

RESEARCH ARTICLE

## Supply chains and COVID-19: impact on Jordan's, countermeasures and post-COVID-19 era

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### Abstract

The objective of this paper is to assess existing information on the COVID-19 pandemic's impact on Jordan's supply chain and countermeasures adopted by businesses to mitigate supply chain interruptions. Many effects have been felt in the supply chain industry. The study will explain how travel restrictions have reduced international trade which has also affected Jordan's supply chain. Global business leaders may use information from this study in making necessary decisions relating to trade activities in the country. It will assess Impacts of COVID 19 in the supply chain Industry in Jordan particularly the impacts of supply chain on demand, on logistics, manufacturing, and finally on people. A series of economic implications and research options are provided based on these results.

**Keywords:** Global supply chain; manufacturing; demand; supply; logistics

### Introduction

Corona virus which is scientifically known as COVID 19 is one of the major deadly viruses ever experienced and evidenced in the world (Peeri et al., 2020). The virus outbreak became a major issue to almost 80% of global countries (WHO, 2020). Jordan imposed major travel restrictions and cessation of movement in many regions. This was to help reduce the spread of the virus to other citizens as the disease caused many deaths among citizens (Baldwin & Di Mauro, 2020). The country also experienced rapid infection rates of the disease within its borders. Without observing and implementing health guidelines to help reduce the spread of the virus, Jordan would have lost many people to the disease (Alzoubi et al., 2020). However, there were many preventive measures which were put in place to help reduce the spread of the virus in the region.

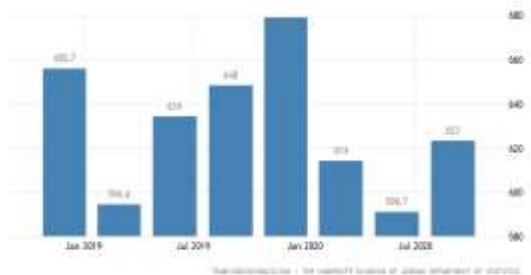
The pandemic's immediate impact on businesses is already severe, and the medium- to long-term implications are projected to be substantially worse (Haren and Simchi-Levi, 2020). COVID-19, according to a recent study, has produced instability in 94% of Fortune 1,000 companies (Fortune, 2020). According to a Dun & Bradstreet (2020) survey, 51,000 global corporations have one or more direct suppliers in Wuhan, and at least 5 million organizations have one or more tier-two suppliers in the Wuhan area, which is where COVID-19 originated. Additionally, a recent survey found that almost 938 Fortune 1,000 companies have tier-one or tier-two suppliers in the Wuhan area (Dun and Bradstreet, 2020).

The significant economic reforms enacted by Jordan throughout the previous two decades and various structural adjustment programs have resulted in nearly doubling the average Gross Domestic Product (GDP) during the 2010-2018 period and posted a 1.9 percent increase for 2018 (Forster et al., 2020). The transport industry which is one of the essential components of the infrastructure has a substantial influence on the economic growth of the nation and accounted for roughly 8.4 percent of Jordan's GDP in 2017. The announced plans to create a 1,000-kilometer railway network in Jordan which would provide train links with Asia and Europe, Turkey, and GCC is predicted to grow the market trajectory broader (Pedigo et al., 2020). However, with the onset of COVID-19 epidemic, a serious public health concern, there was impact on manufacturing, sales, supply chain, and on people (Zhu et al., 2020).

Covid 19 preventive guidelines by Jordan government promoted online trade which reduced physical trades. Since the virus is spread through contact when an infected person comes into contact with an uninfected one, it majorly affects trade markets and centers (Maliszewska et al., 2020). Gereffi (2020) explains that large-scale business organization with online websites benefited from increased demand of commodities when households engaged in online shopping during the pandemic. Additionally, the pandemic limited the movement of people and caused most of the businesses to be physically closed. This increased the demand of goods through the online space as most of these goods were required for survival. However, small-scale traders, for instance, sole

proprietors operating shops, hawkers, and retailers, who depend on physical selling of goods and services experienced reduced sales of products (Ligon et al., 2019). The adversity fairly spread to the small-scale businessmen. These small-scale traders found it difficult to adapt to selling their products through online platforms since their common consumers preferred shopping relatively large quantities of products from large popular organizations (Gereffi, 2020). The Supply chain sense in the complex operation on supplying resources to the same consumers, bearing in mind the small-scale trader was moving from competing locally into trying to adapt to competing with bigger online based and more established companies. These traders faced harsh technical obstacles such as transforming into digital supply chain with no time to learn or rather with a little time to learn, and yet they also had to adapt and fit in the market and keep up for them to be in business. Since small traders relied on other big traders for importing and exporting their products, COVID-19 was detrimental on the relationship because the big traders could not undertake the logistic processes. The Effect of Covid 19 on Jordan's GDP from transport in the country is presented as in the graph below.

Figure 1. Graph 1: Jordan's GDP from Transport



**Source:** The Hashemite Kingdom of Jordan Department of Statistics.

From the picture above, in January 2020, it depicts a distinct drastic rise in transport GDP as compared with 2019 then a drastic drop in July 2020 after restrictions were introduced in the country in March 2020. The difference between these quantities shows the possible effects of Covid 19 on Jordan's supply chain which in turn reduces the overall trade growth. The total reduced amount as displayed in the graph are to a large amount caused by the direct or rather indirect supply chain impacts of Covid 19 in Jordan. As a response to these requests for further information, this study conducts a systematic literature analysis and presents a detailed overview of the COVID-19 pandemic's effect on Jordanian supply chain.

As a result, it would be fascinating to learn how firms in Jordan are handling COVID-19-related difficulties, given that they frequently lack financial resources and work within stricter economic constraints than enterprises in industrialized and developed nations. Additionally, studies on firms' plans for addressing supply chain disruptions caused by COVID-19 are scarce and illusive (Butt, 2021; Choi, 2020). As such, this article will examine the remedies made by Jordanian businesses to solve COVID-19-related difficulties. The following research question is

produced to serve as the study's guidance for the remainder of the investigation. RQ: How is COVID-19 interfering with Jordan's supply chain operations? Specifically, this study seeks to examine the remedies performed by customers, suppliers, and distributors in response to COVID-19-related interruptions.

Two significant contributions are made by this work. First, it details the interruptions to supply chains induced by COVID-19. It discusses some of the solutions that buyers, suppliers, and distribution centers have implemented to offset COVID-19's influence on supply chains. Second, this research offers some constructive guidance to firms on how to manage supply chain disruptions in the aftermath of the COVID-19 epidemic. It also discusses new business opportunities that may exist in a post-COVID-19 environment and how firms might capitalize on these chances. Additionally, firms can employ these suggestions to strengthen themselves in the post-pandemic age.

### Literature Review

Supply chain disruptions are defined as unplanned and unanticipated events that interrupt the normal flow of products and materials through a supply chain, exposing firms to operational and financial risks (Craighead et al., 2020). Wamba (2020) concentrated on the severity of interruptions, whereas Ellis et al. (2010) considered supply chain disruptions in terms of their frequency and magnitude. Disruptions in the supply chain can also occur at any point along the chain (Blackhurst et al., 2005). Risks associated with supply chain disruption are commonly related (Chopra and Sodhi, 2004; Thun and Hoenig, 2011).

Several studies have documented the many, potentially negative effects of disruptions on various supply chains, including accidents and natural disasters (Cooke-Davies, 2002), poor communication, part shortages and quality issues, operational issues (Chopra and Sodhi, 2004), transportation delays and port closures (Chapman et al., 2003) have all documented the many, potentially negative, effects of disruptions on various supply chains (Dubey et al., 2020). These studies have also demonstrated frequent and severe supply network interruptions on individual business or overall supply chain performance. Furthermore, maintaining a highly linked supply chain is becoming increasingly difficult (Wamba, 2020).

Increasing market globalization unpredictability and product life cycles, supply and demand, and increased usage of logistics partners distribution and manufacturing and all of these factors lead to a complicated global network (Dubey et al., 2019). The complexity of many supplier networks has caused many firms to understand that supply chain interruption is inescapable, and many have taken steps to avoid it (Ketchen et al., 2021). Furthermore, these studies have demonstrated that severe and frequent supply network interruptions have a negative impact on the performance of individual firms as well as the performance of supply chains in general. Additionally,

maintaining a highly integrated supply chain is becoming increasingly difficult (Wamba, 2020).

**Discussion**

**Impact from Sources**

Epidemics are a special sort of supply chain hazard characterized by the simultaneous disruptions of supply, demand, and logistical structure in a given region (Ivanov 2020). COVID-19 was found in a large number of publications from the review sample in these three supply chain components.

**Table 1: Impact from sources**

Area	Words Mentioned	Sources of Information		References
		N	%	N
1. Manufacturing	Manufacturing	44	%	575
	Production	42	%	737
	Operations	40	%	517
2. Supply	Supplying	32	%	117
	Sourcing	41	%	335
	Procurement	20	%	68
	Suppliers	44	%	560
3. Supply chain	Supply chain	38	%	531
	Transportation	41	%	344
	Distribution	34	%	150
	Delivery	36	%	163
4. Demand	Demand	43	%	542
	Sales	32	%	154
5. People	People	35	%	125
	Workers	22	%	65
	Consumers	38	%	185
	Buyers	25	%	76

**Source:** Research finding

The propagation of disturbances along the supply chain is significant; rather than being limited in one sector, the disruption flows to other sections, harming the supply chain's overall performance. The ripple effect is the name for this phenomenon (Dolgui et al. 2018). The various

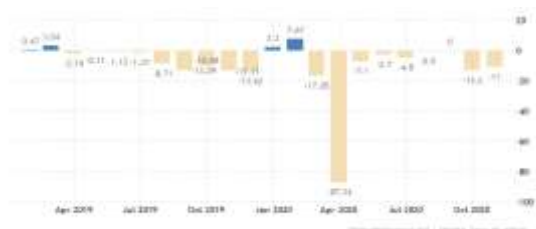
consequences of the COVID-19 interruption did not occur at the same time but were part of a cascade of ripple effects caused by severe shocks, such as the shutdown of manufacturing companies and industrial facilities in Jordan. The COVID-19 pandemic impacted five segments of the supply chain, according to the review sample:

manufacturing, demand, supply, people, and logistics. The consequences on each of these five categories are summarized in the subsections that follow.

### Impact on Manufacturing

Plant closures, one of the most significant supply chain disruptions caused by the COVID-19 epidemic, had an effect on the manufacturing industry (Olsen et al., 2020; Panesar et al., 2020; Kumar et al. 2020; Migliori, et al., 2020). The manufacturing assembly halts for Jordanian enterprises began in March 2020, to stop the virus from spreading further (Ivanov, 2020). Jordan's industrial production in April 2020 fell to -87.34 percent from 2.3 percent in January of the same year as shown in the figure below.

**Figure 2:** Industrial Production in Jordan



**Source:** The Hashemite Kingdom of Jordan Department of Statistics.

It took a long time and a lot of effort to re-start manufacturing in Jordan. According to a study performed by the Institute of Supply Management in late February and early March 2020, Jordanian factories were operating at 50% capacity, with 56% of usual workers on the job. Manufacturing had to wait for supply to start up, adding to the delay (Van Hoek et al., 2020). Infected workers, safe distancing measures inside the facility, and reduced staff mobility owing to traffic restrictions all hampered the resumption of productivity (Seah, & Agrawal, 2020; Khan & Teicher, 2020; Schleicher, 2020).

### Impact on Supply

The most often stated impact on supply was significant decreases in supply availability, leaving enterprises unable to balance supply and demand adequately (Dolgui et al., 2020). Kumar and Mishra (2020) pointed out that even important operations were subjected to considerable supply interruptions owing to supplier production shutdowns in Jordan. Prescription pharmaceuticals, textiles, potassium, phosphates, fertilizers were all mentioned in the articles as being heavily affected (Olsen et al., 2020; Bryson-Cahn et al., 2020). Beginning in March 2020, when Jordanian supplies were curtailed, factories began encountering input shortages from suppliers in China, Europe, and North America, causing them to operate below capacity (Paciocco, 2020). Internal

supply issues hampered manufacturers, who had to rely for their suppliers to scale up output before they could resume assembly (Kebede et al., 2020). Even food producers began stockpiling goods in order to avoid supply shortages caused by product expiration. Farmers are facing supply issues as a result of limited access to vital goods such as fertilizer and pesticides (Mouloudj, Bouarar, Fechit, 2020).

### Impact on Logistics

The outbreak in Jordan disrupted transportation linkages between suppliers, manufacturing facilities, and consumers by decreasing the availability of various forms of transportation even when suppliers were able to satisfy orders (Kebede et al., 2020). The shipping industry experienced interruptions in all modes of transportation: sea, air, and land (Kabadayi, O'Connor, & Tuzovic, 2020). The suspension of Jordanian port operations in March 2020 substantially hampered sea/ocean freight (Al-Tammemi, 2020). As a result, shipping corporations increased blank sailings bypassing ports or whole string of ports entirely. The change in port operation hours prompted trucks to encounter delays while picking up and putting off goods (Ito, Hanaoka, & Kawasaki, 2020).

Because of the closure of manufacturing activities, firms ceased receiving deliveries from their suppliers, which increased short-term storage of goods (Abdallah, 2020) and generated further backlog at ports (Khan & Rayner, 2020). Airfreight was considerably hampered by limitations on cross-border movement of people and the cancellation of passenger flights, which reduced the availability of belly cargo (Rastogi & Arvis, 2020). Border crossing limitations and sanitary precautions at borders can have an impact on road traffic (Bielecki et al., 2020). This, along with limited operating hours at ports, resulted in severe delays in reaching consumers.

All of these effects on various modes of transportation reduced freight volumes (Abdullah et al., 2020), causing some smaller companies to exit the market and lowering overall capacity (Guerrieri et al., 2020) and ultimately increasing shipping costs (Bielecki et al., 2020). The unanticipated huge rise in online demand hampered firms with inadequate inventory dedicated to the online channel and created acute shortages of last-mile delivery capacity in reaching end customers (Hobbs, 2020). The negative impact was exacerbated by virus containment procedures, which included new packaging and cashless last-mile delivery regulations (Alshebami & Rengarajan, 2020). According to Aday and Aday (2020), the difficulty to reach end users resulted in considerable food waste and income loss for food producers.

### Impact on Demand

Most of the publications in the evaluation depicted the impact of the coronavirus epidemic on demand in Jordan as bifurcated: while certain sectors saw big increases in demand, others saw considerable drops (Elavarasan et al., 2020). Essential goods, such as some grocery items, and



products protecting people from the virus, such as masks, hand sanitizers, and cleaners were in high demand, as well as some medications, herbs, and vitamins (Correa et al., 2020). A considerable portion of the food and beverage supplies placed in retail stores to satisfy peak demand (March–June 2020) were predicted to expire due to lockdowns (Balla-Elliott et al., 2020). Lockdown measures and working from home raised demand for non-essential commodities (Nicola et al., 2020).

Most other product categories experienced decreased demand, owing to economic uncertainty and virus control efforts (Meeke, Hassink, & Kalb, 2020). Demand for consumer gadgets, as well as garments and accessories, fell precipitously (Amit, 2020). Plant shutdowns lowered demand for equipment and chemical items used in automobile manufacture in the B2B market (Gereffi, 2020).

The cancellation of events and shutdown of restaurants owing to virus containment measures by the Jordanian Government lowered demand for food sold via this B2B channel, although the overall impact on demand for food seems to be favorable due to increased consumer demand. As a result, food consumption grew overall (Cavallo, Sacchi, & Carfora, 2020). Consumer preferences shifted, favoring big shipments of certain items and weekday delivery during shutdown times (SHARMA & MEHTA, 2020).

### **Impact on People**

The infection spread across the population of Jordan at the same time that the supply chain disruption spread too (Rizou et al., 2020). Infections and anti-infection treatments may cause supply chain disruptions. People are a valuable resource in the supply chain as both employees and customers. Workers and customers may both have an impact on the supply chain. Demand variability and resulting demand–supply imbalances or shifting demand channels towards more online shopping can cause issues for businesses that are not flexible enough to adapt delivery networks quickly.

During the coronavirus outbreak, the most significant effect on individuals was on the workforce. Worker protection measures, or limits on migration caused labor shortages during the epidemic (Irudaya et al., 2020). Affecting supply and demand shocks, enterprises in production and delivery had to choose between safeguarding employees' health and preserving operational viability. Protective distances hinder output efficiency in factories (Hietanen et al., 2020). Reduced seasonal migrant worker availability causes considerable food waste and revenue loss for businesses. Industry professionals could not travel across borders to install or repair equipment for their clients due to border restrictions (Rizou et al., 2020).

### **Conclusion and Limitations**

The paper presented and analyzed the results on the impact of COVID-19 on Jordan's supply chain based on exhaustive literature study. The research indicated that the incident affected various levels of the supply chain. The study found five primary impacts: manufacturing, demand, supply, logistics, and people. The fact that all these impacts stemmed from the same incident underlines the scale and complexity of the COVID-19 disruptions. The incident not only unfolded at several tiers of the supply chain, but also interrupted them. During the epidemic, many supply chains faced serious difficulty. The research indicated that the epidemic constrains individuals, their mobility, and their behavior, and hinders or makes the utilization of people as a resource unreliable. Because humans are engaged in all phases of the supply chain, whether as customers, employees, suppliers, or drivers running logistics systems, all stages were impacted. Thus, the pandemic event's human component was previously disregarded in prior supply chain resilience studies. The study provided here contributes to our understanding of the role of individuals in supply chain disruptions. As a result of the coronavirus outbreak in 2020, a series of disruptions occurred. A pandemic may impact supply networks in various ways, spanning time and space. Managers should now be better prepared to deal with a future epidemic.

The research given has limitations, just like any other study. The research addressed the current state of information about the nature of the supply chain disruption induced by the coronavirus pandemic (including literature until the end of December 2020). There are limits to how thorough a picture of the ripple impact across the supply chain can be created due to the time delay in the publishing process and the fact that the epidemic is continuing, and the consequences of the pandemic still linger in the economy. Another drawback is the process of doing an organized literature review. Because the technique relies on secondary data, some of the nonacademic contributions included in the literature sample to better represent contemporary arguments regarding this issue may be called into question as to their veracity and robustness. Nonetheless, their arguments are intriguing because they contribute to the communal narrative about how supply chains should approach the COVID-19 issue in the future. Therefore, future research should be focused on establishing how the epidemic is affecting business continuity planning. Future research should also include a cross-continental analysis to see whether the outbreak of the pandemic has a bigger impact on supply chains in Asian nations than in European ones. Using digital technology to diminish COVID-19's effect on the manufacturing side of supply chains should be the focus of future studies. The internet of things (IoT) and robots, among other technologies, have been mentioned as ways to simplify the production process.

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