RESPONSES FOR FUTURE SUPPLY CHAIN DISRUPTIONS

Lidija Pulevska Ivanovska
Ss. Cyril and Methodius University in Skopje, Faculty of Economics – Skopje, Bul. Goce Delcev 9V, Skopje, Republic of North Macedonia
lidija.pulevska@eccf.ukim.edu.mk

Snezana Ristevska Jovanovska
Ss. Cyril and Methodius University in Skopje, Faculty of Economics – Skopje, Bul. Goce Delcev 9V, Skopje, Republic of North Macedonia
snezana.ristevska-jovanovska@eccf.ukim.edu.mk

Marija Nestoroska
Infinum Macedonia, Maksim Gorki 13, Skopje, Republic of North Macedonia
marija.nestoroska@hotmail.com

ABSTRACT

The crisis caused by COVID-19 pandemic lead to shocks in the global supply chains in 2020 and 2021. During the past two years - the trade wars, the effects on supply and demand and the ensuing logistical chaos that result from the rapid return to trade - have exposed vulnerabilities in firms' production strategies and supply chains.

The paper is based on data from empirical research, expanding on the vulnerabilities of supply chain operations during global disruptions, focusing on both internal and external aspects of the companies. The research led to the discovery of future challenges which modern supply chains have to adapt to, through the possible digitalization of the supply chains with its analyzed benefits and drawbacks. Digitalization can synchronize various elements by eliminating manual processes and spreadsheets and replacing them with digital systems in companies that unite stakeholders around the world, improving communication, collaboration and ensuring the free flow of information in real time and by including each member in the supply chains.

Based on data from the research, the paper presents detailed responses on various disruptions in supply chains. Organizations that are advanced in supply chain planning show key behaviors that drive their superior performance, enabling them to position themselves successfully and to adapt to most kinds of disruptions and momentary uncertainty.

Keywords: *COVID-19, digitalization, supply chain, supply chain disruptions*

1. INTRODUCTION

The concept of supply chain reffers to the alignment of firms which bring products and services to the market (Lambert et al., 1998). The definition is expanded by Chen and Paulraj (2004), stating that a typical supply chain includes a network of materials, information and services processing links with the characteristics of supply, transformation and demand. Felea and Albastroiu (2013) identify four elements in supply chain, which include management activities; logistics activities; objects and components.

The crisis caused by COVID-19 led to shocks in the global supply chains in 2020 and 2021. The past year - the trade wars, the effects on supply and demand and the ensuing logistical chaos that result from the rapid return to trade - have exposed vulnerabilities in firms' production strategies and supply chains. The challenge companies now face is to make their global supply chains more resilient, without weakening their competitiveness. Leading firms use these crises to provide greater flexibility by embracing process innovations and new technologies, such as robotics and automation. In the early stages of the pandemic, China was severely affected and had to reduce its economic and industrial activities, along with lockdowns of various cities. The global state of emergency was declared on March 11, 2020. The dependence of the world supply chain on world factories was at great risk, and business activities were significantly reduced. After a short time, cases were reported worldwide and COVID-19 became a global pandemic (WHO, 2020).

In recent years, the frequency and severity of these disasters have been deteriorating due to a number of factors. According to the World Health Organization, categorization of various types of disasters is established, according to their importance.

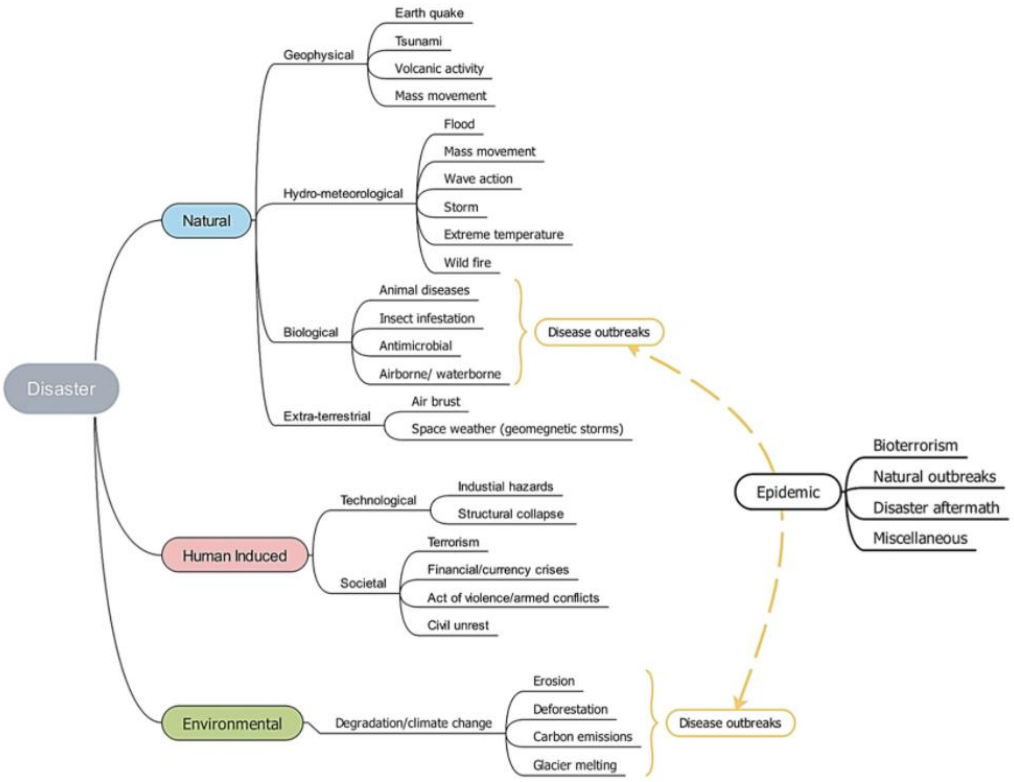

Figure 1: Classification of disasters which pose a serious threat to supply chains

(Source: Farooq, M. U., Amjad, H., Tariq, M. & Muhammad, S. H. (2021). *Supply Chain Operations Management in Pandemics: A State-of-the-Art Review Inspired by COVID-19.* Sustainability, 13(5), 2504)

The recent outbreak has disrupted the business of many companies on a large scale, which may be related to differences in the management of processes in marketing, production, services, distribution, as well as in the past when there were various disruptions in the operation of companies (Srivastava et al., 1999). Therefore, early detection of disturbances and rapid remedial action may enable industries to reduce the impact of current and future shocks (Queiroz et al., 2020). For example, it is advisable to build transparent systems to strengthen logistics capacity, optimize operations, and improve access to the right customer to reduce the bullwhip effect (Cuturi, 2015).

2. METHODOLOGY OF RESEARCH

In order to accomplish the goal of the paper, as well as the full scope of the research subject, a combination of several quantitative and qualitative methods for data collection and processing was utilized. Secondary data was gathered from various relevant publications, research papers, statistics and other sources of information. Primary data was collected through the use of a questionnaire, which was conducted on the territory of the Republic of North Macedonia, in the period of January through April, 2021 with 148 respondents, managers or other employees related to managing supply chains. The data obtained from literature, as well as from the primary research, was collected, processed, systematized and analyzed. Furthermore, basic analytical methods were used, such as the method of analysis, the method of specialization, the method of deduction and the synthesis method.

3. RESEARCH AND DISCUSSION

The onset of the pandemic, as well as the economic downturn, have caused organizations to rethink their ideas of ways in which supply chains can be optimized. Instead of focusing solely on cost and market share, organizations now need to think about how to deal with risk and how to meet strategic goals. This responsibility was given, above all, to supply chain planners, who must take into account the need for flexible maintenance of logistics regimes, rapid response to unforeseen events and addressing changes in demand with great care.

The ability to balance these needs is essential to building a resilient supply chain in the future. Organizations that are advanced in supply chain planning show key behaviors that drive their superior performance, enabling them to position themselves successfully and to adapt to any kind of influence and momentary uncertainty. These organizations are flexible enough to respond quickly to unforeseen outages, but they also plan for the future by providing support for existing and future business models. They also increase their analytical maturity to be able to use data. In addition, they follow trends in development technology to continue and improve their business strategies and goals (Lopes de Sousa Jabbour et al., 2020).

Figure 2 on the next page shows the changes which are needed to strengthen the supply chain, according to respondents. The main challenges faced by Macedonian companies due to crises are storage and distribution (47 Macedonian companies or 31.8%) and stock management and data review (43 companies or about 29%). Relatively large number of companies make efforts in supplier risk management (25.7%) and preparedness and continuity planning (22.3%). The necessary changes in the following links of the supply chain are also important for each owner, because the percentage value shows the challenges of Macedonian companies: international logistics (12.8%), network redesign (20.3%) and demand forecasting. (12.8%), which in turn

indicates that owners and managers believe that they need to make changes in domestic logistics, as well as in production (8.1%).

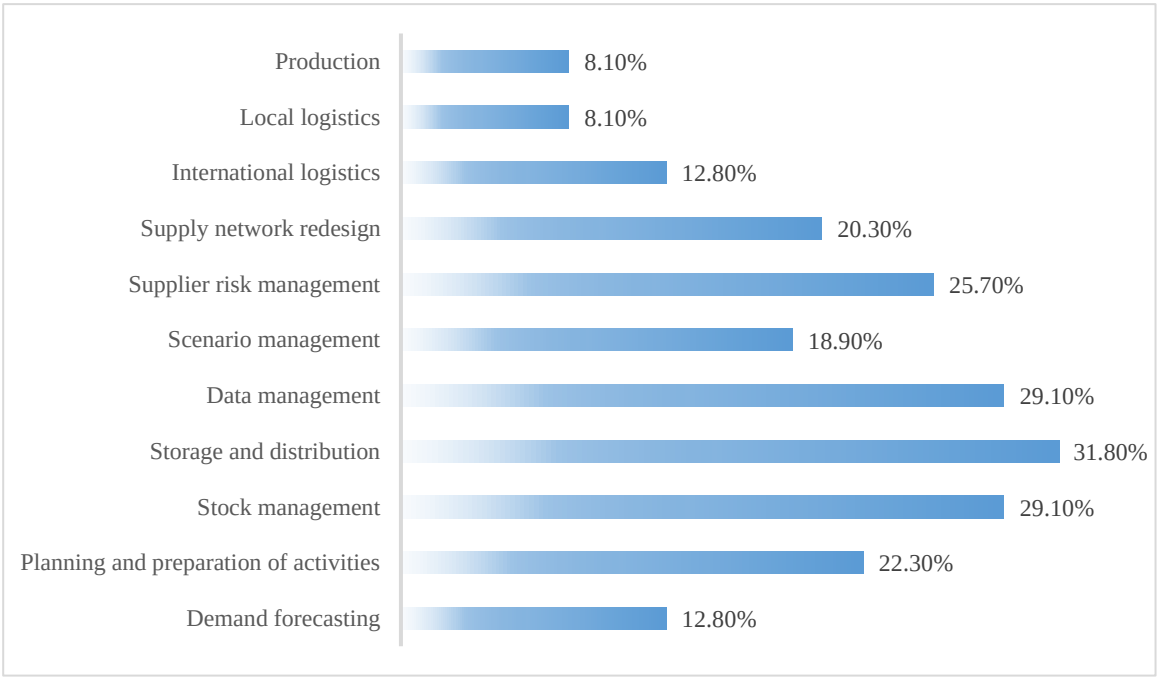

Figure 2: Changes needed to strengthen the supply chain
(Source: own research)

From these results it can be concluded that with the timely perception of the problems and the taking of appropriate measures and actions, the current processes in the work organization will not be stopped and the negative external influences will not be felt, but the functioning of the processes will continue to run smoothly.

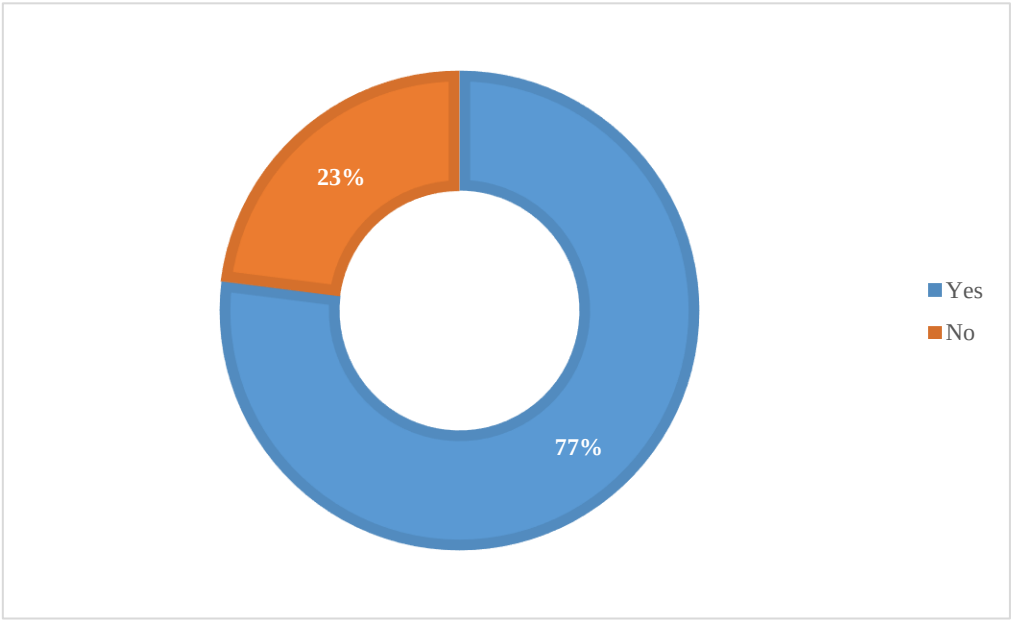

Figure 3: Innovations in the supply chain as a response to the pandemic
(Source: own research)

According to the data in Figure 3, most of the respondents (77%) answered in the affirmative way, i.e. that they are introducing an innovative solution for encouraging and advancing the business in times of crisis, and 23% of them answered that they are not introducing any innovative solution. Most supply chain managers with a clearly defined plan and analysis for functioning in times of crisis, take the initiative to find an innovative solution to facilitate and improve the way the business operates. In addition, some small and medium-sized businesses are applying to the public call for co-financed technological development grants for accelerated economic growth. In times of global pandemic, many companies are ready to invest, create trusting partnerships and realize those innovative solutions and opportunities to meet the challenges they face.

3.1. Supply chain shocks

As the pandemic spread, companies were being forced to adjust their distribution and logistics operations accordingly. The rapid changes in society caused by the pandemic, significantly show the weaknesses of supply chains. As the world struggles with the human and economic crisis, supply chains face challenges that need to be addressed, which directly affect the process of their functioning.

Supply shocks – During the beginning phases of the pandemic, experts were focusing on material supply shocks. These are disturbances in the availability of raw materials coming from China, finished products for sale, as well as products used in factories in developed markets. Companies encounter disagreement when it comes to production and timely fulfillment of demand. At that point, supply chain resistance is being considered. For a supply chain to be durable, levers of supply chain resilience should be established. Some companies have already integrated these methods, but others, in the interest of cost and sacrificing agility and resilience, relentlessly consolidate production.

Shocks caused by demand - As the pandemic crisis deepened and governments began to impose blockades, supply chains started to experience systematic shocks in demand, in which people are supplied with reserves in order to comply with envisaged government constraints (e.g., limited movement, buying in bulk in one day).

People feared that food supply chains will not be able to respond to this unprecedented, massive jump in demand. With a few exceptions, major consumer supply chains responded to the challenge. Recharge models that dictate orders from retail distribution centers to stores were manual and not sophisticated, but they were the best match for continuous and relatively smooth requirements. From the point of view of production, the successful replenishment is a result of maximizing production with the entire reserve capacity. Elasticity problems are less relevant to food supply chains because they tend to be more local than supply chains of other products.

Successive earthquakes - The bullwhip effect describes how demand spikes tend to intensify. A small increase in demand at the consumer level could lead to a large increase in production by food producers or suppliers of its packaging. So the question arises: Will the lash effect reappear? There are countless reasons to suggest that it will not reappear. Among the key drivers of this effect is the lack of visibility in increasing demand. It is thought that all actors in the supply chain are aware of the reasons why demand is increasing and that this is not an organic evolution in product sales.

The new normal - The economic impact is beginning to be felt significantly, and many economists are predicting a deep recession of unpredictable and unknown length. True, some supply chains are incredibly difficult to maintain, but others are forced to shrink.

For supply chain planners, one pitfall to avoid in order to move forward is the momentum called backup bounce. When demand reaches a new steady state, there must be a reduction in output to allow the reserve lines to descend to a new level of steady state. At that point, production is

actually increasing slightly to meet new demand. In the last major recession, ten years ago, the purchase of reserves tricked some supply chains into thinking that demand was returning to stable levels. The lash effect begins and the bounce intensifies.
After the shocks, is there an opportunity for uninterrupted functioning of the management parts of each company?
The decline in supply chain dynamics can be accelerated as companies seek different cost/ resilience and demand localization of production and procurement. Also, now is the time for the supply chain to strengthen and make contributions. Many companies reuse their products for other purposes. L'Oreal and Coty, for example, are redesigning their cosmetics product lines to produce hand sanitizers. In addition to providing a valuable resource that can help save lives, the move helps keep workers and facilities afloat despite difficult economic conditions (Harvard Business Review, 2021).

3.2. Digitalizing the supply chain

In order to achieve greater agility, digitalization of supply chains is inevitable. Digitalisation helps eliminate supply chain productivity barriers**.** Many companies are beginning to define digital transformation as the application of digital capabilities to processes, products, and tools to improve efficiency, enhance customer value, manage risk, and discover new opportunities for monetization (Ivanov et al., 2019). While a number of supply chain initiatives in recent years have focused on these issues, retailers still have a long way to go (Ivanov et al., 2020). Simply put, many companies are successfully establishing a digital supply chain and demonstrating efficient market results. This refers to the clothing retail industry, in which the demands for fast fashion and retail on all channels are exposed to a critical weakness: organizational silos that hinder the ability to collaborate, innovate and improve market speed and agility. Digitalisation destroys parts by eliminating manual processes and spreadsheets and replacing them with digital systems in companies that unite stakeholders around the world, improving communication, collaboration and ensuring the free flow of information in real time and by including each member in the supply chains.
Companies that digitize their supply chain processes with state-of-the-art systems enjoy many benefits. Some of the most common are the following:
a) Enabling a supply-driven supply chain
Demand-driven supply chain is a chain management process. Without a digital system, this is impossible. Digitalization allows companies to tailor products to supply chain, based on demand for those products, using real-time sales information, enabling them to accelerate production and reduce downtime losses.
b) Optimizing time management in the supply chains
This includes factors such as raw material duration, reservation of production facilities to ensure real-time availability of the plant, and distribution planning.
c) Utilizing the "just in time" technique
Timely production means that companies can delay critical decisions about style, product quantities, and so on. to the last minute, allowing them to design styles much closer to the final delivery date and take advantage of the latest trends.
d) Reduction of reserves
Adopting the "just in time" technique, optimizing time periods, and responding to consumer demand greatly increases the likelihood that companies will have the right mix of products and attract customers, thus minimizing reserves (Leith, 2011).
e) Improving cash flow and cost management
The faster the supply chain operations take place, the less capital is tied up in the supply chain and this is a key benefit of the digitalization of supply chain management processes.

4. CONCLUSION

At the beginning of the pandemic, many business activities were largely shut down due to extremely low demand. This has led to dismissal of many employees, lower sales and market share, and even bankruptcy. However, some businesses took advantage of the situation and increased their market share and services. To become more successful, supply chains must retain flexibility and adapt to organizational strategy as well as external changes. Supply chain process analysts in each company establish communication channels to convey strategic changes, such as new products, changed business models, new partnerships, and any supply or demand disruptions.

It can be concluded that business entities that provide products and services to customers through electronic platforms, are becoming popular and receiving an incredibly good response from the public. However, businesses that are completely dependent on physical resources face challenges. The research can be expanded by analyzing case studies in different countries and industries of companies responding to pandemic disruption, as well as primary and secondary research and comparison between the functioning of supply chains in different economies.

LITERATURE:

1. Chen, I. J. and Paulraj, A., (2004) *Towards a theory of supply chain management: the constructs and measurements*, Journal of Operations Management, 22 (2), pp. 119-150.
2. Cuturi, M. P. (2015). *BPM explained to Small and Medium Enterprises*, available at: https://www.bpmleader.com/2015/06/04/bpm-explained-small-medium-enterprises/ (accessed on 10.02.2022)
3. Farooq, M. U., Amjad, H., Tariq, M. & Muhammad, S. H. (2021). *Supply Chain Operations Management in Pandemics: A State-of-the-Art Review Inspired by COVID-19*. Sustainability, 13(5), 2504
4. Felea M., Albăstroiu, I., (2013*) Defining the Concept of Supply Chain Management and its Relevance to Romanian Academics and Practitioners*, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 15, Iss. 33, pp. 74-88
5. Harvard Business Review, (2021) *Global Supply Chains in a Post-Pandemic World*, available at: https://hbr.org/webinar/2020/12/global-supply-chains-in-a-post-pandemic-world (accessed on 15.02.2022).
6. Ivanov, D., Dolgui, A. & Sokolov, B. (2019). *The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics*. International Journal of Production Research, 57(3), 829–846.
7. Ivanov, D. (2020). *Predicting the impacts of epidemic outbreaks on global supply chains: a simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case*. Transportation Research Part E: Logistics and Transportation Review, 136, 101922.
8. Lambert, D.M., Stock, J.R. and Ellram, L. M., (1998) *Fundamentals of Logistics Management*. Boston: Irwin/McGraw-Hill.
9. Leith, P. (2011). *The Upside to Markdowns*, available at https://www.sdcexec.com/warehousing/article/10324365/justenough-software-an-mi9-retail-company-the-upside-to-markdowns (accessed on 29.01.2022)
10. Lopes, de Sousa Jabbour, A. B., Chiappetta Jabbour, C. J., Hingley, M., Vilalta-Perdomo, E. L., Ramsden, G. & Twigg, D. (2020). *Sustainability of supply chains in the wake of the coronavirus (COVID-19/SARS-CoV-2) pandemic: lessons and trends*. Modern Supply Chain Research and Applications, 110-112.
11. Queiroz M., Wamba S., Bourmont M., Telles R., (2021) *Blockchain adoption in operations and supply chain management: empirical evidence from an emerging economy*, International Journal of Production Research, 59:20, 6087-6103, DOI: 10.1080/00207543.2020.1803511
12. Srivastava, R. K., Shervani, T. A. & Fahey, L. (1999). *Marketing, Business Processes and Shareholder Value: An Organizationally Embedded View of Marketing Activities and the Discipline of Marketing*. Journal of Marketing, 63, 168–179.
13. WHO, *Disasters and Emergencies*. Available at: http://www.who.int/surgery/challenges/esc_disasters_emergencies/en/ (accessed on 10.01.2022)