

The Supply Chain Advantages and Challenges of BYD in the New Energy Vehicle Industry: Implications for the Future

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Abstract: The new energy vehicle supply chain is evolving rapidly to meet growing market demand, and innovations in battery technology, motor manufacturing, and charging infrastructure, among others, are driving progress in this sector. This paper explores the supply chain strengths of BYD, a major new energy vehicle manufacturer in China's automobile manufacturing industry, and related issues. Through an in-depth analysis of BYD's history, the company's current status, and its innovative initiatives in the supply chain, the paper identifies its supply chain strengths in intelligence, sustainability, and innovation. However, some of the challenges BYD's supply chain faces, such as delivery issues, data security risks and low collaboration with suppliers, are also raised. Finally, the paper offers some recommendations, including actively collaborating with high-quality suppliers, strengthening data processing and management capabilities, and adhering to supply chain innovation. These recommendations can guide BYD's development and provide useful references for peer companies' supply chain optimization.

Keywords: BYD's supply chain, intelligence, sustainability, inspiration

1. Introduction

In the context of Made in China 2025, intelligent digitization and networking have become the overall trend in the development of the manufacturing industry. China is one of the major producers of new energy vehicles globally. As an industry leader, BYD has continued to innovate in the company's development process, realizing an intelligent and sustainable supply chain. With the help of advanced supply chain models, it has successfully gone global and become the world's first automobile company to produce 5 million new energy vehicles. By sorting out the advantages and disadvantages of BYD's supply chain, this article proposes solutions to existing problems and inspirations from which other car companies can learn.

Christopher, a famous American supply chain management expert, pointed out: "The competition in the 21st century is not a competition between enterprises but between supply chains; there will be only supply chains in the market without enterprises." [1] At present, the status of the supply chain is getting higher and higher, and it is an important link in maintaining the normal operation of the entire enterprise. The study of a successful company is inseparable from analyzing its supply chain.

International crude oil prices are generally on an upward trend amid fluctuations, and more and more consumers are turning their attention to new energy vehicles; the transformation and upgrading of automobile companies is being aided by the development of artificial intelligence and the industrial

internet. The development of new energy vehicles is coming to the forefront. It is worth studying whether BYD's supply chain advantages can be used as a reference for other manufacturers.

2. Company Development and Current Situation

2.1. Company Development History

BYD was founded in 1995. In 2003, it acquired Shaanxi Qinchuan Automobile and entered the automobile industry. It has become a leading company in the new energy automobile industry. BYD's sales in the field of new energy vehicles have maintained a good momentum of steady growth, ranking first in China for nine consecutive years, ranking 212th on the Fortune Global 500 list, up 224 places from 2022, becoming the world's first 5 million A new energy vehicle company with vehicle output [2].

2.2. Company Status

BYD's sales volume grows rapidly. In 2021, BYD achieved revenue of 216.14 billion yuan, a year-on-year increase of 38.0%, and vehicle sales reached 740,000 units, a year-on-year increase of 73%. In 2022, BYD's operating income increased by 96.2% year-on-year, and its net profit increased by 445.9% year-on-year [3]. On the evening of August 28, 2023, BYD released its 2023 semi-annual report: revenue in the first half of the year was 260.124 billion yuan, a year-on-year increase of 72.72% [4].

BYD's Overseas Sales Growing Rapidly. In the first half of 2023, BYD Auto's cumulative sales reached 1.2556 million units, of which 74,300 units were sold overseas, a year-on-year increase of 95.8%, once again setting a new monthly sales record for new energy vehicles in China and firmly occupying the top spot in global new energy vehicle sales with an absolute advantage [5].

BYD's various achievements are inseparable from its supply chain advantages. This article then analyzes the aspects in which its supply chain advantages are reflected and the related problems that still exist.

3. BYD Supply Chain Advantages

3.1. Intelligent Supply Chain

3.1.1. Intelligent Procurement

Supplier recruitment and bidding information has been published by BYD through a public account and special website. At the same time, BYD established a supplier management (SRM) system for suppliers. More than 13 business divisions have launched the system, including the East China Procurement Department and the Northwest Procurement Department. In this system, suppliers can conduct price inquiries, price comparisons, bidding, linked pricing, supplier information collaboration, etc. [6].

The supplier management system conducts the procurement management process on the platform. It uses the system's functions, such as bid-rigging detection, process standardization, visualization, price library, and quotation tools, to simplify the procurement process, reduce the procurement cycle, achieve information transparency, and finally achieve the goal of comprehensive cost reduction. BYD has added supplier partners in the supply chain to the system, opened up more value space, and deeply cooperated, greatly improving the supply chain's flexibility and the company's ability to deal with risks.

3.1.2. Intelligent Logistics

BYD's warehouse management system was upgraded to Advanced Warehouse Management (EWM) System 7.02 in 2015. BYD's warehouse management is backed by the EWM system, which can handle all warehouse logistics processes in a planned and efficient manner.

With Advanced Warehouse Management (EWM) System 7.02, BYD can integrate complex supply chain logistics processes with warehousing and distribution processes to enhance visibility into operations. Including timely data collection, precise process management, fully automated intelligent guidance to improve work efficiency, precise location management and comprehensive status monitoring to make full use of limited warehouse space, real-time control of inventory conditions, reasonable maintenance, and control of corporate inventory; direct control of warehouse automation Equipment to simplify warehouse management processes such as warehousing, sorting, registration, and outbound delivery.

An electronic label system was successfully introduced by BYD's Ninth Business Unit in 2021. Due to the tiny size of the chips during picking and delivery, it was difficult to manage efficiently, quickly place the chips, and achieve total automation. These challenges were successfully overcome with the use of electronic labels. Before goods such as chips, data cards, mold parts, etc., are put into the warehouse, electronic tags are attached to complete the collection of goods status and location information. The selector selects the model and goods status when the materials are shipped out of the warehouse. If the goods meet the conditions, they will light up, and the selector will look for the light to pick up the goods and then scan the code to exit the warehouse.

The electronic label system can realize the traceability of products by tracking the supply chain of products and combining it with the management of distributed databases. BYD uses the electronic label system for smart warehouse cargo management, effectively solving the warehousing cargo information management problem. It can understand the location of goods and the storage situation of goods in time. It is useful for improving warehousing efficiency, feedback on product information, realizing product inventory information transparency, and improving warehousing. Intelligence is of great significance.

3.2. Sustainable Supply Chains

In the product packaging process, BYD actively promotes recycling logistics packaging boxes. For example, it gradually switches the cartons, wooden packaging boxes, iron frames, etc., used in transferring battery pack products to recyclable blister enclosures, with a cycle life of up to 3 years. Above, more than 900 recycling cycles take place annually, significantly lowering the consumption of resources as well as supply chain costs.

BYD's Pingshan headquarters park has successfully built the first zero-carbon park headquarters for a Chinese automobile brand, reducing emissions by 245,681.89 tons of carbon dioxide equivalent. BYD said it has built a three-dimensional intelligent green transportation system through new energy vehicles, cloud buses and rails, and the utilization rate of new energy vehicles in the park has reached 100%. All production in the park uses pure electric forklifts, pallet trucks, heavy trucks, and cleaning trucks developed and manufactured by itself, fully realizing green logistics.

3.3. Innovative Supply Chain

Since BYD entered the automotive field, it has adopted a "vertically integrated" supply chain system. Its supply chain has extremely high stability and security in the face of market and environmental changes. For BYD, the self-sufficiency rate of parts in the new energy vehicle supply chain is over 50%. Therefore, even under the epidemic's impact, this model has enabled BYD to perform very stably in supply chain operations. However, as the company develops, the shortcomings of the

"vertically integrated" supply chain operation model gradually become apparent. In 2017, BYD's supply chain gradually moved from closed to open. In 2018, BYD officially announced that it would change its original closed supply chain and create an open supply chain to achieve innovative development of the supply chain.

4. Problems in BYD's Current Supply Chain

4.1. Delivery Ability and Lead Time Issues

BYD's suppliers' insufficient supply of raw materials and insufficient factory capacity have led to insufficient product delivery capabilities. For example, many orders exist for the DM-i super hybrid model, but vehicle delivery is relatively slow. The delivery of new orders still requires an average of 3.5 months. Time, while Tesla's delivery cycle averages 1-5 weeks. The long delivery cycle makes consumers switch to other brands, and the ratio of orders to returned orders reaches 4:1, greatly reducing customers' trust in the brand and reducing the company's potential revenue.

4.2. Intelligence Brings Data Processing and Risk Issues

The construction of the intelligent supply chain must involve company data management issues. An intelligent supply chain brings management transparency. The company's rapid development also brings risks and challenges, such as data leakage and poor system interoperability. Although BYD uses multiple IT systems for supply chain management, these systems all operate independently and lack unified data standards and data access integration, which brings management challenges. Supply chain managers must collect data from multiple systems, perform individual queries, consolidate processes, and analyze this data in Excel spreadsheets [7].

4.3. Supplier Collaboration Issues

The "vertical integration" model deeply influences BYD and believes in self-production and self-sales. It is less dependent on suppliers, resulting in scattered procurement and has yet to form its own complete and stable supplier procurement system. Although the purchase volume and proportion of purchases from the top five suppliers have increased, the degree of cooperation with suppliers is still low, and the strong scale benefits of a "strong alliance" with suppliers cannot be fully utilized. The cost control benefits of reform and opening up could be more obvious [8].

5. Suggestions

5.1. Actively Cooperate with High-Quality Suppliers

The responsibilities of chain owners should be strengthened by BYD itself, its advantages should be fully utilized, and close cooperative relationships with suppliers should be established at a strategic level. BYD should ensure close coordination between procurement and production, further reduce its inventory costs and procurement costs, and at the same time enhance the ability of both parties to respond to changing markets and improve coordination. Management capabilities change the traditional supplier selection model and create a new system based on long-term interests such as production, delivery, and quality [9]. Through the cross-enterprise information platform, real-time sharing and joint management of planning and inventory information can be realized so upstream and downstream enterprises in the supply chain can maintain synchronization, reduce the surplus between each link, and improve the overall supply chain coordination level [10].

5.2. Understand Customer Demand and Selectively Expand Production Capacity

The supply chain is driven by customer demand, which is an important factor in its operation. BYD must adhere to customer demand orientation, understand customer needs, expand production capacity for high-demand models, and implement a combination of push and pull production. Enhance the overall flexibility of enterprise supply chains.

5.3. Strengthen Data Processing and Management Capabilities

Enhance the security awareness of BYD network managers and adopt a mechanism for unified authentication and hierarchical authorization to access big data. Access operations to supply chain data must follow certain security rules to prevent unauthorized or unauthorized access and prepare emergency backups. And data restoration work. Establish unified standards among various systems in the supply chain to save subsequent secondary data processing steps. BYD can cooperate with domestic digital technology companies to promote data governance to ensure that data maintains a high degree of consistency, comprehensiveness, and convenience during the circulation process so that data can better assist decision-making and operations.

6. Implications of BYD's Supply Chain

6.1. Strengthen Connections with Suppliers and Build Strategic Partnerships

The automobile industry chain is very long, so it has distinctive characteristics, such as many supply chain links and partners. Thousands of parts make up a car, and different suppliers are behind all the parts [11]. The highly integrated and complex nature of the supply chain in the automotive industry greatly increases the risk of "broken chains," and the consequences become more serious. New energy vehicle companies must lead the supply chain, find high-quality suppliers, proactively strengthen ties with upstream suppliers at all levels, and establish strategic alliances.

6.2. Enhancing Supply Chain Intelligence

With the continuous advancement of manufacturing technology and the rapid development of the Internet, Internet of Things technology, artificial intelligence, cloud computing and other technologies, intelligent manufacturing has become a trend in the manufacturing industry, especially in the rapidly developing new energy field. Intelligent manufacturing-related technologies have been widely used. Each car company should strengthen the intelligence of its supply chain and use advanced technology and big data analysis to improve its ability to respond to risks and continuously optimize itself.

6.3. Supply Chain Innovation

BYD's supply chain has gradually developed from a vertically integrated model to an open model and achieved success, bringing huge benefits to the company and becoming a leading company in China's new energy vehicle industry. In the development process, car companies should also learn from BYD to continuously update and improve the supply chain model to achieve greater breakthroughs.

7. Conclusion

This study found that the advantages of BYD's supply chain are mainly reflected in its high degree of intelligence, sustainability and insistence on continuous innovation. Still, there are also

corresponding problems, such as delivery problems, data security risks and low collaboration with suppliers. This study summarizes the factors of BYD's successful supply chain, provides a reference for the future development of enterprises in the same industry, and reduces the cost and time of early trial and error. The current research does not discuss the connections and impacts of BYD's supply chain advantages. At the same time, the implications and suggestions for other car companies do not consider the car companies' situations. Future research can delve into the relationship between the advantages and combining BYD. Research the differences and connections between other car companies to understand the subject in-depth.

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