
AN INVESTIGATION OF SUPPLY CHAIN DISRUPTION MITIGATION STRATEGIES: EVIDENCE FROM KADUNA-NIGERIA

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ABSTRACT

The Covid-19 pandemic forced organisations to rethink their business models and management styles. Supply chains learned the hard way of how to react and operate under pandemic conditions. This study investigated strategies adopted to mitigate disruptions caused by Covid-19. Data was collected through in-depth semi-structured interviews with management staffs and suppliers of the case organization in Kaduna, Nigeria. The findings revealed strategies used by the case study in mitigating supply chain disruption such as routine online meetings with stakeholders, drone delivery to areas where there are logistics and environmental challenges, last mile delivery and use of new technologies in communication. Although the study is a case study which restrict the generalization of its findings, future research may consider building on the findings of this study to survey a larger population to understand the strategies they used in mitigating supply chain disruptions.

Keywords: Covid-19 disruption, supply chain, supply chain disruption, disruption mitigation strategies

INTRODUCTION

The disruptive effects of Covid-19 on economic, political and social-cultural activities worldwide will remain one of the most discussed catastrophic events that devastated economies of developing countries like Nigeria (Babatunde, 2020). Covid-19 disruptions were felt in the form of delayed clearing of goods in ports, reduced capacity, delayed delivery of supplies, contract cancelations and labour and material shortages. Also, medical supplies like facemasks, pharmaceuticals, medical consumables, personal protective equipment, reagents, basic food items and the likes became short in supply. The effect of such disruption caused a distortion in supplies, planning, production flows, contracting, procurement activities and service delivery (Ivanov, 2021).

Organisations needed contingency plans lead to needs satisfaction as prime determinants of survival in the face of Covid-19 induced supply chain disruptions. One of the goals of any supply chain is to achieve end-to-end visibility between upstream and downstream activities. Disruption to supply chain visibility affect organizations' operations, leading to delays and distortion in supplies, disruption in production plans, loss of man hour, tie down working capital, tie-up stock in warehouses, pilferage of idle stock and the likes.

Thus, supply chain managers, academics, politicians are concerned about finding strategies that mitigate supply chain risks. Several risk management strategies have been suggested such as multisourcing, nearshoring, building buffers inventory and capacity, invest in product and plant harmonization, diversifying the supply chain, improving supply chain visibility, contingency planning, internal risk awareness training, and supply chain risk information (Manuj & Mentzer, 2008; Ho et al., 2015).

Kaduna State Public Health Supply Chain System which is the main agency responsible for health supply for residents of Kaduna State-Nigeria is at risk due to disruption caused by

Covid-19 pandemic, coupled with weak supply chain capacity of healthcare personnel, lack of supply chain visibility across the state public health, non-visibility of supplies sources, lack of published selling price of health commodities, and difficulty in measuring costs of running health commodities supply chain and uncoordinated implementation of health intervention supply chain programs.

Strategies are needed in times of uncertainties like the one posed by Covid-19. Consequently, the objective of this study is to investigate strategies used Kaduna State Health Supplies Management Agency (KADHSMA) to mitigate disruptions caused by Covid-19. These disruptions, including delayed clearing of goods in ports, reduced capacity, delayed delivery of supplies, contract cancelation, labor and material shortages, medicals and pharmaceuticals shortages and restriction of patients' access to healthcare centres across the state due to quarantine. Conducting research of this kind, bearing in mind the huge effect it has on global supply chain will reveal strategies used during the pandemic and provide knowledge to mitigate future disruptions.

The remainder of this paper is organized as follows. In Section 2, we review related literature. In Section 3, we present the methodology. Section 4 presents the findings while section 5 presents the conclusion.

LITERATURE REVIEW

Concept of Supply Chain

Supply chains system consist people, material, transformation activities, organizations, information and resources used in fulfilling demand for products by customers. Generally, supply chains deal with different activities, people, material, information, financial resource, knowledge and skills (Saddikuti et al., 2020). According to Pato and Herczeg (2020), supply chains are the results of cooperation of organizations, where different members try to achieve mutually beneficial, synergic relationships in order to achieve more efficient levels of operation. Supply chain activities involve transformations of raw materials and components to into certain products. In supply chains that adopt advanced technology, products can re-enter the supply chain at any point where value can be recycled. Supply chains are thus the result of cooperation between organizations with a common objectives.

These objective can be profit maximization, process improvements, cost reduction etc. The cohesion of the supply chain is based on trust and mutualism. Sari and Bramantyo (2020) explained that the term "supply chain management" is used to indicate needs in the integration process from end-users to original supplier. Supply chain management focuses on integrated patterns in product flows from suppliers, manufactures, retailers to end consumers. A significant amount of material, funds, documents and information flow exists in supply chains; and a proper quantity and quality of flow is required to rationalize or occasionally optimize the processes, reduce costs or increase profits in the supply chain.

Supply Chain Disruption

Disruptions can occur due to natural calamities or man-made disasters (Odunayo & Victor, 2020; Singh et al., 2020). There are several global calamity that have occurred in the past such as, the Gujarat Earthquake of 2001, the Tsunami in Japan in 2011, the Indian Ocean Earthquake, and Tsunami in 2004. And most recently, the 7.8 magnitude earthquake that affected Turkiye and Syria and killed more than 40,000 people. Also, there have also been various outbreaks of highly infectious diseases like COVID-19 which caused global crisis not only to human lives, but also economic activities.

Supply chain disruptions may arise from a “combination of an unintended and unexpected triggering event that occurs somewhere in the upstream of the supply chain (the supply network), the inbound logistics network, or the purchasing (sourcing) environment, and a consequential situation, which presents serious threat to the normal course of business operations of the focal firm” (Bode & Macdonald, 2017). Disruptions, whether natural or human-caused, are inherent part of the global context of all supply chains, regardless of the market niche in which those supply chains operate or the critical nature of the goods and services they provide.

Localized events such as the 2019 wildfires in Australia (Edwards, 2020) or the 9.0 magnitude earthquake that hit Japan in March 2011, causing the Fukushima Daiichi Nuclear Power Plant explosion (World Nuclear Association, 2018), not only caused damage in Japan, but affected global supply chains which resulted to temporary closure of a General Motors truck plant in Louisiana, due to a lack of Japanese parts (Golan et al., 2020; Lohr, 2011). The COVID-19 pandemic is a disruption of an entirely unprecedented magnitude that is testing the resilience of global supply chains.

The ability of supply chain operators to effectively plan, provides a means for the supply chain to absorb, recover from, and adapt to disruptions of various lengths, impacts, and probabilities, and is essential to ensuring the supply chain’s functioning and success. Measuring such abilities provides insights into strengths and deficits and can help focus future planning efforts. Localized disruption affects particular countries and industries while global crises such as a pandemic, simultaneously impacts multiple countries and multiple industries. In the case of the Covid-19 pandemic, the fear of contagion resulted in unanticipated market trends, such as price spikes and hoarding, while demand in other industries reduced.

The Covid-19 Pandemic and Supply Chain Disruption

The negative effects of Covid-19 pandemic on individuals, firms and supply chains may be difficult to measure. The pandemic caused devastating social effects, massively influenced local and global economic activities, including short and global supply chains (Pato & Herczeg, 2020), There was restriction of workers, changes in demand of consumers, closure of production facilities, restricted food trade policies, and financial pressures in supply chain in many countries (Aday & Aday, 2020). Silva et al. (2020) stated that Covid-19 forced many companies to shut down due to lack of capital to maintain operations; others reinvented and adapted during this problem.

Chin (2020) explained that Covid-19 disrupted food supply chain with restriction of movement put in place to reduce transmission of the virus. According to Singh et al. (2020), the outbreak Covid-19 did not only take lives, it also severely crippled economies by disrupting manufacturing and logistics activities and demand and supply of products. Queiroz et al. (2020) argued that the Covid-19 pandemic wreaked serious havoc on supply chains around the globe. Hoek (2020) stated that the Covid-19 pandemic caused risks and disruptions in most supply chains. Golan et al. (2020) highlighted that Covid-19 pandemic revealed the lack of resilience and failure in global network scale in relation to individual supply chain connections. In addition, the Covid-19 crisis caused major supply chain disruptions; and caused considerable damage to global supply chain (Hoek, 2020; Hu, et al., 2020).

There are also several reports about the disruptive effects of the Covid-19 pandemic on countries. In Nigeria, Babatunde (2020) reported that the Covid-19 plunged the world into broken supply chain. Similarly in China, Sharma et al. (2020) stated that Covid-19 disruptions caused ripple effects on global supply chains. In India, Rewari et al. (2020) reported that India’s nationwide lockdown due to Covid-19 pandemic prompted concerns about disruption

to supply of antiretroviral drugs. Similarly, Odunayo and Victor (2020) argued that the Covid-19 crisis created a new set of challenges to which supply chain managers must respond. Covid-19 and the imposition of the strict lockdowns caused disruptions in China with ripple effect on global supply chains (Sharma et al. 2020).

Whilst the literature reviewed, focused on the disruptive effects of the Covid-19 pandemic, this study investigate the strategies adopted to mitigate the negative effect on firms' supply chains. The study seeks to determine the strategies used by Kaduna State Public Health Supply Chain System to mitigate supply chain disruptions caused by the Covid-19 pandemic. By focusing on strategies, this study expects to uncover individual uniqueness and approaches which might be beneficial when faced with future disruptions.

METHODOLOGY

Qualitative research approach was adopted in this study. Creswell and Creswell (2017) states that qualitative research gives researchers the opportunity to focus on a single phenomenon, bring personal values into the study and create agenda for change/reform. Gammelgaard and Flint (2012) suggests that there are more ways to conduct research to extend and enrich knowledge. The strategy of qualitative approach adopted in this study is case study. Case studies are a design of inquiry found in many fields, especially, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process, or one or more individuals. Cases are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time (Stake, 1995; Yin, 2009, 2012).

DATA COLLECTION AND ANALYSIS

The core data for this study are sourced using semi-structured interviews with personnel of KADHSMA. Gammelgaard and Flint (2012) suggests that by exploring supply chains micro processes, the interview method taps into tacit knowledge about how logisticians actually work on a particular process in a way where pure observation would not have been sufficient. The interviewees selected for this study were expected to have an understanding of strategies that were used to mitigate against the disruptions caused by Covid-19.

The interview was conducted at the organizational level because of the aim of the study, to find out strategies used to mitigate supply chain disruptions caused by Covid-19 pandemic. To judge the level of risk management, we considered it vital to understand the perspective of the case organization involved and its supply chain and then made a decision at the network level. Efforts are made to find multiple viewpoints on the phenomenon to enable a deep and informed understanding of specific risk management strategies and their effects.

The study interviewed seven staffs of KADHSMA comprising two strategic and middle managers handling strategic roles and five suppliers. Subsequently, a snowball sampling technique was used to identify 12 participants comprising 7 KADHSMA staff and 5 suppliers. In snowball sampling, we identified people who are essentials to strategic management roles in KADHSMA. We relied on these initial participants to identify additional study participants.

Seven questions were developed to guide the open-ended interview sessions. These questions were formulated with reference to the topics under study, that is: supply chain, strategies, Covid-19, disruption, challenges, recovery, resilient, positive effect, the lessons learnt during Covid-19 disruption and future expectation in post Covid-19.

In analyzing the data collected, we followed case-studies guidelines as suggested by Yin (2009) by continuously contrasting literature and data gathered from our interviews. The analysis focused on examining antecedents to decision-making process in terms of risk management considering, all different perspectives. Data gathered from interviews were analyzed using thematic analysis, a method that identifies, analyses and reports patterns within data. This thematic analysis was performed in phases following the step-by-step guide by Braun and Clarke (2006).

The details of the phases were manually conducted beginning with initial code generation. At this stage the transcribed data was divided into relevant codes that were thought appropriate. This process is easier as it facilitates data familiarization while independently conducting the interview and transcribing the data. Subsequent, main interview themes were captured, named and analyzed to produce a report.

Methodological Rigor

Methodological rigor research refers to the trustworthiness or precision of a study with regards to planning, data collection, analysis, and reporting. Methodological rigor is crucial in qualitative research in order to establish trust and confidence in the findings of the study. Following the suggestion by Strauss and Corbin (1998), data used in this study was designed using; quality criteria of fit, understanding, generality and control in order to assess the trustworthiness of the methodology of this study. In fulfilling the fit criteria, the initial research idea informed by literature and interviewees were integrated into the study. Secondly, complying with the understanding criteria, transcribed data and result were sent back to interviewees to confirm if they understood and approved the findings. As for the generality criteria, the interview length and the openness of the interview questions enabled the collection of different aspect of the phenomenon under study. For the control, only interviewees who can influence or exert decision on supply chain risk management were involved in this study.

FINDINGS

A total of 57 thematic analysis codes were generated at the first level code. The second level code generated a total of 7 thematic codes which were themes that appeared twice and thrice. The codes generated at the second level includes: delay in delivery of healthcare products by suppliers, lockdown of the Nigeria economy, movement restriction in the entire country (Nigeria), disruption of supply chain activities, lack of supply chain visibility, failure in fulfilling of orders and transportation challenges.

Supply chain challenges encountered during Covid-19?

Several supply chain challenges were faced by KADHSMA due to the Covid-19 pandemic which disrupted supply chains across the world. Some were caused due to internal factors and lack of preparedness while others were as a result of external factors. Among the external challenges was the problem of border closure. Being an import dependent country, majority of the supply chains rely mostly on manufactured good from abroad. Hence, as a result of border closure due to the pandemic, there was significant disruption in the supply chain of KADHSMA as described by one of the interviewees; *we are seeing delays in the supply of medical goods to suppliers due to border closures.*

Communication was also a big challenge during the disruption. Although the communication infrastructure was not affected by the pandemic, the restriction of movement and quarantine affected the ability of people to communicate. *Delay in feedback information, you found that someone expects immediate information and saying that someone cannot go to the office so*

that he or she can use it with him at that time. Another interviewer reported that; we have difficulty communicating with company representatives because of the closure of the company.

Other challenges encountered as reported by interviewees are lack of supply chain visibility, failure in order fulfillment and transportation challenges, uncoordinated implementation of health response programs, planned purchase disruptions, inability to obtain cash assistance from budget allocations for the purchase of essential medicines in the country, loss of confidence, abandonment of lean supply chain system policy, inability of suppliers execute orders, stock out in warehouses, poor delivery of goods, crisis with suppliers, increase in cost of shipping, expired imported raw materials and semi-finished products at the port, sharp decline in demand, shortage of raw materials leading to increase in production costs, pay cuts, sharp drop in annual sales, increase in complaints from corporate customers about increase in products prices and closure of distribution stations.

Supply chain disruptions mitigation strategies during covid-19?

The findings reveal several strategies adopted by KADHSMA to mitigate the negative effects of Covid-19 induced supply chain disruptions. With communication identified as one of the challenges encountered as a result of the disruption, KADHSMA leveraged communication technology to hold virtual meetings frequently as reported by one of the interviewees: *we held weekly virtual management meetings to find solutions to operational staff challenges that would limit the supply of our facilities.* Still on the use of technology, one of the interviewee reported that: *we use electronic payment methods to pay for supplies, which reduces communication with the payment of supplies.* This strategy was adopted since there was restriction in person-to-person contact. Also, there was increase interpersonal communication between KADHSMA and its supply chain partners as reported: *we usually call our clients to ask for their needs and meet their needs at the time.* Another interviewee explained that: *we improve our customer communication system by first communicating with them and questioning their needs.*

Furthermore, with challenges of receiving raw materials either due to port closure or restrictions in movement, the case company had to resort to prioritization of resources using rating scales that distribute critical products to places where they are most needed, while reducing outputs to areas where the need is not critical. Also, a new strategy for physical disruption was adopted by the case organisation. *We ensure that all health products are delivered within the last kilometer, and no government-owned facility should come to KADHSMA to choose medicines.* This was also due to the restriction in movement and person-to-person contact. Consequently, for our private clients (pharmacies, patent pharmacies, private clinics and state DMA), the organisation adopted a strategy to provide distribution points on all over the country. This reduces the long distance travel for collection of products.

Emergency and pooled purchases were another strategy adopted to mitigate the negative effects of the disruption. Here the case organisation suspended long bureaucratic processes in procurement. In the pool purchases, orders were collated and placed in one request. This strategy was relevant as international maritime transport as well as the Nigerian port was not working at full capacity during the pandemic. One of the interviewee reported that: *to our partners in Europe and South Africa, we have signed a framework agreement to receive flight supplies directly from South Africa during Covid-19.* For local partners, the organisation had a policy for using third-party logistics as described by one of the interviewee: *institutional clients (public and federal hospitals), we fully agree with departmental officials across the country to provide medicines and other medical products directly using FedEx Courier Express quarterly with a 90-day payment period.*

CONCLUSION

This study investigated strategies that were used to mitigate against the disruptions caused by Covid-19. The results presented in this paper are based on a case study of KADHSMA. Data was collected through in-depth semi-structured interviews with management staffs and suppliers of the case organisation. The findings revealed strategies used by KADHSMA to mitigate supply chain disruptions included routine online meetings with stakeholders, drone delivery to areas where there are logistics and environmental challenges, last mile delivery, the use new technologies in communication, engaging in frequent emergency procurements as against planned procurement, and signing of agreements with key pharmaceutical suppliers and provision of staff incentives.

It was also found that, to remain resilient, KADHSMA strengthened their communication systems, built capacity of its employees by way of training and retraining, and recruited new and experience staff. The study also found some potential positive effects of covid-19 to KADHSMA such as the ability of the agency to strengthen its organizational systems, build resilient systems, and conduct periodic organizational systems review. Although the study is a case study which restrict the generalization of its findings, future research may consider building on the findings of this study to survey a larger population to understand strategies used to mitigate supply chain disruptions.

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