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Impact of the Main Threats from COVID-19 on the Labor Market in the Context of Ensuring Economic Security

Nataliya Andriyiv[1*], Kateryna Voloshchuk[2], Sergii Petrukha[3], Olexsandra Orlovska[4], Oksana Kurylo[5]

[1] Department of Economic Theory, Uzhhorod National University, Uzhgorod 88000, Ukraine
[2] Department of Economics, Business, Trade and Exchange Activities, Podillia State University, Kamianets-Podilskyi 03113, Ukraine
[3] Department of Financial and Economic Security, "KROK" University, Kyiv 03113, Ukraine
[4] Department of humanitrian and Socio-Economic Training, Dnipro National University of Railway Transport named after academician V. Lazaryan, Dnipro 49010, Ukraine
[5] Department Finance, Lviv Polytechnic National University, Lviv 79000, Ukraine

Corresponding Author Email: andriyiv.natali@gmail.com

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ABSTRACT

The main research background involves identifying the factor that today, in the context of a pandemic and hostilities, the issue of labor migration, the labor market is an important problem for ensuring economic security. The main purpose of the article is to determine the major threats from COVID-19 and their impact on the labor market in the context of ensuring economic security. The basis of the methodology includes several theoretical methods for determining the key factors of influence and the method of graph theory and hierarchical ordering, which made it possible to structure the level of influence of these threats. The research process included identifying the main threats that negatively affect the labor market due to the onset of the pandemic and demonstrating the proposed methodological approach to streamlining their level of influence. Research conclusions shows that we have formed a model of hierarchical ordering of the influence of the principal threats from COVID-19 on the labor market in the context of ensuring economic security. Based on the results of the study, our suggestions are the proof of the fact that in modern economic conditions, theses of comprehensive research and monitoring of all negative factors that can affect the labor market are extremely relevant.

1. INTRODUCTION

The COVID-19 coronavirus pandemic is a shock that has greatly accelerated and exacerbated the decline in global economic growth. To stem the spread of the virus, countries have imposed severe travel restrictions, which have almost halted economic activity, exacerbating preexisting economic problems. The general "open door" policy, as a product of globalization, has undergone a crisis. Communication between the countries has been significantly disrupted: all types of passenger traffic are almost completely suspended, freight traffic is significantly complicated due to the closure of borders and efforts to protect against the spread of epidemics. As a result, the world is witnessing an unprecedented reduction in the volume of commercial exchange between countries, with corresponding consequences for the economic security of countries. If the stabilization measures do not give the expected results, more intensified measures may be applied, which is likely to lead to austerity and serious social and political instability with a new round of the economic crisis.

The coronavirus pandemic has rocked economic security and social life around the world. The threat of the spread of COVID-19 and the announced quarantine in a matter of days turned the situation into business and, accordingly, in the labor market. The pandemic has mercilessly exposed the weaknesses of the labor market. The activities of both large and small enterprises have been ended, the working hours have been reduced, and personnel are being dismissed. The closure of shopping malls and restaurants, the cancellation of flights and hotel reservations, the transition of businesses to remote work puts many on the brink of collapse. The first to lose their jobs are often those for whom it was not stable anyway: salespeople, servers, loaders, cleaners.

The coronavirus pandemic has radically reshaped the U.S. job market. In four weeks of quarantine measures, the country has lost more hands than it has struggled to gain over the past 11 years in its recovery from the financial crisis. Now, the top ten most in-demand professions in the United States include nurses, salesmen and cashiers, sorters, and couriers. There is an acute shortage of workers in agriculture, where the share of labor migrants is high. Large losses are expected among hotel service personnel, transport workers, and social workers. More cuts in the United States are expected among low-paid workers, who already find it difficult to keep their families together during the pandemic.

More and more news emerge in the labor market that companies that are suffering losses are laying off people. The trend is likely to continue this year - the only question is the scale. Companies adapt to change in different ways and with varying degrees of success. But, of course, it should be noted that for some businesses and workers, these events will be an impetus for positive changes and the introduction of new

technologies. For example, it is the forced isolation that has contributed to the fact that teachers, usually conservative, are taught methods of distance teaching. This is also true for the "blue collar" category: companies are forced to automate many HR processes and establish remote working hours, where possible, and employees - to adapt to the conditions and acquire new skills.

All this creates external pressure on us, education and self-education, children and their future. But, of course, in order to further shape education in such a turbulent world, classical methods of reform are not enough. Finland and Singapore are considered the most successful educational cases today - two completely different models of education. Finland is a model of the welfare state, where great attention is paid to equality of opportunity and access. Singapore is a meritocratic model, where a selection of the best talent is constantly taking place, where a high stakes game is constantly taking place. A Ukrainian model of education should also appear between these poles, because any transfer of one model will not work. If we take a broad perspective, then the participants in the educational process have important experience of life in conditions of constant stress, constant turbulence, where one cannot rely on institutions.

But the reality of the present is the COVID-19 pandemic, which will certainly change the labor market and the system of economic security. In the near future, we will see an event for some professions and a boom in demand for others. However, the impact of the pandemic on the labor market is not limited to the emergence of a temporary demand for the medical profession. Tectonic shifts are expected in the labor market. In our opinion, the era of large offices is over: companies in different countries, including Ukraine, will decide that before the pandemic they spent too much money on office space rent. The most necessary employees will return to the office, the rest will continue to work from home, go to freelance or part-time work.

Consequently, even in 2022, we can talk about the relevance of studying the problems of ensuring economic security due to the negative impact of COVID-19.

The main motivation of the study is that during the pandemic and the negative impact of COVID-19, we have a new low threat and dangers for the labor market, which can significantly affect the level of economic security. This requires finding new ways to help solve this problem and doing new research. Today, the problem is the fact that no one knows which threats as a result of the impact of COVID-19 are significant and which are not. Which should be responded to and which should not. New ideas are needed to streamline their negative impact.

The value of the study lies in presenting a new approach for this issue to the hierarchical ordering of new threats that negatively affect the labor market due to COVID-19 and can pose a real problem for the economic security system.

The pandemic poses a holistic, massive threat to the labor market and the economic security system in particular. But she embodies a significant number of negative factors, the response to which should be distinguished and some need to be paid more attention, and some less. That is why a new approach is needed to streamline their influence. The main importance of the material is the identified main threats from COVID-19 and its danger in the development of the market in the context of economic security.

2. LITERATURE REVIEW

The issues of ensuring the safety and stability of the labor market have been worrying many scientists for a sufficient period of time. Threats to any socio-economic system have always existed, and their peculiarity lies in the fact that over time and conditions of functioning, they change, new ones are added that exceed the influence of others.

How sensitive systems of economic security and the labor market can be can be seen in many scientific works [1-3].

As noted by Chlivickas et al. [4], the labor market is a very important strategic resource that, if properly functioning and managed, contributes to effective social and economic development.

The labor market is very diverse and all its aspects in one way or another affect the issues of socio-economic development and ensuring economic security. Many scientists carry out this thesis through their scientific works [5-8].

It is interesting how Rembeza and Radlińska [5] and Lažetić, [7] noted the gender problem in the labor market, pointing out that, due to the existence of discrimination, this can be a real threat to economic development and security, only confirms the fact of the importance of the chosen subject

Eichhorst et al. [6] noted how important labor market reforms are and why for Europe and its security, labor market stability is a priority today.

Ogawa [8] analyzed how sensitive the labor market is to the negative impact of macroeconomic threats and how this can affect economic growth and security.

Taking into account the scientific opinion of many authors, we concluded that the labor market is extremely important for ensuring economic security and that is why we chose this research topic. The aim existence of causal links between the state of economic security and the characteristics of the labor market requires research into the features of their functioning and development in close interconnection. The spread of crisis trends, the impact of COVID-19 and the growth of the dynamism and unpredictability of the economic environment to a large extent actualizes the study of economic security in the context of the negative impact of threats. Indeed, the crisis state of the economy due to the influence of COVID-19 entails an increase in unemployment, a violation of the professional and qualification structure of the labor market, losing job security and the effectiveness of a social policy of the state.

The study of threats, their impact and response to them has also been the focus of many scientists. For example, Podra et al. [9], Gladka and Fedorova [10] and Kopytko et al. [11] noted in their works what problematic aspects exist in the issue of countering threats to the labor market, personnel and safety.

Podra et al. [9] considers the main threats to the labor market through the prism of human capital and potential. Gladka and Fedorova [10] considered the labor market through the main marketing strategies and how important marketing is in the development of the labor market. Kopytko et al. [11] investigated an interesting aspect of the shadowy business and its negative impact on the labor market. However, they do not address the impact of COVID-19 in any way.

As noted by Soylu et al. [12], it is impossible to achieve economic growth and development without a proper system of economic security and stable functioning of the labor market.

As noted by Khalina et al. [13], the process of organizing economic security begins with personnel and people. We cannot but agree with this thesis and also believe that it is

extremely important to ensure the national economic security of the stable functioning of the labor market.

Knowing the proper scientific achievement of many scientists and practitioners, today it is important to identify and respond to a new type of threat, which is just beginning to exert its negative impact on the economic security system of many countries, and these threats are part of the impact of COVID-19. This influence is especially noticeable on the labor market.

3. METHODOLOGY

In the process of work, separate methods were used to achieve the set goals. The main method of studying performance is the method of graph theory and the methodology of hierarchical ordering. Their demonstration will be further down the text. The graph theory method made it possible to form an appropriate communication graph and its use based on the theory of network systems [14-20].

These threats were identified on the basis of an analysis of scientific and practical literature, as well as a collective discussion by the co-authors of the study and employees in the field of migration policy and labor market development. So, as a result, we have identified the following threats from COVID-19 to the labor market in the context of ensuring economic security and give them the appropriate mathematical notation:

1. High incidence rate among the population of Eastern Europe (Z_1).
2. Low level of benefits from the state in the fight against unemployment (Z_2).
3. Growth of "shadow" business amid the pandemic (Z_3).
4. Imbalance of supply and demand for certain professions (Z_4).
5. Quarantines restricting the activities of many professions on the market (Z_5).
6. Pandemic restrictions on travel abroad (Z_6).
7. Growth of inflation in many countries of Eastern Europe (Z_7).

In the future, further in the text, we will use exactly those symbols for each of the defined threats.

It should be noted that the existing list of threats to the labor market in the context of ensuring economic security may differ in the future and be supplemented. Our main purpose was to show the work of the selected methodology in this scientific field.

4. RESULTS OF RESEARCH

Consequently, the first stage will be the formation of a graph of connections between the threats resulting from COVID-19 for the labor market in the context of ensuring economic security (Figure 1). The vertex of the graph of connections is Z_1, the lines symbolize a certain connection. If a link is defined, it shows the dependence of one on another (arrows of the bar).

Figure 1 shows how the subset of threats Z_1 has a number of possible relationships with other threats. We see in Figure 1 that Z_1 represents the top of the graph and thanks to the arrows we see its dependence on other threats.

The next step, as a result of the generated graph, we can construct a binary dependency matrix (let us denote it: Matrix *A*) for the set of vertices Z_1. In this case, equality should be achieved Eq. (1).

$$A_{ij} = \begin{cases} 1, & \text{if the vertex } Z_i \text{ depends on the vertex } Z_j \\ 0, & \text{if the vertex } Z_i \text{ independent on the vertex } Z_j \end{cases} \quad (1)$$

So, having calculated, we can build our Matrix *A*, which will have dimensions of 7 by 7 (since we have identified 7 threats in the methodology section). The binary dependency matrix is shown in Table 1.

Based on the generated binary dependency matrix, we can build a reachability matrix, which we denote as Matrix *B*. In this case, the reachability matrix must satisfy the following equality Eq. (2).

$$B_{ij} = \begin{cases} 1, & \text{if form } Z_i \text{ can get to the } Z_j \\ 0, & \text{if if not possible} \end{cases} \quad (2)$$

The reachability matrix is shown in Table 2. It should be noted that if there is a path shown in Figire 1 in the generated graph between Z_i and Z_j, we can say that the established vertex is reachable. We denote such reachable vertices as $S(Z_i)$. Also, if the vertex is a predecessor of the vertex Z_j, if it usually reaches it. Therefore, we will designate such predecessors as $P(Z_i)$.

We can say that a finite section of subsets of vertices that are reachable and predecessors of vertices arises a subset Eq. (3).

$$R(z_i) = S(z_i) \cap P(z_i) \quad (3)$$

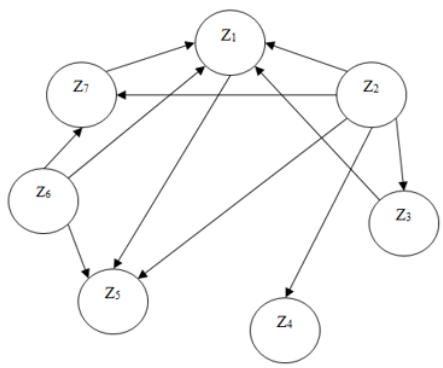

Figure 1. Graph of connections between threats posed by COVID-19 to the labor market in the context of economic security

Table 1. Binary dependency matrix *A*

	Threat (Z_1)	Threat (Z_2)	Threat (Z_3)	Threat (Z_4)	Threat (Z_5)	Threat (Z_6)	Threat (Z_7)
Threat (Z_1)	0	0	0	0	1	0	0
Threat (Z_2)	1	0	1	1	1	0	1
Threat (Z_3)	1	0	0	0	0	0	0
Threat (Z_4)	0	0	0	0	0	0	0
Threat (Z_5)	0	0	0	0	0	0	0
Threat (Z_6)	1	0	0	0	1	0	1
Threat (Z_7)	1	0	0	0	0	0	0

Table 2. The reachability matrix *B*

	Threat (Z_1)	Threat (Z_2)	Threat (Z_3)	Threat (Z_4)	Threat (Z_5)	Threat (Z_6)	Threat (Z_7)
Threat (Z_1)	1	0	0	0	1	0	0
Threat (Z_2)	1	1	1	1	1	0	1
Threat (Z_3)	1	0	1	0	0	0	0
Threat (Z_4)	0	0	0	1	0	0	0
Threat (Z_5)	1	0	0	0	1	0	0
Threat (Z_6)	1	0	0	0	1	1	1
Threat (Z_7)	1	0	0	0	0	0	1

It should be noted that those vertices that are not reached from any of the remaining vertices of the set Z_1 form the so-called level of the threat influence priority hierarchy. The condition is the following equality Eq. (4).

$$P(z_i) = R(z_i) \tag{4}$$

Consequently, the implementation of the above actions and equalities forms this first and this is the lowest level of influence of threats on the labor market in the context of ensuring economic security. The calculated data for the formation of our model are presented in Table 3.

Table 3. The calculated data for the formation of our model

	S(Zi)	P(Zi)	$S(z_i) \cap P(z_i)$
Threat (Z_1)	1,5	1,2,3,6,7	1
Threat (Z_2)	1,2,3,4,5,7	2	2
Threat (Z_3)	1,3	2,3	3
Threat (Z_4)	4	2,4	4
Threat (Z_5)	5	1,2,5,6	5
Threat (Z_6)	1,5,6,7	6	6
Threat (Z_7)	1,7	2,6,7	7

So, we have the second column - these are the numbers of the unit elements of the rows of the reach matrix, when the third column is the numbers of the elements of the columns of the matrix.

Eq. (4) presented by us above holds for: Low level of benefits from the state in the fight against unemployment (Z_2); Pandemic restrictions on travel abroad (Z_6). Consequently, these two threats will form the lowest level of influence on the labor market in the context of ensuring economic security. We remove them from further calculations in order to determine the medium and high level of impact. The second level is determined according to the calculation Table 4.

We have now established that Eq. (4) holds for: Growth of "shadow" business amid the pandemic (Z_3); Imbalance of supply and demand for certain professions (Z_4); Growth of inflation in many countries of Eastern Europe (Z_7). Thus, these three threats will form the second (middle) level of impact on the labor market in the context of economic security. We remove them from further calculations to determine the highest level of impact. The third level is determined according to the calculation Table 5.

All calculations were carried out in accordance with the above formulas and the formed mathematical notation.

Therefore, the final stage of our research will be the placement of all identified threats according to the levels that we have identified in the calculation tables. Thus, we obtain a hierarchical model for structuring the main threats through COVID-19 in the labor market in the context of ensuring economic security (Figure 2).

Table 4. The calculated data for the formation of our model

	S(Zi)	P(Zi)	$S(z_i) \cap P(z_i)$
Threat (Z_1)	1,5	1,3,7	1
Threat (Z_3)	1,3	3	3
Threat (Z_4)	4	4	4
Threat (Z_5)	5	1,5	5
Threat (Z_7)	1,7	7	7

Table 5. The calculated data for the formation of our model

	S(Zi)	P(Zi)	$S(z_i) \cap P(z_i)$
Threat (Z_1)	1,5	1	1
Threat (Z_5)	5	1,5	5

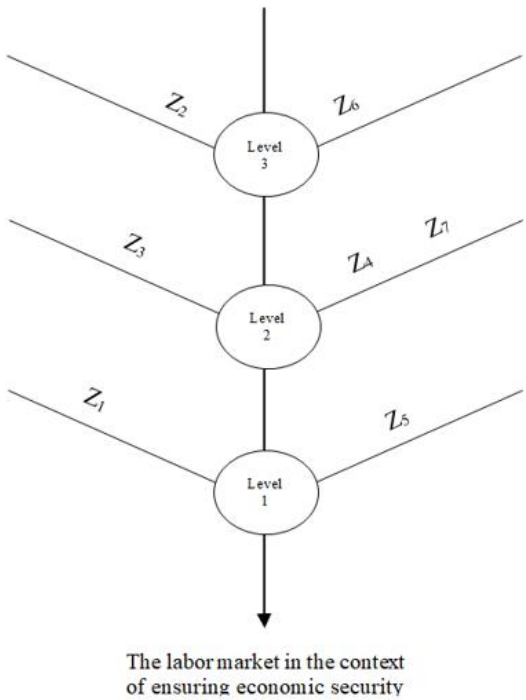

Figure 2. Hierarchical model for structuring the main threats through COVID-19 in the labor market in the context of ensuring economic security

Thus, threats have the most negative impact: High incidence rate among the population of Eastern Europe (Z_1) and Quarantines restricting the activities of many professions on the market (Z_5).

It should also be emphasized separately that speaking about coronavirus, it is more customary to calculate losses: how much the economy has lost, which small business facilities have closed their doors forever, how many employees were left without work in difficult times. However, like any other process, the pandemic has a different, positive side. People had to change their social roles, rather to adapt to a different reality,

to strengthen their leadership qualities, to transform their attitude to work.

Because of COVID-19, employers have had to increase the number of "off-office" days. At the same time, teleworking is still not possible for warehouse personnel, operational workers, production employees or front lines.

The pandemic has shown that only those businesses survive that quickly respond to compelling circumstances. One response option is to create a digital workspace. No office is required to carry out a large number of tasks.

An employee can work anywhere, if he has the necessary skills, can present work results and maintain communication with colleagues.

The pandemic has revealed new priorities: flexibility, speed, attention to automation, demand for creative and highly specialized specialists with analytical thinking and a thirst for knowledge. New skills can be learned through online courses.

The pandemic has created a new normality: stay in your familiar environment, build connections and business with the whole world, earn at the level of the first world and build it here and now in your home country.

To increase resilience and the ability to withstand new threats through further pandemic shocks, companies will need to transform their business model. Stress tests will need to take into account and analyze new risk scenarios to ensure rapid adaptation to economic security. The main task of governments will be to achieve a new, smarter and more sustainable globalization, with a level of security that would ensure internal stability, active participation of the country in the international division of labor, and at the same time would guarantee economic and national security.

It should be noted that the proposed methodological approach is easy to use and its calculations are convenient. We have tried to demonstrate the main results of the study as simply as possible, so that it is better to understand what is happening and what can be achieved in the end. Knowledge in graph theory and methods of hierarchical ordering makes it possible to simplify the demonstration of basic calculations so that it is understandable to the reader.

5. DISCUSSIONS

Overcoming the consequences of the epidemic crisis, superimposed on industrial stagnation and economic recession, the signs of which were observed already at the end of 2019, requires the use of a more flexible model of ensuring economic security, combining state financial support with organizational and economic instruments that allow to use and optimize the decentralized resources of economic entities. subjects and the population through the appropriate regulatory levers. At the same time, it is important to systematically introduce legal and regulatory changes related to the need to prevent the unpredictability of legislation, the commission of corruption acts and other violations of the legitimate interests of citizens and business entities due to restrictions associated with quarantine. In the medium term, the policy of ensuring economic security in the context of the crisis caused by the spread of COVID-19 should be focused on ensuring the sustainable functioning of the national economy in conditions of high epidemic risks and creating the prerequisites for a rapid economic recovery while easing anti-epidemic restrictions.

Discussing the results of the study, it should be noted that our study is purely theoretical and methodological in nature and aims to demonstrate new ways to streamline the negative impact of threats in modern conditions of ensuring economic security.

Research into the underlying security impact of threats is not new. For example, similar aspects were investigated by Rushchyshyn et al. [14], while defining and paying attention to the financial side. In our study, we wanted to focus on the present, namely on the threats posed by COVID-19 to the labor market.

The issue of the impact of COVID-19 has been standing for over one year, and the events of the end of 2019-2021 show that there are already enough scientific developments in that area [15-20]. However, not all of them will concentrate their attention precisely on the search for new methodological approaches to determine the ways of responding to this negative influence. We have tried to show that you can adapt your solutions and direct resources to where the negative impact of COVID-19 threats is greatest. In addition, we have chosen a poorly researched sector of the economic security system, namely the labor market.

Evaluating the results of the study, we can see how, thanks to a methodical approach, we can hierarchically streamline the negative impact of threats on the labor market due to COVID-19 and the economic security system.

6. CONCLUSIONS

To summarize, it should be noted that in 2020, the COVID-19 pandemic dealt a devastating blow to the labor and safety markets around the world.

Firstly, the negative direct consequences of the coronavirus on the labor potential are mainly associated with temporary disability of the employed population in the event of an illness in moderate and severe forms and the subsequent period of rehabilitation, accompanied by reduced performance.

The outbreak of COVID-19 has come as an unprecedented shock to many countries. The economic impact of the pandemic is enormous and could become even more significant in the near future with the rise in COVID-19 cases. Moreover, the labor market has experienced the negative impact of the COVID-19 pandemic in all directions at once.

Coronavirus continues to sweep the planet - the number of confirmed cases has exceeded a million, and the increase in this figure is likely to continue for a long time. Most countries in the world have closed their borders and increased restrictions on movement. But the reality of the present is that you need to continue living and working. Therefore, its negative impact should not be ignored.

As a result of the research presented in the material, we were formed in the model of hierarchical ordering influence of the main threats from COVID-19 on labor market in the context of ensuring economic security. Our model is theoretical and methodological in nature and is designed to streamline the main threats posed by COVID-19 and the labor market in the context of ensuring economic security.

It can be concluded from the results of the study that the applied methodology makes it possible to gradually form a key model of the hierarchical ordering of the negative impact of threats. Of course, threats are different and the specifics of the labor market may differ, but a good example demonstrates that the method works and it is possible to choose the priorities for responding to threats.

Research has a limitation. First of all, they relate to the fact

that the threats we have chosen were a generalization of the analysis of scientific and practical literature and served as a demonstration of the model's action. In the future, attention should be focused on a specific labor market, a specific country and its system of ensuring economic security.

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