

THE COVID-19 IMPACT ON THE FOOD AND TEXTILE INDUSTRY: LESSONS LEARNED

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Abstract The Covid-19 virus pandemic has crippled life as we know it. The virus is still spreading, and life is still not normal. Of course, various industries are crippled. Supply chains will need to become more resilient in the future to possible recurrence of incidents like the pandemic of Covid-19. In this article, we will present how the Covid-19 virus pandemic has affected the food and textile industries. We have reviewed what measures were made at the start of the pandemic and how these industries have adapted to them. We also reviewed how the measures will affect supply chains and how they should operate in the future to withstand possible recurring emergencies such as the Covid-19 pandemic. We also compared the benefits of local in global supply chains, because in food supply chains the issue needs to be addressed and the Covid-19 virus pandemic can encourage consumers to buy locally produced food. It turned out that the Asian textile industry is largely dependent on western countries and has fallen into a major crisis with a massive drop in orders.

Keywords:
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supply
chain
management,
inventory
management



1 Introduction

Covid-19 virus caused by the coronavirus SARS-CoV-2 is a rapidly transmitted disease whose first confirmed infections date back to December 2019. On 11 March 2020, the World Health Organization declared a pandemic, meaning that the Covid-19 virus was present on several continents around the world. The first infections were thought to be related to the so-called sea markets with live animals in Wuhan, China (Galanakis, 2020). Influenza-like symptoms of Covid-19 usually occur 5 to 7 days after infection. Among others the symptoms include fever, shortness of breath, cough, headache, sore throat, feeling tired and loss of taste and smell.

The Covid-19 pandemic has hampered processes in almost all areas, forcing companies to make rapid changes to the ongoing practices of their processes. The changes were felt by all stakeholders, and if we take the food industry as an example, on the one hand consumers felt tighter hygiene conditions when entering stores and reduced supply of products on the shelves, and on the other hand suppliers due to stock purchasing and tighter border measures meaning that suppliers have had problems with supplying the goods. The Covid-19 virus pandemic is one of the so-called black swan events, which are unpredictable events that go beyond what is normally expected of situations and can have serious consequences. Such events are characterized by extreme rarity and the impact of Covid-19 virus on supply chains can be compared to the situation during World War II (Chakraborty & Maity, 2020). Hoping to smooth the curve of Covid-19 infections, governments around the world have taken various measures, such as closing borders with neighboring countries, travel restrictions and lockdowns.

For example, at the outbreak of the Covid-19 virus pandemic, the agricultural sector landed in the test, which was forced to adapt to the situation when demand for hotels and restaurants fell, so that they started selling directly to end consumers. Various government measures, such as quarantine, the ban on unnecessary travel, have further affected the availability of workers, with marked consequences mainly for perishable goods such as meat and vegetables (Maria Nicola, 2020). Even though people were shopping with intentions to have home stock, food supply in stores has stabilized rapidly, as it is one of the key systems that needs to be maintained to ensure food security. Despite the measures already mentioned, which weakened the available labor in the agricultural sector, in principle everything was provided

through the provision of basic foodstuffs. However, the situation was different when it comes to goods that are imported or exported, because when the borders were closed, international trade was paralyzed, but this situation also stabilized with the health measures taken into account (Siche, 2020).

In this article, we will highlight some industries and compare the impact of the Covid-19 pandemic on them. We will review how individual industries have adapted to the pandemic and what losses have been caused by the Covid-19 pandemic. We will also review how supply chains in different industries are expected to change in order to be prepared for possible re-emergencies such as those caused by the Covid-19 pandemic.

2 Methodology

We began the study by reviewing the basic data of the Covid-19 virus. The research examined food industry and textile industry, as well as the impact of the pandemic on the supply chains of these industries. We decided on such an approach because food and drink are existential goods, and we are also interested in what is happening with the textile industry, which is not necessarily necessary for everyday life. With the help of articles from the online databases ScienceDirect and Google Scholar, we obtained literature on the state of these industries and supply chains, as well as predictions of what is expected to change in individual industries in the future to be more resilient to possible new emergencies such as Covid-19 pandemic.

In calculating the differences between the second quarter of 2020 and the same period last year, we obtained data using the MarketWatch online database, which offers the latest stock, financial and business data. We compared the revenues and inventories of companies from all three considered industries. Before the research, we set some hypotheses:

- The food industry has not experienced a significant difference in revenue,
- Inventories in the textile industry have not changed significantly.

In conclusion, we summarized the findings and gave the possibilities for further research, and we also confirmed or refuted the hypotheses.

3 Results

3.1 Food industry

At the time of the Covid-19 pandemic, the resilience of food supply chains was at the forefront, as it was the food supply chains that had to adapt quickly to emergencies and consumer demand and their panicky shopping in quantities that were not a constant practice before the pandemic and at the same time consumers also changed their shopping habits to some extent. However, the offer was paralyzed due to various measures to contain the virus. There was a shortage of manpower, and disruptions in transportation and entire supply chains in general (Hobbs, 2020). Despite governments all through ensured that food would not run out, panicked shopping continued. However, because food supply chains mostly operate on a just-in-time delivery system, such consumer behavior has led to short-term situations where certain products were not in stock (Martin-Neuning & Ruby, 2020). After the initial shock of demand, supply chains stabilized again and there were no more stock outages.

The closure of restaurants, bars and hotels has also contributed to the increased demand of food products, since every fifth meal in the EU is not prepared at home (iriworldwide, 2018). However, supply chains that supply hotels and restaurants may not be suitable for supplying shops due to the way food is packaged and due to the different distribution infrastructure. The adjustment of such supply chains is time consuming and, among other things, this caused store shelves to be completely empty at times. However, the long-term effects on food supply chains are likely to be seen as a result of lower personal incomes of consumers. To some extent, the needs for certain products may also change, as consumers will become more sensitive to product prices and will replace expensive products with alternatives. Such consumer behavior, if certain products will no longer be of interest to them, can help to shrink food supply chains with a goal of cost optimization (Hobbs, 2020). Winners of the pandemic who found new business opportunities during the pandemic are for example farmers who took the opportunity when certain products were in short supply in shops and gained new customers, a certain share of whom will certainly continue to buy from them in the future. Also, smaller losses were experienced by those supply chains that were able to adapt quickly, such as suppliers of hotels, restaurants and bars that began to supply smaller stores through network

distribution. Of course, the costs of such supplies are higher, but they have made up for this with higher margins. Such a system meant the victory of both the supplier and the store, because although the store had less earnings due to the supplier's higher margins, it at least had it by selling. Because otherwise the store shelves could be empty.

During the Covid-19 pandemic, the demand for online food orders and home delivery increased dramatically. Such food delivery can be extremely beneficial for vulnerable groups of people, i.e. the elderly and those with chronic illnesses. This way of posture also contributes to social distancing. However, the sudden increase in demand for home delivery of food has become a challenge, as the systems could hardly or have not been able to cope with the sudden expansion of orders, which was reflected in long queues or no possibility to order at all. Such an ordering system requires investment in infrastructure, staff, and sufficient delivery capacity (Ritter & Pedersen, 2020). With the sudden work cessation of various companies during the general quarantine, there was a large number of people who could be transferred to jobs in food supply chains, such as staff in shops, warehouses and also in food delivery. If, during the pandemic, online orders and food delivery came to life to the point where providers were unable to fulfill orders effectively, it will be interesting to see whether the trend of online shopping will continue after the Covid-19 spread or will the consumers return to traditional in-store shopping.

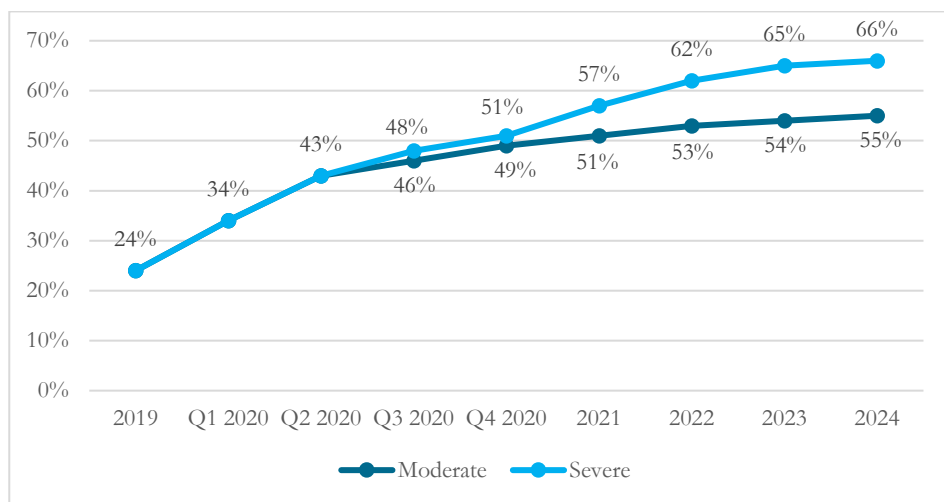


Figure 1: Forecast of online food sales in the US.

(Source: Keyes, 2020)

Figure 1 shows the forecast for the United States, how many people are expected to use online food ordering. The moderate forecast shows how online ordering could increase if the spread of the Covid-19 virus in the third quarter of 2020 were to be curbed to some extent. However, if the virus spreads until a reliable vaccine is available, online food ordering is expected to grow as shown by the lighter curve (severe) (Keyes, 2020). Since the spreading of the Covid-19 virus does not slow down for the time being (worldometer.info, 2020), it is expected that online food ordering will continue to increase in the United States and elsewhere. However, the growth of online orders does not only apply only to the food industry, but also to shopping in all areas.

As food supply chains had to adapt rapidly to consumer panic shopping and the changing market due to various measures to curb the spread of infections, so-called supply chains operating more locally became more and more mentioned. In situations at the start of the pandemic, when store shelves were empty and long queues of waiting consumers lined up in front of stores, many opted for an alternative, such as local food producers. In the short term, local food producers are better able to respond to higher consumer demand, as they tend to have a higher supply of products than demand. In addition, locally grown foods do not need to be transported, which means that locally grown foods have more nutrients. In the future, supply chains with local suppliers will certainly be more resilient to import disruptions or systemic breakdowns due to prolonged border congestion (Corr, 2020). Otherwise, interest in local food is already to some extent an established consumer trend, for which there are many different motives, namely social, environmental and health benefits. As a result, consumers are willing to pay a slightly higher price for locally grown products. The Covid-19 pandemic has cast doubt on the safety and reliability of the existing food system in some parts of the world. As a result, interest in locally produced food will increase, as secure and healthy food certainly mean the most to consumers (Hobbs, 2020). On the other hand, price and convenience still remain the driving force of consumers, and although the current Covid-19 crisis may boost local consumption, we will only see over time the extent to which local food will change the fundamental economy of the food sector (Scanlon, Van Acker, & Yada, 2020).

Table 1: Advantages of different food supply chains.

(Source: King, Hand, & Gómez, 2015, Grunewald, 2020, own research)

Local supply chains	Global supply chains
Preservation of local landscapes and family farms.	Greater diversity of supply due to the fact that the availability of products is not seasonally limited.
Strengthening the local and regional economy.	Lower product price.
Providing fresh, higher quality products.	Ability to cover outages of local products in the event of local weather disasters (hail, drought, frost).
Better supply chain control.	Labor stability (During the pandemic, many seasonal workers dropped out at the local level due to movement restrictions).
Due to shorter transport routes, food contains more nutrients, vitamins and minerals.	
Many times, locally grown food is grown without the use of pesticides.	
More suitable for people with various eating disorders and allergies.	

Table 2 shows a comparison of revenues of major global companies in the food and beverage industry. The table shows that the studied companies generated on average 3 % less revenue in the second quarter of this year compared to last year's second quarter. As a result of consumer panic shopping at the start of the pandemic, revenue increased mainly for meat companies. Anheuser-Busch and Coca-Cola generated 18 % and 29 % less revenue, respectively. Such a business statement is due to the fact that during the pandemic, people focused on buying essential food and thus put luxury foods on the sidelines.

Table 2: Demonstration of differences in revenues and stocks in the food industry.

(Source: MarketWatch, 2020, own research)

Food and beverage industry	Revenue	Inventory
Nestlé	-9%	3%
PepsiCo, Inc.	-3%	8%
Anheuser-Busch InBev	-18%	-6%
JBS	27%	34%
Tyson Foods	-8%	-6%
Archer Daniels Midland Company	0%	-8%
The Coca-Cola Company	-29%	3%
Kraft Heinz Company	4%	-8%
Mondelez International	-2%	-1%
Smithfield Foods/WH Group	11%	-10%
Average	-3%	1%

Table 2 also shows a comparison of inventories of the reviewed food industry companies. The Brazilian meat processing company JBS had as much as 34 % more inventory compared to last year. This can be attributed to the fact that virus prevention measures have not started at the same time around the world, so that companies in other parts of the world were able to monitor developments around the world and prepare accordingly.

The Covid-19 pandemic has crippled food supply chains around the world and those responsible must work towards maintaining and making supply chains more resilient. The just in time system of supply is reliable and efficient under normal circumstances, and the resulting pandemic situation suggests that such system is weak in the short-term disruptions caused by increased demand in consumer panic purchases. However, when the panic shopping ended or decreased, the supply chains with delays still proved to be responsive. Effective supply chain responsiveness is a key indicator of its resilience or stability, so measures will be even more important in the future, which, together with strategic inventory and order management plans and strong and reliable relationships, will shape the resilience of food supply chains (Oecd, 2020). Good relationships within the supply chain build trust and thus greater flexibility in responding to the supply chain's response to unexpected changes in demand and unexpected supply disruptions. Businesses would also be more resilient if they had so-called reserve suppliers to cover supply in the event of a failure of primary suppliers. Of course, these should be positioned across different geographical locations so that companies with a map of back-up suppliers can react quickly in the event of outages. In the future, when the spread of

Covid-19 is curbed, supply chains will be able to make a thorough analysis of what worked well in times of crisis and where processes failed, and how stronger partnerships within supply chains could be established to be prepared for possible future emergencies (Lopes de Sousa Jabbour, et al., 2020).

Table 3: Measures for the future.

(Source: own research)

Local supply chains	Healthier and fuller food and supporting the local economy.
Integrated Supply Chain Management	Companies could quickly react to the failure of certain products by creating a map of spare suppliers, thus increasing the responsiveness of the supply chain. Another option is to remove problematic products from the offer, which would mean a more manageable product range, less risk and lower costs.
Organic food production	Less impact on climate change which causes local weather disasters, resulting in less product loss locally.
Automation of Production	Machines reduce the dependence of food production on migrant workers. Also, with automated production, better traceability is possible to help uncover potential bottlenecks in the supply chain.

3.2 Textile industry

Most global supply chains in the textile industry start in Asia. For example, the United States imports as much as 73 % of textile products from Asian countries (Panigrahi, Ashutosh, Mehta, & Pasricha, 2020). Asia relies on the textile industry, as machinery and technology are manageable and can be learned quickly, with India and China being the first and third largest cotton producers in the world (Statista, 2019). The value of the Indian textile sector alone is 200 billion USD and is projected to grow to 350 billion USD by 2024. In 2018 and 2019, this represented 3 % of India’s gross domestic product, 13 % of industrial production and 12 % of total export earnings (Panigrahi, Ashutosh, Mehta, & Pasricha, 2020). Bangladesh is the second largest exporter of clothing after China with a 6,4 % global share. The textile industry contributes 16 % to Bangladesh’s total gross domestic product and as much as 80 % of total exports (Majumdar & Sinha, 2018). Vietnam is the third largest exporter of clothing with a global share of 6,2 % (Nguyen & Le, 2020). It can be seen that the textile industry in the countries of South and Southeast Asia plays

one of the key roles in the economy and employment (Majumdar, Shaw, & Kumar Sinha, 2020).

For the sustainability of supply chains in the textile industry, it is important to consider three branches of sustainability, namely economic, social and environmental. In this way, a balance is maintained between profit, environment and people or employees (De Brito, Carbone, & Meunier Blanquart, 2008). Ensuring social sustainability increases, among other things, the operational results and financial success of organizations in the supply chain. In reality, however, it is social sustainability that has been most overlooked in textile supply chains, especially in developing countries. Low wages, forced overtime, poor health and safety conditions at work are common practices in textile supply chains in developing countries, although it is these workers who contribute enormously to the economy of countries (D'Ambrogio, 2014). The Covid-19 pandemic in the textile industry in Asia has triggered a so-called drip effect in supply chains. The supply of raw materials was interrupted in January 2020 due to the closure of Wuhan, which clothing manufacturers tried to replace with purchases from local suppliers. However, demand for clothing fell sharply as Europe lockdown took effect in the second week of March 2020. Global brands have responded to the situation by canceling orders or postponing payments. The textile industry, however, came to a halt in Asia in the last week of March 2020 (Majumdar, Shaw, & Kumar Sinha, 2020). The unexpected Covid-19 virus pandemic has created a situation in the Asian textile and clothing industry where demand, supply and production have been disrupted and limited (RetailEconomicTimesIndiaTimes, 2020). In Bangladesh, orders worth 3,17 billion USD were canceled, directly affecting 2,27 million workers employed in the Bangladesh textile industry (Majumdar, Shaw, & Kumar Sinha, 2020). This is an indication that the demand for clothing before the Covid-19 virus pandemic was much higher than our need. We do not need 100 pieces of clothing, but for example, 20 pieces of clothing are enough. Reducing mass consumption would also help reduce the negative environmental impacts resulting from the production of clothing throughout the process, from the raw material to the final product.

In textile supply chains, brands have dominant bargaining power. For the most part, brands dictate the price and terms of delivery. Brands maintain their margins over the years and shift the burden of cost reduction to suppliers. As a result, cost competition between suppliers leads to lower already low salaries of employees, and

at the same time suppliers assume almost all business risks, as brands usually pay when goods are delivered, so the supplier must pay the costs of raw materials and labor early. In the wake of the Covid-19 virus pandemic, brands took advantage of this and canceled or postponed orders that were already under execution or had been completed. Suppliers were forced to make enormous discounts in order to get at least part of the money. During the pandemic, as many as 72 % to 91 % of customers refused to pay fabric and production costs to suppliers in Bangladesh. Regardless of the relationship in the supply chain, suppliers have little choice but to continue because of the fear of losing a business (Majumdar, Shaw & Kumar Sinha, 2020).

In India, as many as 58 % of textile companies were prepared to adapt to the pandemic situation by starting to sew the equipment needed in the Covid-19 virus pandemic, such as masks, gloves, sheets and hospital pajamas. The companies needed assistance in acquiring machinery and labor training, which they did not get and as a result, companies lost business despite the desire to produce the products needed during the pandemic. As a result, between April and June 2020, as many as 50 % of textile companies in India were no longer functional (Panigrahi, Ashutosh, Mehta, & Pasricha, 2020). In addition to dependence on developed countries, various inability to adapt to the new situation has led to the dysfunction of companies. Developing countries need to change their business system in such a way that they are no longer so dependent on developed countries, as possible recurrences, such as the Covid-19 pandemic or the intensified trade wars, will lead to a recurrence of the situation caused by a pandemic. For example, India exports as much as 35 % of its total textile exports to the three countries. These are the United States, the United Arab Emirates and the United Kingdom. Also Bangladesh, which accounts for 60 % of the textile industry's exports to the United States, the United Kingdom, Spain, France and Germany. (World Intergrated Trade Solution, 2019). China has managed to adapt in a way that has increased the demand of its citizens for their products. On the other hand, in Bangladesh, where textile exports account for more than 80 % of their total exports, they will have to find much more effective solutions, as it is impossible for their own citizens to replace a more visible share of exports by purchasing their products.

Table 4 shows the difference in corporate revenues between the second quarter of 2019 and the second quarter of this year. On average, brands in the textile industry generated 38 % less revenue in the second quarter of this year. The luxury brand Louis Vuitton deviates the most from the average, from which we can conclude that the pandemic did not affect the buyers of luxury brands so much, or that the company adapted to the emergency situation by producing protective equipment.

Table 4: Display of differences in revenues, stocks and share values in the textile industry.

(Source: MarketWatch, 2020, own research)

Textile industry	Revenue	Inventory	Stock
Inditex	-44%	-10%	-16%
Nike	-35%	31%	0%
LVMH	-15%	19%	4%
TJX Companies	-52%	-2%	-16%
Hermes	-24%	34%	11%
H&M	-50%	-1%	0%
Kering	-30%	14%	-7%
Adidas	-35%	46%	-11%
L Brands	-37%	10%	-54%
VF Corp	-54%	370%	-29%
Average	-38%	51%	-12%

Table 4 also shows a comparison of inventories in the second quarter of this year and the same period in 2019. The American company VF Corporation had as much as 370 % more inventories in the second quarter of this year than in the same period in 2019. Despite the fact that brands have canceled orders at the beginning of the pandemic the inventories increased compared to last year. As far as the value of stocks, we can see from the table that the value of stocks for L Brands fell by as much as 54 % and for VF Corp by 29 % in the same period compared to last year. For luxury brands such as Hermes and Louis Vuitton, the value of stock increased by 11 % and 4 % .

Table 5: Causes and possible measures to increase the resilience of textile industry supply chains.

(Source: own research)

Causes	Strength of influence	Improvement measures	Significance of the measure
Majority export	Very large	Sales in your own country	Very important
Late payments	Large	Shorter payout deadlines	Important
Inflexibility	Very large	Business plan for emergencies	Very important
Awareness	Very large	Monitoring events around the world	Very important

Table 5 shows the causes of the situation in the textile industries in Asian countries and measures to increase the resilience of supply chains in the future. Countries like Bangladesh export most textile products and are consequently dependent on other countries. Although such a trend before the Covid-19 virus pandemic proved to be profitable, it completely failed during the pandemic, as demand for products from the textile industry declined due to various measures in foreign markets. In such cases, countries like Bangladesh should encourage the sale of products on their soil, as China has done. Certainly, domestic sales cannot replace exports, but they can mitigate losses to some extent. The supply chains of the textile industry, and above all suppliers, were harmed during the pandemic due to late payments and cancellations of orders. Already, brands were paying suppliers with a delay, and as a result, suppliers were left without payment. Here, the solution is a possible mutual agreement between brands and suppliers on a shorter payment period. An important factor for paralyzed supply chains in the Asian textile industry was also lack of information. When China closed its production plants, they turned to other suppliers in other Asian countries, but soon after that other, developed countries also passed into lockdown. Asian producers were left with large inventories and unpaid bills. If they were better informed about the actions around the world, they could be better prepared for the situation.

4 Conclusion remarks

Covid-19 virus infections are still spreading around the world and although supply chains have picked up from the initial shock to some extent they are still operating truncated. The food industry was not expected to suffer excessive revenue losses during the pandemic, which is understandable, as consumers had to take care of livelihoods despite the low income in the pandemic, and this confirms the hypothesis that the food industry had the lowest losses among the industries concerned. The time after the pandemic will show how supply chains in the food industry will change in the future, whether they will become more and more local, or whether they will remain global or more regional- global. During the study, we found that the share of Asian exports in the textile industry represents the vast majority of the total. During the Covid-19 pandemic, Asian suppliers of large brands were the most disadvantaged. Because the following have a lot of bargaining power and do not leave suppliers much choice and dictate the course of mutual cooperation. Prior to the research, we hypothesized that the amount of brand inventory would not change significantly during the pandemic, but we found that they had as much as 51 % more inventory compared to last year's second quarter. Although brands massively shifted and canceled orders during the pandemic, inventory levels are very high compared to last year.

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