Spider-Web-Network Model, a Mitigating Strategy at the Tail End of the Business Supply Chain to Overcome the Disruption Due to Covid-19

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ABSTRACT

The COVID-19 adversely impacted the supply chain operations of many businesses and caused economic slowdown globally. The study is to understand the supply chain disruptions in the market and to know the suitable mitigating strategies formulated. The research inferred industrial degrowth, nevertheless attempting few resilience strategies to overcome the atmosphere. Restrictions in logistics and retailing, mutilated the current supply chain network in many industries. Business revenue drastically reduced due to an imbalance in demand and supply. A network model is proposed to enhance the brands to build trust and to reach the consumers for trade.

Keywords: Supply chain disruptions- resilience strategies- network model

INTRODUCTION

Our ancient barter system has transformed into online trading as of now, where the supply chain plays a vital role. Supply chain is the backbone of every business to reach the consumer and to build integrity. Ever since the evolution of the supply chain has faced several challenges and obtained the optimum level in the global business. Further globalization has made massive growth of supply chain in the movement of products around the world where the entire import and export get balanced across the nations. Technological advancement in the supply chain made robust to deliver the products safely at the right price, at the right time and right volume, providing transparency in the goods movement. Department which had enormous growth got agitated due to the pandemic (COVID-19) right from the beginning of 2020. Almost totally collapsed at the mid of March'20 when all countries closed their gates at their microlevel. The researchers have made an extensive study on disruption at the tail end of the supply chains where the consumers connect. Also inferred the damages concerning various parameters by interacting with industry experts. Finally concluded with a sensible supply chain network format that adapts for several business formats to restart their engine in connecting and building trust with consumers through sales.

LITERATURE REVIEW

This article highlights the impact of the supply chain at the global level, national level, and regional level. The researchers deliberated some of the resilience strategies taken by few companies at different levels.

IMPACT IN THE GLOBAL AND NATIONAL LEVEL

Though the first case of this pandemic was suspected to be in the mid- November 2019, from Hubei province in China (Bryner, 2020), COVID-19 was characterized as a pandemic by WHO on eleventh of March, 2020 (Newsroom: World Health Organisation, 2020). Even before the outbreak of the pandemic, the global trades started facing a ripple effect of its disrupted supply chain, apparently many countries have announced lockdowns. The business activities of the organizations have come down to mute and the supply chains contracted significantly. The impact may be due to the complete shutdowns, restrictions in movement of materials, people and other services.

The retailers in the world had witnessed a peculiar demand on certain goods such as sanitizers, masks, packed food, vegetables, and essential commodities. Hence, these products moved to an essential category where demand stirred to peak when a lockdown is announced. The people have stocked excess that led to the deficit in suppling to the needy with limited income group; unable to commute depends on others for their regular activities.

Considering the agricultural sectors in India, the disruption is due to a problem in transporting vegetables and corps, labours for field activities and other resources. The price of such products is declining at the farmers' end but is higher at the consumer end. The closure of the hotels, restaurants, and other such small shops decreases the demand for vegetables and other agricultural products. Similarly, poultry farmers are also severely affected.

Not only COVID-19 impact but also the anti-china sentiment also growing in the Indian Market that in turn affects the business. As per recent government norms in India, the products selling in the ecommerce portal should disclose the origin of the manufacturer. Duty paid while importing the products to sell in India can be minimized when we shift outsourcing manufacturing from Indian itself. Due to the pandemic, the major export and import supply chain is affected because most of the sports brands produce the product for the world market from certain outsourced manufacturers located at different locations across the world. To overcome this disruption, sports brands find the country level manufacturers to balance the demand faster in a minimum time considering the supply chain cost (John, 2020).

Tourism, according to the World Tourism Organisation (UNWTO) there is going to be a decrease of 20-30% on tourist arrival in 2020 compared to 2019. The loss amounts to one-third of the US\$ 1.5 trillion of revenue generated globally. Nearly 13 million people employed in tourism industries across Europe, so €1 billion in revenues per month is being a loss in the industry. Minimum 6% in small island countries to a maximum of 60% from prime tourism countries like Italy, is majorly affected due to the pandemic lockdown (Paola, 2020).

High labour driven export industries are there in our country, especially in sectors like textile, leather, jewellery, and handicrafts. On account of this pandemic, about 30% of the export order cancelled, payments settlements delayed, and shipments all hampered due to port traffic. $\Box 7,600$ crores in leather and $\Box 8,000$ crores in handicraft industries orders got cancelled. India's export is in steep decline direction after February 2020, where before contracted to \$292.9 billion in the past 11 months.

As per the Gem & Jewellery Export Promotion Council (GJEPC) report decline of 12% in FY20 to \$35.85 billion is noted. As per the Delhi garment exporter association, there is postponement or cancellation of around 70% of orders. Based on the incoterms most of the shipments postponed, and payments delayed (Kirtika & Sutanuka, 2020).

The National Disaster Management Authority (NDMA) of India coordinates with national eco-logistics policies and recommends crafting the urban freight where the local resources can transmit within the states and nearby states and union territories. Once the commodities reach the suppliers or distributors to retailers, from that point, Zomato and Swiggy play a crucial role in outreaching the consumer in this pandemic at doorstep delivery. Hence technology also plays a vital role overcome this pandemic. Various stakeholders are connected via supply chain strongly that helps Indian cities to get their essential goods to reach the consumers at the right time.

Lay off majorly happens in the *Manufacturing industry* (including Exporter/ Importer) (15%) compare to retail end (5%). Salary cut-off happens equally in all the sector nearly 63% where are 37% of the business could able to manage the situation without any reduction in salary (business formats like designers, media, skill development/education organisations)

Various industries' supply chain models have stumbled in transporting the product from the point of origin to the destinations that affect the money circulation across the globe. Industries are overcoming the situation by technological support digitally that bridges the communication gap within every business whereas labour driven and service industries are majorly affected in manufacturing the products and connecting their clients for trade.

CHALLENGES AS OPPORTUNITIES

Having not this pandemic had happened, some of the innovative ideas might not have emerged. Some brands have grabbed the crisis as an opportunity and came out with a creative proposal to reach its stakeholders.

Gillette, one of the producers of safety razors and personal care products, had positively adopted mitigating strategies by stepping out to support the front-line helpers in this global crisis. Sensitising the immediate need for Personal Protective Equipment (PPE) for the hospitals, they adapted their manufacturing capability to help supply critical PPE to health care workers. Instantaneously, produced face shields, distributed 1,00,000 to Massachusetts healthcare, and have committed to manufacturing 2,00,000 more. They had many ingredient similarities and manufacturing synergies between Gillette Shaving Gels and the WHO-approved hand sanitizer formulas. Three of their manufacturing facilities started production of sanitizer and distributed to hospitals and other relief organisations. They have also planned to produce at least 45,000 litres per week (Covid-19 Response, 2020). In addition to those initiatives, they are also addressing a specific unorganized

community whose economic livelihood has been adversely affected. They have launched a new programme named "Barber Suraksh programme".

The programme intents the financial and health safety of the barbers. Similarly, they are trying to educate them with a video demonstration of their hygiene and protective use of the kit. Their approaches might positively address the long term demand and stakeholder loyalty.

The mitigating strategies implemented by the Government of India helped the *agricultural sector* to reduce their loss rather than making zero return on their investment. The Government permitted the farmers to transport their products and allowed them to perform farm operations. They advised performing the activities abiding the guidelines given by the Government. The farmers from their end started carrying the commodities near the doorsteps of the consumers to reduce their loss. The Indian Government has also offered a helping hand to the farmers by issuing a relief package that includes food and cash transfers. The farmers supplied food items for the packages (Mahenra Dev, 2020).

An artist from Tamilnadu, embraced this opportunity and created an innovative mobile and customised wedding hall. There is a high demand for the wedding hall on the wheels. The inventor has stated that the cost of the wedding is less than 25% of its regular expenses (Sindhu, 2020).

The State bank of India is utilising this opportunity through the kiosk model reached the interior villages across India, to create a savings account for the people and to provide minimum loan for small scale entrepreneurs.

OTHER SIDE OF COVID-19

There is no doubt that COVID19 has also positively influenced some companies. On account of the severity of the pandemic, strict guidelines by the Government, and implementation of social distancing, people prefer to travel by car than in two-wheelers or public transport. The automobile sectors expect a reasonable hike in demand for smaller cars. Accordingly, many brands have started to working out mitigating strategy to grab the demand post lock-down. Honda cars India, formulated one of the mitigating strategies, addressing a specific market demand. The brand is strengthening the "Honda Certified used car" programme for domestic customers with a lower budget (Yuthika, 2020). Hyundai Motor India Ltd planned to restart the third shift in one of its units following rising demand for its new models, with a starting price of 22 lakh (Hyundai to start third shift as demand raises, 2020). Similarly, many other brands are working on their mitigating strategies.

The pandemic also increased the swift of the customers to solar energy. Working from home options amplified electricity bills of the customers that resulted from running air-conditioners, computers, and other electrical gadgets. The demand for household and corporate customers has increased. The companies are willing to spend on procuring solar energy panels to reduce their energy expenses (Covid-19 may accelerate Switch to solar energy, 2020).

METHODOLOGY

The present study is an effort to understand the supply chain disruptions in various industries due to the pandemic and to know the mitigating strategies formulated by them. The researchers attempted to appraise the pandemic's impact on the global supply chain.

A semi-structured questionnaire schedule used to collect primary data. On account of continuous lockdown, restrictions for commutation, the respondents interviewed over the phone, their responses recorded via a questionnaire template. The questionnaire was divided into two sections. It is a known fact that most of the companies face de-growth in various facets, the first section of the interview schedule was framed such that the respondents may uncover the extent of setback faced. The second section includes many open-ended questions that enable the respondents to converse more about their strategies. Due to a shortage of time, the samples were selected only from Tamil Nadu. The researchers approached more than 25 employees at the managerial level from different industries, to ensure the reliability of the data. Frequent follow-up calls made to have a telephonic interview, nineteen of them responded who have experience of more than 15 years in their respective fields.

RESULTS AND DISCUSSION

The researchers asked the respondents to provide the details of the area that are affected worse in their business. The essential information gathered from the respondents uncovers not only one department but also interlinked with other departments. For example, the insufficient stock of raw material, non-availability of employees is because of restrictions on transportation. The researchers

have identified the major issues faced by different industries concerning a few areas which have a direct influence on the supply chain network of every business. It starts from sourcing and managing the raw material, essential technical factors and operations, and the fund involved in the entire process chain.

The study reveals that the operating costs and transportation costs have increased by more than 65 percent as they have to depend on alternate sources for the smooth flow of the business activities. The operation cost has increased due to Government norms, imbalance in demand, and fuel availability. Transportation, logistic connectivity has broken in every layer of the supply chain. They are outsourcing local transportation facilities as there is restriction by the government and a complete halt of public transport. The pandemic has further impacted more than 60 percent of the activities related to the sales and the systems to reach the customers. Sales in the tail end (retail) is in de-growth as consumers could not reach the trading zone for their need and want. The buying behaviour of the customers has transformed from impulsive purchases to only essential product purchases. To sell the merchandise stocked, the companies are adopting different strategies. Though the digital platform connects the consumers virtually, the conversion rate of sales from consumers is a tedious task. From the manufacturer's view, clients are easily approachable but from client end due to lack of demand, purchase orders are not made. The next highly squeezed area is HR and Planning for the future course of action. The commutation of the workers is gravely affected that further disturbed the smooth flow of the business. Overall psychological effect of the pandemic has agitated the mindset among business owners and employee; it needs attention to take productive strategies that enhances the business. The less affected areas are business communication and technical support system. Even so, a few complications exist the companies can manage the progress of the work. The current digital technologies keep up the communication gap in business and fund transactions (Refer to Table 1).

RELOCATE

The study has revealed that most of the companies prefer to use the resources available from their local market. Furthermore, it is observed that the companies depend on the local contract transporters for their workers' commutation. The firms are trying to reach the customers by relocating their products in a digital platform. (Refer to Table 2). Hence, they have to relook their sourcing for optimum results. The firms that were so conservative have become digital to contact their suppliers and customers. Most of the industries' manufacturing activities came to a halt, due to one of the critical reasons, the non-availability of raw materials which procured from other countries. Such dependability had severely disturbed the supply chain and manufacturing. Some of the industries depend on suppliers from a single country. In India, some productions depend on Chinese imports. The automobiles companies import 10-30 percent of raw materials and base components, textiles companies import primary dyeing materials and, numerous micro, small and medium enterprises import from China (Roy, 2020). Similarly, several companies import from several countries, which resulted in a catastrophic impact due to the current pandemic situation. The industries are becoming localization that happened to be internationalization and globalization until the beginning of 2020 (Vikram, 2020).

RESPONSIVENESS

They are trying to reach customers through digital platforms and offering more discounts. They do invest in advanced technology to serve the customers uninterruptedly. Being both the internal and external stakeholders of the companies are much concerned about their safety. Hence, the companies are taking significant care of their employees' and customers' safety. The respondents have further trying to upskill and re-skill their employees for the current scenario. The attention of the respondents has also attracted various allied/ancillary products (Refer to Table 2). It is further justified by a study result revealing that more than 50 percent of the companies in the consumer goods space intend to set-up last-mile delivery operations to reach their customers at their doorsteps. They have also worked on their product improvement, and supply chain hygiene since more than 80 percent of the customers prefer to buy from such safe brands (Harsha & Amit, 2020).

REDESIGN

Most of the respondents have redesigned their supply chain to reach their customers. They are using the digital platform to respond to their customer needs rapidly. They are also trying to hold out through third parties who are from the local market. The respondents formulate strategies to reduce operating costs, marketing costs, human resources cost and other miscellaneous expenses.

Nevertheless, they are investing in critical factors such as technology and employee up-skilling. (Refer to Table 2). Supply chains would be optimized by greater transparency with the suppliers, performing intelligent analysis, valid speculations using effective simulation, and digitalization throughout the pyramid of the supply chain (Jatscha, 2020).

OVERALL RESILIENCE STRATEGIES

- 1. The retailers are focusing on the suppliers of their product standards inside the same city where the demand is high.
- 2. Irrespective of the type of business, the multitasking employees are high in demand. To fulfil such needs, the companies are utilizing the local human resource.
- 3. Almost all the respondents' organizations converging to a digital platform for selling the products.
- 4. Importance given on cost reduction in all aspects.
- 5. The manufacturers are flexible enough in switching over the product (diversification)

In addition to the above discussion on the existing mitigating strategies implemented by the companies of the respondents, the researchers proposed a network model that optimizes the services at the tail end of the supply chain.

PROPOSED MODEL

The theory "Malthusianism" named after the author Reverend Thomas Robert Malthus explains that population growth is potentially exponential, while the growth of the food supply or other resources is linear (Malthus, 1798).

Considering the Global supply chain, in this pandemic, most of the products manufactured by the industries/government, find it difficult to reach the consumer due to disruption in the supply chain network. Our business drops income and in connecting consumers due to a break in the logistics chain. The industries produce products for the population, which has not been consumed and lying as dead inventory/wastages and so the supply chain stumbles in the regional and interior market also.

Before pandemic, the tail end of the supply chain network in every business has achieved its maximum level to reach the product/service to their end consumer. At present, the same players are facing an uncertain precedent environment. In this regard, the researchers suggested a model addressing the uncertain scenario. Initially, the authors have discussed the existing format (Type 1), a hub wherein the consumers reach that point to know or to buy the product/service (like retail & service centres). In furthermore discussion (Type 2), a virtual hub where the consumers engage themselves in the web portal and get to know about the product/service. The same will be delivered at their doorstep (like E-com & App & online support).

In the case of Type 1, the companies have invested an enormous amount in the installation of the business infrastructure (retailing) such that consumers can participate in the business in tangible form. Hence, the brands created market places like bazaars and many business streets. In later stages, the brands applied the Nash equilibrium (Nash, 1950) concept to assemble the consumer in a junction point where a particular set of products/services from different brands will be available, like shopping malls, food streets, entertainments, etc.

During this pandemic, the majority of the Type 1 formats are affected, and even though the supply chain extends widely, our consumers are not able to reach our destination, and so our tail end suffers.

In the case of Type 2, due to this pandemic, many businesses are switching on to e-com/App format. The new strategy demands enormous investment in constructing the platform and ending up complicating the supply chain network where they burn their hand in reverse logistics. The marketing expense in engaging the consumers in the platform is a continuous process, as the brands need to compete with the marketplace where highly experienced players are in the field. Moreover, creating consumer trust is highly questionable.

To overcome this challenge, focusing on reaching consumers at multiple nearby destinations is essential. An inclusive supply chain model covering the shorter consumer radius to be focused. The format shall increase our point of contact at minimal investment and resource (human resources & material). The contact point can be in miniature form of the store, having virtual (digital) information of the product/service that can easily be communicated by the business representatives and can

also offer maximum support. Cross-docking techniques need to be implemented effectively to liquated the inventory and minimize the material wastage.

In Gillette's case, during this pandemic time, they help all the small-scale barbers with their brand kit (consists of minimum grooming devices) and also emotionally connecting with the barber, by which in return barbers consume the company's product for the long term even after this pandemic. By increasing our contact points (mini-hub / miniature distributional channels) or preparing a tool kit for the consumers in the shortest radius, the brands reach our products/services effortlessly. Finally, wastages and dead inventories can minimize.

Even when this pandemic gets controlled gradually, people feel tough to travel or migrate to consume the products from the business hubs. So, breaking the business hubs into miniature models will facilitate the availability of the business in an approachable distance (radius), people feel better to reach.

In Figure 1, the entire square is considered as a region of 450 sq km with a 1.25 crore population (Considering Chennai City landscape data). Red dots (Refer Figure 1) are the major hubs of a company or market place where people access them before pandemics.

In Figure 2 for the same 450 sq. km coverage, applying inclusive supply chain models with minimum major hubs and focusing on the maximum point of contacts indicated in green dots(Refer Figure 2). The majority of the retail business shall apply this concept (industries like grocery sellers, restaurants, garment sellers, automobiles, and construction materials) along with digital support. Blue lines (Refer Figure 2) are mobility or connectivity of the business available within the shorter radius.

"Spider-Web-Network" a newly coined model by which many businesses shall create an intense supply chain model to overcome this pandemic uncertainty.

By this, the business representative shall spread in various miniature locations, as an alternate for layoff, and material also can be shared from the major hubs. Easy to manage the less volume of inventory. The brands need to search for the local suppliers who can meet the standard of quality in products/services. The brand shall expand its business and enhance reliability.

Economically managing the points of contacts (mini hubs – Green dots) are cheaper compared to the major hubs (Red dots). In the case of exporters, as of now, necessarily focus on opportunities in the regional marketplace.

Just like mobile grocery sellers reaching our doorstep, nowadays, most of the food restaurants are changing into a portable format, that they organize a truck full of their best products and trying to reach their people at the doorstep. Similarly, the brands need to approach their customer as closely as possible, and so they can enhance their business for the long term.

The approximate cost incurred in installing this setup varies for every business format with respect to the strategy they choose.

Example 1: For mobile caravan set up to cover a specific location (Two Pin-codes in a region) it will take a sales staff/helper/driver of about Rs.4000 per day added to it caravan on rental basis Rs.2500 per day and miscellaneous expense of Rs.1500 per day. In the case of renting a particular place as an event, it cost about Rs.4000 per day. The fixed cost for a smart Television is Rs.25000 (2pcs). This strategy was initially handled by Zivame (Lingerie brand) "Fitting Lounge" to build trust and to make the consumers adapt to their e-com platform.

Example 2: Utilising the employee to reach the consumer at doorstep would cost about Rs.2000 per employee per day (including miscellaneous) and fixed expense for touch screen pad Rs.10000 (1pcs). This strategy is used in private banks to reach their customers (The Doorstep Banking Process, n.d.).

Example 3: Kiosk model planned to set up (500 sq. ft.) at the minimum budget cost about Rs.50000 per month (including rent, two staff, marketing, materials, and miscellaneous expenses). This model followed in food industries/restaurant (Nabeel A., 2009) like shawarma kiosk, and so on.

Considering, the above-said examples as mini hubs (Green dot in Figure 2) that can be achieved effectively by reducing the primary expense incurs in the major hub (Red dot in Figure 2).

CONCLUSION

Trust is the prime factor for every business to build with the customers. And so the products or services should reach the tail end of every business supply chain where the trade is processed. To

build trust, every business's presence and availability are a must in the market by which the tangibility of the product increased to consumers. Trade happens when the consumers could connect the brand with their need and want. When the trade increases, the demand also increases; when the demand increases, the supply also increases, eventually the engine will be rebooted with a continuous flow. This cyclic process right from labour driven industry to small scale business format helps to achieve the fund flow in the business as similar as the blood flows in the human body. The suggested Spider-Web-Network model will help every business to bond the customer and to develop a long-term trade and to liquidate the stock, which is as essential as a heartbeat to make the business immortal.

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Tables and Figures

Table 1: The impact of COVID-19 on various areas of an organization

Areas affected	0-25%	25-50%	50-75%	75-100%
Operation Cost	2	6	7	4
Transportation	3	6	5	5
Sales	3	6	5	5
Mindset (Fear)	4	4	7	4
Reaching Customer	3	8	3	5
Raw Material	4	6	5	4
HR	2	12	3	2
Planning	6	8	2	3
Business Communication	5	10	3	1
Technical Support	13	2	2	2

Source: Primary data

Table 2: Issues faced due to pandemic and the resilience strategies formulated by the respondents' company

The responses of the respondents are grouped for different area and presented in the following table.

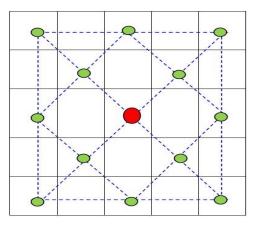
S. No	Area	Issues faced	Resilience strategy	
1	Raw Material	Insufficient stock in manufacturing Higher sourcing cost Over/dead stock in the retail stores	Minimising the raw material procurement Sourcing the products from local distributors (within the city) Liquidating the product assert at all of	
2	Human resources	 Layoff is happening across every industry. Looking for a multitasking resource to manage the situation. 	Upskilling and reskilling of their employees to reduce layoffs	
3	Technical Support	There is only 40% technical impact in the business activities, as most of the companies adapted to the latest digital technology bridges the gap.	 Investing on Cloud based online network, high speed internet for digital communication. Physical access on support required for manufacturers 	
4	Planning	 On field resource planning industry is challenging factor. As the environment is uncertain and the companies are finding it difficult to plan 	 Reduced conservative sales targets Production with minimalistic resource Existing stock liquidation Shifting the stock from lockdown location to operative location Focusing on allied sectors Available stock with inserted client orders Competent Authority is required to manage the production line 	
5	Operation Cost	Highly affected because of government's	Negotiation with vendors/landlord for discount and credit	

		restrictions in transferring the goods • Safety measure expenditure increased	 Reduction in the marketing expense Expecting government subsidy Managing the overhead expense by minimising the working hours
6	Transportation	 Government restriction, e-pass only for essential commodity Due to fuel expenses, logistics expenditure affects the business 100% of employee is not possible to reach the office, hence vehicle is arranged by the company that incur higher cost. 	More third party vehicles are used
7	Reaching Customer	Highly affected because consumer doesn't have the confident to come out over this pandemic.	 Only through digital platforms / Video calls, the customers are contacted Unconditional offers through e- com sites
8	Sales	 50% sales drop due to accessibility of goods to consumer. Insufficient inventory, dependent on major hubs and single point suppliers who are blocked in transport. 	 Safety measure inside store Selling high demand products (mask & Gloves) Increasing the service level and providing confidence on sale environment E-com format struggles in logistics and big players dominate the market Providing more free offers to attract customers Focusing on loyal customers Working on new products to attract customers
9	Business Communication	This is not much affected because latest digital technology bridges the gap	Virtual communication utilising digital networks
10	Mindset (Fear)	Phycological effect of employee and owners also inferred in the supply chain, on when the situation will recover from this pandemic.	Producing/finding the suppliers of their product standards inside the same city where the demand is high

Source: Primary data

Figure 1: Common Supply Chain Network

Figure 2: Proposed Spider-Web-Network



- ---- → product or service connectivity or mobility
- → Major Hub or Market Place (High budget)
- → Point of contacts (Low budget)