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8. Sustainable Supply Chain Management of Food Industry: A Strategic Action Plan for Indian Enterprises

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Abstract:

The COVID-19 pandemic stressed the business concerns about global supply chain resilience. Over 90 percent of the food processing firms were adversely affected by the crisis and faced substantial problems in all parts of their operations. Thus, the study outlined the importance of visibility and agility to develop the supply chains, in view of the COVID-19 disruption. The emphasis on the necessity of agility and visibility in today's environment has transformed business decisions from a consumer's perspective. Since the food sector is confronted by both internal and external risks due to the pandemic, cross-industry collaboration has been regarded to be a key strategy in the food supply chain to rebalance the risks of COVID-19. The study also discussed several sophisticated technologies used in the supply chain of the food processing sector during and after the pandemic. Thus, the study paves the way for Indian food processing firms to enhance flexibility and efficiency to achieve supply chain stability.

Keywords: *Sustainable Supply Chain, Visibility and Agility, Cross-Industry Collaboration, Technological Innovation*

8.1 Introduction:

The novel coronavirus disease adversely affected most of the companies nationally and internationally and allowed limited time to equip. Enterprises confronted with decrease in demand, less production, and delays in delivery and shipping. Mike Jackson, Managing Director, OESA (2020), says that "the rapid change in the supply chain led to several issues such as employee restrictions, resources deficiencies, and liquidity problems by the reduction in production and future forecasting. Thus, the pandemic has revealed the necessity of a strong sustainable supply chain practices."

During the COVID-19 pandemic, India has shown the entire world its resilience and capability to deal with extreme adversities. The vision of the Atmanirbhar Bharat Abhiyan campaign can become a reality by promoting sustainable manufacturing and supply chain practices. Thus, the study analyses the management of supply chain practices with a special focus on the food processing sector. The study outlines a disturbing picture of the food industry in terms of supply chain resilience. In addition, the study also examines the capacity of the food sector to manage a future crisis in a better way.

8.2 The Visibility and Agility of the Food Industry to Develop and Manage the Supply Chain as part of the COVID-19 Disruption:

The COVID-19 epidemic stressed the business concerns about sustainable supply chain resilience. Over 90 percent of the food processing firms were adversely affected by the crisis and the great majority faced substantial problems in all parts of their operations.

These constitute a lack of fundamental ingredients, delayed deliveries and lengthened time for shipping, problems in adapting production capacity to meet changing demand, and difficulties while estimating the changing demand of the clients (Bakkavor Group plc, 2020). Businesses have strived to resolve the supply chain hurdles created by the pandemic (Refer to Figure 2.1).

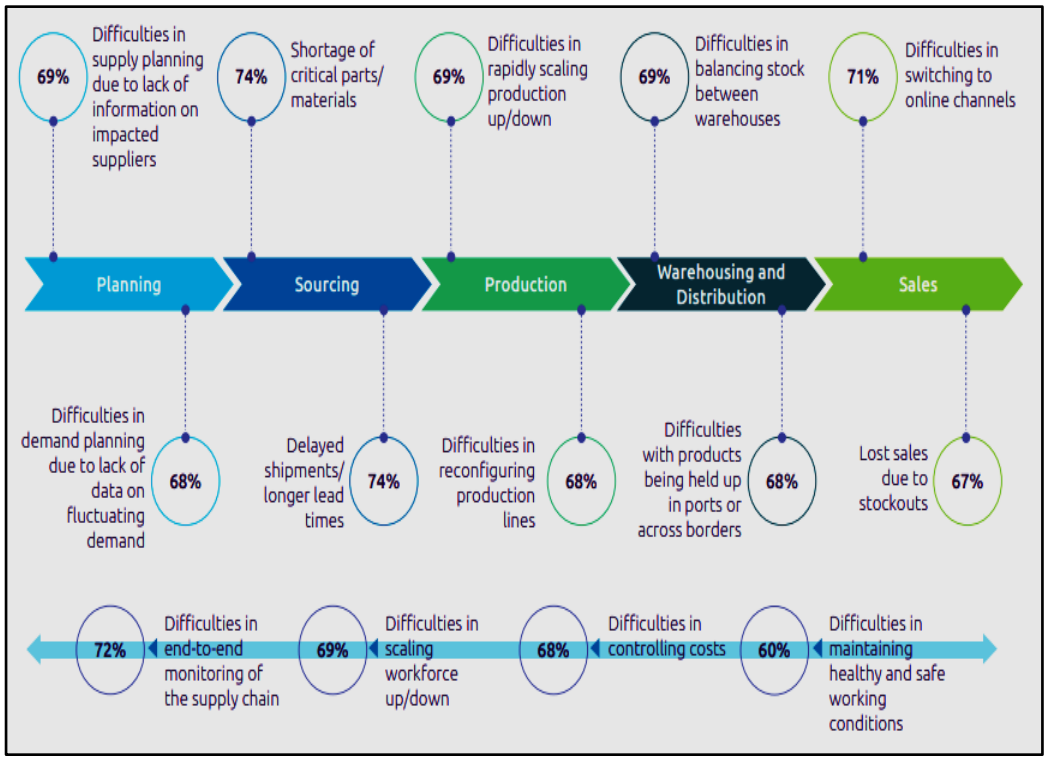

Figure 8.1: Supply chain hurdles faced by the organizations in the wake of the pandemic

Source: Capgemini Research Institute, 2020

The pandemic pushed companies to reconsider long-standing procedures in supply chain management. Many food processing companies feel that their various tactics of the supply chain need to be altered dramatically in response to the pandemic. Food processing businesses become increasingly sensitive to the requirement for supply chain flexibility and agility.

8.2.1 Visibility and agility in the food supply chain:

Due to the pandemic situation, visibility throughout the supply chain was very important. The food industry has seen a change in customer demand during the pandemic and it causes interruptions to their supply chain (Brusset, 2016).

This has resulted in the requirement for effective cooperation and access to information to enhance the visibility of the supply chain. Agility is considered a crucial aspect of resilience in the supply chain, which lowers the adverse effect of interruption by enabling companies to react and recover quickly.

A key test for supply chain agility has been the COVID-19 issue, which requires food processing companies to adapt to a large number of unintended difficulties (Baah et al, 2021; Michel-Villarreal et al, 2021). Future steps are being taken in the food industry to enhance this supply chain agility to better prepare for future disruptions.

Globally, the agile manufacturing facility is given top priority by more than three in four food processing companies. Consumer demand suddenly dropped for the food industries and had to struggle with low demand. The requirement for agility is critical in this unpredictable climate.

Food processing firms such as Bakkavor, JBS, and Nestlé operate at less cost to produce and manage the limited resources in a better way. For future producers, this agility in manufacturing will be a significant requirement (Capgemini Research Institute, 2020). Nestlé works together with several regulatory organizations, including the Swiss government and public health, to provide a safe working environment. The HR team created a 'Nestlé Helping Hand' for the welfare of its workers because of the stress pattern of the COVID-19 pandemic (Alvarez et al, 2020). To satisfy client requirements and their satisfaction PepsiCo created two direct websites i.e., https://www.pantryshop.com/ and snacks.com (Barman, 2021). Bakkavor safeguards its consumers by enhancing health, security, and well-being measures in response to the pandemic. For health and safety devices namely protective shields, face masks, sanitizers, and temperature scanners, Bakkavor has used over £ 5 million (Hobbs, 2020).

8.2.2 Lean supply chain:

Today, food processing firms are looking to create a more resilient supply chain via lean supply chain management. It is based on the idea of persistent elimination of non-value-added time and subsequent decrease of lead time at every stage of the supply chain (Arif-Uz-Zaman &Ahsan, 2014). Changing consumer demands have meant a growing need for meal solutions that can be delivered directly to a consumer’s home. Thus, JBS launched innovative meal ranges for its consumers in the US (Capgemini Research Institute, 2020).

For companies to achieve cost efficiency and effectiveness theories like lean supply chain can be used and they are using it. Apart from this, SKU rationalization, logistics, warehouse optimization, and refreshed inventory planning parameters bring cost-effectiveness to the food sector (Tortorella, 2017).

8.2.3 Sustainable supply chain:

As one of the main ideas of production management, the notion of sustainable supply chain management is vital. Many aspects (resources, packaging, waste management, etc.) need to be addressed to sustainability throughout the food supply chain from production to consumption (Bloemhof & Soysal 2017). The sustainable assessment of the performance of the food supply chain in Turkey shows that it performs 79.7 percent overall (Yontar & Ersöz 2020).

8.2.4 Supply chain resilience:

Resilience is a critical element in an environment of turbulent change. With the collapse of conventional commercial channels, companies across the world had to react fast to their clients and start new projects that are more cost-effective, responsible, and customer-driven, because of the COVID-19 disruption (Ponomarov, & Holcomb, 2009).

The emphasis on the necessity of agility and visibility in today's environment has emphasized the supply chain resilience. In short, economies of scale and scope give economic and production advantages in normal times whereas visibility and agility along with lean and sustainable supply chain practices provide more adaptability and flexibility that enhance resilience for abnormal times.

8.3 The Role of Cross-Industry Collaboration to Enhance the Capabilities of the Food Supply Chain to Quantify and Rebalance the Internal and External Risks of COVID-19:

The novel coronavirus disease has had an enormous disruption on the sustainable supply chain management and the consumption habits of consumers. The COVID-19 pandemic has changed the entire pursuits of consumers in the food sector. Especially, customers preferred convenient in-home meal practices by curbing direct purchasing and enlarging the portfolio via online purchasing (Hobbs, 2020). The consumer's approach to the food processing sector has been seen as a paradigm change. Consumer attention is rapidly increasing to nutrition-friendly food products. Due to these recent changes in consumption habits, food production and demand generation are of considerable importance to the food business (Thilmany, 2021; Boyacı-Gündüz, 2021).

The closure of eateries and the government's direction on work-in-home practices constitute other major dilemmas owing to COVID-19. These internal and external risks have led to a significant decrease in demand for freshly cooked products. As a result, food manufacturing firms must create innovative ideas to match the consumer's wants with their unique production capabilities. In the coming years, there will be major improvements in this sector to cope-up with the changing market conditions and consumer habits (Iyer, 2020).

The food sector has the potential to make considerable profit in the future, despite the continuous problems. Figure 2.2 presents the major internal and external risks as a result of the unforeseen catastrophe created by the coronavirus disease.

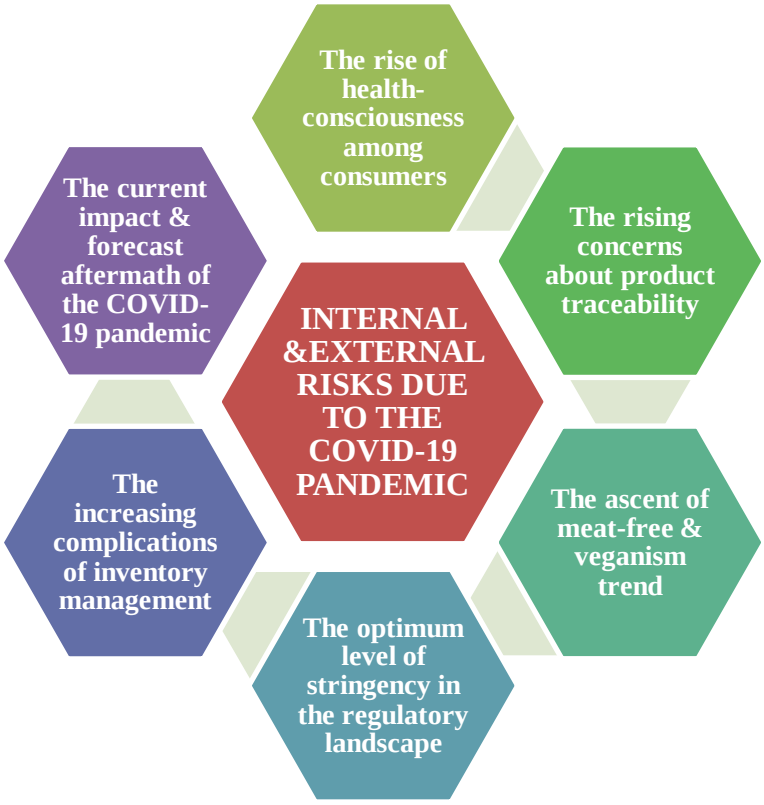

Figure 8.2: Internal and external risks faced by the food sector due to the COVID-19 pandemic

Source: Kumar et al, 2021; Shahbaz, 2020; Grinberga-Zalite, 2021; Amjath-Babu, 2020

Since the difficulties confronted by the food sector are high due to notably rapacious competition, an appropriate framework concerning supply chain management with substantially desirable dimensions is the need of the food processing sector.

Under this situation, Cross-industry collaboration has been regarded to be a key strategy in the food supply chain to quantify and rebalance the internal and external risks of COVID-19.

Cross-industry collaboration means that to produce mutually advantageous results, two or more organizations across sectors or industries work together (Banomyong, 2018). Successful collaboration might lead to a cross-industrial partnership in the formal use of resources and funds to achieve joint and quantifiable goals by partners (Mentzer et al., 2001; Muckstadt, 2001; Slone et al., 2007). A well-designed and productive cross-industrial collaboration brings the following benefits to the partners (Refer to Figure 2.3).

Figure 8.3: Benefits of cross-industrial collaboration

Source: Ellinger, 2000; Lin et al, 2015; Gassmann et al, 2010

Literature on cross-industrial collaboration with respect to the supply chain is extensive and it can be seen that five key elements are vital for cross-industrial collaboration. The five concerned elements are reported in Table 2.1.

Table 8.1: Key elements of cross-industrial collaboration

Key Elements	Meaning	Source of Literature
Faith	To what extent associate firms are willing and capable of working for the mutual benefit of the supply chain.	Kahn et al., 2006; Morgan and Hunt, 1994; Jones et al., 2014
Responsibility	An inherent or linguistic commitment of the among partners for the relationship continuation.	Mentzer et al., 2001; Spekman et al., 1998
Corporative movement	Joint planning and operational decision-making.	Simatupang and Sridharan, 2005; Min et al., 2005; Cao et al., 2010; Wiengarten et al., 2010
Inducement	To what extent, risks and rewards are shared by supply chain members.	Mentzer et al., 2001; Muckstadt, 2001; Simatupang and Sridharan, 2005;Slone et al., 2007
Data distribution	The readiness to provide other members of the supply chain with strategic and tactical data.	Barratt, 2004; Simatupang and Sridharan, 2005; Simatupang and Sridharan, 2008; Wiengarten et al., 2010

Source: Self-Created based on the existing literature

Collaboration between the members of the supply chain of the food sector is crucial to mitigate the risks caused by the pandemic. The cross-industrial collaboration between members of the supply chain can be treated as a means of achieving resilience during or after the interruption of the pandemic.

8.4 The Role of Advanced Technologies in the Food Sector to Tackle the Threats and Remain Competitive After the Pandemic:

The supply chain management in the food processing sector must be regarded as an intricate and dynamic process assessed by product quality, pricing, and delivery time (Haji et al, 2020; Ruiz-Garcia, 2009). Effective food supply chain management is, according to Pang et al. (2015), based on the delivery period, customer relations, and overall expenses associated with the supply chain management. This section focuses on several sophisticated technologies used in the supply chain of the food sector during and after the pandemic.

8.4.1 Investments for Digital Trends in the Supply Chain:

The digitalization of the food sector's supply chain offers many advantages, including enhanced customer service, cost savings via operational effectiveness, and higher revenues. So, most food processing firms are increasing their investments in the digital supply chain particularly in the aftermath of the coronavirus disease.

The digitization of the food supply chain and increased investment in technology are the key to the strength of resilience because they permit supply chains to respond more rapidly and with the sudden changes (Capgemini Research Institute, 2020; Accorsi, 2017; Galanakis, 2021).

8.4.2 Blockchain:

Blockchain is the trendiest and most disruptive technology of the supply chain. The food supply chain is becoming complicated because of engagement by a large number of stakeholders such as farmers, growers, manufacturers, traders, wholesalers, and consumers (Antonucci, 2019). In the fields of efficiency, transparency, safety, productivity, and cost-efficient in Bakkavor, Blockchain technology had shown itself to be beneficial (Bakkavor Group plc, 2020). Lack of centralized control is a vital element of Blockchain technology at all stages of the supply chain so nobody is completely empowered throughout the process.

8.4.3 Radio Frequency Identification (RFID) Technology:

In addition to the tracking of commodities, RFID has recently been used to provide comprehensive sensitivity and traceability for the food supply chain (Kumari, 2015; Trienekens, 2012). Brody et al. (2008) furnished RFID technology to monitor food goods to the area where they were delivered. It monitors the temperature of food and ensures the quality and security of food. In the agri-food business, this technology has been widely utilized, especially in monitoring temperature, for fire disclosure, and cold chain traceability.

8.4.4 Internet of Things:

The Internet of Things gives a wide range of applications for the functioning of the food supply chain to enhance the efficiency of the food supply. It builds conventional devices more automated networks (Reyna, 2018). By preserving quality, assuring customer safety, and allowing speedier response to changes, the food supply chain has proved its efficacy (Tzounis, 2017).

The Internet of Things cannot be utilized independently for certain practical reasons. But food processors like Bakkavor combined the technology with RFID or Blockchain for a better supply chain (Bakkavor Group plc, 2020).

Globally, the food processing firms have executed a variety of actions in reacting to the present crisis to improve their supply networks. The foremost benefit of employing sophisticated technology in the supply chain is to enhance flexibility and efficiency in order to achieve supply chain resilience (Büyüközkan, 2018). The factor of flexibility is more significant in contrast to other elements since it is needed for attaining supply chain resilience. Through better management of the food supply chain, these technologies can offer more effective and cost-effective food products. Thus, it is necessary for the food sector to establish a new supply chain for better resilience.

8.5 Conclusion:

Disruption of the supply chain due to coronavirus disease is not new to the food sector. Over the last ten years, the Ebola crisis, Hurricane Maria, and the Japanese earthquake were also witnessed by the food sector. But the contingencies of the current supply chain due to the COVID-19 pandemic have not been underlined by another catastrophe. Therefore, developing resilience in the supply chain is vital and it requires strategies on diversification and localization while increasing the agility and visibility of the supply chain.

The study underlined the fact that a well-designed and productive cross-industrial collaboration brings notable benefits to the food sector and thereby solves the internal and external risks of the pandemic. The study also identified the connection between cross-industrial collaboration and the resilience of the food sector through wide literature review. Recently, food processing firms are enhancing their investments in the digital supply chain management. Most of the companies accelerate their automation and robotics efforts after the pandemic. The Internet of Things and Artificial Intelligence are also among the companies' priority techniques, garnering more investment in the context of the crisis.

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