The Motivation and Economic Consequences of BYD's Vertical Integration Strategy

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Abstract. Against the backdrop of rapid development of the global new energy vehicle industry and increasing supply chain risks, Build Your Dream (BYD) is implementing a full chain vertical integration strategy. The main motivation is to ensure supply chain security, including the independent production of blade batteries and automotive-grade chips to address core component supply issues; Strengthen cost control and reduce transaction and unit production costs through internal production; Promote technological collaborative innovation, achieve technology sharing across all links of the industrial chain, and accelerate product iteration. After implementing the vertical integration strategy, BYD's short-term market response has been positive, with a cumulative abnormal return rate of 12.41% during the 2020 blade battery release event window period; Financial indicators continue to optimize, with a significant rebound in net profit margin and other factors after 2021. During the same period from 2020 to 2023, the company's profit performance was better than that of Xiaopeng, which also promoted the upgrading of industry competition and the coordinated development of the industry chain. This article studies BYD's vertical integration strategy, which can provide relevant planning references for the supply chain strategy of the new energy vehicle industry.

Keywords: Build Your Dream, vertical integration, supply chain.

1. Introduction

Currently, competition in the global new energy vehicle industry is intensifying. Traditional car companies Volkswagen and Toyota are accelerating their transformation, while emerging car companies such as Tesla are also actively expanding their presence [1]. The stability and autonomy of the supply chain are crucial for new energy vehicle companies, so they are exploring strategies to enhance their competitiveness. In the context of the transformation and upgrading of the manufacturing industry, the vertical integration strategy has attracted much attention. Numerous studies have shown that by implementing a vertical integration strategy to integrate industrial chain resources, enterprises can reduce transaction costs, enhance control over key resources, and improve core competitiveness [2]. In the field of new energy vehicles, this strategy helps companies cope with supply chain volatility risks and promote technological collaborative innovation [3].

Build Your Dream (BYD), as a leading enterprise in China's new energy vehicle industry, was established in 1995. Starting from the battery business, it has expanded to new energy vehicles, semiconductors and other fields. It is listed in both Hong Kong and Shenzhen, with revenue and market value exceeding 100 billion yuan [4]. The direct reason for BYD's vertical integration strategy is to ensure the security of its supply chain. The core components of new energy vehicles, such as batteries and chips, are often in short supply and have large price fluctuations. BYD independently develops and produces blade batteries to achieve independent and controllable battery supply, and has established a full chain production system of "battery chip vehicle" through its semiconductor company's layout of automotive-grade chips [5]. Meanwhile, strengthening cost control and promoting technological collaborative innovation are also important driving forces. Internal production reduces intermediate transaction costs, and technology sharing among various links in the industrial chain accelerates product iteration [6]. Nowadays, its vertically integrated strategy has covered the entire process from upstream lithium resource layout to downstream sales and service network, forming a unique competitive advantage.

This study is of great significance. On a theoretical level, analyzing BYD's vertical integration strategy can enrich the application of vertical integration theory in emerging manufacturing industries and improve the theoretical system of enterprise strategic management. On a practical level, it can provide reference for other enterprises in the new energy vehicle industry to formulate supply chain strategies, helping them optimize resource allocation and enhance competitiveness in complex market environments [7, 8]. The research objective is to clarify the specific reasons for BYD's implementation of a vertical integration strategy, analyze the actual effects of this strategy in ensuring supply chain security and improving financial performance, and reveal its impact on the development of the enterprise and industry.

2. Analysis of the Economic Consequences of BYD Company's Vertical Integration Strategy

2.1. Short Term Market Performance Analysis of Vertical Integration Based on the Event Study Method

The key event in BYD's implementation of vertical integration is the official release of blade batteries in March 2020. Based on the announcement date of March 30, 2020 as the reference date, the event window is set to [-1, 1], which is one trading day before and after the reference date, excluding rest days and suspension days. The specific research period is determined to be from March 27, 2020 to March 31, 2020.

Adopting a market model. Firstly, by estimating the window data and fitting formula 1 using the least squares method, as shown in formula 1:

$$R_{i,t}=\alpha_i+\beta_i R_{m,t}+\epsilon_{i,t} \tag{1}$$

The functional relationship between actual return $R_{i,t}$ and market return $R_{m,t}$ is obtained. Next, select the 80 trading days prior to the event as the estimation window, and use the least squares regression method to obtain BYD's market model parameters: α=0.0012, β=1.2436. According to formula 2, as shown in formula 2:

$$AR_{i,t}=R_{i,t}-(\alpha_i+\beta_i R_{m,t}) \tag{2}$$

Calculate the abnormal return rate (which $R_{i,t}$ is the actual return rate of the stock, and $\alpha_i+\beta_i R_{m,t}$ is the expected return rate including excess returns, market risk, and market returns). Then, using formula 3, as shown in formula 3:

$$CAR_{i,t}=\sum_{n=j}^{t=1} AR_{i,t} \tag{3}$$

Calculate the cumulative abnormal return rate $CAR_{i,t}$ (where j is the start date of the window period). Finally, organize and compile the daily stock price of BYD and the daily index of the Shenzhen Composite Index during the aforementioned time period, calculate BYD's abnormal return rate and cumulative abnormal return rate during the event window period, and record them in Table 1.

Table 1. BYD abnormal returns and cumulative abnormal returns during the event window period

Date	Real Rate of Return	Market Yield	Expected Return	Abnormal Rate of Return	Cumulative Abnormal Return
-1	0.94%	-0.46%	-0.49%	1.43%	1.43%
0	2.65%	-2.11%	-2.40%	5.05%	6.48%
1	6.65%	0.51%	0.72%	5.93%	12.41%

Data source: Investing.com

As shown in Table 1, during the event window from March 27, 2020 to March 31, 2020, BYD's cumulative abnormal return rate reached 12.41%, showing a significant positive response. On the day before the benchmark date (March 27th), the abnormal return rate was 1.43%, indicating that the market had caught the event signal in advance. Investors had positive expectations for the release of

blade batteries, which may be related to the early leakage of information or market predictions; On the benchmark day (March 30th), the abnormal return rate jumped to 5.05%, and the cumulative return rate doubled to 6.48%, indicating that after the event was officially disclosed, the market confirmed the technological breakthrough and supply chain independent advantages of blade batteries, and investors reached a consensus on its logic of enhancing product competitiveness and reducing costs, driving the stock price to rise significantly; On March 31st, one day after the benchmark date, the abnormal return rate remained at a high level of 5.93%, and the cumulative return rate exceeded 12%, reflecting the further fermentation of the market's positive evaluation of the event. Funds continued to pour in, verifying the boosting effect of the blade battery release on the company's short-term value.

2.2. Research on Profitability Based on Longitudinal Analysis

When analyzing BYD's profitability vertically, this study selected four key financial indicators to systematically evaluate BYD's profitability, including gross profit margin, net profit margin, return on equity, and return on total assets, which are recorded in Table 2.

Table 2. Relevant data table of BYD's gross profit margin, net profit margin, return on equity, and return on total assets from 2016 to 2023

Year	Gross Profit Margin	Net Profit Margin	Roe	Return on Total Assets
2016	19.57%	4.03%	11.74%	2.76%
2017	19.38%	4.63%	14.02%	3.16%
2018	16.40%	2.79%	8.84%	1.88%
2019	16.49%	1.16%	3.54%	0.75%
2020	19.38%	2.73%	7.43%	1.76%
2021	13.02%	2.72%	7.34%	1.84%
2022	17.04%	4.30%	14.23%	3.18%
2023	23.02%	5.81%	18.34%	4.18%

Data source: BYD Annual Report

As shown in Table 2, BYD's profitability indicators from 2016 to 2023 exhibit phased characteristics. The overall fluctuation of gross profit margin will remain stable at a certain level from 2022 to 2023, with a significant rebound from the low point in 2021; The fluctuation of net profit margin has rebounded, reaching the highest level in nearly eight years from 2022 to 2023; The trend of return on equity and net profit margin is consistent, with a rapid rebound after a decline in the early stage, and an increase in the efficiency of shareholder equity return; The return on total assets fluctuates with profits and continues to improve in the later stage, optimizing asset utilization efficiency. Overall, despite significant fluctuations in gross profit margin, net profit margin, return on equity, and return on total assets have all significantly rebounded since 2021, with particularly outstanding performance from 2022 to 2023. This reflects the continuous improvement of cost control, product added value, and asset operation efficiency under the promotion of the vertical integration strategy, and substantial enhancement of profitability.

2.3. Research on Profitability Based on Horizontal Analysis

When analyzing BYD's profitability horizontally, select Xiaopeng, the main competitor in the new energy vehicle industry, and compare its profit performance with BYD from 2020 to 2023. The indicators include gross profit margin, net profit margin, return on equity, and total asset return, and draw a graph.

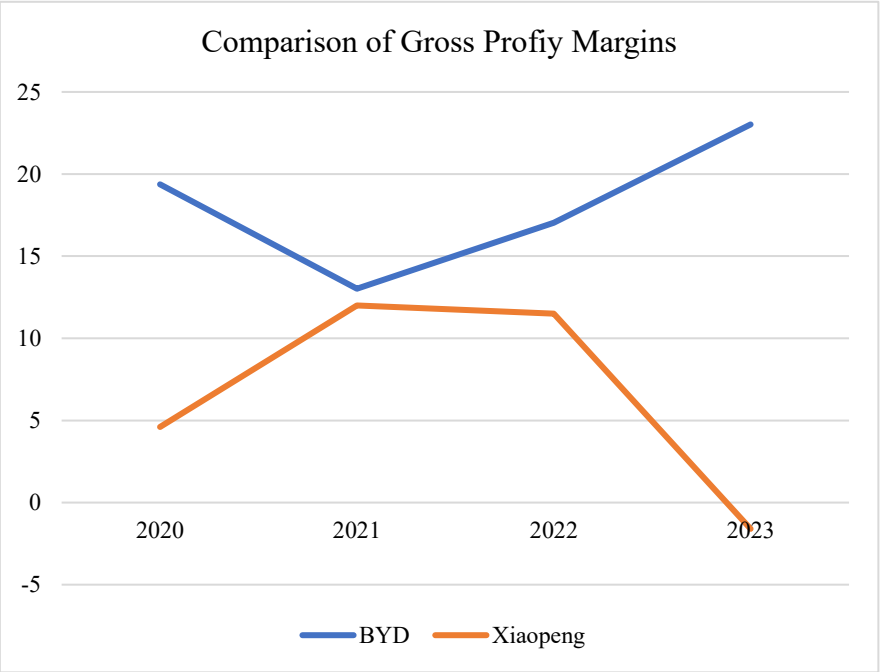

Figure 1. Comparison of gross profit margins between BYD and Xiaopeng from 2020 to 2023 (Picture credit: Original)

Data from: Annual Reports of BYD and Xiaopeng.

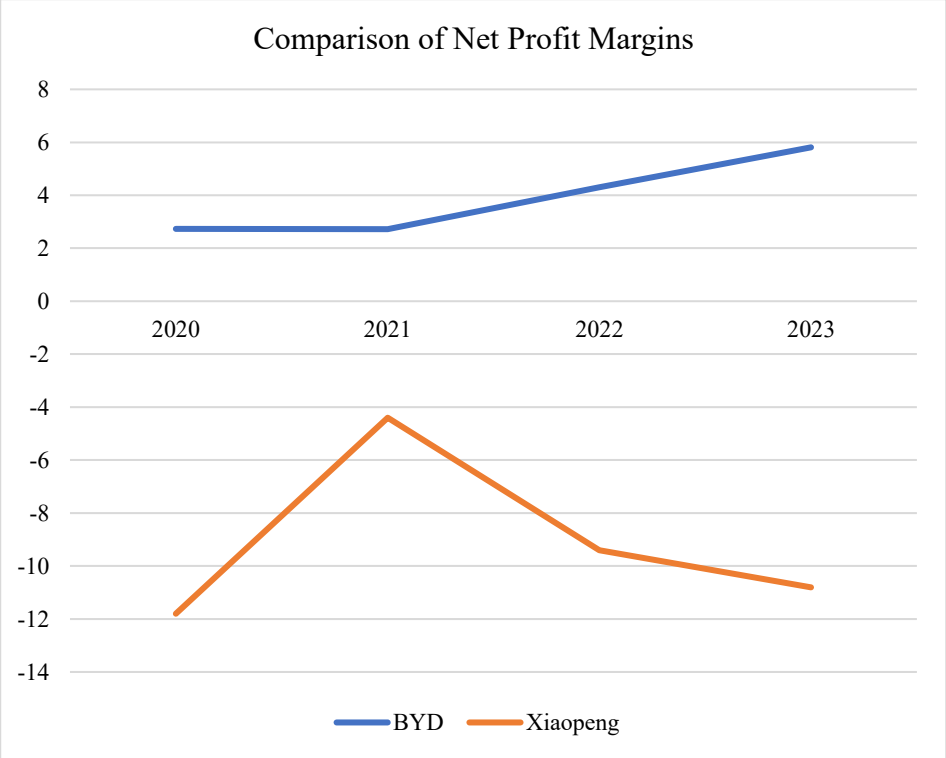

Figure 2. Comparison of net profit margins between BYD and Xiaopeng from 2020 to 2023 (Picture credit: Original)

Data from: Annual Reports of BYD and Xiaopeng

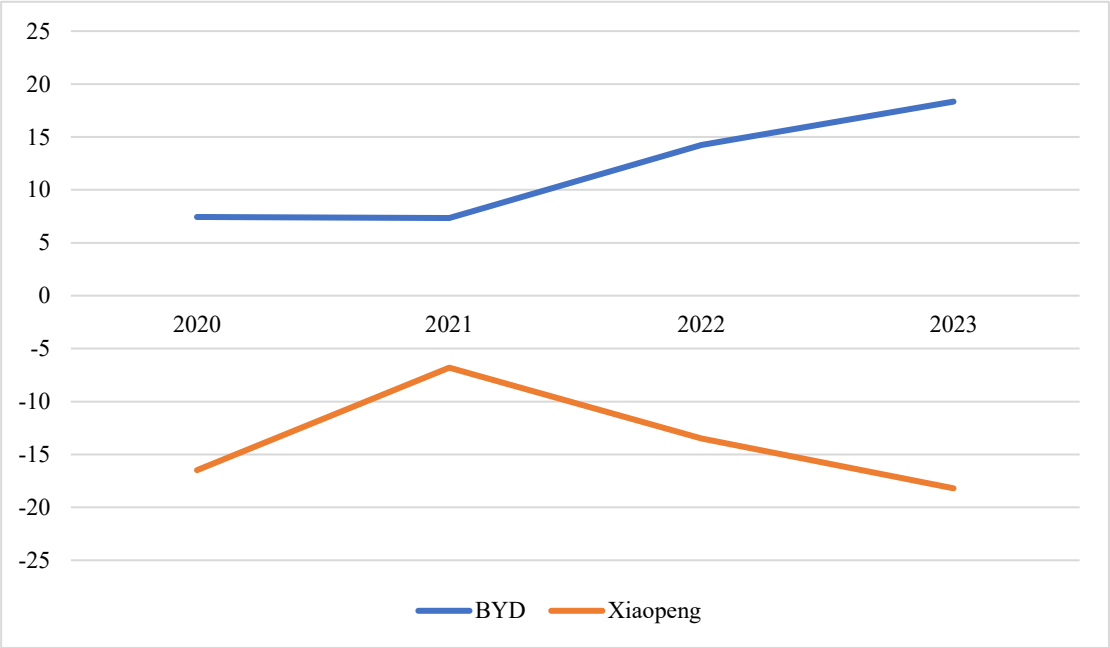

Figure 3. Comparison of return on equity between BYD and Xiaopeng from 2020 to 2023 (Picture credit: Original)

Data from: Annual Reports of BYD and Xiaopeng

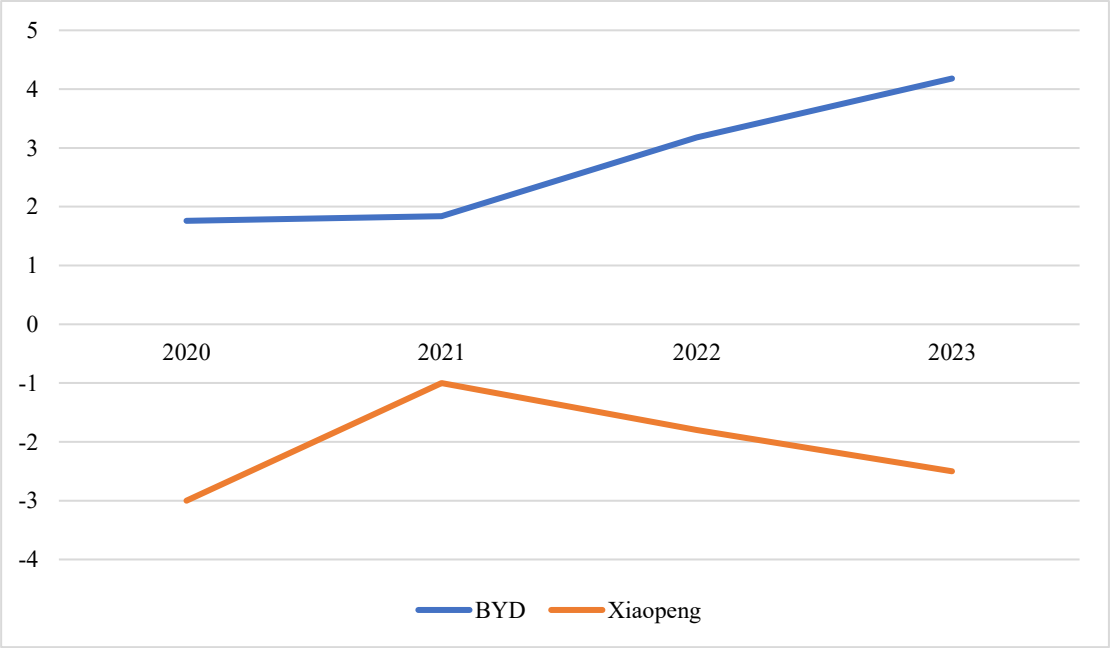

Figure 4. Comparison of total asset returns between BYD and Xiaopeng from 2020 to 2023 (Picture credit: Original)

Data from: Annual Reports of BYD and Xiaopeng

As shown in Figures 1, Figures 2, Figures 3, and Figures 4, there is a significant difference in profitability between BYD and Xiaopeng. In terms of gross profit margin, although BYD has fluctuated, it is generally high and later rebounded. Xiaopeng first rose and then fell, with negative gross profit in 2023, highlighting BYD's cost control and product premium advantages. Xiaopeng is more affected by market competition and insufficient scale; In terms of net profit margin, BYD has steadily climbed, demonstrating its profitability conversion ability, while Xiaopeng has suffered long-term losses, exposing shortcomings in expense control and profit model; In terms of net asset return and total asset return, BYD continues to improve, reflecting the optimization of asset operation and equity returns, while Xiaopeng is sluggish, reflecting insufficient asset utilization and profit support.

Overall, BYD has built a mature profit model based on economies of scale and industrial chain layout, and its profitability has steadily improved; Xiaopeng is facing multiple constraints and profit pressures, and needs to break through in cost control and product competitiveness to narrow the gap with the top players.

3. Changes in Market Landscape

BYD's vertical integration strategy has greatly changed the competitive landscape of the new energy vehicle industry. Teng Binsheng and Cao Xinbei pointed out in their article "Is Vertical Integration Coming, Rolling or Not?" that vertical integration can promote upstream and downstream collaboration in the industrial chain, reduce transaction costs, and enhance profit potential [9]. BYD is deeply implementing this strategy, and its Sea Lion models mainly rely on the domestic supply chain, with little reliance on overseas suppliers. This puts the overall cost of the Sea Lion model 15% lower than the Tesla Model 3 produced at the Shanghai Gigafactory and 35% lower than similar Volkswagen models produced in Europe, giving it a competitive advantage in the market. The Pengpai News reported that in the first half of the year, BYD's bicycle profit was 8500 yuan, and BYD continues to lead in technology popularization. Through the integration of the entire industry chain and independent research and development, BYD has maintained a leading 22% gross profit margin in the industry for many consecutive years. This huge advantage has forced other car companies to increase their R&D investment and integrate their supply chains. For example, in December 2023, Aion, Jike, and NIO successively released self-developed batteries [10].

In terms of coordinated development of the industrial chain, BYD has the world's largest production and manufacturing system for new energy vehicles. With its subsidiary, Freddie, independently producing core components such as batteries, BYD has a stronger ability to respond to market changes and supply chain risks, thereby driving the coordinated development of the upstream and downstream industrial chains. When promoting intelligent driving for all citizens, BYD has closely cooperated with several local industrial chain companies in Guangdong, such as Sagitar Juchuang. In BYD's advanced solution, Sagitar Juchuang accounts for 80% of the laser radar, and its "megawatt flash charging" technology has promoted the upgrading of the entire industrial chain from silicon carbide devices to high rate battery materials, promoting the prosperity of the industrial chain.

4. Conclusion

This study found that BYD's implementation of vertical integration strategy is mainly aimed at ensuring supply chain security, strengthening cost control, and promoting technological collaborative innovation. From the actual effect, this strategy has achieved significant results. When the blade battery was released in 2020, the cumulative abnormal return rate during the event window period reached 12.41%, indicating a positive short-term market response; After 2021, financial indicators such as net profit margin have significantly rebounded, and the profit performance from 2020 to 2023 is better than that of Xiaopeng, with a steady improvement in long-term profitability.

At the same time, this strategy has also changed the competitive landscape of the new energy vehicle industry, not only giving BYD an advantage in cost and other aspects, forcing other car companies to increase their research and development and supply chain integration efforts, but also driving the coordinated development of the upstream and downstream of the industry chain. Therefore, new energy vehicle companies can moderately promote vertical integration according to their own situation, control core links, and lead the construction of industrial ecology. The government can also support enterprise research and development and improve the industrial chain through policies.

In the future, vertical integration of industries may develop towards deep integration and ecological synergy. Enterprises need to balance independent innovation and open cooperation to achieve sustainable development.

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