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# ГЛОБАЛЬНА ЕКОНОМІКА

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**ADJOKA Honlan Ezechiel**

E-mail: [Adjokaezechie@gmail.com](mailto:Adjokaezechie@gmail.com)

ORCID: 0000-0002-3161-4449

postgraduate student Department of World Economy,  
Kyiv National University of Trade and Economics  
19, Kyoto str., Kyiv, 02156, Ukraine

## GLOBAL SUPPLY CHAINS IN PANDEMIC

*In the course of the research, the theoretical approaches to determining the content of the process of formation of global supply chains were considered. The impact of the COVID-19 pandemic on international trade in the EU region is analyzed and the main features of this impact are identified. The main features of the response of international corporations to the challenges of quarantine restrictions are substantiated. In particular, the current trends in changing global approaches to the formation of supply chains and the formation of priorities for their development in the near future are analyzed.*

*Keywords:* supply chains, COVID-19, the transformation of supply chains, industry 4.0, automation, supply efficiency.

**Background.** Nowadays, managers of large enterprises and multinational corporations understand that it is not enough to simply manage supply chains, reducing this process only to increase the organizational and financial efficiency of supply chains. In the context of the economic crisis caused by the COVID-19 pandemic, many companies are now actively implementing risk management mechanisms to ensure uninterrupted supply. Therefore, it is important to focus on a responsible approach to improving global supply chain management. This will overcome a number of risks in the field of failure of supply and adaptation of supply systems to the conditions of quarantine restrictions.

The rationality of the formation of global chains involves the minimization of funds for their organization and the economy of supply. Negative phenomena in inventory management for many companies in a pandemic are either a shortage of certain stocked resources, or an increase in inventories. In order to reduce the costs of transportation of goods, it is necessary to use motor vehicles efficiently, which can be achieved under

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the conditions of delivery of goods not in a random selection, but in a complete range of products.

**Analysis of recent researches and publications.** C. Díaz-Mora and G. E. López [1] paid special attention to the organizational and information support of global logistics processes. The authors pointed out that in the modern world, the processes of the formation of global supply chains are based on the widespread use of information systems in supply chain management.

E. Brynjolfsson, F. Eggers and A. Collis [2] investigated the main stages of supply chain formation in the organization of production processes and distribution of finished goods. The authors considered the economic preconditions for the formation of supply chains in the face of ever-increasing competitive pressure and globalization of the market. According to the authors, ensuring the competitiveness of enterprises should be done by reducing logistics costs and increasing the level of quality of goods. Particular emphasis on reducing logistics costs is placed on the development of information technology that allows you to quickly and efficiently coordinate all stages of the movement of goods.

The work of K. De Backer and S. Miroudot [3], who studied the peculiarities of the development of global supply chains in different regions of the world is noteworthy. Supply chain management was considered by the authors from the standpoint of the marketing approach, namely in terms of building sales channels. In our opinion, this approach is especially important for the development of Supply Chain Management methodology, as it should be based not only on the influence of factors of logistics development but also on the influence of factors of the company's marketing environment.

R. Stöllinger, D. Hanzl-Weiss, S. M. Leitner, R. Stehrer [4] investigated methodological approaches to the construction of supply chains, supply chain management tools. In the process of critical analysis, they highlighted the main achievements and contributions to the development of supply chain management methodology. Researchers have argued that to improve the efficiency of a company's management, its management must have all the strategic aspects of supply chain management.

V. Kulik, V. Marchuk, O. Garmash, A. Zakharchuk, Yu. Gradysky [5] noted that the general trend of using a process approach in management has defined modern logistics as supply chain management (SCM) based on the concept of logistical integration of functional business processes and chain self-organization of interfirm economic relations of enterprises and organizations – supply chain entities. According to the author, individualization of demands and dynamism of consumer behavior, accelerated pace of innovative technological change, the formation of a single economic and information space have created the necessary conditions for in-depth positioning of supply chain actors and their effective interaction. Thus, the global supply chain is proposed to be defined as a closed cycle of movement and

transformation of primary resources (intellectual, material, energy) into end products of demand – ie as a «loop of business processes of a spiral nature» – with subsequent renewal or loss of initial need or new need.

T. Kolodizeva [6] noted that the key trends are characterized by increasing complexity of new entities (hybrid relations «competition + cooperation») and the number of parameters that shape the international environment. Investigating global trends, which are covered in the global programs of The World Economic Forum, as well as in the works of famous economists The World Trade Organization and Fung Global Institute, logistics solutions in building global supply chains are reduced to the following parameters: changing consumer needs and emerging new expectations; network economy; globalization and complexity of logistics processes; environmental instability; sustainability of system development; increased risks; lack of reliable infrastructure; growing government restrictions and barriers. The complication of market relations in the supply chain from the standpoint of taking into account the time factor and customer-oriented business has led to the transformation of supply chains into network economic structures, to the formation of economic relations in a special business environment – network economy. Organizations and enterprises are becoming more part of the network economy.

P. Pananond [7] noted that the international nature of corporations is reflected, in particular, in the form of global supply chains, the effective operation of which in the international market is ensured not only by the value of assets located in many countries, but also supply chains the products they produce in the markets. Their role is not limited to efficient delivery and stream synchronization. This is evidenced by the evolution of the concept of supply chains, the adopted criteria for assessing the effectiveness of their work. According to the investigation results, it can be observed the different approaches to the formation of concepts, goals and objectives of supply chains, among which should to highlight traditional functions, such as coordination of flows of goods, information and money flowing through the entire chain. At the same time, other researchers are trying to approach this issue with a broader definition of the strategic role of chains, which is associated with the implementation of the concept of doing business, and supply chain management is identified with the management of the entire network of enterprises.

M. Cooper and L. Ellram [8] analyzed the features of supply chain management in the context of the formation of the procurement strategy of the campaign. The study was based on statistical observations of a number of international companies engaged in procurement.

Directly to the principles of F. Kotler it can be noticed that Supply Chain Management and the construction of marketing strategies are interrelated processes [9].

For Tom Davis, the term supply chain management became widely used in the practice of logistics management in the early 1990s, which required the systematization of scientific approaches to determining the essential characteristics of this concept. Tom Davis pointed out that supply chain management is a prerequisite for the successful development of supplier management, ie the process of distribution of goods among customers. Based on this, the author substantiated the methodology of supply chain management, which is based on the provisions of successful development of the supply chain of goods and takes into account all its principles [10].

According to J. Carlos work consists of 4 sections, which include issues of modeling and optimization of supply chains. To carry out the procedures of optimization of supply chains, the author proposes to use the methods of mathematical linear programming, including the number of solutions to transport problems of different levels. Particular attention is paid to methods of studying the influence of factors on the processes of building logistics chains [11].

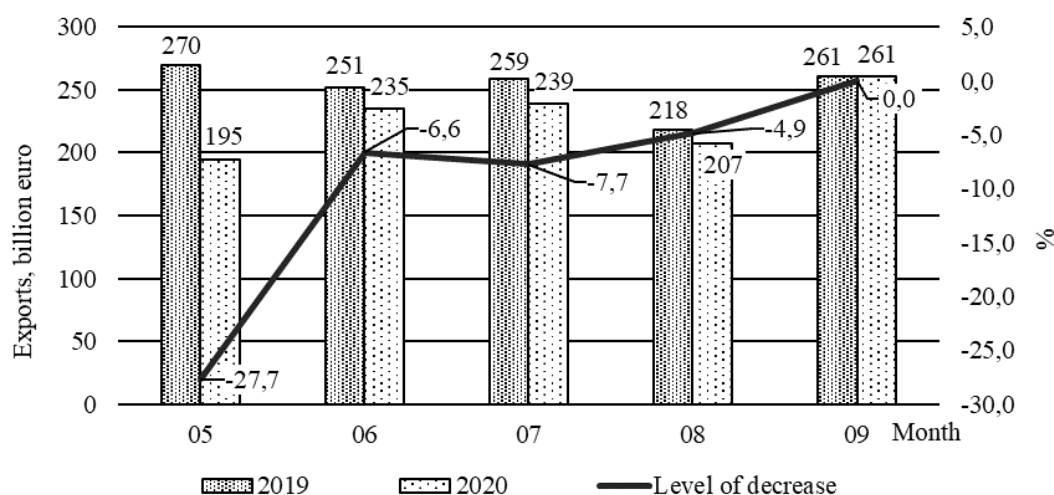
**The aim** of the paper is to define the *COVID-19* pandemic impact on the global supply chains.

**Materials and methods.** The study involved the use of a number of general and special methods. General scientific methods of theoretical analysis are used to compare the approaches of different authors to the views on the formation of global supply chains. Methods of critical analysis of sources, content analysis, semantic analysis of the use of scientific terms and references to them were used. During the study of the impact of the *COVID-19* pandemic on global supply chains, statistical data analysis methods were used, including time series analysis, assessment of the structure of economic phenomena, and assessment of growth rates.

An important element of the research methodology is the formation of a sample of information indicators for statistical analysis. For this purpose, the statistics of the World Bank and the EUROSTAT resource were used. The study was limited to the European region.

**Results.** Examining the peculiarities of the development of global supply chains during the *COVID-19* pandemic, it should be noted that it has a very significant impact on international trade. To analyze the consequences of the *COVID-19* pandemic and the quarantine restrictions imposed as a result, it is worth to analyze the indicators of international trade within the EU, in particular the volume of exports, imports and the foreign trade balance [12].

*Figure 1* shows a comparison of indicators of exports to the EU for two similar periods – 1 half of 2019 – 1 half of 2020.



**Figure 1. Exports from the EU for 2019–2020**

Source: developed by the author based on [13].

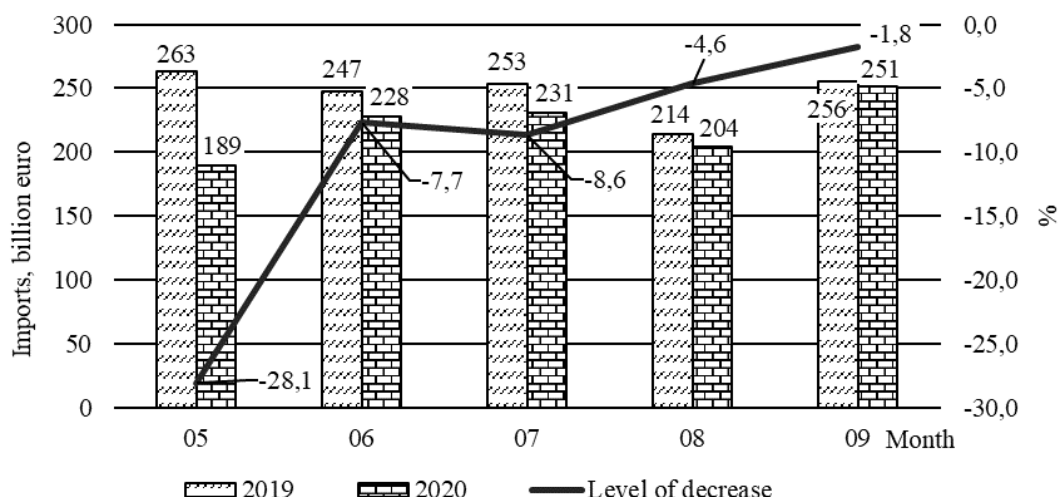
It is obvious from the statistics; the pandemic has affected the reduction of exports in the EU region. This is very noticeable at the beginning of the pandemic – since May 2020, when the full economy of the region’s quarantine restrictions. In general, the largest rate of decline in exports can be observed in May 2020. Compared to the same period in 2019, exports decreased by 27.7 %. In June 2020, the decline in exports in the region was 6.6 %, in July – 7.7 %, in August – 4.9 %, and in September, in terms of value indicators, exports in 2020 were equal to the same indicator in 2019.

Based on the above data the following conclusion [12] is considered:

- the impact of the *COVID-19* pandemic on exports in the EU region was greatest at the beginning of the pandemic – 1–1.5 months after the start of quarantine restrictions;
- after the removal of quarantine restrictions in May 2020, export volumes began to grow gradually, reducing the gap with the level of 2019;
- in September 2019, the rate of decline in exports was completely offset by the pace of economic development of the region.

*Figure 2* compares the volume of imports into the EU for two similar periods – 1 half of 2019 – 1 half of 2020.

As can be seen from the data in *Figure 2*, the pandemic has affected the reduction of imports in the EU region. Similar to exports, the decline in imports is very noticeable at the beginning of the pandemic – from May 2020. The largest rate of decline in imports can be observed in May 2020. Compared to the same period in 2019, the volume of imports decreased by 28.1%. In June 2020, the decline in imports in the region was 7.7 %, in July – 8.6 %, in August – 4.6 %, and in September – 1.8 %.



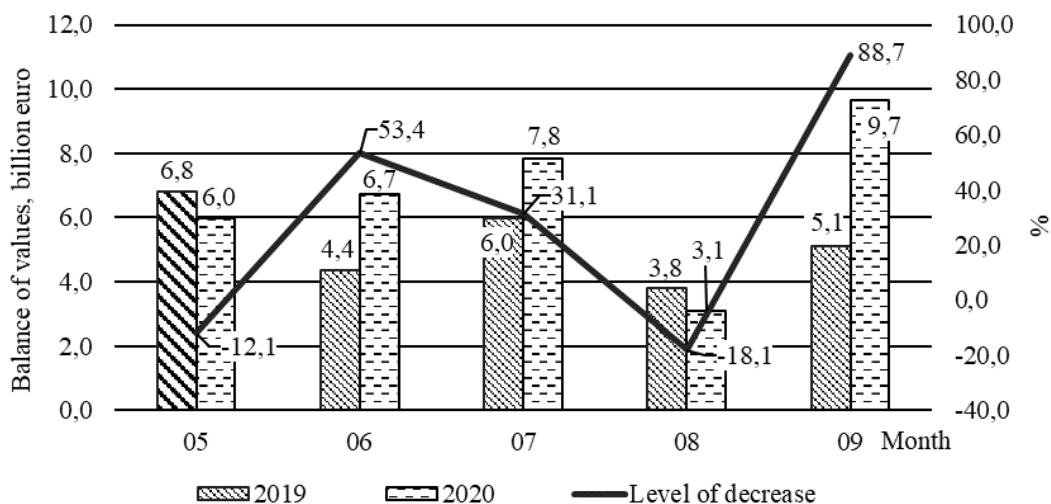
**Figure 2. Imports to the EU for 2019–2020**

Source: developed by the author based on [13].

Based on the above data the following conclusions could be defined:

- the impact of the *COVID-19* pandemic on imports in the EU region was greatest at the beginning of the pandemic – 1–1.5 months after the start of quarantine restrictions;
- after the removal of quarantine restrictions in May 2020, imports began to grow gradually, reducing the gap with the level of 2019;
- in September 2019, the rate of decline in imports was minimal, but has not yet reached the level of 2019.

Similarly, also it is worth to analyze the changes in the foreign trade balance in 2020 compared to 2019. The corresponding indicators are shown in *Figure 3*.



**Figure 3. Foreign trade balance of EU countries for 2019–2020**

Source: developed by the author based on [13].

Regarding the EU region the quarantine restrictions have even to some extent affected the growth of the positive balance of foreign trade, mainly due to reduced imports. But based on the results above and given the fact of almost synchronous decline in both exports and imports, it can be considered a certain structural crisis that has occurred in the supply chains of the EU region. At first glance, it is not noticeable from the statistics, but it can be seen quite significant fluctuations in the foreign trade balance for 2019–2020: from –12.1 % in May to +53.4 % in May–June; from –18.1 % to +88.7 % in August–September. Such significant fluctuations in the foreign trade balance indicate a decrease in the influence of the seasonality factor and an increase in the influence of a number of internal centrifugal tendencies that unbalance supply chains.

The main features of the impact of the *COVID-19* pandemic on the functioning of the global supply chain should also be considered in the future. Most Industry 4.0 business models include automation, stand-alone systems, and artificial intelligence. Until recently, these technologies mostly remained on paper. There were developments, but there was no readiness to put them into practice, no readiness to take responsibility for possible social and economic shocks.

The *COVID-19* crisis is likely to accelerate these processes. Shorter and simpler supply chains may soon appear. More flexible and adaptive management strategies and approaches are likely to emerge [12].

The pandemic has led to a sharp decline in actual supplies around the world – a vital element of most businesses. Free and open movement of goods and services is a great principle, but risky. The more supply chains depend on people, the greater the risks. Initially, *COVID-19* hit Chinese enterprises, disrupting infrastructure and supply chain networks around the world. Empty cargo containers began to accumulate in Chinese ports, and in other parts of the globe, on the contrary, there was a shortage. Whoever could, temporarily refused to work with China. But this is a short-term solution. In the long run, the risks remain, their profile has simply changed [12].

Companies also had to learn to work with reduced staff, which affected all major supply chain processes. For example, telephone lines in London are of terrible quality, and personal contact is required to confirm legal documents. All of these issues underscore the importance of the widespread introduction of non-human Industry 4.0 technologies in trade and economics. This is not the first year that Nike has talked about the need to digitalize the entire supply chain. They want to introduce 1,200 automatic machines in the United States, which will reduce delivery times from 60 to 10 days. This, according to their calculations, will lead to a significant reduction in transportation costs, import duties and the risk of overproduction. This is 30 % fewer steps in the delivery process and greater stability [14].

Nike's revenue and stability will increase, but the social consequences will be significant. The company estimates that the number of employees within one particular supply chain will be reduced by 50 %, which could lead to a reduction of 500 000 jobs (mainly in factories in Asia). But the transition from old to new supply chain management methods cannot be painless [12].

Technologies such as autonomous systems and automated production are not implemented in vain. They are implemented in a confusing, crowded environment that will inevitably lead to errors and consequences for corporate strategy, risks and damage to reputation. Thus, companies must be ready to participate in a broader discussion about the future of humanity and the place of business in it. This can be applied in the context of the effects of the *COVID-19* pandemic in the economic recovery phase and in the longer term to balance different situations.

In all changing circumstances, there are winners and losers. In the current situation, the winners are those who supply basic necessities, and the losers are those who offer luxury items. Lockdown led people to pay attention again to the basic stages of Maslow's hierarchy of needs: food, housing, medical supplies. In our 21st century, the need for Wi-Fi and digital networks has been added to this list.

It is likely that in the period after *COVID-19*, at least at the initial stage, consumers will feel a psychological attachment to the established way of life. Having got used to home delivery, having connected it with feeling of convenience and safety, it is quite probable that such model of consumption will become more desirable to consumers. But for businesses, this means additional costs, as many home delivery services are provided free of charge or at cost-effective prices. This will help find automated solutions for the collection and packaging of goods – instead of people. In the medium term, adaptability will be a priority for any business. Companies that understand their capabilities and can be flexible will cope as efficiently as possible. Examples include Louis Vuitton and Brewdog, which began producing hand sanitizers simply because they had the ability to pour liquid into bottles. Car companies began to make respirators.

The idea that is gaining momentum in logistics is bimodal supply chains: «first mode» (traditional) – cost-effective, low risk, high predictability; «Second mode» – the need for agility, speed and learning new opportunities. Today, most companies will have to become bimodal, and the priority for them will be the second mode – rapid recognition of opportunities, adaptability, willingness to solve unexpected problems [15].

It is obvious that at the moment the main problems of the industry due to the pandemic are associated with serious delays in deliveries and damage to goods with special properties (eg, perishable). We should also not forget that a lot of people are traditionally involved in cargo



transportation, starting with the preparation of cargo, its packaging and loading, and ending with paperwork and maintenance. The execution of documents for cargo – an integral part of the work of freight forwarders, carriers, line agents, warehouses and terminals, customs authorities and banks. Despite the widespread introduction of digital technologies and the use of modern data exchange systems, many stages of transportation are still associated with paperwork performed exclusively by humans. Due to the introduction of strict quarantine measures, many companies temporarily close offices, transfer their employees to remote work, changing the usual business processes, which can cause various errors in the transmission of data along the supply chain and registration of transport documents for cargo [12].

It is also obvious that any reduction in the volume of goods produced and delays in their shipment have a strong impact on the income of cargo owners. In this regard, there is a risk that customers will require freight forwarders urgently (including without proper paperwork and changes in the contract) to organize alternative options for delivery of goods, which may be more expensive or less reliable than traditional – for example, to deliver goods by air, which is constantly rising in price, use for delivery of small and little-known contractors with all the ensuing risks.

Many companies have not only temporarily closed their offices, but have also significantly restricted the business trips of employees abroad, which may lead to insufficient control over the security of transactions and reduced quality of customer service. It should be noted that in these circumstances, the role of video conferencing is significantly increasing, which allows to gather all stakeholders in the supply chain and promptly discuss the necessary actions for each party to the process [15].

It is known that in many cases, when it comes to large and important customers, contracts are concluded on terms that consciously involve more rights for the customer than for the transport operator. However, the current situation in the freight market allows operators to declare the need to review the obligations of the parties, citing the obvious «force majeure», restrictive measures by the authorities and uncertainty in forecasts of global market recovery.

Finally, and most importantly, you must promptly notify your customers of any current or potential changes in the agreed supply chain, citing force majeure, to prevent or anticipate which the transport operator has not been able to anticipate. It is they and only they can release the transport operator from its obligations in the (sometimes unlimited) amount that was originally specified in the contract [15].

If the transport operator carries out cargo operations on standard terms of liability (ie within the framework of the current legislation), it must in any case send all customers official notifications of force majeure, which

do not allow full compliance with the contract. In addition, even if the formal date of force majeure in a contract may be the subject of dispute, when concluding new agreements related to international transport, it is necessary to further elaborate and detail the terms of contracts in terms of fulfilling their obligations. and determining the «parameters» of force majeure [12].

One of the important points in the current situation is to constantly inform customers about all the problems faced by participants in the supply chain: freight forwarders, carriers, shipping lines, agents, ports, warehouses and terminals. To take advantage of the force majeure warnings, the transport operator will need to prove that the inability to fulfill its obligations to the customer is due to circumstances beyond its control. As a rule, to use protection in the form of force majeure, it is enough for operators to take the necessary measures to prevent losses to the customer, which are often not even associated with significant additional costs. Timely and constant information is just one of these measures.

**Conclusion.** Thus, according to the results of the study, it can be assumed that the *COVID-19* pandemic has significantly affected the mechanisms by which modern global supply chains operate. Significant fluctuations in the foreign trade balance indicate a decrease in the influence of the seasonality factor and an increase in the influence of a number of internal centrifugal tendencies that unbalance supply chains. The pandemic has reduced imports in the EU region. As in exports, the decline in imports is very noticeable at the beginning of the pandemic – in May 2020. The largest rate of decline in imports is observed in May 2020. The impact of the *COVID-19* pandemic on export volumes in the EU region was greatest at the beginning of the pandemic – 1–1.5 months after the start of quarantine restrictions.

The practical experience of many international companies in the world to respond to the challenges of the pandemic shows their active efforts to restructure supply chains to increase the level of automation. The main priorities in the formation of supply chains today are their flexibility and adaptability to changing external conditions.

## REFERENCE

1. Díaz-Mora, C., & López, G. E. (2018). Product Complexity in International Production Networks: Comparing EU Core and Old and New EU Periphery. *Emerging Markets Finance and Trade*, 55(4), 950-966. DOI:10.1080/1540496X.2018.1443073 [in English].
2. Brynjolfsson, E., Collis, A., & Eggers, F. (2019). Using massive online choice experiments to measure changes in well-being. *Proceedings of the National Academy of Sciences* 116.15: 7250-7255. DOI: 10.1073/pnas.1815663116 [in English].

3. De Backer, K., & Miroudot, S. (2014). Mapping global supply chains. DOI: 10.1787/5k3v1trgnbr4-en [in English].
4. Stöllinger, R., Hanzl-Weiss, D., Leitner, S. M., & Stehrer, R. (2018). *Global and Regional Value Chains: How Important, how Different?* Vienna Institute for International Economic Studies [in English].
5. Kulik, V., Marchuk, V., Garmash, O., Zakharchuk, A., & Gradysky, Yu. (2019). Formation of global supply chains in the agrologistics system. *Technical service of agriculture, forestry and transport systems*, 16, 61-69 [in English].
6. Kolodizeva, T. (2016). Supply chain management. KhNEU named after S. Kuznets [in English].
7. Pananond, P. (2015). Motives for foreign direct investment: A view from emerging market multinationals. *Multinational Business Review*, 23 (1), 77-86. DOI: 10.1108/MBR-02-2015-0008 [in English].
8. Cooper, M. C., & Ellram, L. M. (n.d.). Characteristics of supply chain management and the implication for purchasing and logistics strategy: *International Journal of Logistics Management.*, (Vol. 4, Issue 2), (pp. 13-22) [in English].
9. Kotler, F. (n.d.). *Marketing. Management: Analysis, planning, implementation, control.* 2nd ed. Moscow; Kiyv; Minsk: S-P.: Peter [in English].
10. Davis, T. (n.d.). *Effective supply chain management: Sloan Management Review*; Cambridge, Mass: 3 [in English].
11. Carlos, J. V. (n.d.). Strategic production-distribution models: A critical review with emphasis on global supply chain models, 9, 53-80 [in English].
12. Barriball, E. & Lund, S. (2020). *COVID-19 and supply-chain recovery: Planning for the future.* *McKinsey & Company*. Retrieved from <https://www.mckinsey.com/business-functions/operations/our-insights/covid-19-and-supply-chain-recovery-planning-for-the-future#> [in English].
13. Eurostat. 2020. Electronic resource. (accessed: March 2021) Retrieved from: <http://ec.europa.eu/eurostat/web/education> [in English].
14. Sait *researchgate.net*. [https://www.researchgate.net/publication/341533151\\_IMD2020\\_A\\_Large-Scale\\_Annotated\\_Dataset\\_Tailored\\_for\\_Detecting\\_Manipulated\\_Images](https://www.researchgate.net/publication/341533151_IMD2020_A_Large-Scale_Annotated_Dataset_Tailored_for_Detecting_Manipulated_Images).
15. Willy C. Shih. *Global Supply Chains in a Post-Pandemic World.* Harward Business Review. 2020. URL: <https://hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world> [in English].

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**Аджока Х. Е. Глобальні ланцюги поставок в умовах пандемії.**

**Постановка проблеми.** У контексті економічної кризи, спричиненої пандемією COVID-19 багато компаній активно впроваджують механізми управління ризиками для забезпечення безперебійного постачання. Тому важливо зосередитись на відповідальному підході до вдосконалення глобального управління ланцюгами поставок. Це дасть змогу подолати низку ризиків у сфері відмови постачання та адаптації систем постачання до умов карантинних обмежень.

**Аналіз останніх досліджень і публікацій** виявив, що вплив пандемії COVID-2019 на глобальні ланцюги постачання досить активно вивчався

у працях низки світових учених, зокрема західноєвропейських, азійських та американських. У науковій літературі основний акцент робиться на оцінці наслідків пандемії для ланцюгів поставок і світової економіки.

**Метою** статті є дослідження особливостей впливу пандемії COVID-19 на глобальні ланцюги постачання.

**Матеріали та методи.** Використано загальнонаукові та спеціальні методи: теоретичного, критичного, змістового та семантичного аналізу; статистичного аналізу даних, аналіз часових рядів, оцінки структури економічних явищ і темпів зростання.

**Результати дослідження.** Розглянуто теоретичні підходи до визначення змісту процесу формування глобальних ланцюгів поставок. Проведено оцінку впливу пандемії COVID-19 на міжнародну торгівлю в регіоні ЄС та визначено його основні особливості. Обґрунтовано ключові фактори реагування міжнародних корпорацій на виклики карантинних обмежень. Зокрема аналізуються сучасні тенденції зміни глобальних підходів до формування ланцюгів поставок і визначення пріоритетів для їхнього розвитку на найближчий час.

**Висновки.** Пандемія COVID-19 мала значний вплив на механізми, шляхом яких функціонують сучасні глобальні ланцюги поставок. Значні коливання сальдо зовнішньої торгівлі свідчать про зменшення впливу фактора сезонності та зростаючий вплив низки вітчизняних відцентрових тенденцій, що розбалансовують ланцюги поставок. Пандемія призвела до скорочення імпорту в регіоні ЄС. Практичний досвід реагування багатьох міжнародних компаній у світі на виклики пандемії свідчить про їх активні зусилля щодо реструктуризації ланцюгів поставок для підвищення рівня автоматизації. Основними пріоритетами формування ланцюгів поставок сьогодні є їхня гнучкість і пристосованість до змінних зовнішніх умов.

**Ключові слова:** ланцюги поставок, COVID-19, трансформація ланцюгів поставок, промисловість 4.0, автоматизація, ефективність постачання.