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Global Supply Chain Disruptions During COVID-19 Health Crisis



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Definitions

Supply chain management is defined as the network of suppliers, businesses, and consumers who are involved in the supply, processing, and delivery of the product to the final consumers (Mentzer et al. 2006; Chand 2012). The global supply chain management considers the role of international suppliers, multinational and transnational companies, and consumers in managing the supply and production of goods and services (Mentzer et al. 2006; Chand 2012).

Introduction

The COVID-19 is a global pandemic that has caused massive devastation to people's livelihood

in all parts of the world. Due to the rapid pace of globalization, private sector operations are no longer limited to one isolated geographical region. Companies that have wide-scale retail operations in the USA, the UK, and Europe have their production supply chains in China and Central Asia (United Nations 2020). The outbreak of COVID-19 in the Hubei province in China does not only impose threats to the Chinese economy but it has an everlasting impact on the global supply systems (Hopman et al. 2020; McKibbin and Fernando 2020). Before the outbreak of COVID-19, the global community was working in solidarity to achieve the Sustainable Development Goal (SDG) 12 on "Responsible Production and Consumption" (United Nations 2020). According to SDG 12, there should not be a trade-off between economic growth and environmental degradation. The globalized economy must work in solidarity to address the disposal of waste materials and toxins from the natural environment (United Nations Development Programme 2020). Essentially, the role of the suppliers, businesses, and consumers are equally important in addressing the problems of improper waste disposal on the natural environment. The United Nations Development Programme (2020) highlighted that around 2 billion people in this world are undernourished, with approximately 1.3 billion tonnes of food is wasted every year (United Nations Development Programme 2020). A thorough understanding of the players in the

supply and demand for basic consumption items is essential to allocate food items and resources to the underprivileged and undernourished in society (United Nations Development Programme 2020). The COVID-19 health crisis has put a halt to all the efforts of the national governments, international donor agencies, financial institutions, and the private sector in achieving the outcomes of SDG 12 (United Nations Environment Programme 2020).

With the outbreak of the COVID-19, the global economy has gravitated backward as poverty and hunger have significantly increased, and each country is seeking for innovative ways of addressing the growing rise in these socio-economic problems (United Nations Development Programme 2020). The national leaders have to collaborate with the private sector players to find ways of sustaining production amid lockdowns, home confinement, and curfew periods. Recovery from the COVID-19 crisis is only possible if all the stakeholders in the domestic and international economies work together to understand the unique challenges imposed by the COVID-19 and designing strategies to address these challenges (United Nations Development Programme 2020).

The main aim of this entry is to discuss the global supply chain disruptions caused by the COVID-19 health crisis period. Additionally, this entry also seeks to identify the innovative tools used by the private sector to sustain production levels to satisfy consumer demand. This entry will also discuss how the government response to the COVID-19 crisis changed the production and consumption patterns.

Factors Driving the Domestic and International Supply Chain Disruptions During the COVID-19 Health Crisis

The SDG 12 on responsible production and consumption patterns encourages the creation of a global economy whereby sustainable economic development strategies facilitate the provision and accessibility of essential services and decent jobs for everyone (United Nations 2020). Retrospectively, the work towards achieving SDG 12 was well on track before the outbreak of

COVID-19 in the Hubei province of China. The nature of this health crisis not only generated production chaos but it had significant implications on consumer's consumption patterns. As a common practice, to manage the chaos generated by the COVID-19, innovative companies are seeking for ways of integrating superior global supply chain tactics with production and consumption decisions to manage supply chain shocks (World Economic Forum 2020).

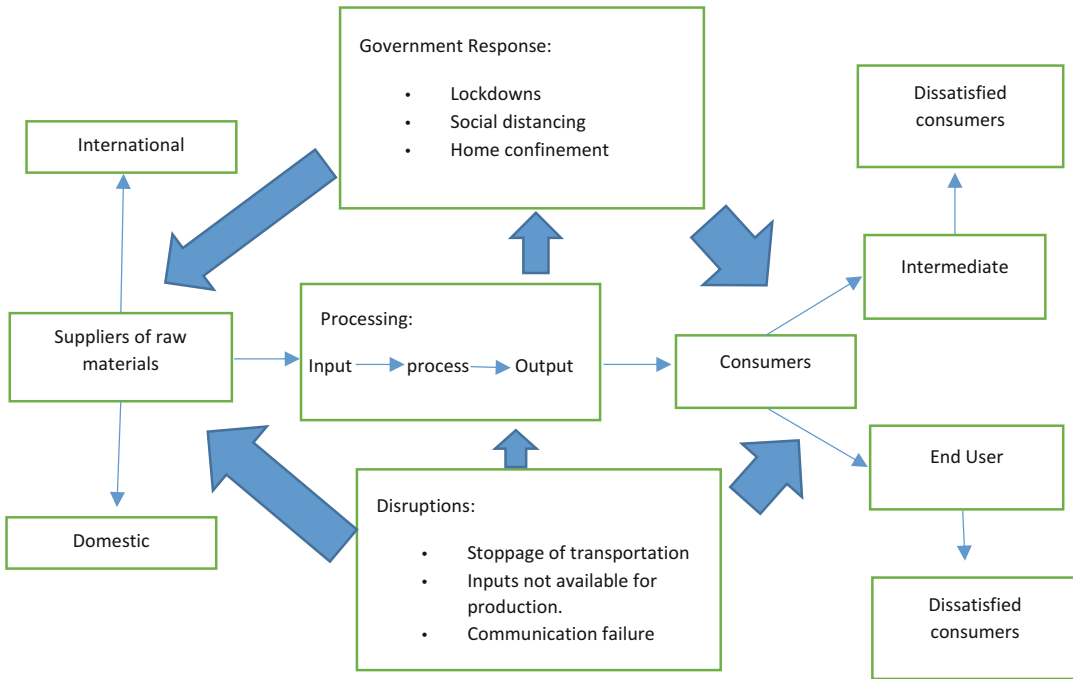
In this modern decade of globalization, the supply chain decisions are no longer restricted to the domestic economies because firms are crossing national boundaries to expand their operations in the international markets (World Economic Forum 2020). In light of this argument, the COVID-19 health crisis multiplied as a severe production and consumption crisis for the global economy as it had a disastrous impact on the countries that are at the center of the global production chains. These countries are the USA, Russia, the UK, Spain, Brazil, Germany, Turkey, France, Italy, China, India, Europe, South Korea, Japan, and Hong Kong (World Economic Forum 2020).

Countries that were affected by the COVID-19 had to implement stringent measures to combat the escalating spread of the virus, both within and outside the national boundaries (World Economic Forum 2020). Specific measures, such as social distancing, home confinement, quarantine, and lockdowns, had adverse implications on the global production networks. The contractions in the global production systems decreased the industrial production of several COVID-19 affected countries (World Economic Forum 2020). For example, the industrial production of China from January to February decreased by 13.5% during the COVID-19 outbreak (World Economic Forum 2020). Table 1 provides a global perspective on the impact of COVID-19 on the key sectors of the global economy. Generally, all the sectors in Australia, Canada, Germany, New Zealand, the UK, and the USA are facing a continuous decrease in demand. However, the demand increased for toiletries, antibacterial soaps and detergents, face masks, and hand gloves (World Economic Forum 2020).

Global Supply Chain Disruptions During COVID-19 Health Crisis, Table 1 Impact of COVID-19 on the global economy

Sector	Countries					
	Australia	Canada	Germany	New Zealand	The UK	The USA
Agriculture, forestry, and fishing	Decline in global production Reduction in prices Decline in export demand Decline in global retail sales	Forty temporary sawmill closures	An increase in producer prices of pork Shortage of domestic fruits and vegetables	Export demand for Kiwi fruit from mainland China has increased Depreciation of NZ dollar Demand for seafood has decreased	Labor shortage in fruit and vegetable picking and jobs in the UK Demand for soya, rapeseed, and wheat has decreased Sale of liquid milk has declined	Agriculture exports to China have declined
Mining	Weakening mining activity Supply disruptions Disruptions in demand for steel	Reduction in oil and gas prices Investment in technologies replacing workers has increased	Oil prices have decreased Decrease in energy consumption	Weakening global demand Commodity prices and demand conditions are still poor	Poor performance of the mining sector	Decline in the commodity prices globally
Utilities	Thermal coal prices have declined Decrease in demand for electricity	Commodity prices of natural gas and oil have decreased	Demand for industrial production has decreased	Decrease in demand for electricity	Decrease in demand for electricity	Reduction in demand and production of electricity
Manufacturing	Global supply chains are restricted Decline in demand for beef and cellar door wines	Negative repercussions from the global supply chain disruptions Increased demand for soap, toiletries, and pharmaceuticals	Revenue loss for car manufacturers Volkswagen AG reduced the scale of its operations	As the operations in China normalizes, NZ's supply chain operations will improve Export of all commodities are low	21% decline in output in the UK Car manufacturers cut production	Decline in consumer demand for manufacturing products Manufacturing industry clusters are at risk of decline

IBS World (2020) and World Nuclear News (2020)



Global Supply Chain Disruptions During COVID-19 Health Crisis, Fig. 1 COVID-19 shocks and global supply chain. (Created by the authors (2020))

Furthermore, the global supply chains are experiencing severe disruptions as the countries that are at the core of global value chains have been adversely affected by the confinements, lockdowns, social distancing, and quarantine measures taken by the government to combat the spread of the virus. The supply chains have been subject to three major shocks, and these shocks are (1) supply shocks, (2) demand shocks, and (3) aftershocks (Seifert and Markoff 2020; Ho 2020). First, the supply-side shocks emanating from the global supply chains relates to the inability of the affected countries to supply raw materials needed for responsible production and consumption purposes (see Fig. 1). Initially, China was adversely affected by the outbreak followed by countries in mainland Europe, Central Asia, North and South America, and the Pacific Islands countries (Seifert and Markoff 2020). The inputs sourced from the best suppliers facilitates the production and goods and services that improve the quality of life for everyone (Seifert and Markoff 2020). For example, companies must procure high-quality raw materials from

domestic and international suppliers to responsibly produce high-quality goods and services that may be consumed locally or exported internationally. With the outbreak of COVID-19 in mainland China, countries have not been able to procure raw materials from high quality and cost-effective producers from the international markets (Seifert and Markoff 2020). This inability of companies to procure high-quality raw materials from best international suppliers translates into poor quality of goods and services supplied to consumers, which ultimately leads to the welfare loss of consumers (Seifert and Markoff 2020).

Second, the panic behavior of people is the driver of the demand shocks associated with the COVID-19 health crisis (see Fig. 1). Countries that had recorded confirmed cases of COVID-19 experienced heightened demand for consumer staples, antibacterial cleaning supplies, toilet papers, face masks, and hand gloves (Seifert and Markoff 2020; Hughes 2020). The panic behavior of customers made it difficult for companies to replenish stocks to meet consumer demand. Consumers were engaging in stockpiling as

restrictions on movement and home confinement periods would have inhibited them from purchasing goods to meet their daily needs and wants (Seifert and Markoff 2020; Notebaert 2020). Government authorities had to intervene to address the panic behavior of consumers by setting the quantity controls on the purchase of staple food items (Seifert and Markoff 2020). For example, the government had to impose limits on the quantities of basic consumption items, such as wheat, rice, breakfast crackers, toilet papers, and tinned products that can be purchased and easily stored by consumers (Seifert and Markoff 2020; Notebaert 2020). The manufacturers had to intervene to control the panic buying behavior of consumers by assuring the general public that the supply of staple food items will be available in sufficient quantities to the general public. If there are shortages, the public will be informed, and the manufacturers will make alternative arrangements to increase the supply of those products (Seifert and Markoff 2020; Notebaert 2020).

Third, the aftershock of the COVID-19 health crisis was characterized by the bullwhip effect, whereby small increases in consumer demand led to a large increase in the production demand (see Fig. 1). Manufacturers can easily meet the short-term increase in demand by increasing the production capacity of the products for which there has been an increase in demand (Seifert and Markoff 2020). Most companies rely on replenishment systems to calculate the demand for inventories in the short-term production cycle (Seifert and Markoff 2020). An increase in short-term demand for inventories will require the supply chain planners to modify their planning systems manually. In large organizations, companies can easily meet the whopping short-term increase in demand by deploying robust forecasting techniques that can incorporate the specific effects of the health crisis in the demand prediction models (Seifert and Markoff 2020). The SDG 12 on sustainable production and consumption implies that companies should be able to sufficiently meet demand at any specific point in time by supplying goods and services in quantities that meet any unexpected increase in demand. This effort of companies can be easily facilitated

if companies can track the changes in consumer behavior during the global pandemic and crisis events (Seifert and Markoff 2020). For example, organizations can easily use the information provided on the international news media to adjust production requirements to meet the changes in the demand for consumables at any point in time. On December 31, 2019, the Chinese health officials had recorded 41 patients suffering from mysterious pneumonia. By January 30, 2020, the World Health Organization (WHO) had declared that the COVID-19 is a global health emergency (Secon et al. 2020). This information is sufficient to help the organizations to understand the specific changes in consumer behavior that they may be expecting in the short and long term. Producers can quickly preempt the spikes in consumer demand that may be caused by the COVID-19 (Secon et al. 2020). Figure 1 captures how the COVID-19 shocks affects the global supply chain.

China's Role in Global Supply Chain

China's role is changing at the global forefront as the Chinese economy is moving towards hi-tech and service industries. In the modern age of technology, it is critical to understand that technology feeds into all aspects of human life (Jun 2020; Atlantic Council 2020). China has made significant contributions towards the production of raw materials, and this makes its role essential in the way the global economy is gravitating towards the production of high-quality goods and raw materials by China (Jun 2020; Atlantic Council 2020).

With the announcement of the COVID-19 as a global pandemic on January 30, 2020, the sustainable consumption and production strategies required the companies from the international markets to diversify their production away from China and identify key suppliers who can provide raw materials at competitive prices to the international markets (Mirchandani 2020; Atlantic Council 2020). However, finding suppliers in the international markets that have similar key competencies and capabilities is indeed a challenging task for the companies that have lost most of their

suppliers from China. According to Mirchandani (2020), there are around 51,000 companies that have their competitive suppliers in Wuhan, where the outbreak of coronavirus happened in January 2020. Additionally, five million companies have tier two suppliers in Wuhan, which indicates that the global production and consumption patterns are heavily reliant on Wuhan province for the supply of goods sold to the domestic and international markets (Mirchandani 2020). With the outbreak of COVID-19, China has taken proactive steps to use digital supply chains to run businesses remotely (Achim 2020). The sudden sharp decline in the production and investment in China led them to produce and map the innovative means of production. In this situation, China was forced to adopt innovative and emerging technologies to reduce the cost of labor and shorten production cycles while at the same time maintaining the investment attractiveness of the country (Achim 2020). For example, in the retailing edge, companies are using the latest technologies, such as 3D animation, analytics, and augmented reality, to make responsible production decisions for their clients. The traditional domestic and international supply chains are subject to backlogs, complex cycles, and a high level of coordinating costs. Put simply, when we integrate the impact of COVID-19 on global supply chains, we are exploring the inability of the businesses to supply raw materials on time, and disagreements and disputes arising as a result of the deteriorating supply chain (Achim 2020). Not only Southeast Asia but all the major regions of the world are heavily dependent on China for the supply of raw materials. Surveys conducted by the Institute of Supply Chain Management found that around 57% of companies are experiencing longer lead times, and 44% are facing continuous supply chain disruptions as a result of lockdowns, social distancing, and home confinement measures in China (Mirchandani 2020).

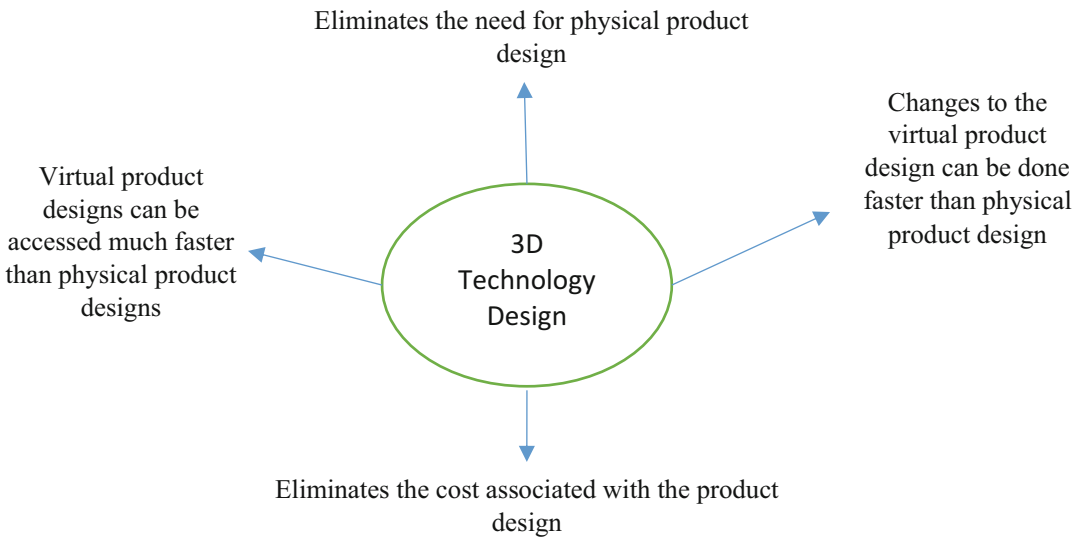
In response to this effect, several multinational companies had shifted their processing plants to Vietnam and India. China is the hub of some of the core supply chains, and this includes the supply of technology, medical equipment, consumer goods, and electronic supplies of intermediate materials

to the international markets (Mirchandani 2020; Atlantic Council 2020). Several countries are providing numerous incentives to their multinational companies to shift production away from China to other countries around the world. For example, Japan undertook a stern approach of providing a stimulus package of \$2.2 billion to manufacturing companies to shift production outside of China (Mirchandani 2020).

The outbreak of COVID-19 in Hubei Province in China required the policymakers, practitioners, individual households, and private sector to work together and design policies to change production and consumption patterns to suit the uniqueness of the COVID-19 situation (Mirchandani 2020; Atlantic Council 2020). For example, as a result of social distancing, and home confinement measures, it is extremely challenging for companies to complete their production requirements within acceptable timeframes. As a result of this, consumers suffer as goods are not available in quantities necessary to meet consumer demand (Mirchandani 2020; Atlantic Council 2020). In such situations, consumers must change their consumption patterns to suit the capability of the companies to supply goods and services to the consumers. Before the COVID-19 health crisis, the global economy was facing challenges as a result of trade tensions and arguments between China and the USA. Undoubtedly, the USA has been pushing for its international brands to reexamine their portfolio of operations to China and pushed for businesses to reevaluate their single source strategies to China (Mirchandani 2020).

Businesses Move Towards Adopting Sustainable Production Patterns on SDG 12

The use of high-tech computer technology has enabled many Chinese businesses affected by the COVID-19 to come up with innovative solutions to redesigning their supply chains. Specifically, the three innovative supply chain management technologies used by innovative companies are (1) 3D product design, cloud



Global Supply Chain Disruptions During COVID-19 Health Crisis, Fig. 2 Advantages of using the innovative 3D technology design. (Source: Developed by the authors by using information from Achim (2020))

computing, (2) artificial intelligence and big data management, and (3) virtual reality (Achim 2020). The following subsections discuss how companies use these three technologies to manage their supply chains.

3D Design Technologies

Numerous companies around the world are using innovative 3D technologies to manage their supply chains. The development of 3D design technologies has helped to reduce or eliminate the need for presenting physical product samples (Achim 2020). Essentially, the need for 3D product design models eliminates the need for physically presenting the product to customers (Achim 2020). For example, with the spread of the COVID-19, the CEOs of numerous multinational organizations have confirmed that transportation companies, retailing chains, factories, and networks have come to a standstill and requires companies to find innovative solutions to conducting their businesses online via the use of the information computer technology (Achim 2020; Ishack and Lipner 2020). Figure 2 captures some of the advantages of using innovative 3D technology designs for managing the supply chain.

The 3D product design helps the companies to eliminate the need for physical product design as

companies are quickly able to make changes to the product design and let the customers know how the product attributes will change based on their specified changes. The approvals for the final product design under the 3D product designs are done without the need for directly contacting the customer (Achim 2020). This whole activity is done remotely without the need for face-to-face visits with the customers. However, the success of the 3D product models is industry-specific, with the success of this model noticed mainly in the automotive industry. The 3D models of product design have been least successful in the clothing industry (Achim 2020).

Artificial Intelligence and Cloud Computing

The development of artificial intelligence has completely revolutionized the way data has been used to innovate the supply chain. Big data is available to companies to make decisions on innovating the supply chain. China has been at the forefront of leading changes in the supply chain of both developed and developing countries (Achim 2020; Tuli et al. 2020). Numerous companies are using drones to manage local logistic networks.

Virtual Reality Technology (VRT)

With the outbreak of COVID-19, the global community is searching for innovative ways of enhancing customer experience by using virtual reality technology. Most of the customers who used to enjoy outdoor activities in the shopping malls and parks have to abide by the self-isolation and confinement measures. For example, customers are making outdoor visits to buy essential items only. There are numerous implications of the COVID-19 health measures on the welfare of people (Joshi 2020). These are as follows:

1. Humans are social creatures. They need to socialize to maintain a healthy lifestyle. The stress level of customers has significantly increased as customers are trying to adhere to social distancing and home confinement measures (Joshi 2020). The virtual reality (VR) technology has allowed customers to socialize by using immersive platforms. Individuals need an association to the natural environment. Put simply; they need to interact with the natural environment to maintain a healthy lifestyle. The COVID-19 measures restrict the movement of individuals and confine their movement to a restricted area to combat the spread of COVID-19 (Joshi 2020). The VR technologies are readily available and affordable by the customers. These technologies are designed to satisfy the social need of the customers as it provides virtual buying experience to customers (Joshi 2020).
2. Shopping acts as a relaxing exercise for customers, whereby it provides customers with an opportunity to spend time outside their regular work routine. One of the main advantages of shopping in a physical store is that it relaxes the customer's mind and helps them to spend quality time outside their normal work routine (Joshi 2020). The outbreak of COVID-19 in Hubei province in China led to the implementation of several measures by the national government to combat the spread of this deadly virus. Social distancing and home confinement measures restrict customers from enjoying the physical shopping experience that they used to enjoy before the outbreak of COVID-19 (Joshi 2020). Virtual reality (VR)

technology provides the customers with the online shopping experience as it enables the customers to browse the retailer's online catalog, select the products and provide details of its delivery in the specified location. Businesses complete these activities without the need of the customer visiting the physical stores (Joshi 2020).

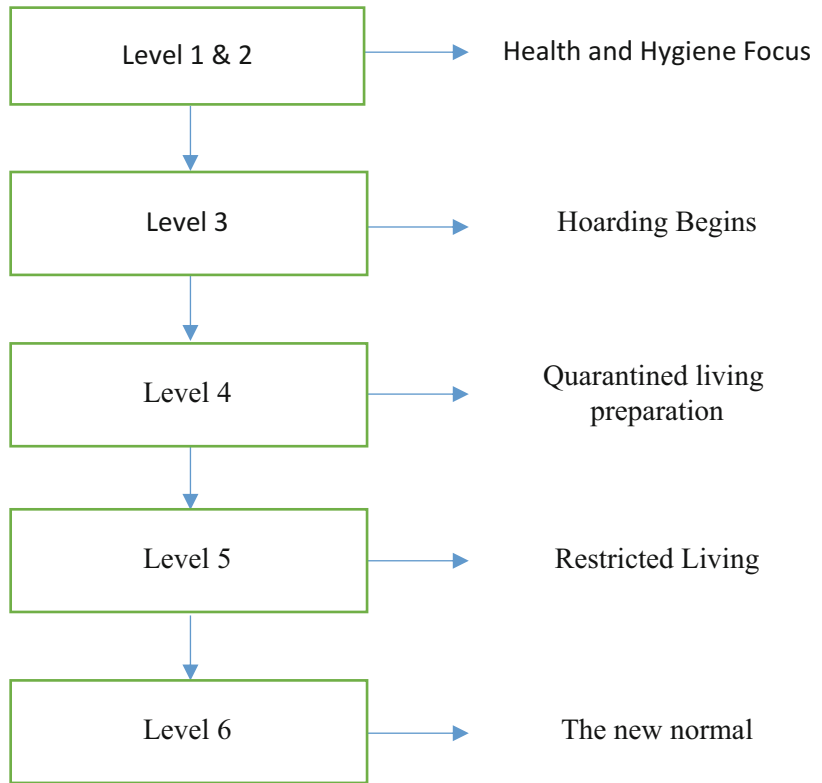
Changes in the Consumer Behavior to Adopt Sustainable Consumption Patterns on the SDG 12

Businesses need to reexamine the role of global supply chains in consumer purchase behavior as consumers are at the center stage of business production decisions (Accenture 2020). Consumer habits are changing as consumers are protecting themselves and their families from the coronavirus. The COVID-19 health crisis has changed consumer's consumption habits. These new consumption habits that consumers have developed to managed COVID-19 will last post-COVID-19 period (Accenture 2020).

Furthermore, due to the uncertainty of the COVID-19 health crisis, consumers are facing mixed emotions as they are unsure of how the crisis will unravel in the future (Accenture 2020). According to the SDG 12 on sustainable production and consumption patterns, businesses need to identify new solutions to the production and consumption challenges faced by consumers and producers. As consumers are uncertain about their future, they are making buying decisions more consciously as compared to before. Put simply, the consumer's mixed emotion is the main driver of their self-conscious purchase behavior (Accenture 2020).

The ultimate goal of businesses is to maintain sustainable production and consumption patterns, and at the same time, they have to produce products that maximize consumer satisfaction. Undoubtedly, this involves aligning the activities of the value chain to understand the possible ways of addressing consumer challenges and problems (Accenture 2020). Figure 3 captures the changes in consumer behavior with the unraveling of the COVID-19 health crisis.

Global Supply Chain Disruptions During COVID-19 Health Crisis, Fig. 3 Changes in consumer behavior during the COVID-19 health crisis based on six threshold levels. (Source: Developed by the authors by using information from Nielsen (2020))



According to Nielsen (2020), six key consumer threshold levels capture the changes in consumer behavior as the COVID-19 virus takes its deadly toll on the national economies. These levels offer insights to the business owners, government policymakers, international agencies monitoring the progress of COVID-19 as it alerts them on the expected changes in consumer behavior. In the threshold level one, consumer interests rise in products that support the health and wellness of the customers (Nielsen 2020). As consumers progress to level two, they are more concerned about buying products designed to maintain public safety, such as masks, hand gloves, hand sanitizers, and disinfectants. Furthermore, in level three of the consumer behavior threshold, consumers aggressively engage in stockpiling of food staples and other essential commodities (Nielsen 2020). The threshold four on quarantine living preparation captures the intention of the consumers to adhere to government measures on lockdown, quarantine, and home confinement to combat the spread of

coronavirus. For instance, consumers are more likely to engage in online buying and selling of goods and services (Nielsen 2020). The fifth threshold is on restricted living that emphasizes consumers raise concerns related to high prices of goods and services, and limited stocks available for the products. Finally, in threshold six, the consumers return to their daily work routines, but they do take measures to stop the spread of the coronavirus. For example, consumers would be restrictive in their movements and take precautions to contain the further spread of the coronavirus (Nielsen 2020).

Moreover, businesses need to understand the changes in consumer behavior as it provides them direction on how to reengineer their contemporary supply chain dynamics. At this point, businesses need to identify the loopholes in the value chain and possible ways of addressing these loopholes to satisfy the needs of their customers. Before reinventing the supply chain dynamics, businesses must understand consumer emotions and how these emotions are driving changes in

consumer behavior (Accenture 2020). Existing studies have divided consumer reactions during the COVID-19 in two groups. The first group includes consumers who are feeling anxious because they are unsure of what the future holds for them. For example, these consumers are aggressively engaging in panic buying of consumer staples and hygiene products. The second group includes consumers who are feeling nervous, but they are not engaging in stockpiling as they are optimistic that the situation will improve in the future (Accenture 2020).

Furthermore, the use of digital commerce to purchase products and services has increased as consumers are adhering to social distancing and home confinement measures. Consumer behavior experts are arguing that consumers will continue to use the e-commerce facilities in the post-COVID-19 crisis period (Accenture 2020). Currently, the biggest priority of consumers is satisfying basic needs and maintaining personal health. One of the major social impacts of the COVID-19 health crisis is that it has slowed down the consumer's daily pace of work and how consumers associate with their friends, families, and communities (Accenture 2020). Rather than watching movies in theatres, consumers these days prefer to watch television and videos online. Additionally, people also prefer to work from home and remotely without the need to meet each other (Accenture 2020). To work from home, employees need computers, internet, and communication devices, and with the outbreak of COVID-19, the demand for these products has significantly increased (Accenture 2020).

Global Supply Chain Disruptions Caused by National Governments Response to COVID-19

The national government's response measures used during the COVID-19 period is determined entirely by the availability of financial resources, human skills, capabilities, national laws, and private sector support of the COVID-19 measures taken by the national governments. The four specific challenges faced by the national governments in designing specific policy measures to

combat the spread of COVID-19 are as follows (World Bank 2020):

1. Tracking the patients who are infected by the COVID-19 and treating these patients.
2. Tracking people who may have been in close contact with the infected patients.
3. Increase in food security problems as a result of the economic downturn and mandated stoppage of the international transportation system.
4. Declaring the state of emergency and using emergency powers to address the COVID-19 crisis.

The COVID-19 pandemic had a major adverse impact on the global trade, livelihood, and transportation networks of all the affected countries (World Bank 2020). As soon as the government announces a COVID-19 infected case, the health officials have to implement specific measures to trace the people who came in contact with the affected victims of the coronavirus. This massive tracking effort require lockdown of specific areas where the chances are high for the infected victims coming in direct contact with uninfected ones.

The COVID-19 pandemic adversely affected the global economy, particularly the transportation and trade sector (International Monetary Fund 2020). In this modern decade of globalization, companies procure raw materials from the best suppliers, irrespective of their location. The transportation stoppage and travel restrictions in most of the countries affected by the coronavirus inhibited the ability of the domestic companies to import raw materials for production purposes. In the case of Afghanistan, border closures and panic buying disrupted the flow of raw materials and inputs used to produce goods and services (International Monetary Fund 2020). Panic buying skyrocketed the demand for food staples as consumers were stockpiling to address the problems of food insecurity that they may be facing in the future. In this situation, the manufacturing companies are not able to meet consumer demand as consumers had started buying more than they would purchase in a normal situation (International Monetary Fund 2020).

Similarly, in the case of Argentina, border closures and stringent quarantine measures inhibited the ability of the companies to produce goods and services in a timely and reliable manner. Companies had to reconsider their global supply chains and substitute international suppliers with domestic suppliers to meet their raw materials production demand (World Bank 2020). Comparatively, only a few businesses are open in Afghanistan, whereas, in the case of Argentina, businesses have started opening gradually (Table 2).

Conclusion

The impact of COVID-19 on the global economy is unfolding rapidly as the visible implications of this health crisis is evident in high unemployment and poverty rates (North 2020). Proactive companies had prepared themselves quickly to deal with this crisis; however, reactive companies are facing major losses from the disruptions in the supply chain activities caused by the coronavirus (North 2020). Countries such as Japan and South Korea have supplier networks based on the Just-in-Time (JIT) inventory management system. Companies that have purely relied on the JIT network system keep minimal inventories to reduce the manufacturing and supply chain management costs. The COVID-19 containment measures adopted by most of the national governments caused major disruptions to the companies that kept minimal inventories under the JIT system (North 2020). In light of the latest developments in the COVID-19 crisis, the main objective of this entry is to discuss the global supply chain disruptions caused by the COVID-19 health crisis period. Additionally, this entry also seeks to identify the innovative tools used by the private sector to sustain production levels to satisfy consumer

demand. This entry will also discuss how the government response to the COVID-19 crisis changed the production and consumption patterns of suppliers and consumers.

This entry argues that the COVID-19 health crisis has adverse implications on the global collective efforts by the national governments, private sector, and international agencies in addressing the issues related to sustainable production and consumption, as stipulated in the SDG 12 outcomes. The national governments had to intervene with policy measures, such as quarantine, lockdowns, curfews, and home confinement, to combat the spread of the coronavirus. Undoubtedly, these measures caused major disruptions in the ability of the businesses to procure raw materials at the right time and produce enough goods to satisfy consumer demands. China is one of the main suppliers of low cost and high-quality raw materials to the international markets. The major disruptions caused by the COVID-19 in China triggered shock waves throughout the world as most of the open economies are heavily reliant on China for the supply of raw materials. Proactive companies are using 3D design technologies, artificial intelligence and cloud computing, and VRT to manage their supply chains. Before strategizing on innovating the supply chains, companies need to understand the changes in the consumer behavior triggered by the COVID-19 health crisis. Nielsen (2020) proposed six threshold levels that capture the changes in consumer behavior during the COVID-19 period. These are (1) Health and Hygiene Focus, (2) Hoarding Begins, (3) Quarantined Living Preparation, (4) Restricted Living, and (5) New Normal. Companies should reinvent the supply chain mechanisms by assessing the changes in the consumer behavior triggered by the COVID-19 health crisis.

Global Supply Chain Disruptions During COVID-19 Health Crisis, Table 2 Background on COVID-19 cases and impact on global supply chains

Country	Date	Reported cases	Implications on global supply chains			
			Border closure	Panic buying	Transportation disruptions	Businesses open
Afghanistan, Islamic Republic of	May 21, 2020	8676	√	√	√	Few
Albania	May 21, 2020	969	√	√	√	Almost all
Algeria	May 21, 2020	7728	√	√	√	Some
Angola	May 19, 2020	50	√	√	√	Partial resumption
Argentina	May 28, 2020	13933	√	√	√	Gradual reopening
Armenia	May 21, 2020	5041	√	√	√	Almost all
Aruba	May 21, 2020	101	√	√	√	Almost all but with restrictions
Australia	May 28, 2020	7150	√	√	√	Some
Austria	May 20, 2020	37	√	√	√	Gradual reopening
Azerbaijan	May 21, 2020	3,749	√	√	√	Gradual reopening
The Bahamas	May 20, 2020	96	√	√	√	Gradual reopening
Bahrain	May 20, 2020	7843	√	√	√	Limited stores with restrictions
Barbados	May 28, 2020	92	√	√	√	Gradual reopening
Belarus	May 28, 2020	39,858	√	√	√	Gradual reopening
Belgium	May 27, 2020	57,849	√	√	√	Gradual reopening
Bolivia	May 20, 2020	4481	√	√	√	Gradual reopening
Cambodia	May 21, 2020	122	√	√	√	Gradual reopening
Cameroon	May 19, 2020	3,529	√	√	√	Partial resumption with restrictions
Canada	May 28, 2020	More than 80,000	√	√	√	Some
Chile	May 21, 2020	61,857	√	√	√	Some
China, People's Republic of	May 28, 2020	82,995	√	√	√	Some
Denmark	May 20, 2020	11,117	√	√	√	Gradual reopening
Ecuador	May 20, 2020	34,151	√	√	√	Some
El Salvador	May 20, 2020	1571	√	√	√	Gradual reopening
European Union/ Euro Area	May 28, 2020	1.3 million	√	√	√	Some
France	May 28, 2020	149,071	√	√	√	Some
Germany	May 28, 2020	181,918	√	√	√	Some
Honduras	May 28, 2020	4401	√	√	√	Some
India	May 28, 2020	86,110	√	√	√	Gradual reopening
Indonesia	May 27, 2020	23,851	√	√	√	Gradual reopening
Japan	May 29, 2020	16,647	√	√	√	Gradual reopening
Kenya	May 6, 2020	582	√	√	√	Some
Republic of Lithuania	May 28, 2020	1656	√	√	√	Gradual reopening
Malaysia	May 21, 2020	7,009	√	√	√	Gradual reopening
Mexico	May 27, 2020	78,023	√	√	√	Gradual reopening
Nepal	May 21, 2020	444	√	√	√	Gradual reopening
New Zealand	May 20, 2020	1,503	√	√	√	Gradual reopening
Pakistan	May 21, 2020	48,091	√	√	√	Gradual reopening

(continued)

Global Supply Chain Disruptions During COVID-19 Health Crisis, Table 2 (continued)

Country	Date	Reported cases	Implications on global supply chains			
			Border closure	Panic buying	Transportation disruptions	Businesses open
Qatar	May 28, 2020	50,914	√	√	√	Gradual reopening with restrictions
Russian Federation	May 28, 2020	379,051	√	√	√	Gradual reopening
Singapore	May 20, 2020	28,794	√	√	√	Gradual reopening
South Africa	May 27, 2020	25,937	√	√	√	Gradual reopening
Tanzania	May 21, 2020	509	√	√	√	Gradual reopening
Uganda	May 19, 2020	264	√	√	√	Gradual reopening
Vietnam	May 20, 2020	324	√	√	√	Gradual reopening
Zimbabwe	May 20, 2020	48	√	√	√	Gradual reopening

Source: International Monetary Fund (2020)

Cross-References

- ▶ [Awareness Rising of Consumers, Employees, Suppliers, and Governments](#)
- ▶ [Role and Responsibility of the Consumer\(s\) in Sustainable Consumption](#)
- ▶ [Supply Chain Management](#)

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