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RECONCILIATION OF THE SUPPLY CHAIN

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Abstract - *Adaptive response to disruptions while maintaining control over the structure and function is the need of the hour. It encourages proactively planning and designing the supply chain network to prepare for unpredictable turbulent events instead of reacting to disruptions. The case study in this report of a company affected by the pandemic challenges faced and methods for overcoming those challenges can help companies respond to changing supply and demand patterns. Supply chain resilience is measured by analyzing the company performance results, including operational, tactic, and strategic risks. To determine priorities, managers must balance resilience and costs. The ability to recover from interruptions in the supply chain will improve customer service, market share, and profitability by restoring the original or better state. Today, disruption is more likely than ever. Therefore, businesses need to implement risk management strategies that incorporate a comprehensive view of complexity into the supply chain. The ultimate goal is to boost performance.*

Key Words: **Resilience, Performance, Supply Chain, Logistics, Market Speculations**

1.INTRODUCTION

From day-to-day operational risks to catastrophic supply chain disruptions, supply chain resilience is about managing and adapting to the unknown. As supply chains struggle with new demand patterns, supply constraints, and logistical challenges, you can use lessons learned to kickstart transformation and build resilience.

Supply Chain resilience is becoming increasingly important due to globalization and, most recently, the COVID-19 pandemic. Diverse types of disturbances are affecting our Supply Chain globally. COVID-19 is the most significant disruption to global supply chains in modern history, followed by Japan's 2011 earthquake and tsunami. Although logistics complexity has increased, the Supply Chain's adaptability has not. For Supply Chain decision-makers to make more resilient decisions in the face of disruptions, strategies and tools are necessary. Most CEOs cite supply chain risk as the biggest threat to their companies. Turbulence constantly occurs in a supply chain, resulting in an unpredictable disruption [1]. Even though corporate board members are concerned about managing operational risks, the Council for Competitiveness found it Under-informed about those risks [2]. Traditional risk management techniques are insufficient to address supply chain complexity, evaluate the intricate interdependencies of threats, and prepare enterprises for the uncertain future [3] [4]. Increasingly, supply chain researchers are beginning to grasp the concept of resilience; defined as the ability to survive, adapt, and grow despite turbulent times . A framework is proposed for evaluating and improving supply chain resilience using lessons learned from supply chain disruptions.

Risks can be divided into operational, tactical, and strategic types.

- Risk of Operational Failure: SCR's supply chain visibility and mitigation solutions help companies deal with sudden supply chain changes.
- Risks in tactical situations: Sales and operations planning should include scenarios, modeling, and analysis of risks and opportunities.
- Risk management in strategic planning: Gain flexibility and capacity by leveraging network modeling, simulation, and strategic buffer sizing.

2. LITERATURE REVIEW:

While supply chain resilience is important, this review examines the business benefits a resilient supply chain can bring, including increasing productivity, improving efficiency, and reducing risks. Many authors have proposed the concept of resilience and studied its impact on the availability, flexibility, configuration, and control of lean supply solutions for low-risk supply chain management while material scientists research how materials restore their original shapes after being deformed, psychologists analyze what makes individuals emotionally and mentally resilient to failure, and management experts examine the role resilience plays in organizational leadership. As a result of their seminal contributions to the field of resilience supply chain in the early 2000s, Christopher and Peck and Sheffi brought the Bringing the concept to the general public's attention [6] [7] [8]. In terms of supply chain management, the resilience concept was a major appeal. Firstly, we have to face an increasingly dynamic and turbulent world today , characterized by a more complex supply chain as well [9][10]. Numerous events occur every day forcing disruptions, increasing volatility and jeopardizing the

ability to perform effectively and efficiently [11]. A natural or man-made disaster can be caused by equipment failures, fires, labor disputes, supplier defaults, political instability, or terrorist attacks.

Machine learning techniques have also been developed to solve supply chain problems and the Application of machine learning techniques for supply chain demand forecasting" goes a long way in identifying the applicability of such approaches especially during this covid 19 pandemic albeit models like SSM predicted the statistics during the first wave [12]. Other approaches like XBNet have also given substantial results in the field while BadNets help in Identifying Vulnerabilities in the Machine Learning Model Supply Chain [13][14].

Conventional approaches to risk management cannot help enterprises become more resilient. In large corporations, enterprise risk management (ERM) is the existing strategy used to identify and deal with price increases that may be a threat to achieving strategic objectives or opportunities for competitive advantage by buying the potential events. Organizations must address supply chain volatility with new strategies despite the relevance of ERM. Risk management traditionally focuses on planning and reducing vulnerabilities. Resilience management emphasizes accelerating recovery and facilitating adaptation. An increasingly perilous and costly risk environment requires boards to embed strategic risk capabilities throughout their organizations in order to steer their companies toward resilience and value. Global supply chains are complex and dynamic, so spotting potential weaknesses and adjusting to unforeseen events requires constant attention. Resilience can only be strengthened by new analytical tools and a cultural shift.
We found many cases of companies gaining an understanding of disruption and then moving to a stronger posture.
The definition of resilience is "the capacity of an organization to adapt, grow, and survive a turbulent change environment". Resilience is not about managing a specific instance of risk, it's about being ready for anything through the way you operate.

- We developed a theoretical framework based on grounded theory to collect data on past disruptions such as 9/11, labor disputes at US ports on the west coast, and the foot-and-mouth disease outbreak in Great Britain [15]. The theory of resistance is related to two prior streams of research: (1) the ability to minimize disruption - such as a natural disaster - by either avoiding it completely or by minimizing the amount of time between the beginning and the end of the impact of disruption on supply chains.

(2) Returning to full operation after interruption. The resilience of supply chains is characterized by a stabilization phase after which performance can return to a steady state. The forecasting of supply chain has also been elucidated by various machine learning literature where even data from twitter is used to analyze and forecast the current trends and loop holes in the pipeline [16] [17].
Following recovery, firms often take time to learn from their experience to help with future planning and supply chain risk management.

3. Supply Chains and Market Speculation

Leaders of supply chains realize that becoming more resilient is a necessity in the current environment. Some historical events can help us understand
Supply chain managers' priorities have changed due to Brexit, the U.S.-China trade war, a global geopolitical trend toward nationalization, and most recently, the COVID-19 pandemic. It is important to strike a balance between cost savings and supply chain resilience when developing efficiency measures. In order to create a more resilient network, here are three major strategies:

- **Manufacturing diversification**

Supplier diversification is an industry term used in manufacturing businesses to increase suppliers' options, create variety, and increase flexibility.

- **Collaboration within an ecosystem**

During Covid-19, it was evident that diverse methods must be employed for sourcing. To ensure future preparedness and resilience, however, partnership with strategic raw material distributors and external service partners is also vital.

- **Offshore**

The geographical range of some companies is being reduced. Despite the disruptions in routes, the supply chain is likely to be affected by them

4. The Major Problems:

- Supporting the employees and society during the first lockdown period: As per communication with higher authorities, several plants have started manufacturing Face Masks/Face Shields

- Reopening of supplier operations after government lockdown by meeting necessary compliance.
- Managing Logistics–When the movement was restricted nationwide
- Procurement of bought-out components for productions.
- Skilled Labor migration - Managing Manpower for Suppliers' operations.

- To support Satellite Plants for aggregates by streamlining Mumbai (Red Zone) based suppliers
- Inventory management: high plant, 3PL (Third Party Logistic Provider) and import inventory, and low demand
- To minimize cost, implement model transfer according to the SAP APO (Advanced Planner Optimizer Tool)

- Recovering the market volumes during nationwide unlocking
- Stringent government guidelines prevented the plant from restarting operations in May/June 20.
- Assembling material from suppliers and their tier 1 to meet production needs due to cash crunch
- The state government facilitated procurement in times of lockdowns in local government.

5. An approach to a Solution

- New sources and suppliers of raw materials have been identified for the New Domain (Healthcare-Face Shield/Mask). By assisting health care providers and packaging producers in obtaining government certification to resume production.

- Establish reliable logistics to ensure timely delivery of materials to the site. There are ambulances, office vehicles, motorcycles, and MLL vehicles used for inspections & logistics.
- Mumbai was one of the epicenters of CoVID 19. A proactive approach was taken to classify suppliers from the Mumbai Metropolitan Region (MMR) and balance suppliers from India to R/Y/G (Red/Yellow/Green) containment guidelines, in order to assess the severity of supply disruptions.

- A detailed analysis of the regions of suppliers who met the government's criteria. Due to labor migration, it was necessary to provide skilled labor to suppliers based in the Mumbai Metropolitan Region.

- A plan is developed (at the daily, weekly, and monthly levels) A large number of suppliers received immediate financial support for their smooth operations by involving and coordinating with the SSU and Finance team. A unique supplier finance management solution was implemented as well. Alignment of Tier1 & Tier2 RM for critical suppliers parts with the help of the sourcing department.
- The Inventory Strategy of all regular parts was changed from Make-To-Stock to Make-To-Order in order to reduce high plant inventory levels. Considering no buffer stock in the system, production plans are released and Inward only the minimum amount of material required for production.
- The padata system will monitor procurement against consumption on a daily basis and alert excess parts inward (Top 3 high-value items a day). A Procurement Planning Tool will be developed to measure the Buying Value for each month of production plans while considering continuous dynamic scenarios.
- Material from 3PL(Third Party Logistic Provider) is directly transferred to the end-user through Cross dock.
- In order to minimize lead time and delivery costs, and to avoid the limitations imposed by CoVID, goods are received in SAP at Plant and physically delivered to the user plant from Cross dock.
- **Transfer Of Models-** The manufacturing plant will have an open store concept to assist satellite plants in case of shortage In order to meet immediate production requirements, the tools/materials needed for BMT Diesel model transfer were arranged on short notice from suppliers/other plants

6. Outlining the innovation's unique characteristics

The Covid 19 presented unprecedented challenges to the entire world, but despite of this the company responded to these challenges by implementing innovative methods never before utilized. Since the company lacked both the technology and approval to find healthcare equipment, it was a challenge to locate it. The company initially planned to install five thousand face shields, but after receiving positive feedback from government hospitals, it decided to install nearly five lakh and achieved optimum production by planning and organizing all types of logistics. By analyzing suppliers in the green, yellow, and red zones, company developed a roadmap for restarting production. In order to control the supply chain of a supply chain, skilled labor is temporarily transferred from a central manufacturing unit to the supplier to ensure the supplier's production.

During the lockdown, SCM's central team streamlined aggregate production for different Sectors. The Padata System was useful to track inventory on a daily basis and Using the Procurement Planning Tool, the value of Purchasing for the production plan was calculated. The Open Store program facilitates the transfer of materials to users and by purchasing on behalf of suppliers; we help suppliers receive reliable quotes from Tier 3 suppliers. Eg- Chassis Steel, Conrod Steel etc. A program providing child

parts to suppliers in need (Vendor aid), such as M/s Amul and M/s Tenneco, during their severe financial crisis

6. Three-fold impact: Profit/People/Planet

People - The project supported the distribution of 45K face shields to AD/FD (Auto Division and Farm Division) employees and also restructuring the automobile industry has boosted India's GDP.

Planet- They have reduced fuel consumption by transferring material directly from warehouses to other plants.

Profit- By discussing with Supplier/3PL/Logistics & ensuring status quo which prevents inward of In-transit materials worth 4.1 Crores.

In coordination with Production Planning Control, Demand Chain Management, and logistics, provide 800 vehicles to customers by May. The BO inventory decreased from 113 Crores in May to 83 Crores in July.

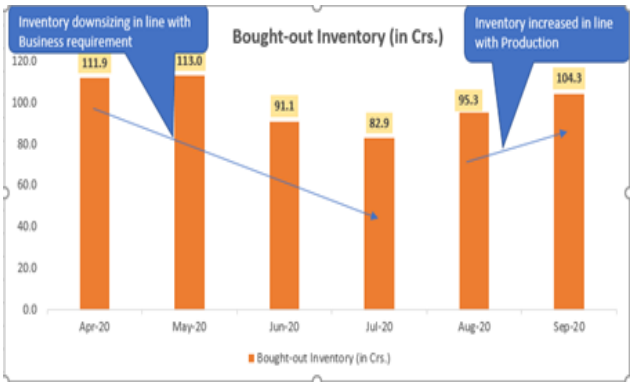

Chart -1: Bought-out Inventory till Sept. 20.

As a result of moving the central manufacturing unit to other plants, the company sold inventory worth 2.34 crores to Vehicle PU stores. Due to coordination of production shifting to other plants, Vehicle PU stores liquidated inventory worth Rs 7.4 crores. In spite of so many hurdles in the supply chain of India and internationally, we were back to normal production within four months.

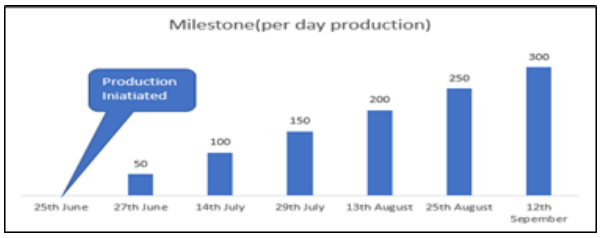

Chart -2: Cumulative production report till Sep 20.

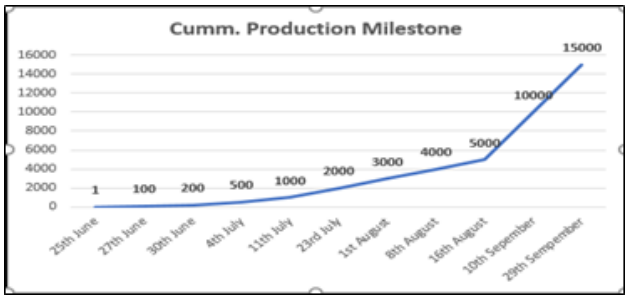

Chart -3: Cumulative production overall

7. CONCLUSIONS:

While the pandemic was unfolding, there were many challenges and roadblocks to overcome. First and foremost was to source and procure the material when there was a national lockdown understanding a completely different area of healthcare. We need human resources, materials, logistics, compliance with the government, and we need to protect Corona Cases from rusting due to the monsoon. The challenge was to manage revenue during the nationwide unlock process, deal with more than 450 suppliers, and operate within different lockdown policies. Also, the entire operation was managed with limited resources at various times and with varying zones at multiple times. Managing market volume during the nationwide unlock process, operating with 450+ suppliers inside and outside India, understanding and working within different lockdown policies at various times in the different zones, and managing the entire operation with no or limited resources.

7. FUTURE SCOPE AND LIMITATIONS:

months. Supply Chain is also quite revolutionized by machine learning and data approaches so adding that might give your readers some more perspective.

For any business organization, managing the supply chain is vital. Planning, procurement, production, inventory management, transportation, distribution, and customer relationship management are all part of the supply chain. Companies' prospects are determined by these decisions. Predictions and forecasts are developed for different

aspects of the supply chain, as mentioned above, in order to make these decisions. As revenue depends on these models and frameworks, it is crucial that they are precise and accurate.

As there are numerous uncertainties; huge supply risks, and ever-increasing competition, the quality of the supply chain depends on the capability of the organization to manage all activities from procuring raw materials, turning them into useful products, and delivering them to customers efficiently. The ability to do This can only be achieved when there is no lag in information flow and real-time communication between all parties involved in the supply chain. Companies are facing increased pressure to make supply chains more information-intensive, which include sharing real-time information about assets (e.g. warehouses, inventory) in, real-time. Since supply chain managers have realized the importance of sharing information, they have begun exploring methods to leverage it. One of those ways might be the use of Machine Learning, which has existed for a long time but is rarely applied to supply chain management.

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