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Review Research Paper

A Review on the COVID-19 Pandemic and Its Impact on Supply Chain Management: Preventative Measures and Lessons Learned

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ABSTRACT

A concise overview of the challenges faced by supply-chain operations worldwide as a result of the COVID-19 pandemic is the aim of this research. Methods and suggestions for handling supply-chain issues caused by the epidemic are also covered in the paper. The recovery of the economy depends on the supply system being able to withstand disruptions. Highly efficient supply chain architecture is crucial for achieving superior financial results, shorter production cycles, lower production expenses, stronger client connections, and increased operational effectiveness. The drop in retail and trade activity, especially for non-essential goods, has had a devastating effect on the industrial sector. Reason being, this sector handles the distribution of finished goods to customers. Manufacturers and distributors have had a hard time getting new equipment and refilling their inventory because of problems in the worldwide supply chain. Because of restrictions and the decline in industrial activity among important trading partners, the import and transit of goods across most international borders has grown more challenging. The most important route for international trade, seaports, has been greatly affected by this. Businesses will need to come up with creative ways to distribute and manage inventories if the logistics, transportation, and supply chain industries are to lessen the impact of COVID-19 on company operations. Along the value chain, they should also collaborate with key intermediaries and stakeholders.

1. Introduction:

The global spread of COVID has posed serious problems for supply chains at every stage, from production to distribution. The epidemic has shown how critical it is to redesign supply networks in order to make them more robust and adaptable. Investors in digital technologies, a diversified supplier base, and increased supply chain visibility and openness are all examples of initiatives that logistics stakeholders should examine in light of future dangers. Businesses who had prepared for market shifts by diversifying their supplier bases and investing in digital technology fared better than those that had neither of these things in place and so experienced substantial interruptions. The current microprocessor scarcity has had a substantial impact on the automotive, consumer electronics, and healthcare industries, all of which were negatively impacted by the interruption to the supply chain brought on by the epidemic. Due to the scarcity, it is more important than ever to invest in the United States' semiconductor manufacturing capacity and to strengthen the supply chain. Significant weaknesses in global supply networks have been shown by the COVID-19 pandemic, underlining the need for improved adaptability, endurance, and cooperation across all involved parties.

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1.1 Background

World Health Organization (WHO) proclaimed the COVID-19 outbreak a Public Health Emergency of International Concern on January 30, 2020, and a Pandemic on March 11, 2020 (WHO Director-General's Opening Remarks, 2020). With this proclamation, the battle to strike a balance between living and working began in earnest. Many countries used lockdowns and other severe measures to stop the spread of the COVID-19 epidemic. According to "Lockdown is the World's Biggest Psychological Experiment," 2020, an estimated 2.6 billion individuals were placed in a state of lockdown during the early stages of this dreadful disease. On March 24, 2020, India enforced a lockdown that was among the strictest of any country in the world (Coronavirus in India, 2020). Impact of COVID-19 on People's Livelihoods, Their Health, and Our Food Systems (2020) notes that supply chains were disrupted as a result of border closures, trade restrictions, and other containment efforts. Raw material shortages and sluggish consumer demand further contributed to the pressure on companies to adjust their tactics.

Companies have to deal with issues including low demand (Kasliwal, 2020) and a lack of available workers (Nag, 2020). The services sector was affected almost as much as manufacturing. After the lockdown was implemented in April of 2020, production drastically decreased (Suneja, 2020). In April of 2020, the IHS Markit manufacturing index is predicted to fall significantly from March 2020 levels. The manufacturing had to slash costs as a result, which led to even more layoffs. CMIE figures show that in April of 2020, the jobless rate jumped to 23.52 percent from 8.74 percent in the previous month.

The fact that 200 of the Fortune Global 500 have offices in Wuhan is indicative of China's importance as a manufacturing centre (Managing Supply Chain Risk and Disruption, n.d.). Companies had various approaches to coping with the interruptions brought on by the COVID-19 epidemic. McKinsey found that 93 percent of top supply chain executives are open to implementing changes to make their operations more flexible and robust. Initiatives included stocking up on essential goods and finding alternative sources for raw materials. Several top-level managers have tentative plans to regionalize their operations in the future (How COVID-19 Is Reshaping Supply Chains | McKinsey, n.d.). EY found that the majority of US businesses are open to increasing their investments in AI and automation while yet maintaining their current staff levels.

Scholars are also interested in the knock-on effects of a pandemic on many economic and societal subsystems. The academic studies conducted to assess the worldwide and Indian impact of the COVID-19 epidemic on supply chain are summarised here.

2. Literature Review

The supply chains of a country are crucial to its economic growth. Companies' supply networks were impacted by the COVID-19 epidemic and associated lock downs. Supply chain disruptions caused by COVID-19 and geopolitical tensions are expected to cost U.S. and European businesses a combined $4 trillion, according to a recent estimate. This expense emphasises the need of investigating COVID-19's effect on supply chain operations and the measures taken by businesses to lessen the problem.

2.1 Review Area Broad

2.1.1 Impact of COVID -Global Context: Review

There have been a number of studies conducted to determine how various value chains would influence by the pandemic. The COVID-19 pandemic was analysed for its effect on supply chain resilience (Shen & Sun, 2021) and a challenging scenario for retail supply chains in China during the pandemic was given. They discussed the actions taken by the internet store JD.com during the epidemic. Impact on supply chains from lockdowns enacted to prevent the spread of the COVID-19 pandemic was assessed (Guan et al., 2020). For this investigation, they relied on a framework for assessing international commerce. Policy suggestions and the food supply system have also been discussed (Aday & Aday, 2020). The effects of the coronavirus on supply chains were studied using a text mining strategy. This R-based text mining technique was applied to both broad-ranging news sources and vertical publications covering topics like supply chains and logistics. The results of an analysis of the effects of the COVID-19 pandemic on Egypt's logistics industry were published in 2021 (Bayoumi et al). It used an interview-based research approach and analysed existing literature to convey its findings. Nagurney (2021) presented a paradigm for managing supply chains using game theory that accounts for manpower shortages induced by the COVID-19 pandemic. The impact of Industry 4.0 advances on environmentally responsible supply chain procedures was studied by many academicians. Supply chain risk drivers were evaluated in connection to supply chain and company performance (Parast & Subramanian, 2021). It used data from a cross-sectional poll to draw that conclusion. A second research (Zhang et al., 2021) looked at how the 2020 COVID-19 pandemic affected the shellfish industry. In order to gather information, a survey was undertaken at the farm and market levels. Researchers dug further deeper to evaluate the shellfish industry's preparedness for the pandemic. The potential economic consequence of a lockdown of Tokyo City to prevent the spread of this pandemic was investigated by Inoue and Todo, (2020). It assessed the global fallout from a disruption in the supply chain for luxury items based in Tokyo. The situation was simulated using an agent-based model developed by the authors. These metrics were used to assess the health of Canada's fresh produce sector. After a year had passed since the beginning of the epidemic, this research was conducted. Potential shifts in global value chains were explored (Panwar et al., 2022). It contends that the rise of digital technology and automation will be important factors in bringing about these shifts.

2.2 Review Area Narrow

India's lockdown because to the COVID-19 outbreak was among the strictest in the world. Because of the country's massive population, people all around the world were affected by the pandemic outbreak. This highlights the need of conducting studies in an Indian environment. The effects of the COVID-19 pandemic on the food supply chain were investigated (Lowe et al., 2021). They looked at how often COVID-19 occurred before and after the disruption in supplies. Both the beginning and the end of the relationship were analysed. Another study looked at the impact on the food supply chain (Mahajan & Tomar, 2021). Using a case study of an online grocery store, it analysed how interruptions affect product stockouts and pricing. It lists a number of problems that need fixing, such as a lack of personal protective equipment (PPE), active pharmaceutical ingredients (API), or ventilators. In regards to the ongoing pandemic, it laid out the financial risk management framework and the supply chain risk management framework in detail. The effects of the swine flu pandemic on the emigration population were assessed (Khanna, 2020). The article addressed the impact the shutdown and high unemployment rate have had on the economy of the migrant workforce. Both pre- and post-pandemic performance metrics of India's major ports were analysed. The report included an expert poll that found marine organisations to be unprepared for COVID-19 and the development of future policies. The effect of COVID-19-caused interruptions on farming in India was evaluated (Kumar et al., 2021). This study analysed the elements that impacted the farming industry after the lockdown in the Indian state of Uttar Pradesh via a mix of qualitative and quantitative research. A. Sharma, Adhikary, et al., 2020 study was to offer strategic insights into the primary challenges encountered by the enterprises as a result of COVID-19 disruptions, as well as the steps those firms planned to take to address those challenges. It analysed tweets from executives at the NASDAQ 100 companies to identify common concerns. The effects of the COVID-19 pandemic were studied (Chaudhary et al., 2020) with particular attention paid to the aviation, MSMEs, tourism, retail, capital markets, and oil industries. It also analysed the effect on GDP growth and the number of displaced workers. Khurana et al., 2021-Companies can weather the COVID-19 storms with the help of the variables. In this article, we employ the Analytical Hierarchy Process (AHP) methodology to zero in on the most crucial elements that helped businesses strengthen their business.

2.3 Factors critical to success of Study

This study aims to demonstrate that the effects of a pandemic demonstrated the vulnerability of worldwide supply chains, especially in logistics, production, distribution, and demand, and to suggest a redesign of the supply chain to better survive such catastrophes. Many Asian companies had to temporarily down due to lockdowns because of the epidemic, which had a substantial impact on industrial activities worldwide. As highlighted in the thesis's closing chapters, this caused manufacturing delays, which in turn led to shortages of essential components and materials, especially in the healthcare, automotive, and microprocessor industries. Shipments were delayed or cancelled as a result of the travel and mobility limitations imposed by the epidemic. The supply chain constraints developed, especially in international shipping, as a direct result of the interruption. Many stores' supply chains were disrupted by the epidemic, and vital supplies were unavailable because of lockdown procedures.

3. Research Design, Methodology and Plan

3.1 Data sources

The majority of this paper will make use of secondary sources. Articles aren't the only things that belong in the literature review; books, reports, and other related items are required as well.

3.2 Design of Research

The systematic literature review should employ a robust, well defined research technique that permits future replication. The review should include not only articles, but also books, papers, and other sources that are relevant to the topic at hand. As it will simultaneously be (a) an evaluative review, (b) a syncretizing review, and (c) a gap review in this article, the review will have more than one outcome (a three-in-one review).

3.3 Survey questions

This paper is basically an review work but the questions that can be developed for this research includes both the open and close ended questions.

3.4 Data Analysis Procedures

We initially analysed the state of the art to determine the research gaps that require a more open methodological approach (including stratified selection). Based on the PRISMA diagram (2020), Denyer and Tranfield (2009), and this research's phases,

1. Pre search
2. Search
3. Screeming
4. Reporting

Some examples of pre-search activities include a review of the existing literature and the formulation of research objectives.

Finding what you're looking for requires developing search criteria and perusing relevant material. Reporting on the screening process includes checking for duplicates, removing irrelevant articles, reviewing the complete text, and analysing the findings. Theoretical frameworks, operational procedures, and analytical methods developed to manage the distribution of scarce resources during the Covid-19 pandemic were used to identify three knowledge gaps. This research investigates the effects of the COVID-19 pandemic on the supply chains of industrial firms, with a focus on those located in poor countries. We describe a theoretical framework for analysing issues and selecting suitable preventative actions, which is based on the dynamic capacity theory. Major concerns are identified based on a literature review, a review of several news articles, and interviews with subject-matter experts. We also make an effort to establish connections between the various supply chain issues. Dealing with potential staffing (SSL) and supply (SSM) gaps might be challenging.

5. Findings and Analysis

The preceding information, collected through available literature (interviews with experts) in various sectors of the Indian economy, sheds light on the varying supply chain issues encountered by businesses in the country. Manufacturing, infrastructure, and services are the three broad categories into which the examined economic sectors fall. The chemical industry, the food and beverage industry, the automotive industry, and the pharmaceutical business are all subsets of the broader Manufacturing sector.

Real estate, construction materials, and construction are all sub-sectors of the infrastructure sector. Similarly, interviews were conducted with service industry professionals from fields including banking, software, broadcasting, hospitality, and finance. The most significant problems that the COVID-19 epidemic caused for the manufacturing sector were delays in the supply chain. Most companies in this category reported supply disruption as a major concern. Many components became obsolete, resulting in shorter shelf lives, which was especially problematic in the pharmaceutical industry due to buyer uncertainty about the raw materials, shortages of raw materials and packaging materials, availability of parts from the vendor (service level impacted), and so on. The other issue was warehousing at various junctures in the supply chain due to expectations of increased demand. Uncertainty over the lockdown scenario led to a jump in demand across a number of sectors, but none more so than the food and beverage industry.

The food and beverage, automotive, and pharmaceutical sectors were particularly vulnerable to the sector's unpredictable demand. Vehicle sales decreased considerably in the auto sector as a result of the lockout and subsequent lack of confidence in the future. The pharmaceutical business saw an enormous spike in demand for a small number of items, but the supply chain forecasting model could not account for this. As an example, during the second wave of COVID-19, there was an exponential increase in the demand for ventilators. The manufacturing schedules need to be adjusted to accommodate the increased demand. Another important problem for manufacturers is a lack of staff because of social conventions of isolation and lockdown. To hasten the approval procedure, the pharmaceutical sector has to reorganize its quality control systems. Companies in the industrial sector had diverse responses to the COVID-19 epidemic. The companies aimed to have certain of their products classified as necessities so that shipping would go off without a hitch. These companies aided some of the suppliers in becoming approved as providers of critical commodities. Alternate vendor development was another supply-side initiative that helped strengthen the supply chain.

Companies like Ford and 3M have taken advantage of the possibility to produce ventilators by cross-leveraging their workforce and unused production capacity. Several demand-side scenarios were analysed in tandem with customers to gauge the potential effect on final products. Orders that could not be fulfilled were delayed or cancelled. In order to keep the accuracy of the prediction, a short horizon forecast (once a week) was developed. Companies in the car sector have begun collecting orders in advance from dealers. Distribution firms placed their order based on this data. A bonus of 2% was offered to encourage early order placing. Lean manufacturing practices were used by some of the companies as a lens through which to analyse the issue. GE used lean technologies to optimise the operations and speed up the reaction time. Additionally, companies implemented new technology to boost supply chain awareness.

System redundancy, such as increased production capacity or larger stockpiles, was used to improve system resilience. The pharmaceutical industry's logistical difficulties can be mitigated by improved visibility and process efficiency. However, the businesses believe that meaningful progress in this area will take some time. Most industrial companies have constructed a supply chain resilience strategy for the long term. In order to keep their clientele, certain chemical manufacturing companies have begun offering deeper discounts. Short-term cost reductions in manufacturing and the introduction of distributor communication channels like zoom calls enabled automobile manufacturers lower their market outstanding. As a result of the COVID-19 epidemic, several industrial companies opted for a more innovative and adaptable approach to the workplace.

6. Interpretation of Results

6.1 Infrastructure sector

Real estate, building supplies, interior design, and construction are all examples of businesses that make up the infrastructure sector. Market closures led to a lack of essential raw materials, which was a severe problem. Cement and sand were in low supply since mines had to close because of government regulations.

Many businesses had to halt their projects because of a lack of raw materials, and as a result, the regulatory authorities froze the associated finances. Companies also struggled with a lack of available workers. As the infrastructure sector relies heavily on human work, this shortfall has had far-reaching consequences. Migrant workers make up a large proportion of the workforce in the construction industry. After the lockdown was over, these employees returned to their home countries. For instance, one business in the field of interior design and construction noted that during lockdown, the number of available workers dropped by half. Companies also saw a rise in the expense associated with contracting out work. The third problem is the lack of readily available building tools such Transit mixes and pumps. To offset the fixed costs they were incurring, the suppliers of such devices raised their prices. Companies took many steps to mitigate the value chain effects of the COVID-19 epidemic. The companies built in some wiggle room into the projects where the cement was made onsite to mitigate the impact of raw material shortages. The demand was rationalized in order to give some plants higher priority than others.

The supply of raw materials was ensured by the establishment of long-term ties with the suppliers. Transportation expenses were weighed against the cost of the raw materials themselves as options for sourcing were considered. In an effort to cut expenses, the quality assurance staff came up with a novel method of modifying the mix's preparation. The negative impacts of labour shortages were softened by the establishment of labour camps equipped with the bare necessities of life. During the epidemic, rates were negotiated down in the work contracts. Renegotiating land lease rates also helped bring down fixed expenses. The logistical expenses of infrastructure companies were brought under control by switching to a variable cost model. Equipment shortages were mitigated by widespread equipment sharing and the joint purchasing of replacement pieces. The unit for which rent had not yet been placed was given higher priority and was completed first. In order to make up for the shortfalls, the imported raw materials had to be flown in. The companies have a plan in place to increase the system's stability over time. There was an office move and employees were dispersed to their new places. The "Make in India" concept became a bigger part of the strategic decisions going forward. Companies committed themselves to suppliers for the long haul to fortify the system and counteract raw material shortages.

6.2 Impact on Services industry

The services industry is crucial to the national economy, accounting for a large share of GDP. The effects of the COVID-19 epidemic on the service economy were devastating. Banking, lodging, software, broadcasting, finance, and the armed forces are all examples of service businesses. Work from home (WFH) was a huge challenge for businesses in the banking, software, and financial services sectors. Working in a WFH fashion on a constant basis was unprecedented. High-speed internet, sufficient numbers of laptops, and access to VPN-enabled devices were all areas of concern.

During the lockdown's early stages, WFH also led to inefficient work completion. Inadequate internet speed and cyber security issues also hampered communication between international teams working on WFH-related projects. High software engineer turnover owing to WFH regulations was another problem facing the service sector, especially the software industry. They were able to bypass geographical limitations because to WFH policies that allowed them to work from anywhere. Broadcasting was another area of the service economy that felt the effects. The key to success in the market is content creation while monitoring consumer sentiment. The specific difficulty was that as more people stayed at home, the demand for material rose, but the industry was ill-equipped to meet it. As a consequence, income dropped from 100 Cr to 20 Cr. The hospitality sector, and the restaurant industry in particular, had to deal with difficulties. One of the main problems was a lack of necessary ingredients for the cooks. Concerns were raised about the logistics of transporting a raw material because of limitations on the movement of commodities. Both transportation and raw material prices increased significantly. The supply of imported supplies was also severely hampered. Problems in shipping and importing the supplies prevented their delivery. Since hotels have to purchase raw ingredients from local suppliers, those sellers could charge more.

Due to prevalent uncertainty, precise demand forecasting was not possible. As a corollary, this caused supplies to build up or run out. The international geopolitical circumstances and disturbances caused by COVID-19 also had an effect on the military. Moving troops across the nation and back to their forward deployment sites during a lockdown was a big logistical difficulty. Major difficulties arose from the need to quarantine and acclimatize newly enlisted soldiers before sending them to dangerous regions. Forces' resources needed to be organised, while manpower shortages slowed production.

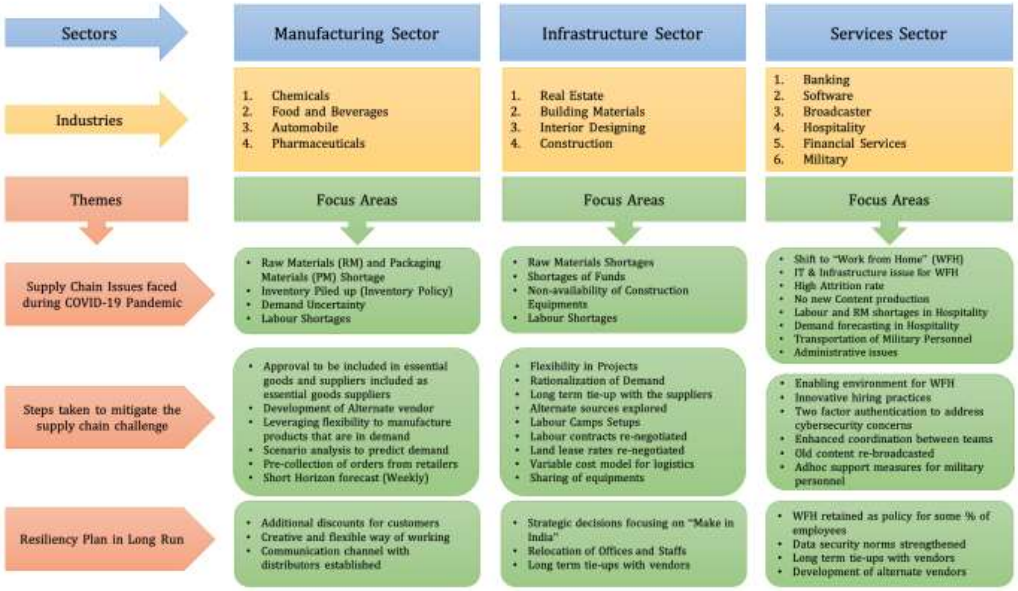
Companies implemented WFH rules and created a welcoming workplace for their staff. Employees were given laptops and access to high-speed internet. Some companies, notably those in the software business, have chosen for creative hiring

practices by offering larger compensation packages to attract candidates in the world's most expensive cities. Companies that were contacted for this study also reported tripling their recruitment staff. The financial services sector helped shape WFH laws and encouraged workers to extend their service hours to meet rising customer demand. Incentives were provided to employees who participated in customer-facing virtual meetings. Financial institutions have started using two-factor authentication for VPN in response to growing cyber security concerns.

Through discussions and analyses of the pandemic's impact on business, these financial institutions monitored the situation as it developed. It was suggested that the teams work together to make up for each other's absences. The military effectively managed the trade-off between preventing the spread of the infection and getting the job done. The highest degree of approval was obtained for the train transportation of soldiers. The newly enlisted soldiers were accommodated on an as-needed basis. The control system was set up after discussions with Air India and the Indian Air Force. Thirty COVID camps were set up across a 400-kilometer area to control the spread of COVID19, and a local military force was tasked with running them. To keep an eye on all of these outposts, a command centre was set up. Another service sector that responded creatively to the COVID-19 epidemic by adopting preventative measures.

They aired the old episodes again in the hopes that people would tune in out of pure nostalgia. The hospitality industry adopted a number of measures to mitigate the effects of the interruption to their supply chain. Hotels, like other manufacturers, sought out secondary suppliers to strengthen their supply networks. But this also led to a rise in supply chain expenses. The companies in the service industry also planned ahead to include effective resilience into their value chains. WFH has been maintained as a policy for a percentage of workers in the banking and software services industries. GDPR requirements have been considered, and data security standards have been tightened. Short-term infrastructure was made available and WFH standards were applied in the financial services industry as well.

Some efforts were taken on short notice by the armed forces to aid the 20,000 new recruits. Time constraints necessitated the establishment of temporary structures, such as administrative measures and medical facilities. A centralized operations room was set up to track instances of COVID-19 and identify potential carriers. High costs and supply chain disruption were bad news for the hospitality sector. Alternative vendors were sought, and new suppliers were introduced, to bolster the system's resilience and reduce the impact of these problems in the long run.



6.3 Production sector

The manufacturing industry's focal points were determined through in-depth interviews with company leaders. The following diagram points in the direction of the related field of study that can be investigated in the future.

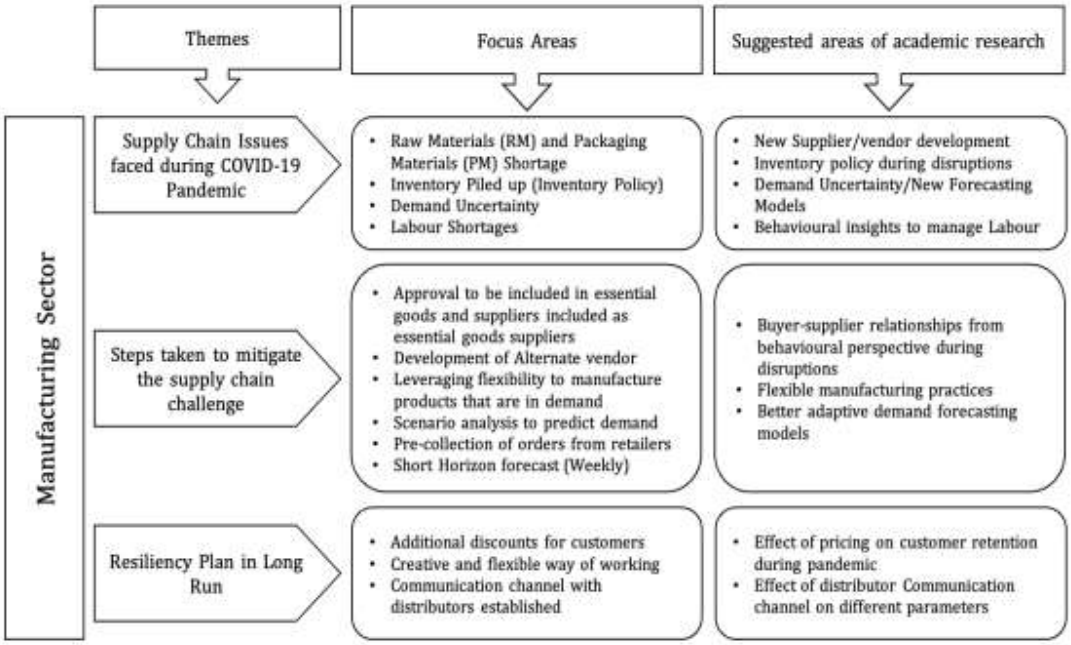


Fig 1: Suggested areas of academic research in Manufacturing sector

6.4 Construction sector:

In a comparable manner interview data from infrastructure industry leaders helped determine the sector's focal points. The following diagram illustrates potential avenues of academic inquiry that might contribute to the strengthening of these companies' value chains.

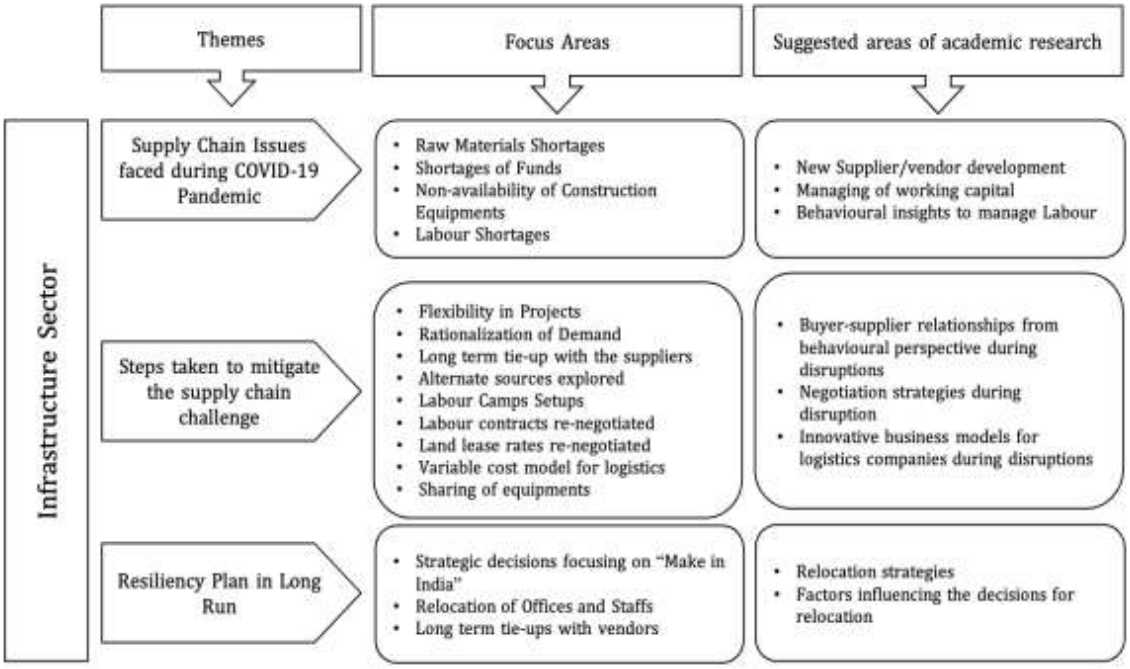


Fig 2: Suggested areas of academic research in construction sector

6.5 Service sector:

The services sector was also impacted due to COVID-19 pandemic. The qualitative data in the form of interview captures the focus areas under the themes. The following figure depicts the suggested areas of academic research corresponding to the focus areas identified from the data.

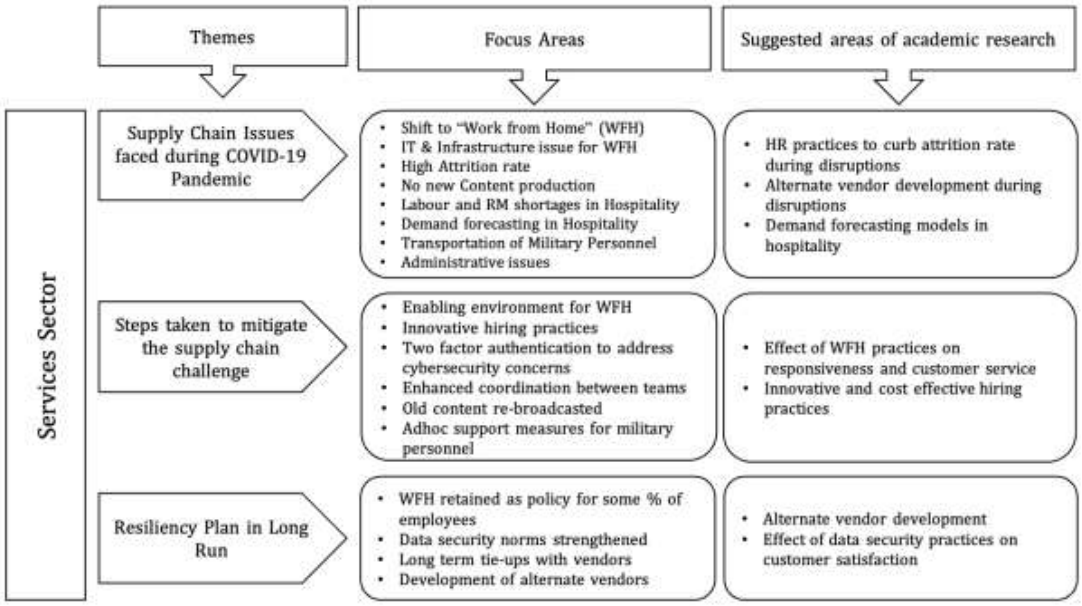


Fig 3: Suggested areas of academic research in services sector

7. Conclusions and Scope of Future work

There has been a significant change in global supply chain management due to this pandemic, which is the interconnected systems of manufacturers, distributors, and suppliers of services that bring products to consumers all over the world. In early 2020, the pandemic broke out, causing widespread disruptions in the supply chains of several organizations and stressing the need for flexibility in this system.

The global logistics sector has been impacted by the epidemic, as have the difficulties businesses have in reorganizing and enhancing their supply chains to make them more robust and adaptable to future crises. Global supply chain refers to the interconnected web of manufacturers, distributors, and logistics companies that work together to provide consumers products and services from all over the world. With firms relying on suppliers and partners in many regions of the world to keep their operations operating successfully, these chains have become increasingly intertwined and interdependent in recent years. Beginning in 2020, when the COVID-19 pandemic broke out, these international supply networks were severely disrupted.
Many companies' supply lines were severely disrupted when governments blocked their borders and instituted lockdowns. The unexpected shutdown of factories and warehouses, as well as transportation and logistics networks, sent shockwaves across the whole supply chain. Many firms' supply networks had their weaknesses revealed by the epidemic, underscoring the need for increased resilience and adaptability. Companies with a high degree of reliance on a single supplier or nation were more susceptible to supply chain disruptions because of the domino effect. That's why many businesses are looking into methods to strengthen their supply networks so they can better weather future shocks.

In view of the vulnerabilities shown by the COVID-19 pandemic, the global supply chain must be reorganized and made more efficient. In order to get over the roadblocks brought on by the pandemic, businesses need to adopt a mindset that is geared towards reducing supply chain fragility. This mindset involves being alert to supply chain disruption events and realizing the lessons that may be drawn from them. This can only be done by establishing a means of rapid communication and data sharing among all participants in the supply chain. Supply chains that span greater distances geographically are more vulnerable to disruptions because the network of enterprises involved is larger and more complicated. When businesses act as both distributors and suppliers, we say that they are part of an interwoven supply network (ISN). Understanding the layout and features of a network might help in pinpointing weak spots in the chain.

Having adaptable methods of sourcing materials and manufacturing and transporting finished goods is crucial to a sturdy supply chain. Supply, manufacturing, and delivery risks may all be mitigated by increasing overall flexibility. However, businesses must be aware of how much adaptability is possible in light of the environment in which they function.

Taking this into account, the temporary halting of their partners' activities owing to lockdowns in numerous countries was a hurdle that corporations encountered as a result of the epidemic. As a result, manufacturing capacity was cut, and there was a chance that some partners might go out of business for good. The supply chain requires the formation of new relationships. The flow of information along a supply chain may be improved by fostering a culture of cooperation and trust among all

participants. In addition, the rise in raw material prices caused by COVID-19 has brought into sharp focus the precarious nature of supply chains, the burden of which is ultimately borne by consumers. While the former is able to keep up with demand regardless of disruptions, the latter has lower margins and fewer inventories on hand in order to save expenses. While selecting suppliers in light of their potential for risk and employing backup supplier tactics can strengthen a supply chain, prioritizing cost and quality when making purchasing decisions is the key to running a lean operation.

Finally, the COVID-19 pandemic has exposed weaknesses in global supply networks and highlighted the need for increased resilience, agility, and coordination among supply chain partners. The pandemic highlighted the significance of adaptable methods of procurement, manufacturing, and distribution, demonstrating the centrality of logistics in the effective system. A robust supply chain requires a redesign that strikes a balance between efficiency and resilience, one that takes into consideration the risks posed by suppliers and makes use of alternative sourcing methods. Companies have reorganized and enhanced their supply chains in response to the pandemic in order to lessen the likelihood of interruption, increase their ability to recover quickly from disruptions, and keep operations in a positive steady state. The global supply chain system is more resilient and efficient now that businesses have had the opportunity to learn from the COVID-19 outbreak and react accordingly.

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