

Examining Supply Chain Resilience in the Automotive Industry: A Case Study

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Abstract

The sudden outbreak of the COVID-19 pandemic, along with government control measures and management strategies, has impacted various sectors of the economy to differing extents. The previous “dynamic zero-COVID” policy posed significant risks to companies, leading to frequent production halts and supply chain disruptions. This risk was particularly critical in the automotive industry, where each link in the supply chain is vital. If any manufacturer in the supply chain ceases production, the entire chain risks breaking during the shutdown period. Ensuring the normal operation of other parts of the supply chain during such shutdowns presents a significant challenge to the resilience of the automotive supply chain. In the current post-pandemic era, as the impact of COVID-19 diminishes and national policies adjust to reopen the country, positive implications for economic development are evident across various sectors. However, the issue of supply chain resilience remains critically important.

Keywords: automotive industry, supply chain resilience

1. Current Status of the Automotive Industry Supply Chain

Since the COVID-19 outbreak at the end of 2019, the automotive industry has experienced intermittent disruptions. These sporadic outbreaks have led to designated risk zones where production and operations were often halted. Many companies faced significant impacts, leading to production stoppages and supply chain disruptions. Companies relied on existing inventories to fulfill orders, but with production halts ranging from weeks to months, many could not survive on inventories alone, pushing them to the brink of bankruptcy. As of March last year, the overall resumption rate for automotive dealerships nationwide was only 50%, with store reopening rates at 80% and customer flow recovery at about 44%, indicating a still challenging situation.

Relevant data indicate that China’s automotive industry began experiencing difficulties in 2019. The total revenue for the industry that year was approximately 8 trillion yuan, a nearly 2% decrease from the previous year, with main business costs dropping by 1.4% and total profits plummeting by 16%. Starting in 2020, automotive sales in the Chinese market significantly declined, with a drop exceeding 90%, resulting in substantial economic losses for various companies within the automotive supply chain. According to a 2021 report by SAP China, industries such as automotive, aerospace, computers, and electronics experienced substantial supply chain disruptions every 3.7 years on average, with an average disruption time of over a month. Since 2012, the automotive industry’s supply chain and logistics have been increasingly impacted by political events, international trade shocks, public health emergencies, and shortages of crucial components, severely affecting business operations.

An analysis of second-quarter 2021 data from major job sites like 51Job, Zhaopin, and Liepin shows that traditional automotive manufacturers and emerging automakers were hit by declining sales and overcapacity. Consequently, there was a noticeable reduction in regular job postings for positions in production planning,

material management, and on-site logistics within the supply chain and logistics departments.

The pandemic has affected the automotive industry supply chain not only in terms of work resumption issues but also in terms of disrupted information flow and inefficient product connectivity upstream and downstream. For domestic companies, transportation restrictions and limitations on the movement of people have challenged the timeliness of parts transportation and supply. Many auto parts factories in China engage in export activities, and for international export businesses, the pandemic's impact is even more pronounced. Customs clearance efficiency has significantly declined due to various disinfection and inspection procedures, greatly extending transport times, increasing costs, and affecting in-person exchanges and cooperation between multinational companies. Moreover, the sudden nature of the pandemic caught many companies unprepared, with insufficient inventory reserves. Even after resuming work following shutdowns, increasing inventory reserves was impractical due to the substantial cash flow required. During the pandemic, with companies already facing significant financial risks, relying solely on increasing inventory was unrealistic.

Overall, automotive supply chain companies had to periodically halt production due to the pandemic. This, combined with prolonged inefficiencies, led to widespread performance declines, increased costs, and cash flow issues. Some companies faced the dilemma of having no production or income for nearly a month. Even in the relatively resilient traditional fuel vehicle sector, many small and medium-sized parts companies and dealerships teetered on the brink of bankruptcy. The challenges were even more pronounced for emerging new energy vehicle companies, which faced product development and manufacturing delays and cash flow interruptions. This situation highlights the necessity for a resilient supply chain that ensures production safety across the automotive industry's supply chain, which is currently lacking.

2. Performance of Supply Chain Resilience in the Automotive Industry

The automotive industry supply chain is vast and complex, encompassing processes such as production, supply, logistics, product operations, and sales planning. Supply chain resilience, in simple terms, refers to the ability to ensure the supply chain continues to “operate, produce, and distribute” in the face of significant disruptions, helping companies withstand crises. Evaluating the resilience of a supply chain involves assessing its responsiveness, adaptability, and recovery capabilities.

Firstly, responsiveness emphasizes a company's ability to accurately understand changes in external conditions during production, manufacturing, and delivery processes, enabling swift responses to unknown changes. Agility and coordination are crucial factors in assessing responsiveness, requiring rapid adaptation to market demands and changes to effectively manage instability. Collaborative capability involves leveraging shared resources and information technology with partners to mitigate uncertain risks and enhance service quality. Weak collaborative capability may result in partners failing to meet delivery requirements or lacking the managerial capacity to cope with company operations, hindering swift responses to instability.

Secondly, adaptability emphasizes a supplier's maximum capability to maintain normal operations despite external disturbances, encompassing resilience and safety management redundancy. Resilience refers to the ability to swiftly adjust product marketing plans as per environmental requirements during sudden events. Safety redundancy indicators show a company's strategic use of surplus backup capabilities to enhance crisis response and reduce the possibility of service interruptions.

Lastly, recovery capability indicates a supply chain's ability to swiftly return to normal operations after encountering interruption risks. Following disruptions, company decision-makers need to reconfigure resources and adjust supplier strategies to facilitate their swift return to normalcy. Recovery capability includes emergency response and logistical support, where emergency response signifies a company's ability to form response mechanisms through resource reconfiguration and information monitoring after operational disruptions, thereby enhancing recovery capability. Logistic support ensures the transportation and distribution of goods under operational disruptions.

3. Development Trends of Resilient Automotive Supply Chains

Building a highly resilient automotive industry supply chain is undoubtedly challenging. The automotive supply chain encompasses everything from raw material procurement and component production to vehicle assembly, logistics, product operations, and sales planning. Achieving high resilience requires comprehensive consideration of every aspect.

Firstly, starting with procurement, it is crucial to strengthen relationships with existing suppliers to ensure flexibility in scenarios like supply interruptions or sudden surges in demand. Moreover, relying solely on a few suppliers is inadequate; every enterprise should establish relationships with multiple suppliers, ideally dispersed across different regions, to maintain supply chain continuity even amidst disruptions. For instance, collaboration with multiple tire suppliers based on tire quality and regional distribution ensures balanced order distribution. Should one supplier face interruptions, the shortfall can be transferred to another supplier.

Secondly, effective demand and manufacturing planning are essential. Enterprises need to understand the implications if upstream manufacturers fail to deliver as expected and prepare corresponding adjustments when crises arise. Regarding manufacturing planning, companies must have contingency plans in place when production teams cannot operate at full capacity. This may involve identifying third-party manufacturers who can quickly step in to meet short-term production needs and assessing the financial impacts on profits and cash flow. Additionally, companies may face sudden urgent orders, necessitating rapid scaling of production capacity.

Effective inventory management is critical to supply chain resilience. Companies must implement precise inventory management using methods like ABC classification or Vendor Managed Inventory (VMI) to maintain a robust inventory while safeguarding financial stability. Although this may initially increase warehouse costs, it plays a crucial role in establishing supply chain resilience by preventing immediate chaos during supply interruptions. Collaborating with third-party logistics providers for emergency warehouse management can streamline operations.

In automotive marketing, the rapid growth of e-commerce, especially during the pandemic when consumers were less likely to visit physical stores, presents opportunities. Utilizing an O2O (online-to-offline) e-commerce model allows companies to combine online promotion with offline test drives, thereby reducing the risk of consumer exposure. Consumers can view vehicle analyses and appearances online and then experience actual test drives offline, ensuring a comprehensive car-buying experience. This approach not only enhances consumer engagement and sales but also improves supply chain resilience by avoiding excessive inventory accumulation.

4. Conclusion

Building a resilient supply chain in the automotive industry is a complex yet essential endeavor. It involves optimizing procurement strategies, enhancing manufacturing flexibility, improving inventory management, and embracing digital marketing innovations. Each of these aspects contributes to the overall resilience of the supply chain, enabling companies to effectively navigate disruptions and crises.

The key to resilience lies in proactive planning, swift adaptation to changing circumstances, and the ability to recover quickly from disruptions. By implementing robust strategies at every stage of the supply chain — from sourcing raw materials to delivering finished vehicles — automotive companies can mitigate risks, maintain operational continuity, and ultimately sustain competitiveness in a challenging global landscape. Achieving high resilience in the automotive supply chain demands continuous innovation, collaboration with diverse suppliers, and leveraging technological advancements. It is a journey that requires ongoing evaluation, adjustment, and investment to safeguard against uncertainties and ensure long-term success in the dynamic automotive market.

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