share (BIS Research, 2022).

According to Gibson, Rosen, and Stucker (2015), “3D printing, also referred to as rapid prototyping or free-form manufacturing, is a manufacturing technique that creates physical objects by depositing materials layer by layer” (Gibson et al., 2015). Kianian (2019) states that 3D printing, also known as incremental manufacturing, is “the process of creating physical objects by adding successive layers of material based on a digital model or design.”

Nkomo, Sibanda, Gwamuri, Igadwa (2019), “3D printing is a form of additive manufacturing in which objects are created by adding layers of material, often in the form of liquid, powder or filament, under computer control from a digital model or design.” (Gwamuri et al., 2019).

In contrast, Mahamood, Khader, and Ali emphasize that: “Three-dimensional (3D) printing, also known as additive manufacturing, is the process of creating solid objects from a digital file. Creating a 3D printed object is done through an incremental process” (Mahamood et al., 2016).

3D printing uses an incremental manufacturing process in which products are built layer by layer through cross sections (Barry and Zarb, 2012). 3D printing enables low-cost, bottom-up production of objects with complex geometries that are difficult to manufacture using traditional methods (Jun et al., 2015). The advent of 3D printing shortens the design and development cycle of thermoformed products. 3D printing increases productivity and promotes product development (Feixiang et al., 2016).

Thus, 3D printing is the process of producing a three-dimensional component based on the same computer model. Each layer is a thin horizontal cross-section of the printed object. Traditional manufacturing technologies create the part by subtracting material and cutting with a milling machine, but more material is consumed. Each 3D process consists of three stages listed below (Skrzek, 2020):

- Modeling – three-dimensional models can be built using CAD software, downloaded from the Internet, a 3D scanner, or possibly by taking photos and then using computer software for photogrammetry. An incorrectly developed three-dimensional model can be repaired – the easiest will be with a self-created one using a program; correcting a model downloaded from the internet is slightly more complicated.

- Printing – before you start printing, you should check the correctness of the three-dimensional model – if it is made correctly, you need to select parameters, such as temperature and layer height. When setting the parameters, you need to consider the material, method, and geometry of the part. Another option is to use software that will divide the model into layers. Printing can take from a few minutes to a few days, depending on the method, the size of the part, the complexity of the model, and the machine itself. Once the process is complete, unnecessary material is removed, and the workpiece is detached or removed from the table.

- Finishing – the surfaces of the printed parts are porous, so they are still subjected to finishing treatment to smooth them out. The type of finishing depends on the material used. In the most popular method, FDM, acrylonitrile-butadiene-styrene (ABS) polymer can be treated using chemical vapor processes based on acetone or similar solvents. For metal parts, the surface can be improved by grinding, for example. In the finishing process, supports are removed, i.e., elements whose function is to support the main structure to protect it from deformation. There are methods for printing colored parts; finished parts can also be varnished or painted.

### 3. Research methodology

The author used the method of secondary data analysis (desk research) to gather information on 3D printing and its application in various sectors, especially in the medical field. Secondary data analysis refers to examining, interpreting, and extracting information from the data previously collected and shared by other institutions or organizations. Secondary data is already known and compiled for another study or analysis. Secondary data analysis uses existing data to extract new information, identify trends, relationships, and dependencies and answer research questions. In the literature review, the author used the following combinations of keywords and logical operators (“3D printing,” “3D printing market,” and “application of 3D printing in medicine”). For the desk research analysis, the following professional databases were used for data collection: Google Scholar, ScienceDirect, Emerald, Emis Intelligence, Passport, and Statista. The study gathered literature for this article and the research problem stated above. The analysis included a review of literature and online sources from 2012–2023.

### 4. 3D printing market in the light of the data found

No longer a niche technology, 3D printing is becoming increasingly popular in industries such as manufacturing, automotive, consumer goods, medical and healthcare, aerospace, and electronics.

3D printing enables the rapid and accurate creation of prototypes and finished objects of varying complexity and personalization in small batches without the need for large production capacity. Currently, the most popular types of 3D printing include FDM/FFF, which prints from thermoplastics; SLA and DLP, which print from resins selectively cured with laser or projector light; and SLS and DMLS, which form layers from plaster or metal-based powders.

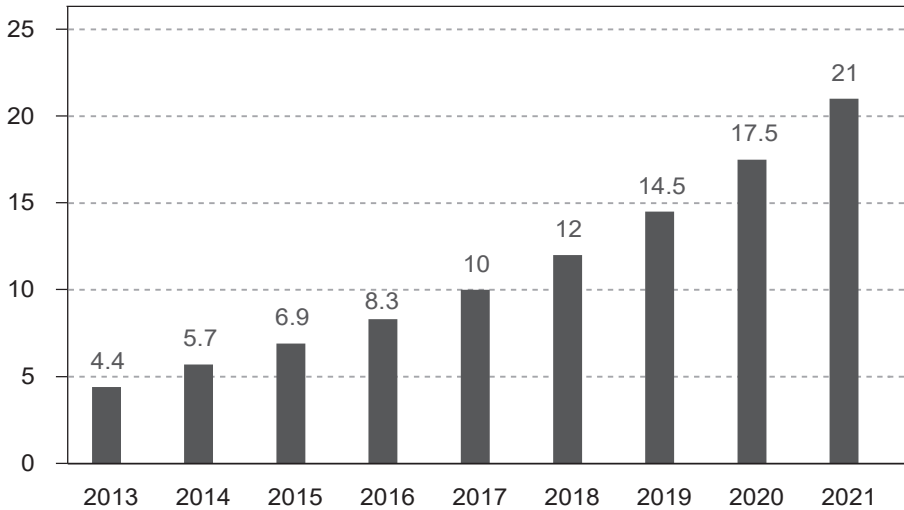
According to the analysis, the global value of the 3D printing market is set to grow at a staggering rate in the coming years. A.T. Kearney estimated that the 3D printing market would grow to USD 17.2 billion in 2020 and USD 26 billion in 2021. According to McKinsey, the market will grow even faster, reaching a value of USD 100–250 billion by 2025 (Ilya Klyha, Corporate Development Analyst).

According to BIS Research, the global 3D printing market was estimated to be worth around USD 12.9 billion in 2020, growing 25% year-on-year since 2014.

In addition, the 3D printing industry recorded growth of 19.5% in 2021, valued at USD 15.4 billion. In 2021, polymer consumption in 3D printing increased by more than 40% from 2020 levels and overtook photopolymers as the most widely used 3D printing material (BIS Research, 2022).

Despite varying estimates of the size of the 3D printing market, growth trends are evident, as shown in Figure 1. There is a noticeable year-on-year increase in

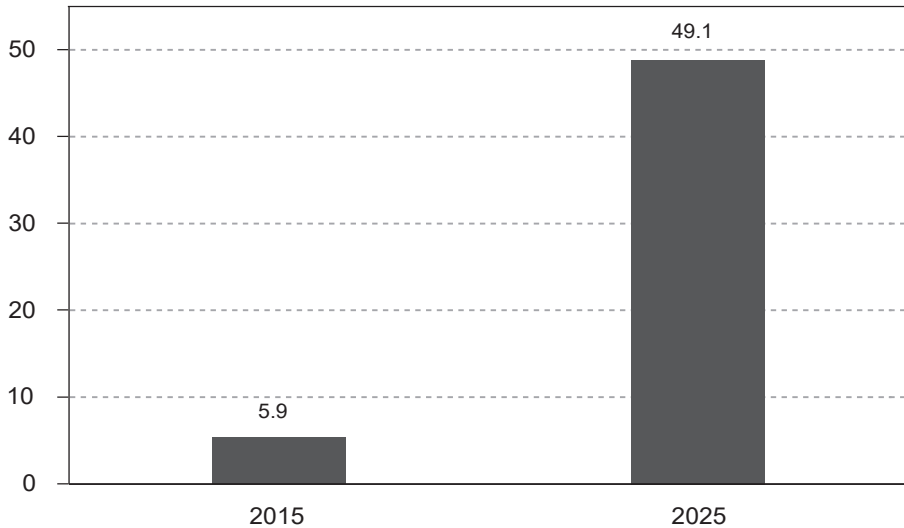
the size of the global 3D printing market between 2013 and 2021, from USD 4.4 billion in 2013 to USD 21 billion in 2021.



**Figure 1.** Global 3D printing market size from 2013 to 2021 (in USD billion)

Source: Statista, 2021.

With the expansion of 3D printing, the size of the global 3D printing materials market is also expected to grow (Figure 2).

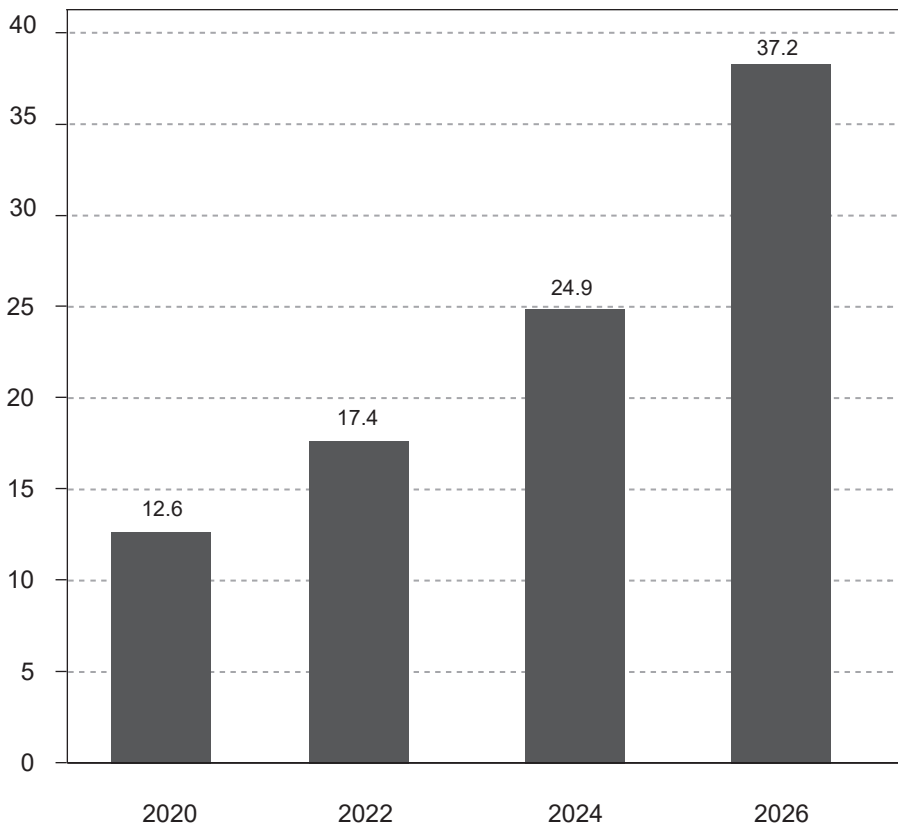


**Figure 2.** Forecast size of the global market for 3D printing, materials, and related services in 2015 and 2025 (USD billion)

Source: Statista, 2022.



Thus, the size of the global market for 3D printing products and services will be characterized by an upward trend over the years 2020–2026 (Figure 3).



**Figure 3.** Global market size for 3D printing products and services from 2020 to 2026 (USD billion)

Source: Statista, 2022.

In 2023, sales of 3D printing products and services in Poland are projected to reach USD 85 million; in 2029, sales in Poland will reach USD 245.4 million (Table 1).

Sales will change by 19.7% in the following year (2023 to 2024). The compound annual growth rate will vary by 28.2% from 2024 to 2029 (Table 2).

The growth in the size of the global 3D printing market, the projected size of the worldwide printing market, and the size of the global 3D printing products and services market over the years will be influenced by the following key trends (BIS Research, 2022).

**Table 1.** 3D printing market sales in Poland

Year	Market sales (USD)	Share of the global market
2018	30,717.6	0.75%
2019	37,377.7	0.76%
2020	45,667.3	0.77%
2021	55,221.2	0.73%
2022	70,860.1	0.71%
2023	84,987.7	0.69%
2024	101,704.1	0.67%
2029	245,358.0	0.59%

Source: Perry/Hope Partners Global Innovation Markets Forecast (2023), p. 70.

**Table 2.** Compound annual growth rate in Poland (year-to-year change)

2018–2019	21.7%
2019–2020	22.2%
2020–2021	20.9%
2021–2022	28.3%
2022–2023	19.9%
2023–2024	19.7%
CAGR <sup>1)</sup> 2024–2029	28.2%

Note: 1) Compound annual growth rate.

Source: Perry/Hope Partners, Global Innovation Markets Forecast (2023), p. 70.

– A growing number of startups in the market. The 3D printing market is characterized by an increasing number of startups worldwide due to the highly fragmented and unorganized nature of the market. The 3D printing market comprises of hardware, software, services, and printing materials.

– The use of 3D printing for functional or end-use parts. 3D printing technology allows users to produce any part and design without compromising the quality of the final object. The number of 3D-printed functional or end-use objects is expected to increase in the next 3–5 years.

– Service providers and online 3D printing. The 3D printing services segment is one of the fastest-growing areas of the 3D printing market, and its growth is affecting the conventional manufacturing industry. Demand for online 3D printing is increasing in developed markets such as North America and Europe. The electrical and consumer goods sectors are among the leaders with the highest online manufacturing demand, accounting for nearly two-thirds of the total market for online 3D printing.

In addition to the above trends, the growth of the 3D printing market will be influenced by:

- reorganization of healthcare systems,
- industry 4.0 and in-house 3D printing,
- small-batch production,
- technology convergence.

To summarize, the 3D printing market has been characterized by a significant rate of growth and diversification in recent years. The global 3D printing market is expanding, driven by technological advances, increased applicability across industries, and demand for custom and on-demand manufacturing.

Several factors listed below are contributing to the growth of the 3D printing market.

- Opportunities for its application in various industries. 3D printing has penetrated many sectors, including aerospace, automotive, healthcare, consumer products, architecture, etc. The ability to create complex geometries, reduce material waste and enable rapid prototyping has made 3D printing an attractive manufacturing solution for many sectors.

- Customization and personalization. 3D printing enables the production of highly personalized products. This aspect has gained importance in the consumer goods industry, healthcare (e.g., patient-specific medical implants), and other sectors where customized solutions are desired.

- Cost and time savings. 3D printing can streamline manufacturing processes by reducing the need for tooling and assembly, resulting in cost and time savings. This aspect is particularly beneficial for industries such as automotive and aerospace, where complex parts and components can be produced in a single operation.

- Advances in materials. The availability of a broader range of printing materials, including metals, polymers, ceramics, and composites, has expanded the potential for 3D printing applications. Ongoing research and development of materials contribute to the growth and adoption of this technology.

It should be noted, however, that the 3D printing market is still in its infancy and there are some challenges, such as scalability to mass production, material limitations, and high initial investment costs. Nevertheless, the market still shows strong growth potential.

## 5. 3D printing applications in medicine

The medical and healthcare industries have seen an increase in the use of 3D printing in recent years, along with a growing number of research and development programs conducted by private and government-funded organizations. The printing of spatial elements using various materials can affect many areas of medicine and related fields, such as the pharmaceutical industry or health-related education. The

following examples show how 3D printing is being used in prevention, rehabilitation, and various therapies.

Hospitals and laboratories have invested in hardware, software, and services related to 3D printing technology. Nearly 3% of large hospitals as well as medical and research institutions already have on-site printing capabilities. They print models of the heart, to help cardiac surgeons prepare for surgery, or joint components, which are based on a natural prototype. In the next three years, one in four surgeons will prepare for surgery using 3D-printed, complete patient models (Piątek, 2018).

Along with the military and industry, medicine is one of the sectors most rapidly adopting new technologies and adapting them to its needs. This is also the case with 3D printing, which is widely used in scientific research to save lives and health.

3D printing is used to print prosthetics and implants. It is also one of the fastest-growing areas of medicine using 3D printing technology. 3D printers are used to create prosthesis components (or entire low-cost prostheses), dental implants, synthetic replacements for damaged parts of the skeletal system (such as skull fragments), or artificial heart valves. Customized prostheses can be made at a fraction of the cost and time of traditional methods. The technology also allows for iterative improvements and design modifications based on patient feedback (Lesiński, 2020).

Another area where 3D printing is being used is in rehabilitation and disability equipment. Like implants and prostheses, customized rehabilitation equipment (such as plastic-printed “armor” instead of traditional plaster casts) can significantly increase the comfort of the injured person and speed up their recovery. Thanks to this technology, it is possible to help people with disabilities with many everyday activities. For example, 3D printers are being used to create exoskeletons that allow patients with paralyzed limbs to walk independently.

3D printing is also being used to educate doctors. It enables the creation of accurate anatomical models based on patient-specific medical imaging data. These models are used for surgical planning, medical education, and patient communication. Surgeons can study and practice complex procedures on these models, improving surgical outcomes. The precise mapping based on accurate computer analysis enables creating a near-perfect preoperative model. Such a model not only helps surgeons in their work (for example, by allowing them to fit an implant on a replica rather than live during surgery), but also supports their communication with the patient and helps explain the details of the planned procedure.

The next application of this technology is the printing of tissues and organs. 3D bioprinting involves embedding living cells, biomaterials, and growth factors to create functional tissue constructs. Biogel (as a base for cell growth), stem cells, and other tissue- or organ-specific cells are used for this purpose. An auricle, urinary bladder, liver, skin, and heart or blood vessels have already been created using this method. The technology has great potential for tissue engineering and regenerative medicine. Bioprinted tissues and organs can be used for drug

testing, disease modeling, and ultimately transplantation, potentially solving the organ shortage crisis or the issue of the body's negative immune response (transplant rejection).

3D printing is being used to produce personalized medicines with precise dosages and formulations. This approach, known as 3D printed pharmaceuticals or personalized medicine, allows for customized drug delivery systems, especially for patients with unique drug needs, such as pediatric and geriatric populations.

These are just a few examples of 3D printing applications in medicine. The technology continues to evolve and has the potential to improve care, enhance surgical outcomes and drive advances in personalized medicine and regenerative therapies.

In the coming years, 3D printing may become a disruptive technology for the medical AND healthcare industry due to its diverse applications in several sub-segments. In addition, the growing popularity of AR, artificial intelligence (AI), and other advanced technologies and the mutual integration of these technologies with 3D printing are expected to create several growth opportunities for 3D printing.

Although 3D printing provides excellent benefits, it also has some disadvantages. Some of these are as follows (Ramola et al., 2018).

- Printing medicines will make them more personalized to the patient's needs, but printing a prescription with different ingredients for each patient will be very difficult. Another problem is maintaining the properties of the elements during printing, as they can change with temperature changes.

- Printing prosthetics presents challenges, such as maintaining the durability of the product. For example, they will not allow lifting heavy things and work that requires rotation of the wrist.

- Vascular organs, such as the heart and blood tissues, which have very complex structures, continue to pose problems for 3D printing.

- The incremental printing process is complicated, so a slight change in properties can change the properties of an entire cell.

- The limitation of using a 3D printed model instead of the traditional method is that it is still more expensive. In addition, the 3D models generated are still not precise enough to provide more accurate results.

- Although the 3D printer supports the preparation for surgery, there is a limitation in implementing such a method when urgent surgery is required (printing time sometimes takes several hours to several days).

## 6. Conclusions

3D printing is being researched, implemented, or already used in a wide range of sectors, including industrial goods, services/manufacturing, consumer goods, aeronautical/aerospace, automotive, and those related to medicine: prostheses, im-

plants, anatomical models for science, pre-surgical models, components of medical equipment and rehabilitation devices or even some medications, among others, are created this way. Work is also underway to develop prints: cells, tissues, or entire organs.

3D printing is a particularly attractive technology in cases where a “tailor-made” component is needed. For example, to reconstruct a bone fragment or to create a precise preoperative model.

Although several studies on the development of the 3D printing market and its application are available, some players are not willing to use it commercially due to the high investment required and the limited application.

Experts predict that in 50 years, biotechnology, i.e. bioprinting and 3D printing of food, will join the still-developing rapid prototyping.

The key to the development of 3D printing technology is materials and overcoming technological barriers. This mainly concerns failure-free and reliable equipment and production cycles.

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# Employees' dynamic capabilities-based model of their perceived job security

JEL classification: M12, M54

**Keywords:** management, employees' dynamic capabilities, job security

## Abstract

The article concerns the role of employees' dynamic capabilities in boosting the perceived job security of employees in contemporary organizations. It is assumed that the fit between employees and their job (P-J fit) and employees and their supervisor (P-S fit) in mediating the influence of employees' dynamic capabilities on perceived job security. Such a theoretical model is empirically verified based on the sample of 1,197 organizations operating in Poland, Italy, and the USA in 2021 when job security was crippled by COVID-19. The results confirm that employees' dynamic capabilities remain crucial for boosting perceived job security and such relation is mediated by P-J fit and P-S fit.

## 1. Introduction

The functioning of modern organizations is determined by a dynamically changing environment, which means that the nature of work and work environment today is also changing (Piekarski, 2014; Virtanen et al., 2002; Sverke et al., 2006). Thus, there is a need to redefine the expectations placed on the employee – it is necessary to promote orientation to change both inside and outside of the work environment. This means that not only the existing resources (competencies) of the employees are important in the organization, but also the mechanisms for the formation and

use of new knowledge and skills, necessary for successful job performance in a given position in the organization (Virtanen et al., 2002). This creates a unique combination of the employee's resources and the ability to flexibly adapt them to changes in the environment, especially those affecting the employee's performance of assigned duties. In essence, this means discussing the issue of an employee's job suitability (or lack thereof) in an organization (Piekarski, 2014), which can then translate into perceived and real job security (job insecurity). At the same time, perceived job security (insecurity) concerns an employee's expectations about the permanence of the job, hopes (fears) about its future, and perceptions of potential opportunities (threats) to the permanence of a person's job.

The ability to integrate, build, and reconfigure employee competencies in the context of adapting them to the demands of a changing environment is called employees' dynamic capabilities (EDC) (Bieńkowska, Tworek, 2020). EDC (understood in this way) – as empirically confirmed – have an impact on both the productivity of employees and the performance of the organization as a whole.

The aim of this article is to demonstrate how the dynamic capabilities of employees affect the perceived job security of employees (self-perceived security) related directly to their anticipated guarantee of continued employment with the organization and derived, in light of the literature on the subject, from employees' possessed and potentially attainable competencies. The issue indicated as the aim has not been analyzed in the literature, so far. Hence, a research gap has emerged.

In this context, based on the critical analysis of the literature, the model was proposed, in which EDC affect employees' perceived job security through the person-job fit (P-J fit) and with the person-supervisor fit (P-S fit). In addition, the potential mediating effect of other factors: person-organization fit (P-O fit) and person-co-workers fit (P-C fit) were empirically analyzed and excluded as insignificant. The proposed model is empirically verified on a sample of top managers from 1,200 organizations operating in Poland, Italy, and the USA (during the COVID-19 pandemic), which will be presented in the second part of the article. The empirical research was conducted using the computer-assisted web interview (CAWI) method on a purposively selected sample of organizations. The results were obtained using path analysis – i.e. a method of statistical analysis of the relationship between the variables entered into the model. All of that will allow to fulfill the proposed aim and close the research gap.

## **2. Perceived job security and factors shaping it (security-related factors)**

Perceived job security or – as the inverse – job insecurity are nowadays recognized as important issues affecting the functioning of the employee in the organization and the organization as a whole (e.g. Witte, 1999; Van Vuuren, 1990). These phenom-

ena are of particular importance (they are intensified) when organizations and their employees need to function under the conditions of a Black Swan-type crisis – that is, under conditions of extreme difficulty (e.g. Nemteanu et al., 2021; Wilson et al., 2020; Lin et al., 2021). Nemteanu et al. (2021, 65) claim that “the COVID-19 pandemic has brought new challenges regarding employee adaptation to change as well as job security, with levels of well-being and satisfaction being greatly affected”.

Perceived job security concerns expectations about the permanence of the job, hopes for the future of the job, perceptions of potential opportunities, and threats to the constancy of a person's work. In turn, “job insecurity is conceived as an overall concern about the continued existence of the job in the future” (see e.g. Van Vuuren, 1990). “(...) Others consider job insecurity as a multifaceted concept, encompassing aspects such as the perceived threat to various job features and the individual's ability to counteract these threats” (see e.g. Ashford, Lee, Bobko, 1989; Rosenblatt and Ruvio, 1996; Witte, 1999, 156). Understood in this way, job insecurity is a subjective feeling and implies uncertainty about the future. At the same time, the feeling of job insecurity creates negative consequences for both employees and the organizations that employ them. “Job insecurity reduces psychological well-being and job satisfaction, and increases psychosomatic complaints and physical strains” (Witte, 1999, 155). It implies the perception that the current job might be lost (Witte, 1999, 159). Job insecurity is thus a stressor (Van Vuuren, 1990) and has a harmful impact on employees' lives (Witte, 1999). “Job insecurity first of all reduces the well-being of the individual” (Witte, 1999, 157).

Both terms: job security and job insecurity are directly related to the employee's perceived and real employment suitability in a given work environment, i.e. in an organization, in a group of co-workers or, finally, in a specific job (Ludwikowska, 2018; Piekarski, 2014). Thus, job security, as deriving from employment suitability, is primarily related to the competencies possessed by an employee to ensure that he or she can perform the work of a particular job at the desired level of efficiency of that work, which determines the suitability of an employee at a particular moment in time, in a particular place and in a particular organization (Cargile, 2000).

Job insecurity, in the context of employment suitability may result from changes occurring in the environment, causing, in particular, changes in the organization's requirements for the employee (Piekarski, 2014). These changes can foster a commensurability gap between the competencies desired for the job and/or the organization and those possessed by the employee, especially if the employee fails to keep up with the changing requirements.

In this context, it is not surprising that the issues of job security and job insecurity are also related to person-job fit (P-J fit). This is because P-J fit refers to the fit between an individual's knowledge, skills and abilities and the demands of the job (Edwards, 1991). P-J fit positively influences task performance (Chi et al., 2012) and job performance (Lin et al., 2014; Edwards, 1991), and according to Kristof-Brown and colleagues (2005, 309), “the conceptualization of fit acted

as a moderator of job satisfaction, organizational commitment, intention to leave and overall performance.” In this context, it is clear that it increases the job fit and therefore reduces job insecurity.

However, **P-J fit** does not seem to be a sufficient condition for defining an employee’s fit in the work environment in a broad sense. “Employees have a strong need to fit their work environment” (Van Vianen, 2011, 906). Thus, starting from an approach that takes into account the need to fit the employee in the broader sense of person-environment fit (P-E fit) – as written about above – one should also, in addition to employment suitability and P-J fit, consider the fit of the employee to the organization (P-O fit), to the supervisor (P-S fit) and co-workers (P-C fit, P-G fit). In general the “fundamental assumption of fit theory is that good fit leads to positive work outcomes and poor fit results in negative work outcomes” (Astankhova, 2016, 956; Werbel, Gilliland, 1999; Werbel, DeMarie, 2005), as well as affect the effectiveness of the organization as a whole (see e.g. Bowe, 2020).

First of all, **P-O fit** is defined by Kristof (1996, 6) as “the compatibility between people and organizations that occurs when: at least one entity provides what the other needs, or they share similar fundamental characteristics, or both.” Kristof’s (1996) concept distinguishes between supplementary and complementary matching. The P-O fit influences positive attitudes toward work, i.e., job satisfaction and organizational commitment, as well as behaviors such as lower turnover, greater willingness to work as a team, higher propensity for ethical behavior, lower organizational stress, etc. (Terelak, Jankowska, 2009; see also Kristof-Brown, 2005). It does not determine P-O fit, but it can be a trigger for the willingness to change in terms of P-O fit when a competency gap appears, because an employee who does not want to leave the organization is more likely to develop the missing competencies. In this view, P-O fit positively affects job suitability and increases job security.

**P-S fit** in turn refers to the perceived fit between the supervisor and characteristics of the employee (Zhang et al., 2015, 1569). “It has been shown that if employees feel that their values match those of their supervisor, they are satisfied with their job and overall work environment” (Van Vianen, 2011, 908). Because P-S fit “would be helpful for employees to maintain, protect and build a variety of resources in the organization” (Zhang et al., 2015, 1569). P-S fit influences work-related attitudes, especially organizational commitment (e.g., Van Vianen, 2011; Güneşer, 2007), job commitment (Zhang et al., 2015; Güneşer, 2007), job satisfaction (Kristof-Brown, 2005), and turnover intention (Zhang et al., 2015), as well as affecting job performance and, ultimately, job outcomes (Kristof-Brown, 2005; Utami, Zakiy, 2020). So, like P-O, P-S fit positively affects job security.

**P-C fit and P-G fit** concern interpersonal compatibility between individuals and their work groups (Kristof, 1996; Werbel and Gilliland, 1999). Understood, therefore, as “matching the skills, knowledge and abilities of employees to both the complementary and additional requirements of a particular work group” (Werbel

and DeMarie, 2005, 251), the P-G fit concept focuses on “having a complex set of skills and behaviors that support both the group task dimension (skill diversity) and the group maintenance dimension (value similarity) in a given work team” (Werbel and DeMarie, 2005, 249). It seems that the influence pattern of P-C fit on job security is analogous to that of P-O fit and P-S fit.

### 3. The role of dynamic capabilities in shaping perceived job security

The labor market, as well as the modern economy, is characterized by a high variability of professional tasks, which requires not only the constant replenishment of knowledge and acquisition of skills, but also the development of professional competencies of the so-called “future-oriented”, allowing to find oneself in new conditions resulting from functioning in a changing environment (Piekarski, 2014). “The unpredictable nature of post-industrial working life has also increased perceptions of poor employment security in permanent jobs” (Virtanen et al., 2002, 569). In this context, the literature refers to the management of employment suitability (Marzec, 2003), which emphasizes its dynamic nature and highlights opportunities to influence it. For this reason, “organizations have been forced to engage in various adaptive strategies in order to tackle new demands and remain vigorous in this unpredictable environment” (Sverke et al., 2006, 3).

This study assumes, as described above, that job security results from the fit between the employees and the organization, supervisor, co-workers and job. However, taking a dynamic view of the issue in question in the context of the changing environment in which modern organizations operate, it is necessary to consider – as a factor influencing perceived job security – the employees' dynamic capabilities (EDC) (Bieńkowska and Tworek, 2020) as a tool for bridging the competency gap.

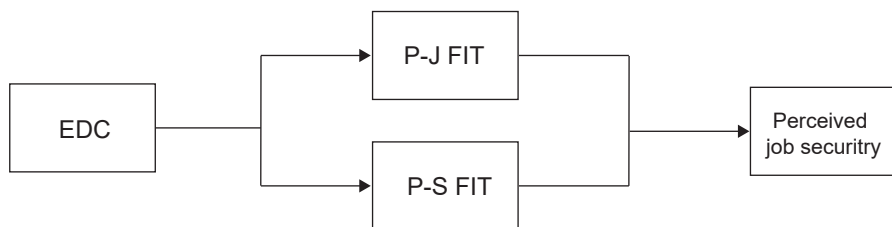
EDC are the element building DC of an organization (Teece, et al., 1997; Pisano, 2017; Teece, 2007). Understood as “abilities to integrate, build, and reconfigure employees' competencies to address rapidly changing environment, which is directly influencing the performance of tasks in the workplace” (Bieńkowska and Tworek, 2020), they are shaped by:

- “ability to be sensitive to changes in the environment (the ability to see changes, recognize opportunities and risks potentially affecting the performance of work at the workplace),
- ability to adapt to changes in the environment (the ability to undertake preventive actions, preventing the occurrence of problems in the workplace),
- ability to proactively solve problems arising in the workplace (if they occur), and include innovations in the workplace,
- ability for continuous personal development and learning” (Bieńkowska and Tworek, 2020).

EDC positively influences the job performance of employees through intermediary variables, i.e. P-J fit, work motivation, job satisfaction, work engagement and organizational commitment (Bieńkowska and Tworek, 2020). The necessity for EDC stems from the fact that nowadays “workers need to be increasingly adaptable, versatile, and tolerant of uncertainty to operate effectively in these changing and varied environments” Pulakos et al. (2000, 612), which means that by taking into account all the EDC components indicated above, it is possible to positively influence first and foremost the P-J fit, as well as – according to the mechanism described earlier – P-O fit, P-C fit, and also P-S fit. It can be assumed that the group of P-O fit, P-C fit, and P-S fit are represented by P-S fit as the mechanism of the influence of EDC on perceived job security is the same in all three cases, and in addition, there is always a direct employee-supervisor relationship in the organization (with the supervisor influencing the subordinate), while the employee-organization relationship is not direct, and the co-workers relationship does not always have to occur. Also, Nemteanu et al. (2021) point to the wage of the supervisor relationship in the context of job insecurity analyses. Moreover, Debus et al. (2014) confirmed that job insecurity is built by factors directly related to the employee as well as environmental factors related to the organization. However, they argue that there is not enough empirical evidence to verify which are more important. Lee et al. (2018) note, however, that sources of job insecurity are connected to both individual and organizational level, but are most closely related to an employee’s job fit in terms of his or her individual characteristics, how the job is organized (which can be expressed in P-S fit), which translate into work engagement and a range of other organizational factors. It suggests that fits directly related to the employee (P-J fit and P-S fit) will be particularly important in the context of correcting job insecurity. Therefore, in light of the above, the main hypothesis should be formulated as follows:

***H: EDC influences perceived job security through P-S fit and P-J fit.***

The diagram illustrating the adopted research hypothesis is presented in Figure 1.



**Figure 1.** Mediation model of EDC influence on perceived job security

Source: own work.

## 4. Research methodology and results

The theoretical model obtained on the basis of a critical literature review and presented by hypothesis H was verified using empirical research, which was conducted as a part of project no. 2020/37/B/HS4/00130 entitled “Development of the Job Performance model based on EDC for various phases of crisis in organization” funded by the National Science Centre in Poland. The primary phase of the investigation was preceded by a pilot study involving 25 individuals serving as competent judges. Its objective was to assess the quality of the questionnaire as a research instrument. The insights gained from the pilot study facilitated enhancements to the questionnaire used in the main phase of the study, including rephrasing certain questions that were not fully comprehended. Moreover, it helped mitigate potential common method bias. The main phase of the study encompassed 1,197 organizations located in Poland, Italy, and the USA, with surveys conducted at the organizational level. The questionnaire was administered using the CAWI technique, engaging a pre-selected panel of respondents, which comprised high-level managers from organizations in Poland, Italy, and the USA employing more than 10 individuals. Each organization received only one survey. The research was done in the first quarter of 2021, during a period characterized by an active surge of the COVID-19 pandemic, characterized by an increasing number of cases and the implementation of various restrictions imposed by most countries, such as social distancing measures, travel limitations, and the adoption of remote work practices.

**Table 1.** Sample characteristics

	Poland	USA	Italy	Total
Total	428	543	235	1,197

Source: own work.

### 4.1. Overview of variables

The verification of the model was based on the questionnaire, which measured the variables used in the model: EDC, P-S fit, P-J fit, and job security.

**EDC** was measured based on the scale consisting of 6 items on a 5-point Likert scale and covered 45 dimensions of EDC.

**P-S fit** was measured based on the scale consisting of 3 items on a 5-point Likert scale and covered the match between the values, personality, and leadership style of the supervisor and employees.

**P-J fit** was measured based on the scale consisting of 3 items on a 5-point Likert scale and covered the match between employees' knowledge, skills, abilities (including talent) and job requirements.



**Job security** (perceived) was measured based on the scale consisting of 2 items on a 5-point Likert scale and covered the perception of the likelihood of maintaining a job.

The measurement scales employed in the study were subjected to validation to ensure the suitability of the adopted variables for statistical analysis, which formed the basis for model verification. To validate the scales, both Cronbach's  $\alpha$  coefficient and Exploratory Factor Analysis (EFA) were conducted using IBM SPSS. The results of these analyses are presented in Table 2, indicating the Average Variance Extracted (AVE) as the outcome of EFA, which consistently produced a one-factor solution in each case. As shown in Table 2, it can be stated that the performed analysis shows that measurement scales are well-fitted, reliable, and coherent and can be used for further statistical reasoning.

**Table 2.** Variables statistics

Variable	Items	Cronbach's $\alpha$	AVE
EDC	8	0.843	0.478
P-S fit	3	0.683	0.612
P-J fit	3	0.685	0.547
Job security	2	0.630	0.576

Source: own calculations.

## 4.2. Results

In order to verify the hypothesis, the path analysis was performed using IBM SPSS AMOS. To do so, the multicollinearity test was performed using the analysis of VIF, which revealed that the value remained below 5 in all cases. Since no significant multicollinearity was present among the variables, the path analysis was performed based on them. The statistically significant and well-fitted model was obtained. In order to verify that fact, the assessment of the model was performed.

First, the assessment of statistical significance and fit measures was performed. The fit of the final model was assessed with CFI, TLI (goodness of fit) and RMSEA (badness of fit). The obtained model was statistically significant and well-fitted:  $\text{Chi}^2(2) = 9.969$ ,  $p < 0.001$ ; CFI = 0.982; TLI = 0.910; RMSEA = 0.118. The values of fit indexes were sufficient to state that there is a good fit of the model.

The regression coefficients and effects (total, indirect, direct) occurring within the model were calculated next. Regression weights in the model are presented in Table 3, total effects are given in Table 4, direct effects are given in Table 5 and indirect effects are given in Table 6.



**Table 3.** Regression weights

	Estimate	S.E.	C.R.	P	Label
P-J fit ← EDC	1.001	0.044	22.789	***	
P-S fit ← EDC	0.096	0.071	1.350	0.177	
Job security ← P-J fit	0.225	0.033	6.900	***	
Job security ← P-S fit	0.363	0.034	10.830	***	

Source: own calculations.

**Table 4.** Total effects

	EDC	P-S fit	P-J fit
P-S fit	0.096	0.000	0.000
P-J fit	0.999	0.000	0.000
Job security	0.260	0.363	0.225

Source: own calculations.

**Table 5.** Direct effects

	EDC	P-S fit	P-J fit
P-S fit	0.096	0.000	0.000
P-J fit	0.999	0.000	0.000
Job security	0.000	0.363	0.225

Source: own calculations.

**Table 6.** Indirect effects

	EDC	P-S fit	P-J fit
P-S fit	0.000	0.000	0.000
P-J fit	0.000	0.000	0.000
Job security	0.260	0.000	0.000

Source: own calculations.

The obtained results clearly show that EDC is influencing job security in a given sample. The obtained model also confirms that P-S fit and P-J fit are mediators of such relation. The mediating effect is much higher in the case of P-J fit, however, P-S remains a statistically significant mediator. Hence, it can be concluded that EDC is influencing job security through P-J fit and P-S fit, which allows to accept the proposed hypothesis H. It should be stated that country-specific results lead to the same conclusions in the case of each group (USA, Italy, Poland), therefore results for each group of organizations are not given separately.

### 4.3. Discussion

The performed empirical research was based on path analysis. It revealed, most of all, that EDC have an influence on perceived job security through P-J fit and P-S fit. The obtained results first of all confirmed the significant role of EDC in the process of shaping perceived job security. So far, the impact of EDC on job performance, as well as organizational performance, has been demonstrated also for organizations operating during a crisis caused by Black Swan-type phenomena – and therefore in extremely difficult conditions (Bieńkowska et al., 2020; Bieńkowska et al., 2023). This is in line with the contemporary trend of research indicating the need to verify not only traditional, but also modern models explaining the phenomena accompanying modern organizations according to the crisis theory (see Ahmed et al., 2020; Wanasida et al., 2021). The analytical results presented here show that EDC also affects perceived job security, which can become a motivational factor for employees to perform their job effectively, and not only – especially in the case of job insecurity – a hygiene factor that increases, among other things, the intention to quit or mental health (see Nemteanu et al., 2021; Wilson et al., 2020; Lin et al., 2021).

The results of the conducted research show the mediating mechanism of the EDC influence on perceived job security, assuming in the first place a direct influence of the EDC on P-J fit and P-S fit, which is primarily in line with the EDC-based model of job performance (Bieńkowska & Tworek, 2020). However, the existing state of knowledge was expanded to include empirical verification of the significance of the EDC in the process of shaping perceived job security related directly to employee employment suitability (Piekarski, 2014). The results show that EDC affects perceived job security, but not directly, which mainly confirms the constation of Chi et al. (2012) about the positive impact of P-J fit on an employee's job performance, which naturally translates into employment suitability (Piekarski, 2014), and therefore lowers job insecurity. Moreover, the results obtained confirm views found in the literature, e.g. Nemteanu et al. (2021), who point to the importance of direct relations with the supervisor in the context of job insecurity analyses.

## 5. Conclusions

The aim of this article is to demonstrate how EDC affects the perceived job security of employees (self-perceived security) related directly to their anticipated guarantee of continued employment with the organization and derived, in light of the literature on the subject, from employees' possessed and potentially attainable competencies. Such aim was fulfilled using a critical literature review, which was the basis for formulating the hypotheses, stating that EDC is influencing job

security through P-J fit and P-S fit. Such a hypothesis was empirically verified on the basis of 1,160 organizations operating in Poland, Italy and the USA during an active wave of the COVID-19 pandemic in 2021. The obtained results allowed to confirm that among organizations operating in such conditions, EDC affects perceived job security, and such relation is mediated by P-J fit and P-S fit. Such findings allowed to fill the existing research gap and provided a contribution to both theory and practice. The results allow to contribute to the theory of management, more precisely crisis management, underlining the importance of EDC for sustaining perceived job security among employees. It allows for practical implications, showing entrepreneurs that P-J fit and P-S fit are important factors contributing to ensuring such perception, which remains especially important during a crisis.

The performed research has some limitations, as the hypotheses were verified using a sample which cannot be considered as a representative one, however, it is large and sufficiently diversified to allow the development of a path model based on it and form generalized conclusions. Moreover, the empirical research was conducted during the COVID-19 pandemic, and the proposed model should be verified among organizations experiences crises of different origins or without one to reach more generalized conclusions.

It shows further directions of research, underlining the need for including EDC as an important factor for employees and their self-reported job security during crises.

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