

Information Support for Economic Growth and Security under the Influence of COVID-19

Lina Shenderivska [†], Taisiia Lazorenko ^{††}, Oksana Butkevych ^{†††}, Andrii Khomenko ^{††††},
Nataliia Shuprudko ^{†††††}

laplarev24@gmail.com kinadwidi@yahoo.com Butkevych_oksi@outlook.com
lpnu5050@outlook.com kafedradepart11@outlook.com

[†] National Technical University of Ukraine “Igor Sikorsky Kiev Polytechnic Institute”, Kyiv, Ukraine

^{††} National Technical University of Ukraine “Igor Sikorsky Kiev Polytechnic Institute”, Kyiv, Ukraine

^{†††} Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine

^{††††} Lviv Polytechnic National University, Lviv, Ukraine

^{†††††} Kyiv National University of Trade and Economics, Kyiv, Ukraine

Summary

The main purpose of the article is to study the peculiarities of the formation of information support mechanisms for economic growth and security under the influence of COVID-19. The cyclical nature of economic growth is a well-established and proven fact. In this context, one of the main tasks of the state is to develop measures to mitigate the impact of economic crises on the entire economic system of the state, individual economic entities, as well as to introduce anti-crisis mechanisms and tools to support the economy. When the cyclical nature of economic crises coincides with destabilizing processes in society, such as natural disasters, military actions or epidemics, the role of the state and adequate information support for economic growth is sharply actualized. As a result, an analysis was made of the main aspects of information support for economic growth and security in the context of COVID-19.

Key words:

economic growth, information support, anti-crisis mechanisms, destabilizing processes, COVID-19.

1. Introduction

The prospects for the global economic crisis have been actively discussed and predicted by practical economists and academic researchers. In particular, according to the World Bank, over the past 50 years, global recessions have occurred once a decade, therefore, the last recession took place in 2009.

In addition, experts note significant amounts of loans in the global economy, in particular, the ratio of total debt to GDP as of 2019 exceeded 300%, which, quite logically, leads to a slowdown in economic processes. The projected drop in economic indicators has increased significantly with the introduction of quarantine in connection with the coronavirus epidemic in early 2020. Forced inaction of business entities negatively affects global economic processes and has a detrimental effect on the economy of each individual country. According to IMF forecasts, "the

coronavirus pandemic will lead to the deepest crisis since the Great Depression of 1929-1933"[1-3].

Sustainable socio-economic growth today is one of the most important problems of mankind. The essence of “sustainable development” is to maximize economic and social benefits from the development of the national economy system, provided that the environment is protected and the reproduction of natural resources is ensured in the long term. In an economic sense, sustainable development means not only the growth of the national economy and an increase in per capita income, but also the improvement of all elements of social security.

Sustainable development must be accompanied by the necessary structural changes in the economic and social spheres. The crisis of the world economic system after the end of the Second World War and the entry into the world arena of new countries - contenders for world leadership require states to create and implement their own strategies for sustainable socio-economic growth. Thus, the study of theoretical and analysis of the practical aspects of sustainable development of socio-economic systems with the subsequent formation on this basis of national development strategies is relevant and timely [2].

However, ensuring sustainable development of the national economy and a constant improvement in the quality of life of the population remains a difficult task for almost all states of the world. In modern conditions, the weakness of many national socio-economic systems in front of political and economic influences from the outside in a number of cases negates all the advantages of the openness of international markets and globalization. This necessitates the development of effective state programs for information support for sustainable economic growth and security [4].

The main purpose of the article is to study the peculiarities of the formation of information support

mechanisms for economic growth and security under the influence of COVID-19.

2. Methodology

The study is based on the principles of a structural approach, a systematic analysis of the theoretical, methodological, methodological and practical foundations of information support for economic growth in the context of the consequences of COVID-19, the development of a significant amount of economic literature, legislative and regulatory acts, and the involvement of various statistical and economic data.

The obtained results of the study are based on the use of classical and modern views on the foundations of information support for economic growth in the context of the consequences of COVID-19 in modern conditions. During the study, a complex of general scientific methods of cognition was used: analysis, synthesis, abstraction, generalization, induction and deduction, as well as special methods that were used to reveal the goals and objectives of the work, which ensures its integrity and versatility, a combination of theory and practice. The following methods were applied in the article: search and bibliographic, structural and functional, comparative, calculation method based on a system of assumptions, economic and statistical, system analysis

3. Results

In terms of economic indicators, they reflect the depth of the current crisis in Ukraine, namely a 7.2% decline in GDP and an 11% rise in unemployment. This is due to the fact that Ukraine is traditionally more vulnerable to economic shocks, and its anti-crisis capabilities are rather modest. The reason is a weak economy, limited financial resources, high dependence on IMF loans, incomplete key reforms, political instability. Based on this, we believe that in the first half of 2021, the Ukrainian economy will continue to decline due to an increase in the number of diseases and the planned lockdown. However, in the case of coordinated action of fiscal and monetary policies, as well as the successful implementation of the first stage of vaccination, the second half of 2021 may be marked by partial macroeconomic stabilization. The current coronavirus crisis has forced the governments of individual countries to reconsider their approaches to regulating the economy, as well as to decide on the use of an appropriate strategy to minimize its negative consequences. The latest global experience shows the use of two main strategies to combat the spread of the COVID-2019 pandemic and restore macroeconomic

stability. The first strategy is a hard constraint strategy. It provides for the introduction of a full lockdown, namely, the closure or transition to remote operation of all enterprises and institutions whose activities are not critical for ensuring the uninterrupted life of the country, the functioning of only supermarkets, pharmacies, and strategic enterprises. Auxiliary measures are restriction of population movement, self-isolation of contact persons, total reduction of social contacts. Such measures are aimed solely at preventing the spread of coronavirus, they have a positive effect on human health, but they are catastrophic for the economy: a sharp drop in GDP, rising unemployment, balancing many industries on the brink of bankruptcy, and the like, exacerbate the crisis and postpone the restoration of macroeconomic equilibrium. To date, this strategy is recognized as the most effective in limiting the spread of coronavirus. The governments of many countries used such drastic measures at certain periods (China, Singapore, Ukraine, Austria and other countries). The most striking example of the application of this strategy is China, which became the epicenter of the coronavirus at the end of 2019. By completely blocking entire cities and regions, the Chinese government was able to quickly and effectively cope with the spread of the disease, as well as reduce the negative economic impact of severe restrictions. The second strategy is the soft constraint strategy. Its application involves the observance of social distancing, the prohibition of mass measures, the introduction of anti-epidemic measures at enterprises and institutions operating in real time. This strategy is effective in countries with a high level of self-organization and responsibility of economic agents for their actions (Netherlands, Sweden, South Korea).

The situation with the change in the required reserves ratio and the narrowing of the interest rate corridor is interesting. Yes, required reserves are considered not only one of the main traditional instruments of monetary policy, but also a powerful instrument of countercyclical policy. Their presence serves as a guarantee of sufficient liquidity of banks to fulfill their obligations. A change (even small) in the required reserve ratio leads to significant changes in the volume of credit investments of commercial banks and significantly affects the money supply. Despite this, many developed countries no longer require their banks to hold reserves. Some developing countries are still using this instrument and are reducing the required reserve requirements to expand lending to the economy. The interest rate corridor limits the interest rate fluctuations in the interbank lending market around the key rate. Under normal operating conditions, banks have no incentive to conduct transactions in the interbank market at rates outside the range of interest rates on standing-by-access transactions. The narrowing of the interest rate corridor at a low key rate allows the central bank to more effectively achieve the operational goal of monetary policy - to keep

interbank rates in the national currency at a level close to the key rate. As a rule, only developing countries can apply the corridor narrowing. Developed countries cannot use this tool as their market rates are changing close to key rates announced by central banks. Among the listed countries, only Ukraine took advantage of the required reserves and the interest rate corridor. In addition, to give banks more flexibility in managing their liquidity in the face of the coronavirus crisis, central banks in some countries have increased the frequency of recurring transactions.

At the turn of 2019-2020, the world faced one of the most terrible threats to the health and life of the world's population - the COVID-19 pandemic. The latter has become a global challenge that provoked not only a crisis in the health care system, but also the world economic crisis. Considering the root cause - the spread of coronavirus infection - the current crisis is called the "coronavirus crisis". To limit the spread of coronavirus infection, national governments and health organizations around the world are forced to apply unprecedented security measures: border closures, full, partial or adaptive quarantines, and social distancing. Such restrictive measures aimed at preserving the health and life of people had a negative impact on the development of economies and disrupted macroeconomic stability. The quarantine measures entailed a shock effect both on the side of aggregate demand (as a result of a drop in real incomes of the population) and on the side of aggregate supply (through the closure of many enterprises, primarily small and medium-sized businesses). As a result, there was a decline in various sectors of the economy, many workers (primarily those who were engaged in low-paid manual labor and did not have the opportunity to switch to a remote mode of work) lost jobs and income, consumer and business sentiment worsened, the volume of world trade and tourism decreased, and etc. The rapid spread of the COVID-19 pandemic has become a global challenge that requires an immediate search for measures to effectively counter it. National governments are being forced to tackle not only the COVID-19 pandemic, but also the coronavirus crisis caused by it. Many efforts have been made to invent a magic recipe for economic recovery, primarily through the use of various economic policies. The coronavirus crisis stimulated the states to quickly develop packages of fiscal and monetary solutions to minimize its negative consequences.

During 2020, numerous studies are being carried out by both foreign and Ukrainian scientists of the impact of COVID-19 and the coronacrisis caused by it on various spheres of public life. Now, objectively, two topics dominate: medical (how to protect people from this viral scourge) and economic (economic losses from a pandemic in different dimensions). In particular, various scenarios of the spread of coronavirus are considered - from optimistic

to pessimistic, its impact on the world and national economies, the depth of the crisis it caused, foreign economic relations and world trade, the labor market, etc. A separate area of modern research is to establish the role of the state in mitigating the negative consequences of the coronavirus crisis, the effectiveness of its economic and administrative instruments. Most of the studies examine how the state, during quarantine, tries to support entrepreneurs, especially small and medium-sized businesses, what financial instruments could help businesses survive in conditions of macroeconomic instability.

The experience of the development of the world economy shows that neither the global economic system, nor the national economies of different countries have faced the crisis that has now swept the whole world. The main features of the current coronavirus, we believe, are the following:

- A root cause that goes beyond the action of economic factors: The emergence in the fall of 2019 in a separate country (in China, according to the official version) and the uncontrolled spread of a new coronavirus led to a violation of macroeconomic stability and the deployment of crises. The specificity of this coronavirus crisis is related to the fact that it is caused not by economic or geopolitical factors (as in most previous crises), but by those directly affecting the health and life of people. The emergence of such a crisis was unpredictable and unpredictable, which makes it difficult to restore macroeconomic stability.

- Speed of spread: The spread of the COVID-19 virus has reached a very rapid pace. At the turn of 2019-2020. The outbreak of the virus continued to spread outside China, and by early 2020 it had already been recorded in 19 countries around the world. National governments have implemented unprecedented security measures: border closures, lockdowns and quarantine restrictions, various regulatory measures, etc. Despite such strong measures, as well as efforts to develop an effective vaccine against the coronavirus, its spread remains poorly controlled and poorly regulated.

- Global: The expansion of the COVID-19 virus has crossed national borders and has become global.

Today, two topics objectively dominate in information flows on the COVID-19 pandemic: medical (how to protect people from this viral scourge) and economic (economic losses from a pandemic in different dimensions). Recently, more and more publications have appeared on how the world economy and information support of economic growth and security in the post-pandemic period will look like in general, and what needs to be done to resume economic activity. This discussion is quite practical, because it forms a certain ideology of economic policy.

As for the trajectories of overcoming the crisis in individual countries, the situation here is much more complicated. The expert community is currently considering several scenarios for economic renewal after the taming of the pandemic. At the same time, for obvious reasons, much attention is paid, first of all, to national economies, although issues of a global nature are also being considered quite actively.

The world economic community has already begun to develop scenarios for the recovery of the economies of the countries of the world after the consequences of the economic crisis and the negative impact of the pandemic. In particular, the IMF prioritizes measures to restore the global economy, including support for national health systems, as well as protecting businesses and individuals with fiscal simplifications and social assistance.

In addition, the tourism industry is clearly identified as one of the most affected sectors of the world economy: according to estimates by the World Tourism and Travel Council (WTTC), the industry's losses in 2020 may reach \$ 22 billion.

The World Tourism Organization indicates that the annual damage to the global industry will be \$ 30-50 billion, but this may increase as the situation is constantly changing. At the same time, the tourist services market will lose 50 million jobs and shrink by 25% over the year.

The solution to the problem of staff cuts as a consequence of a decrease in the services provided can be the introduction of hourly wages, as well as a reduction in the duration of the working week, the transfer of some employees to part-time work. Shrinking the workweek even by one day will reduce labor costs by 20%, with many workers agreeing to part-time work if they are confident it will keep the job and generate income. Hilton, one of the world's largest hotel chains, is fighting a quandary by launching a temporary job search program for its employees. It is planned that when the crisis recedes, Hilton will meet its employees again. Today, a number of countries have introduced reduced taxes and compensation for damage in the tourism sector (Australia, Great Britain, Italy, China).

According to forecasts, it will be possible to recover only closer to 2023. The outlined global directions are of decisive importance for the economic growth program of anti-crisis measures. The need to search for additional sources of funding for the medical sector and measures to combat the spread of the epidemic led to a significant revision of the main financial plan for 2020 movement between countries potentially increases the number of citizens who are left without a livelihood and will be forced to seek financial assistance from social services. In such conditions, the formation of the legislative field and adequate information support for the development and stimulation of the activities of those sectors of the economy and the sphere of economic security that have

experienced the greatest negative impact can become an important aspect of the development of the state's anti-crisis policy.

As you know, economic crises are not unexpected, but occur at regular intervals, which economists call economic cycles. The most recent global financial and economic crisis (also known as the Great Recession) began with the collapse of the market economy in December 2007 and peaked in September 2008. So, 12 years have passed since the last financial and economic crisis. In 2020, the pandemic halted the global economic recovery from the previous crisis, the Great Recession of 2007-2009. Disappointing forecasts and uncertainty surrounding the outbreak of a pandemic in early 2020 have led to disagreements between the two largest oil producers, Russia and Saudi Arabia.

Oil demand has plummeted since the introduction of tough travel quarantine restrictions in 2020-2021. Thus, the main catalyst for the 2020 economic crisis was the fall in oil prices on the world market. In particular, for the period from 6 to 9 March 2021, the price of oil on world markets fell by 34.65%, which is the lowest result since 1991. As a result, in the first quarter of 2020, stock exchanges around the world lost mostly more than 20% of their value, recording the lowest results in comparison with the global financial crisis of 2007-2009. COVID-19. Analyzing previous epidemics, namely the H1N1 flu (2009-2010) or the Ebola virus (2014-2016), we can note that the coronavirus pandemic poses a broader threat to the global economy. Since during previous epidemics in the affected countries, the rate of economic growth slowed down to 2.4% compared to other countries.

At the same time, after the end of the epidemics, the economic growth of the countries accelerated. The COVID-19 pandemic has been going on for a long time, during which time it has significantly affected the development of the world economy, since it has not bypassed any of the countries. In general, statistics show that in 2021, global GDP decreased by about 4.36% compared to the previous year (Fig.1).

In total, quarantine restrictions have affected about half of the world's population and negatively affect the national economies of different countries.

Quarantine measures and restrictions imposed by national governments have resulted in disruptions to international supply chains, with negative social and economic impacts in the countries concerned.

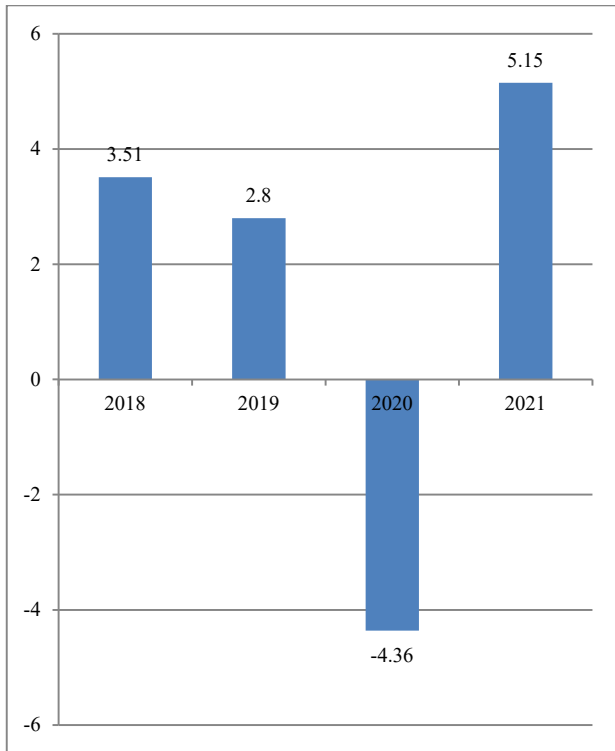


Fig. 1 World GDP growth (% compared to the previous year),

For example, sea transport faced the following problems:

- 1) problems with delivery lead time;
- 2) empty floats;
- 3) closing ports;
- 4) shortage of labor and transport;
- 5) limitation of cargo capacity.

However, the main challenge for maritime transport in quarantine restrictions in 2020 was to ensure effective crew changes. The COVID-19 pandemic also had a negative impact on foreign direct investment activities in 2020. The outlook remains dire, with further deterioration predicted by early 2022, as the current exceptional circumstances resulting from the pandemic have delayed the implementation of ongoing investment projects and delayed new projects, as well as reduced foreign investment income.

The main directions of strategic programming for sustainable development of national socio-economic systems can be designated as follows [5-10]:

- constant implementation of measures aimed at increasing the competitiveness of the national producer in foreign and domestic markets, as well as using the advantages of open markets;

- a slowdown in the growth of demand for energy resources in the national economy through a simultaneous increase in the diversification of sources

and supply channels for imported energy resources (including renewable sources);

- development and formation of new incentives to attract investment and retention of existing financial reserves in the national economy;

- mitigating the impact of rising world prices for energy resources on the national economy and the welfare of citizens;

- availability of an effective program of rapid response in the event of a crisis in the economic, social, environmental and political spheres;

- development of a consolidated generalizing index of sustainable socio-economic growth to track the effectiveness of government actions and identify possible weaknesses in the national economy.

Thus, both the initial formation and the process of adjusting existing programs for sustainable socio-economic growth should be based on a system of indicators - indicators of sustainable development. Sustainable development indicators are a tool for obtaining information on the state and dynamics of the economic, social and environmental components of the national socio-economic system and serve as the basis for fine-tuning the existing system of the national economy.

Taking into account the very essence of sustainable growth, all indicators are grouped in three areas: economic, social (including institutional), and environmental spheres. A number of groups of indicators are distinguished in each of the three areas.

If we look at the essence of the concept of sustainable socio-economic growth, then we can say that the main goal of sustainable development is to improve the quality of life of the population now and in future periods, therefore, the main measure (indicator) of the effectiveness of the development and implementation of a strategy for sustainable development of national socio-economic systems is the quality of life of the population, which, based on the statistical data existing today, can be measured only by using a composite generalized index.

4. Discussions

With the outbreak of the COVID-19 pandemic in China, and then in the United States and Europe, many analysts and experts began to argue that this is the "black swan" that suddenly appears and changes the course of world history. However, from our point of view, the virus did not appear as unpredictably as the media claim. In 2016-2017, many scientists declared a high probability of the emergence of dangerous viruses. In particular, many scientific articles have been published on this topic. In 2015, during a speech at the annual international TED

conference (a platform where ideas worth spreading are discussed).

Bill Gates, analyzing the situation with the Ebola virus, called on humanity "to spend huge amounts of money not on nuclear missiles, but on the fight against especially dangerous viruses." Such warnings did not attract enough attention from world leaders who, given the existing biological threats, could develop and implement the necessary preventive measures. Consequently, the problem of the emergence of viruses dangerous for humanity did not acquire a priority importance and was ignored by the influential world elites and governments of countries, therefore the lightning-fast spread of the virus from the Chinese province of Hubei to the rest of the world led to the fact that on March 11, 2020 WHO announced the beginning of a pandemic COVID-19.

To curb the rapid spread of infection and protect the life and health of their citizens, most countries were forced to impose strict quarantine restrictions, which in turn led to a sharp reduction in economic activity on a global scale. However, it should be noted that the main problem lies not only in the significant economic losses suffered by the global economy, but in the fact that the pandemic caused a slowdown in economic growth, since the economic recession provoked by the coronavirus pandemic was superimposed on the recession phase of the global economy.

Thus, information support for sustainable socio-economic growth means the implementation of three interrelated and interdependent goals [11-14]:

- creating a more competitive, highly efficient and low-cost economy;
- raising the standard of living of the population;
- improvement of the ecological situation.

The process of restoring macroeconomic stability, disrupted by the COVID-2019 pandemic, is likely to be lengthy. The return to pre-crisis levels of GDP will take at least a year. The same or more time will be spent on reaching the pre-crisis levels of unemployment and economic growth. The likely duration of the recovery depends primarily on the strength of the specific national economy and the effectiveness of the economic policy measures used. Also, the duration of the renewal of the global and national economies depends on the likelihood of new outbreaks of coronavirus infection, compliance with quarantine measures and restrictions, the confidence of consumers and companies in the future, as well as how the scale of government support will meet the needs of business. For now, governments need to continue loose fiscal and monetary policies, and this should last as long as necessary to fully restore macroeconomic stability.

As for the use of monetary policy measures to restore macroeconomic stability, it is advisable to use both traditional and new non-traditional instruments, the so-called unconventional monetary policy instruments. First

of all, this concerns the use of currency swaps and quantitative easing measures (QE, Quantitative Easing). The use of non-traditional tools is advisable when the potential of standard tools has been exhausted or traditional tools, due to a number of factors, are not effective enough. It should also be noted that while developing countries predominantly use traditional monetary policy measures, developed countries have already exhausted their potential during the previous global crisis in 2008 and switched to unconventional instruments. In particular, the method of quantitative easing, popular in developed countries, is used by the government when the central bank's interest rate has dropped to a critically low level, which makes it impossible to operate on it to depreciate the national currency and increase the money supply.

5. Conclusions

The study shows the prevalence of negative consequences of the impact on the economies of the countries of the world in connection with the spread of the pandemic. Changes in consumer behavior due to quarantine restrictions determined a decrease in the production of goods and services in various sectors of the economy: transport, tourism, restaurant, industrial and foodstuffs. Despite the negative consequences of changing social patterns of individuals' behavior, the pandemic can be seen as a "black swan" that has cleared the economy of insolvent enterprises. In addition, new services began to actively develop in the economy, in particular, delivery services built on digital business models and modern mobile applications.

Initial estimates of the impact of the pandemic on the world's leading economies are significantly overestimated, because the actual data for 2021 indicate a decrease in production in certain countries and a slight drop in GDP in others due to the different structure of the economy and the behavior of economic agents. The sectors in which there was the largest reduction in income, trade and services were: tourism, civil aviation, industrial production (quarantine restrictions led to a complete shutdown of some industries), retail, entertainment and sports, etc. Countries with the largest share of these sectors in GDP have been hardest hit by the rapid spread of the pandemic. It is advisable to focus further research prospects on identifying patterns of behavior of individuals, in particular, with the aim of finding employment in the context of the spread of a pandemic, in different sectors of the economy. There is also a need for urgent research into the relationship between changes in consumer behavior and business activity in various sectors of the economy, which in the future will be affected by various viral pandemics.

References

- [1] Calof, J. *Government sponsored competitive intelligence for regional and sectoral economic growth: Canadian experiences*. Journal of Intelligence Studies in Business, 6(1), 48–58. (2016)
- [2] Giannopoulos, G., Filippini, R., & Schimmer, M. *Risk assessment methodologies for critical infrastructure protection: part I*, Luxembourg. (2012)
- [3] Gontareva, I., Babenko, V., Yevtushenko, V., Voloshko, N., & Oliynyk, Y. *Efficiency of Information Management and Analysis for Industrial Entrepreneurship*. Journal of Information Technology Management, 12(3), 4-13. (2020)
- [4] Madon, S. (2000). *The Internet and socio-economic growth: Exploring the interaction*. Information Technology & People, 13(2), 85–101. <https://doi.org/10.1108/09593840010339835>
- [5] Mishchuk Ie., Rebrova S., Krush P., Zinchenko D., & Astafieva K. *Digitalization security as a marker of modern mechanical engineering technology implementation in the context of ensuring strategic economic security of enterprises*. Transactions on Business and Economics, 18, 117-125. (2021)
- [6] Mishchuk, Ie. *Economic security of competitive status: the genesis of the concept*. Cherkasy University Bulletin, 3, 38 – 46. (2018)
- [7] Narcyz Roztocki, Piotr Soja & Heinz Roland Weistroffer (2019) *The role of information and communication technologies in socioeconomic growth: towards a multi-dimensional framework*, Information Technology for Development, 25:2, 171-183, DOI: <https://doi.org/10.1080/02681102.2019.1596654>
- [8] Nikonenko, U., Khalina, O., Kazyuk, Y., Paliukh, V., & Shevchenko, S. *Influence of internal and external factors on the structural changes of national economy: an example of Ukraine*. Business, Management and Economics Engineering, 19(2), 244-271. <https://doi.org/10.3846/bmee.2021.14472> (2021)
- [9] Pylypenko, K. A., Babiy, I. V., Volkova, N. V., Feofanov, L. K., & Kashchena, N. B. *Structuring economic security of the organization*. Journal of Security and Sustainability, 9(1), 7-38. DOI: [https://doi.org/10.9770/jssi.2019.9.1\(3\)](https://doi.org/10.9770/jssi.2019.9.1(3)) (2019)
- [10] Savytska, N., Chmil, H., Hrabynnikova, O., Pushkina, O., & Vakulich, M. *Behavioral models for ensuring the security of functioning and organizational sustainability of the enterprise*. Journal of Security and Sustainability, 9 (1), 63-76. DOI: [https://doi.org/10.9770/jssi.2019.9.1\(6\)](https://doi.org/10.9770/jssi.2019.9.1(6)) (2019)
- [11] Schwab, Klaus. "The Fourth Industrial Revolution: What It Means, How to Respond." weforum.org, January14,(2016)
- [12] Soja, E. *Information and communication technology in active and healthy ageing: Exploring risks from multi-generation perspective*. Information Systems Management, 34(4), 320–332. <https://doi.org/10.1080/10580530.2017.1366217> (2017)
- [13] Taçoğlu, C., Ceylan, C., & Kazançoğlu, Y. *Analysis of variables affecting competitiveness of SMEs in the textile industry*. Journal of Business Economics and Management, 20(4), 648-673. DOI: <https://doi.org/10.3846/jbem.2019.9853> (2019)
- [14] Yaseen, S., Abbas, S. M. A., Anjum, A., Saba, T., Khan, A., Malik, S. U. R., & Bashir, A. K. *Improved generalization for secure data publishing*. IEEE Access, 6, 27156-27165. (2018)