

SOME SPECIFICS OF SUPPLY CHAIN MANAGEMENT IN POST-COVID PANDEMIC – 19 ERA

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Abstract: *The outbreak of the COVID-19 pandemic caused major disruptions in all parts of the supply chain. Due to the increased vulnerability at all levels of business, it is necessary to suggest appropriate supply chain management strategies. As the pandemic is expected to end, identifying the main obstacles to the recovery of the supply chain is necessary for its survival and competitiveness in the market. The goal is to ensure the efficient functioning of the supply chain in the post-COVID-19 period. This research aims to examine some specifics of supply chain management to mitigate the consequences of disruptions caused by the current pandemic. This paper analyzes some of the challenges in supply chain management recovery, including how some companies have responded to disruptions during the pandemic. Some of the supply chain models that would further contribute to improving its sustainability after the pandemic were also discussed.*

Keywords: *SCM, recovery, post COVID-19 era, challenges.*

1. INTRODUCTION

The global spread of the COVID-19 pandemic, which began in late 2019, has brought the problem of supply chain (SC) resilience into the focus of much research. SC represents a network of interdependent business entities, i.e., a set of relationships between suppliers, manufacturers, and distributors that are organized to achieve the flow of materials, finished products, information, and money (Ivanov, 2020). Increasing SC resilience can be achieved by implementing appropriate management strategies. Supply Chain Management (SCM) is the organization and coordination of goods and service flows and encompasses all processes that transform raw materials and semi-finished products into finished commodities (Ivanov, 2020; Sabouhi et al., 2021). It includes the rationalization of a company's operations to meet customer requirements, gain a competitive advantage in the market, and enable a continuous flow of all goods.

The outbreak of the pandemic significantly affected the resistance to SC. Under the current conditions, many negative consequences have occurred in terms of finances, goods delivery, customer service, production performance, and so on. Effective SCM

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2. CHALLENGES IN COVID-19 PANDEMIC RECOVERY

Some of the numerous recent studies have highlighted actual problems for SC in recovering from the COVID-19 pandemic, either directly or indirectly. According to analyzed studies, the COVID-19 pandemic might have detrimental and long-term consequences for companies and the global economy (Ivanov, 2020; Lalon, 2020; Majumdar et al., 2020). For a long time, it was believed that the financial crisis would cause significant changes in the SCs' companies. This crisis will have an impact on end-user demand for some products, such as clothing, electronics, and luxury goods (Lalon, 2020; Majumdar et al., 2020). During the recovery phase, manufacturers of these products will experience order cancellations and delayed payments from customers. As a result, it will take longer for these SCs to recover from the pandemic. Furthermore, because of the severity of the crisis, companies are likely to be impacted for a long period of time. Also, many companies may go bankrupt due to the impact of COVID-19, which will cause difficulties in allocating resources to implement SCM recovery strategies (Majumdar et al., 2020; Choi, 2020).

Numerous research studies on the current COVID-19 pandemic have identified the effects and challenges that significant pandemics have on SC operations. For example, Ivanov (2020) discusses the impact of a pandemic on demand, production, supply, and other processes in the SCM at the same time. Given the numerous consequences of the COVID-19 pandemic, SCM recovery models must address all of them simultaneously. The complexity of SC activities is expected to rise as a result of careful consideration when developing recovery solutions (Ivanov, 2020; Choi, 2020). For SC and SCM, increasing entities' capacity and continuous flows of materials, energy, and information are key challenges in the post-pandemic period. Comprehensive and effective strategies need to be introduced, as coordination and horizontal cooperation between producers at the national level within the SC are needed. Companies are also facing threats of closure due to temporary blockades in the countries where their key partners in the SC operate.

SC and SCM in the post-COVID-19 era characterize companies that have faced an economic crisis, reducing production capacity, limiting institutional support and other societal challenges in the medium or long term. Moreover, some SC partners may suspend their activities if they are unable to absorb the loss from disruption (Lalon, 2020). This will present many challenges in the recovery phase. For example, companies could be forced to purchase materials at higher prices because of a shortage of suppliers. As a result, new partnerships in the SC should be developed, which will affect the current cooperation and partnerships (Paul et al., 2021).

Recovery decisions making SCM are a major challenge that has been discussed in the literature (Ivanov, 2020; Lalon, 2020; Majumdar et al., 2020; Choi, 2020). Even though companies have encountered several major outbreaks in the past, the current COVID-19 pandemic is far more severe than prior outages. As a result, there has been a lack of capacity to deal with such a pandemic, which will cause delays in decision-making (Van Der Hoek et al., 2020). SCs are expected to have difficulty implementing quick recovery plans and strategies because of weaknesses in infrastructure, digital technologies, and resources. Many issues suggest that recovering from the COVID-19 pandemic will be challenging, requiring comprehensive research into all potential problems while respecting the economic, ecological, and social pillars of SCM (Gurbuz & Ozkan, 2020; Leite et al., 2020; Sharma et al., 2021).

Table 1. SCM challenges in the post-COVID-19 period

Authors	Challenges
Choi (2020)	The bankruptcy of partners in SC.
Garbuz et al.(2020)	Layoffs in the industry, the renewal of SC networks, and difficulties in maintaining relationships.
Leite et al. (2020)	Lack of resources to implement a rapid recovery plan and difficulties in increasing production capacity.
Sharma et al. (2021)	Low level of preparedness, inadequate infrastructure, and resources.
Sharma et al. (2021)	Demand disruption, implementation of dynamic response and the latest technologies, SCM reconfiguration, and synchronization process.
Van Der Hoek et al.(2020)	Flexibility and the possibility of the adoption of new distribution models and digital technologies are limited.

Table 1. summarizes many important challenges in SCM's recovery from the COVID-19 outbreak. Based on Table 1, which lists only some of the key challenges, it is concluded that their list is not complete. The possibilities of company bankruptcy, lack of resources and disruptions in demand, as well as layoffs, clearly indicate that the current conditions will maintain the status quo and cause other challenges that must be effectively addressed in order to succeed and sustain the sustainability of SCM.

3. SCM - EXAMPLES OF GOOD PRACTICE AT THE TIME OF COVID-19

The efficiency of SCM plays a key role in improving the financial performance of companies, which is directly related to meeting customer requirements through the delivery of products and services. It is also a crucial factor in lowering procurement, transportation, and delivery costs. Costs incurred as a result of unfulfilled deliveries were unavoidable during the pandemic. However, some companies have established sustainable strategies to mitigate losses incurred as a result of the new business environment. Amazon and Johnson & Johnson are just two examples that will be discussed below (Van Der Hoek et al., 2020; Leite et al., 2020).

3.1 Flexibility in Amazon delivery

Amazon is an American multinational technology company based in Seattle, Washington that has a focus on e-commerce, cloud computing, and artificial intelligence, as well as other Industry 4.0 solutions. Specifically, Amazon is the largest electronic marketplace and cloud computing platform in the world, measured by revenue and market capitalization. This major world trade network faced incredible obstacles in early 2020,

partly due to growing global demand and partly as a result of quarantine due to the COVID-19 pandemic. Despite many challenges in a short period of time, Amazon's SCM has been successful in solving a number of problems at all levels of customer service. At the moment when the countries were locked down, i.e., the borders were closed, the transport stopped and many deliveries were not delivered on time (Ivanov, 2021).

Amazon then showed its strongest link, and that is flexibility. At that moment, their SCM had to adapt to the new situation to find a way to fulfill their goal, which was to satisfy the end-user. Amazon's SCM has taken over the cost of delayed delivery. The company has made changes to its business model to prioritize the storage and delivery of all deliveries that were delayed during the pandemic, including those related to the delivery of medical care and household necessities, as well as basic foodstuffs. Adjustment measures have enabled the distribution of goods, allowing Amazon to meet its primary goal of meeting customer requirements (Ivanov, 2020; Ivanov, 2021). Another strategy used by the corporation to avoid supply delays during the pandemic was to go entirely online. During the current pandemic, Amazon also opened plants dedicated solely to internet commerce. As a result, the company was able to increase its delivery capacity. By modifying its business model, Amazon nearly doubled the capacity of its grocery delivery service from March to September 2020, resulting in increased profits (Figure 2).



Figure 2. Amazon's sales and profits grow in 2020 (Ivanov, 2021)

Furthermore, to protect employees and customers, health and safety measures against the COVID-19 pandemic have been developed at their physical collection sites. To adapt to current conditions, many stores have also adopted a new manner of working. For example, during certain parts of the day, they provided services to the elderly and users with special needs, as well as high-risk groups (Ivanov, 2021). These conditions affected the increase in Amazon sales that continued in 2021, as shown in Figure 3.

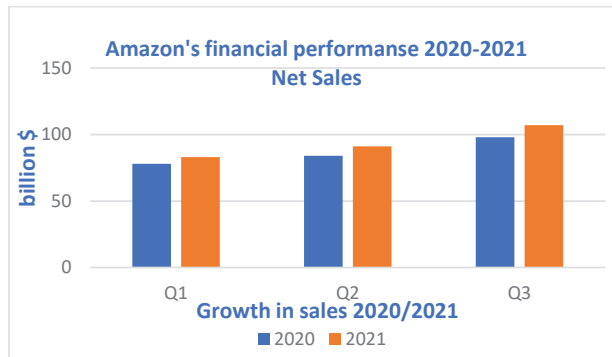


Figure 3. Amazon's growth in sales for 2020–2021 (Ivanov, 2021)

Based on Figure 3, it was observed that there was an increase in sales volume of 6.5% to more than 8% in the first and second quarters, respectively. This increase was about 9.5% higher in the third quarter of 2021, which indicates the effectiveness of Amazon's SCM in post-COVID-19 conditions. Furthermore, accepting costs for delivery delays at the start of the pandemic resulted in a revenue boost during the COVID-19 pandemic (Ivanov, 2021).

3.2 Flexibility in supply - Johnson & Johnson

Johnson & Johnson is a leading international company engaged in the production of drugs, medical devices, and related products. As a result of its response to the COVID-19 pandemic, Johnson & Johnson has provided SCM sustainability. This SC has been disrupted due to demand for a quick response from its SC in the past, giving SCM valuable expertise in circumstances like pandemics (Ivanov, 2021).

Thanks to the activities of Johnson & Johnson, the increase in demand for its paracetamol-based painkiller has doubled, and Tylenol. Although there was a temporary scarcity of this medicine, the SC worked promptly to increase product supply, allowing manufacturing and other sectors to expand their capacity. Following the pandemic's spread in Italy, SCM responded to many challenges related to customer satisfaction. Besides, Johnson & Johnson modeled possible scenarios based on actual data on the number of employees and regular production volume to protect itself from production delays due to staffing issues.

Based on the outcomes of applied quantitative models, company management was able to estimate the impact of disruption and identify potential SCM areas for modification. The company was able to use risk simulation technologies to determine the appropriate quantity of raw material orders and avoid the implications of ordering greater or smaller quantities (Ivanov, 2020; Ivanov, 2021).

Visibility of the situation of inventory in the SC is always critical for the supplier of crucial drugs, especially during the pandemic. To track common order patterns and discover major discrepancies, Johnson & Johnson deployed digital technologies and advanced algorithms. As a result, the deliveries had track and trace sensors attached, which could also measure the temperature and product quality (Lalon, 2020; Majumdar et al., 2020). This continual visibility into the whereabouts of the package also aided the company in coordinating delivery, particularly during the pandemic when numerous bans and limitations were in effect. For example, smart glasses technology enables employees to

see and access information through the glasses of another person on the spot and also extract data (Majumdar et al., 2020; Paul et al., 2021; Van Der Hoek et al., 2020).

Thanks to those and similar technologies, the company can continue functioning without interruption. Some of the company's product lines are also included in other locations around the world. The company also produced hand sanitizers for its staff as well as for the health centers in these facilities (Ivanov, 2021).

Of the many performances, Jonson & Jonson and Amazon focus more than half of their efforts on flexibility, inventory, and customer service. Customer requirements cannot be met unless products are available in warehouses. In addition, when the SCM is not flexible, it cannot respond to user requests. Due to the high level of internal flexibility, Amazon and Jonson & Jonson were able to provide a sustainable SCM to meet stochastic user requirements. In that way, these companies have also become more resilient, especially in terms of the conditions of the current pandemic (Sabouhi et al., 2021; Ivanov, 2021).

4. SCM SPECIFICS AFTER COVID-19 CONDITIONS

Before the COVID-19 crisis, trade tensions rose due to rising import duties between Washington and Beijing (Remko, 2020). Rising costs and the emergence of other financial barriers bring with them many challenges for SC. The main goals of almost every SCM are to minimize delivery time and provide service at the lowest price. However, political developments and now the global pandemic have revealed the weakness of the current production models. The hidden costs related to dependence on a single source and the lack of flexibility in adapting to real-time disturbances has come to the fore. As a result, the change that has already begun in the SCM towards greater flexibility will be significantly accelerated. In the coming years, a reconfiguration of the SCM is predicted based on three dimensions, discussed below (Buatois & Cordon, 2020; Remko, 2020).

4.1 From globalization to regionalization

The regionalization of logistics hubs is one of the goals of flexible and sustainable SCM in post-COVID-19 conditions. The problem is that China is almost the only source of material supply, which was a condition for increasing the costs of all new SCs. The difference in labor costs between Asia and Europe, which used to be a great attraction for companies, has narrowed significantly in recent years. However, China's developed network of suppliers continues to attract global interest from many companies (Ivanov, 2020; Remko, 2020).

The world's major electronic equipment manufacturers procure about 40% of their parts from China (Remko, 2020). Returning to regional SCs is a major challenge in terms of procuring the necessary parts. Given the incredibly large number of required parts of electronic equipment, each of them needs different delivery time. However, this challenge might be worth accepting in the world after COVID-19. An example that justifies the transition from a global to a regional SC is the high share of global procurement in the pharmaceutical industry in Europe. During the pandemic, Europe imported 80% of the active components of drugs from China and India. In the future, more precisely in the post-COVID-19 era, it is quite expected that European governments will ensure that these supplies can be drawn from their region. This would lead to a meaningful shift to regional sources of supply (Buatois & Cordon, 2020).

4.2 Supply chain as a new protagonist

Due to the economic crisis of 2008, the balance sheets of financial institutions around the world were analyzed from the aspect of their readiness for recession. Companies have been obliged to assess their cybersecurity systems after a series of big cyber-attacks over the last 10 years. SC resistance evaluation will become the new standard across the globe following COVID-19. In the post-COVID-19 period, the current global business model, which is optimized for low costs, will not be used. New business situations necessitate new optimization priorities. SCM activities have taken the lead in all aspects of the company's operations (Remko, 2020).

Due to the consistency of production volume, SC has traditionally been able to provide a high level of customer service while reducing delivery costs and maintaining acceptable quality. SC, SCM, and production facilities provide limited flexibility in volume. As a result, production changes have a notable impact on the entire SC. As expected, the largest suppliers and logistics operators must have such a SCM that will ensure the smooth implementation of all activities in the service of customers in disaster conditions such as fires, floods, tsunamis, pandemics, strikes, civil unrest, etc. (Buatois & Cordon, 2020).

4.3 Human resources

The human factor is back in focus again and it will be a critical pillar in rebalancing the global SC during and after this crisis. Statistical models are rendered ineffective by significant and unexpected changes in production volume. They categorize events like the pandemic as "unusual" and, therefore, exclude them from being generators of valuable information. Although visibility is required for SC entities to make choices, the majority of decisions must be made manually. In conclusion, the human factor is critical. The "autonomy" idea (automation with personal interaction) pioneered by Toyota has proven to be the most adaptive. This comprises automation of around 80–90% of the system while allowing 10–20% of human experience to improve system performance (Ivanov, 2020; Remko, 2020).

As the world's unemployment rate raises, the health and agricultural industries, as well as grocery stores and other key areas of "core business," are facing labor shortages. Amazon has announced 100,000 new positions in manufacturing centers, many of them in China. The return of quarantined employees to manufacturing plants and factories has brought relief to the West. Similarly, despite the positive impact of artificial intelligence on efficient e-commerce, the "last mile" of delivery from the distribution center to the doorstep still requires a human driver or drone operator. Working should be controlled as a fundamental mode of adjustment that is integral to the crisis response strategy. For example, to accommodate the demand for N95 masks, new manufacturing facilities are required. A larger workforce is required to start a new production line or modify an existing one. COVID-19 has exposed the flaws in the global manufacturing system, demanding a revision of the SC to respond to market demands. Post-COVID-19 goals of companies would make SC regional, change the existing SCM as a significant driver of business and strengthen the social pillar of sustainable SCM so that employees will be the key to its competitiveness (Sharma et al., 2021).

5. CONCLUSION

The COVID-19 pandemic has caused disruptions at all levels of business and society. Based on the conclusions of the paper, the great complexity of the functioning of the SCM in the conditions of a pandemic can be noticed. In addition, it can be concluded that the consequences and time required for the recovery of SC and SCM will be significantly longer than the interruptions that occurred in previous years (such as earthquakes in Japan, floods in Thailand, etc.). As the pandemic made new business conditions, companies had to find a way to adapt to the new situation. Examples are Amazon and Johnson & Johnson. The mentioned companies managed to adapt their businesses to the conditions of the pandemic thanks to their flexibility, which was discussed in the paper. To meet customer requirements, Amazon had to bear the cost of delayed deliveries. It should be noted that the COVID-19 pandemic significantly affected changes in consumer behavior and global economic conditions.

Continuous monitoring of trends in ordering enables the identification of potential generators of distortions in customer requirements. Therefore, Johnson & Johnson applied digital technology and sophisticated algorithms to make the delivery location transparent to all entities in the SC. In this way, the company provided conditions for the coordination of participants in the delivery of goods, especially during the pandemic.

The paper analyzed some typical potential obstacles and challenges in the recovery of SCM from the current crisis. The literature review identified the main obstacles, namely the bankruptcy of SC partners, inadequate infrastructure and resources, a lack of resources to implement a short-term recovery plan, and a low level of readiness for digital technology implementations. Future SCM trends are mainly driven by the return of SC from the global level to the regional level and the return of employers to the main role in the management of all processes. These are the only basic conclusions that this research provided as directions for future research. It should be noted that the real picture will only be clearer when the pandemic is completely over. The conclusion is that the approach to SCM will be completely different than before the pandemic. It is ungrateful to predict how long it will take for the SC to fully recover, which will result in significant changes at all levels of the SCM.

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