



RESILIENCE: NEED FOR INDIAN AUTOMOTIVE SUPPLY CHAIN

Dr. Nishtha Agarwal

Abstract

The notion of supply chain resilience is not new. The present global business environment presents the supply chains with not one but several challenges. With the paradigm shift in the era of globalization, supply chain performance strategies focusing merely on efficiency and effectiveness are proving insufficient and simply not competitive. Organizations are in search of strategic capabilities that can mitigate these issues related to global unrest with this much risk arising. To minimize the risk of disruptions, firms need to build capabilities across their value chain to position them in readiness to withstand and recover from disruptions, which constitutes the essence of supply chain resilience. The Indian automobile industry is witnessing paramount changes in its functioning as it operates amidst the global turbulence. In light of the above considerations, attempt has been made in the paper to study the supply chain resilience in the context of an automotive company of India.

INTRODUCTION

The present global business environment presents the supply chains with not one but several challenges. Some of these challenges include first, disruptive events arising out of natural and man-made calamities; political and economic upheavals; second, complicated supply chain structures, third, competitive market conditions and rapidly changing customer demands to name a few (Aslam et al., 2020). The past few decades have been notable for these major changes in supply chains owing mainly due to an increasing level of globalisation and a higher rate of innovation (Kamalahmadi et al., 2022). With the paradigm shift in the era of globalization, supply chain performance strategies focusing merely on efficiency and effectiveness are proving insufficient and simply not competitive. Organizations are in search of strategic capabilities that can mitigate these issues related to global unrest with this much risk arising.

RESILIENCE

To minimize the risk of disruptions, firms need to build capabilities across their value chain to position them in readiness to withstand and recover from disruptions, which constitutes the essence of supply chain resilience (Asamoah et al., 2020). Thus, resilience represents a strategic and critical capability that can mitigate the devastating effects of disruptive events on the operations of firms and supply chains. The notion of supply chain resilience is not new. In fact, firms are considering supply chain resilience as a way of dealing with vulnerabilities in the supply chain as it enables them to readily prepare, adapt and respond to unforeseen events (Piprani et al., 2020). It aids supply chain managers in taking quick measures to recover from such events (Piprani et al., 2020) thereby making resilient supply chains recover better from hardships. These measures include reducing likelihood of disruptions through monitoring and detecting weakest signals, demand responsive supply chains, supply chain wide collaboration, redundancy; operational flexibility through standardization of parts facilitating interchangeability, postponement or mass customization strategy to respond to unpredictable demand

changes, customer and supplier relation management and multiple sourcing (Sahu et al., 2017). Resilience is the key to develop a strategic plan that is supportable and capable of producing results that are better than those of less resilient competitors. Consequently, resilience is attracting increasing attention from scholars and practitioners as the ability of the supply chain (SC) to recover and maintain the continuity of material, information and cash flow in the presence of SC disruptions (Gu et al., 2021).

OVERVIEW OF INDIAN AUTOMOBILE INDUSTRY

The Automotive industry in India is one of the main pillars of the Indian economy and a key driver of growth. Liberalization and conscious policy interventions over the past few years created a vibrant, competitive market, and brought several new players, resulting in capacity expansion in automobile industry and generation of huge employment. Aptly, the industry is christened as the 'Sunrise industry' of the Indian economy. The Indian automobile industry has emerged as the fourth largest in the world in terms of motor vehicle production volume in 2021 despite the disruptions faced by it. It is set to become the third largest in the world by 2030. The success is coupled with strong forward and backward linkages through presence of established domestic and international original equipment manufacturers (OEMs) and strong domestic and exports respectively. The industry is also referred to as the backbone industry owing to its contribution to the growth of the Indian economy. The industry contributes close to 7.1% towards India's Gross Domestic Product (GDP) and 35% to the manufacturing GDP; provides employment to 37 million people directly or indirectly and has approximately 8% share in India's exports. The industry while contributing to the Indian economy also has a 40% share to the global R&D initiatives making it an important asset globally. The industry is expected to reach US\$300 billion by 2026 owing to strong policy support from the government, rising demands and technological developments (SIAM, 2022). The Automobile industry can be categorized into segments namely, passenger vehicles, commercial vehicles, three-wheelers and

two-wheelers. Two-wheelers occupy the dominant position, constituting about 80% market share and overall passenger vehicles comprise 13%. The industry is closely catching up to the global standards in terms of another emerging segment of electric vehicles. Presently, India has a total of 13,34,385 Electric Vehicles and 27,81,69,631 non-Electric Vehicle in use (0.5% of total vehicles). The segment has shown an enormous leap in terms of developing EV infrastructure. There is 2.5 times

increase in charging stations with additional installation of 678 public EV charging stations in 9 mega cities in four months from October 2021 to January 2022. Several organisations have pledged to establish the EV charging infrastructure some of which include TCIL (Telecommunications Consultants India Limited), IREDA (Indian Renewable Energy Dev Agency Ltd), BEE (Bureau of Energy Efficiency) etc.

Figure 1. (i) Segment wise Domestic market share of Indian automobile industry along with overall exports (source: IBEF)

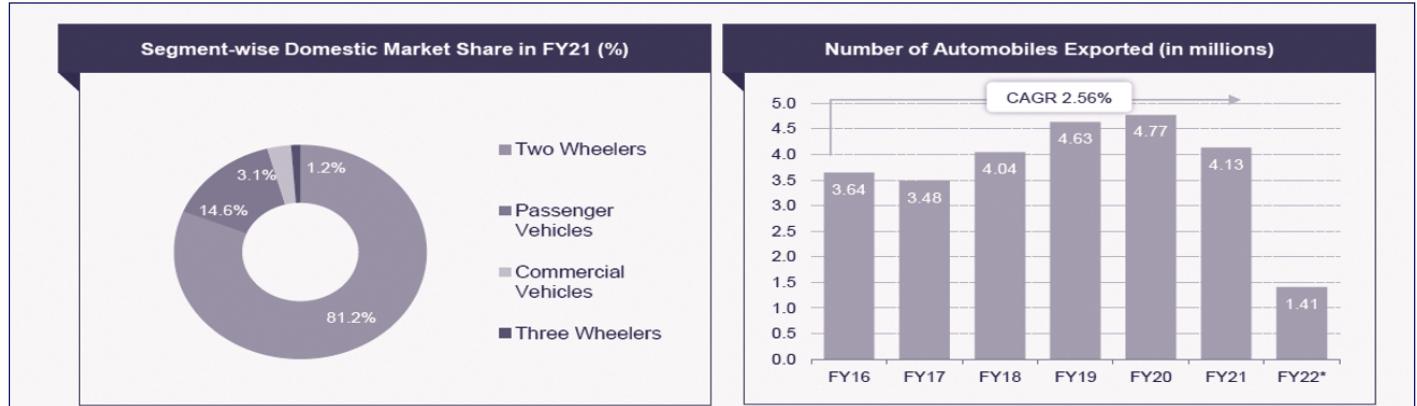


Figure 1(ii): Automobile industry of India and key statistics of production volume and domestic sales (Source IBEF)

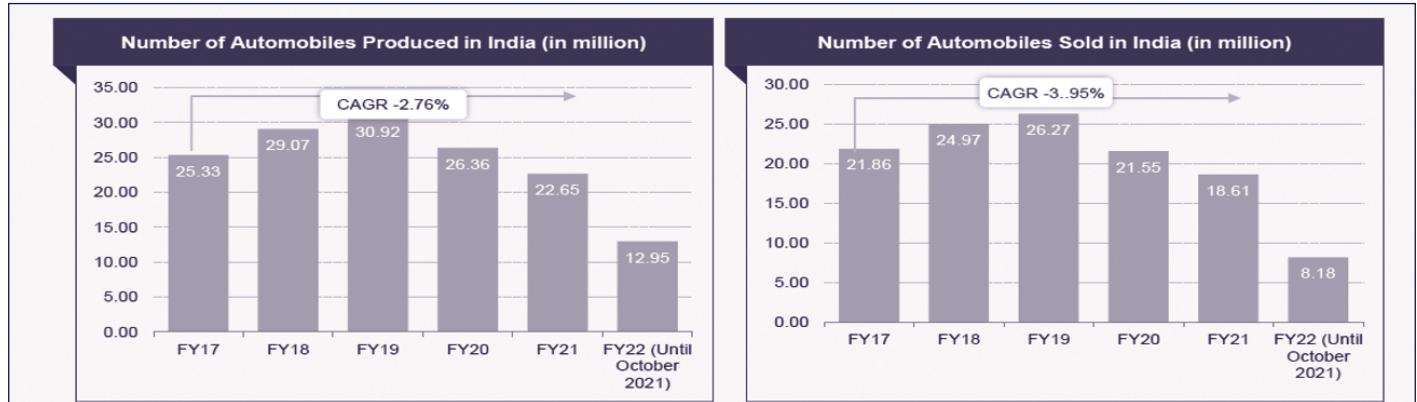
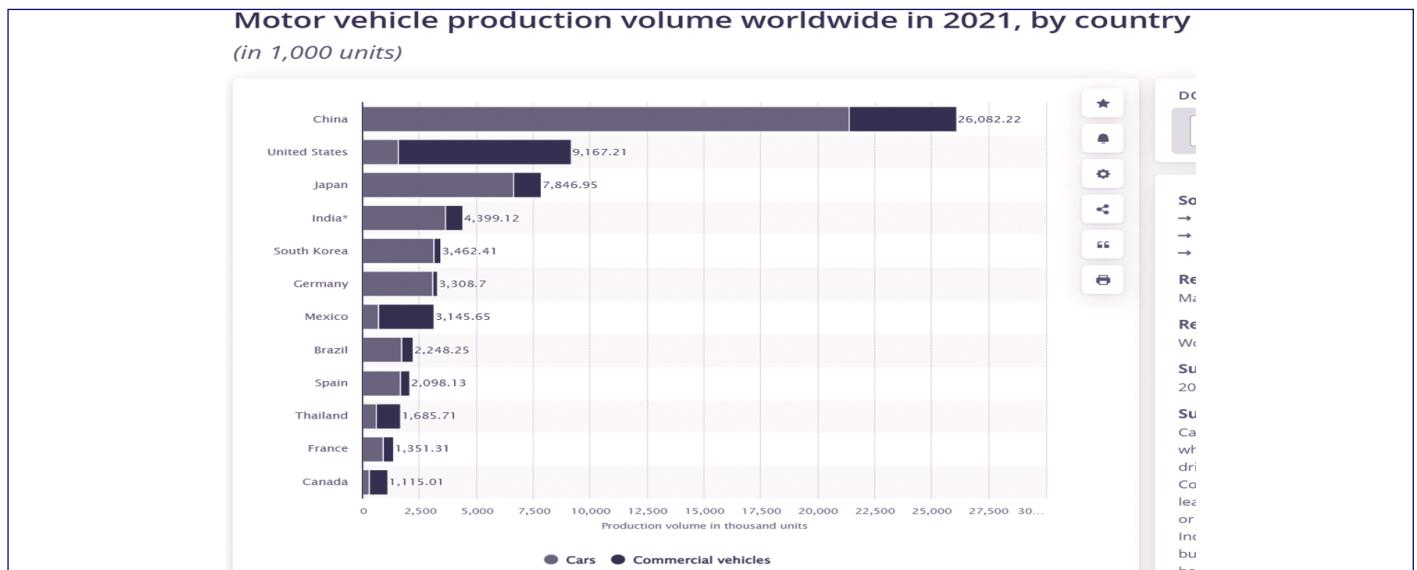


Figure 2: Motor vehicle production volume in 2021 (Source Statista <https://www.statista.com/statistics/584968/leading-car-manufacturing-countries-worldwide/>)



ISSUES AND CHALLENGES WITH INDIAN AUTOMOBILE INDUSTRY

India is fast turning into a global automotive hub. However, the sector experienced an uneven growth trajectory owing to the recent disruptions (COVID-19 pandemic, semiconductor crisis, transition to BS-VI etc.) and subsequent changes around the globe. Its catastrophic effects were witnessed by the automobile industry as sales volumes in FY21 were pushed back by multiple years. For passenger vehicles, sales volumes were lowest since FY16, for two wheelers - lowest since FY15, for commercial vehicles – lowest since FY11 and three wheelers – lowest since FY03. Evidently, FY21 was an unpleasant year for the automobile industry including ancillaries. Industries which consider automobiles as their large end user also were impacted – which includes glass, metals, rubber, paints, electronics, etc (CARE Ratings, April 2021).

The automobile industry exports also suffered in FY 21 due to closure of international borders and many nations restricting their imports to essential items. During FY 21, passenger vehicle exports fell sharply by 38.9%, the two-wheeler exports were lower by 6.9% while the three-wheeler exports fell by 21.7% in FY21. Going ahead the industry expects to face headwinds from the global business environment (Table 4). Amidst these risks the inherent resilience of the industry needs to be developed along with government interventions.

AUTOMOBILE SUPPLY CHAIN MODEL IN INDIA

The previous section elaborated upon the Indian automobile industry, its components, performance and importance for the Indian sub-continent and the world. It has been described as ‘both a form and function’ based product involving high level of engineering as well as being positioned as a fashion product. The industry has rightly been called as “the industry of industries”, since it uses outputs of nearly all manufacturing industries and supports upstream (mining, steel etc) and downstream industries (finance, insurance, after market etc). Such an important industry sits on the foundation of strong supply chain management practices. Sub-optimal use of supply chain management practices poses challenges to automakers in their quest for achieving competitive advantage, especially in emerging markets like India. The automobile supply chain also faces challenges of safeguarding it from disruptive events arising out of the vulnerabilities mentioned in the previous section. Therefore, there is a need to examine various aspects of automobile supply chains in an emerging market like India which has its own peculiarities. A supply chain is defined as a network of organisations linked together through the upstream and downstream flow of processes and activities to produce value for the ultimate consumer. It is the sum total of efforts in integrating a network of firms and coordination as regards information, material and financial flows. The Indian automobile supply chain is highly complex and consists of several processes which when linked together form a supply chain from the customer back to various tiers of suppliers. The major players of the Indian automobile supply chain model are Original Equipment Manufacturers (OEM), Original Equipment Suppliers (OES), the independent aftermarket and

the first, second and the third-tier component manufacturers. The structure of the supply chain consists of physical components, operational and planning processes and strategies.

NEED FOR RESILIENCE

The need and importance on the phenomenon of supply chain resilience and its enablers has been emphasized in the operations and supply chain management literature (Kamalahmadi et al., 2022; Fayezi and Ghaderi, 2022). Despite this, the review of existing literature points the presence of several research gaps. Till date, there are few studies that have developed a structural framework analyzing the relationships between the resilience enablers and its outcomes. There is also a limited attention towards the context in which the resilience enablers are embedded. More attention is given towards identification of enablers for manufacturing sector that involves several industries or a mix of goods and services is observed but studies involving specific focus on automobile industry are limited.

The Indian automobile industry is witnessing paramount changes in its functioning as it operates amidst the global turbulence.

Some of the key changes that have taken place are:

- Rapid integration of Industry 4.0 technologies in SC processes
- Rising demand for Electric Mobility segment,
- Rising demand for autonomous, shared and connected cars
- Volatility in the commodity prices
- Stringent regulations regarding environment and sustainability
- Increased instances of turbulence (Terrorism, natural disaster, political uncertainties etc) in global markets causing volatility
- Pressures from end consumer regarding continuity of services amidst turbulence
- Rising competitions from low-cost competitors
- Changing customer behaviour
- Focus towards lean and complex global networks for reduced costs

RESILIENCE FOR INDIAN AUTOMOTIVE SUPPLY CHAIN

The automobile industry plays an important role in the economic development of the Indian sub-continent and is seen by researchers as a place to develop, introduce and improve supply chain management concepts (Kaviani et al., 2020) as a reference for other industrial fields. The Indian automobile industry has a contribution of 7.1% to Indian GDP and employs approximately 37 million people. The share of automobile industry towards global R&D is approximately 40% and 5% of total exports of India are accounted by automobile industry. In light of the above considerations, it is important to study the supply chain resilience in the context of an automotive company of India. As India makes the transition to an attractive global manufacturing power, it faces a series of challenges from the global business environment. These include rising prices of raw materials such as that of nickel, cobalt and lithium in production of electric vehicles, volatility in the fuel prices across the globe,

increased instances of environmental risks that include political upheavals, countries struggling with economic crisis, natural and man-made disasters etc., increased emphasis of customers on sustainable options etc. Traditionally, the economic scenario in India is also characterized by poor infrastructure, insecure technology, paucity of resources, and inadequately trained manpower, resulting in poor security standards of products and personnel. These are some critical issues which act as a challenge for Indian automobile supply chains leading to its interruptions that can cascade into disrupting the entire global automobile supply chain connected to India. The noticeable lack of studies despite the importance of building resilience in the supply chains of the Indian automobile industry motivates towards examination of resilience capability for Indian automobile supply chains.

CONCLUSION

This paper discusses the need of the research with detail background of supply chain risk and resilience, its relevance in manufacturing, need for this study in Indian automotive sector. The study undertaken is an attempt towards the identification of resilience enablers of supply chain for automotive supply chain context. In this paper, need of resilient supply chain is justified with its importance in automotive industries perspective.

REFERENCES

1. Aslam, H., Khan, A. Q., Rashid, K., & Rehman, S. (2020). *Achieving supply chain resilience: the role of supply chain ambidexterity and supply chain agility*. *Journal of Manufacturing Technology Management*, 31(6), 1185–1204.
2. Asamoah, D., Agyei-Owusu, B., & Ashun, E. (2019). *Social network relationship, supply chain resilience and customer-oriented performance of small and medium enterprises in a developing economy*. *Benchmarking: An International Journal*, 27(5), 1793–1813.
3. Care Edge Ratings. (2021). *Update on Auto Components Industry*. Care Edge Ratings. <https://www.careratings.com/> uploads/newsfiles/31032021114956_Update_on_Auto_Components_Industry_(1).pdf
4. Fayezi, S., & Ghaderi, H. (2022). *What are the mechanisms through which inter-organizational relationships contribute to supply chain resilience?*. *Asia Pacific Journal of Marketing and Logistics*, 34(1), 159–174. <https://doi.org/10.1108/APJML-06-2019-0363>
5. Kamalahmadi, M., Shekarian, M., & Parast, M. M. (2022). *The impact of flexibility and redundancy on improving supply chain resilience to disruptions*. *International Journal of Production Research*, 60(6), 1992–2020.
6. Kaviani, M. A., Tavana, M., Kowsari, F., & Rezapour, R. (2020). *Supply chain resilience: a benchmarking model for vulnerability and capability assessment in the automotive industry*. *Benchmarking: An International Journal*, 27(6), 1929–1949.
7. Piprani, A. Z., Jaafar, N. I., & Ali, S. M. (2020). *Prioritizing resilient capability factors of dealing with supply chain disruptions: an analytical hierarchy process (AHP) application in the textile industry*. *Benchmarking: An International Journal*, 27(9), 2537–2563.
8. Sahu, A. K., Datta, S., & Mahapatra, S. S. (2015). *Evaluation of performance index in resilient supply chain: a fuzzy-based approach*. *Benchmarking: An International Journal*, 24(1), 118–142. <https://doi.org/10.1108/BIJ-07-2015-0068>
9. Society of Indian Automobile Manufacturers (SIAM). (2022). *Society of Indian Automobile Manufacturers*. Siam.in. <https://www.siam.in/statistics.aspx?mpgid=8&pgidtrail=9>.

AUTHOR

Dr. Nishtha Agarwal, Assistant Professor (Operations Management), New Delhi Institute of Management (NDIM) Delhi, 50 & 60 (B&C, Mehrauli - Badarpur Rd, B/H Batra Hospital, Tughlakabad Institutional Area, New Delhi, Delhi – 110 062.

Email: nishtha.agarwal@ndimdelhi.org