



Study of Xpeng Automotive's Development Under China's Carbon Neutrality Policy

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Abstract. Nearly all nations have faced environmental degradation, global warming, and carbon emissions. On December 2015, 171 nations committed to limiting the increase in average global temperature to no more than 2 °C above pre-industrial levels, aiming for a limit of 1.5 °C, and achieving a global “carbon-neutral” target between the year of 2050 and 2100. Under this scenario, the Chinese government has paid attention to environmentally-friendly industries such as photovoltaic, wind power, biomass, and electric vehicles (EV). This study analyzes Chinese leading EV company, Xpeng Auto Group, and its financial reports and market performance over the past few years. The research on the annual and quarter financial reports shows that Xpeng performs well in terms of financial structure but was poor in profit-generating ability. Regarding the market environment, Xpeng benefits from China's carbon neutrality and other environmental policy, and rising oil prices will encourage more customers to purchase electric cars. In addition, Xpeng faces technical bottlenecks in intelligent assisted driving systems and foreign competitors. Through financial analysis and SWOT analysis, this paper provides a reference for Xpeng and other electric vehicle companies to develop strategies when facing upcoming challenges.

Keywords: Electric Vehicle · Carbon Neutrality · Global Warming · Debt-to-Equity Ratio

1 Introduction

1.1 Background

Carbon neutrality means that the CO₂ emissions produced by a country are offset by the CO₂ absorption by the carbon sink, resulting in net zero CO₂ emissions [1]. Carbon neutrality has become an indicator of China's green economy and raised awareness of the new energy vehicle market. From 2013 to 2017, the Chinese government issued various policies to combat air pollution, including cutting vehicle registration lottery slots and distributing more than 20,000 slots to new energy vehicles [2]. In 2015, Beijing and other cities also issued travel restrictions for fuel car vehicles. To address climate change, a problem all of humanity is facing, On 12 September 2020, Chinese President Xi Jinping pledged at the 75th UN General Assembly that China will achieve its carbon neutrality target by 2060 [3]. The 2021 Domestic New Energy Vehicle Sales Report

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by Ping An Securities points out that domestic new energy vehicle sales reached 2.87 million units, a 158% increase year-over-year. Among them, 2.37 million units are pure electric, a 161% increase year-over-year; 502,000 units are plug-in electric, a 147% increase year-over-year [4]. The current representatives of Chinese domestic electric vehicle companies include BYD, NIO, Xpeng, GAC Motor, etc. China's new energy vehicle market is highly competitive and faces an influx of overseas competitors such as Tesla [5]. Therefore, this paper mainly uses the SWOT analysis to analyze Xpeng under the carbon neutral policy and provide guidance on developing China's electric vehicle industry.

1.2 Related Research

The related literature can be divided into two categories: The SWOT analysis of crucial EV businesses and the relation between the government and the market for electric vehicles.

1.2.1 The Relationship Between the Government and the Electric Vehicles Market

In order to reach the 2060 carbon neutrality target, the Chinese government has provided significant subsidies and developed many policies for the new energy vehicle market. Many scholars have studied the relationship between China's EV vehicle market and the Chinese government's policy. J. Li et al. [2019] used a complex evolutionary game theory approach to analyze government policies' dynamic effects on the market penetration of electric vehicles. The paper shows that as the number of manufacturers increases, the degree of market penetration of EVs increases accordingly under the same government policies [6]. Furthermore, government production subsidies to manufacturers better affect electric vehicle market promotion. S. Ou et al. [2019] point out that the Chinese government favors electric vehicles with a high battery range in supply-side subsidies [7]. In terms of demand-side subsidies, free vehicle licenses can save megacity EV users about \$10,000. In addition, Chinese government subsidies for new energy vehicles are slowly shifting from the demand side to the supply side. In the context of carbon peaking and carbon neutral policies, Zhang and Hanaoka [2021] conducted an integrated assessment to analyze the domestic share of the electric vehicle market in China, the rate of transportation electrification, and the decline in CO₂ emissions from 2015–2060 in three different government policy scenarios [8]. When discussing whether the new energy vehicle market can contribute to the carbon neutrality target, C. Su et al. [2021] found a positive correlation between air quality and sales of new energy vehicles. The researchers conclude from the experiment that electric vehicles are not significantly improving air pollution in China. The rising PM 2.5 level will also indirectly promote electric vehicle sales, reflecting the social awareness of environmental protection, and will affect the new energy vehicle market [9]. The above studies all focus on the impact of government policies on the macro market of EVs. However, very few studies incorporate case studies of specific EV companies with government policies, which is necessary to provide guidance to EV companies.

1.2.2 The SWOT Analysis of Major EV Companies

The SWOT analysis is a general model in business research. The analysis focuses on the subject's strengths, weaknesses, opportunities, and threats; and proposes development recommendations based on these four points. Many scholars have conducted SWOT analyses on the world's major new energy vehicle companies. For example, Y. Gao [2021] conducted a SWOT analysis to evaluate BYD, China's most famous electronic vehicle company. The research shows that BYD's EV battery has a relatively longer life span and higher safety. BYD's production model allows it to control costs and maintain a price advantage. However, BYD's electric car battery has poor conductivity and low efficiency. In addition, conflict of interest with distributors on sales makes BYD less competitive in the market [10]. When examining BYD's opportunities, J. Geng [2021] found that the oil crisis and rising disposable income per capita will positively impact BYD's electric vehicle sales. Furthermore, based on BYD's weaknesses and potential future threats, BYD needs to communicate with other outstanding EV companies to promote technological progress [11]. X. Meng et al. [2021] conducted a Harvard financial analysis on BYD company. The research indicates that although BYD's production and sales have increased annually, BYD's accrued revenue makes itself under the threat of bad debt. BYD's liabilities increase which results in a poor solvency rate [12]. T. Jiang [2022] uses the SWOT model to analyze Tesla's market strengths, weaknesses, opportunities, and threats. The research indicates that Tesla is currently the leader in the electric vehicle market. Its extensive customer base and investment in R&D will continue strengthening its market position [13]. J. Liu and S. Zhou [2022] analyze Tesla and NIO's current market strategies and prospects. The researchers conclude that a flexible pricing strategy and product cost control will greatly influence market penetration [14]. Therefore, SWOT analysis can objectively reflect the performance of the company in the industry and can develop a suitable strategy for the company's characteristics.

1.3 Objection

The new energy-electric vehicle, driven by a carbon-neutral strategy, is promising in its market. With the government's active promotion and capital market, China has already formed a market for new energy vehicles. Xpeng is the leading electric vehicle company in China, but there are only a few studies and analyses about Xpeng's market strategy. This study focuses on the recent performance of Xpeng, Inc under the carbon neutral policy. By evaluating Xpeng's financial report and market penetration strategy, this study identifies Xpeng's competitiveness and shortness for its future development.

2 Background of Xpeng, Inc

2.1 Basic Information

Founded in 2014 by Heng Xia and Tao He, Xpeng, Inc is one of China's leading electric Vehicle companies. Xpeng's target customers are those tech-savvy middle-class consumers in China. This group of consumers is large and is continuously growing. In order to optimize the driving experience, Xpeng has developed its own internal intelligent

operating system as well as driver assistance systems. Xpeng has also upgraded the powertrain and electronic architecture. Xpeng's headquarter is in Guangzhou, China, and its manufacturing facility for electric vehicles is in Zhaoqing, Guangdong. More than 90% of Xpeng's team members are technicians, mainly from well-known vehicle companies such as GAC, BMW, Lamborghini, and Ford; large auto parts companies such as Delphi; and IT companies such as Samsung, Huawei, and WeChat.

2.2 The History of Model Released

On September 13 2016, Xpeng Auto officially released its first model, the BETA version of Xpeng Auto, which is positioned as a battery electric SUV [15]. This beta model was renamed Xpeng Identity X and was released in 2017 in limited quantities. After a year of trial operations, Xpeng Identity X changed its name to Xpeng G3 and began its mass production in 2018 [16]. In 2019, Xpeng presented the P7 concept model at the Shanghai Auto Show, and it went into production in December of the same year [17]. Xpeng P7 is positioned as a sedan, and compared to the Xpeng G3, the P7 has fully upgraded hardware and can support an L-3 level self-driving system. In addition, the range of battery life of Xpeng P7 has also been greatly improved [18]. In April 2021, Xpeng released its third car model, the Xpeng P5, which will go on sale in September 2021. Xpeng P5 is the first electric vehicle in the world to be equipped with the Lidar sensor and mass produced. In July 2021, three years after the launch of the Xpeng G3, Xpeng unveiled the updated version of the model, the G3i, which has a similar exterior design to the Xpeng p7. In addition, the Xpeng G3i is equipped with a new generation of intelligent operation systems and XPILOT 2.5, the autonomous driving assistance systems [19].

2.3 The History of the Financing Phase

In November 2019, Xpeng, Inc finished its series C financing and collected more than \$400 million in funding from investors. In July 2020, Xpeng completed Series C + financing of nearly \$500 million. The major investors of the Series C + financing are Aspex, Coatue, High Tide Capital, and Sequoia China. In the following August, Xpeng received an additional \$300 million in funding from Alibaba Group, Qatar Investment Authority, and other investors. On 8 August 2020, Xpeng officially submitted IPO documents to the SEC and was officially listed on the NYSE on 27 August.

2.4 Current Situation

Xpeng first demonstrated its latest model, the G9, at the Guangzhou Auto Show in November 2021 and plans to bring the G9 to market in the third quarter of 2022. Xpeng G9 model is a luxury mid-size seven-seat SUV. Compared to the P5, P7, and G3i, Xpeng G9 is equipped with Xpeng's centralized electronic and electrical architecture, and its driver assistance system has been upgraded to 4.0. However, Xpeng has hit a bottleneck in its development. Although Xpeng's R&D investment rose from RMB 1,725,906 in 2020 to RMB 4,114,267 in 2021, Xpeng2022 sales did not improve significantly in the first two quarters. Xpeng is still facing losses year after year. Recently, many traffic

accidents related to Xpeng's Vehicle have caused consumers to be concerned about the safety of Xpeng's assisted autonomous driving system.

Therefore, this paper first analyzes the financial report of Xpeng and then discusses the development strategy of Xpeng under carbon neutrality combined with a SWOT analysis.

3 Financial Report

3.1 Consolidated Income Statement

Table 1 shows the consolidated income statement of Xpeng, Inc from 2019 to 2021. An income statement can demonstrate a company's profit-related activities to outside investors and regulators. It also reflects the change in retained earnings, which directly influence shareholder's equity. Xpeng's operational revenue mainly comes from the sales of the vehicle. From 2019 to 2021, the revenue increased continuously, thanks to the rising sales and Xpeng's expanding product portfolio (Fig. 1). Though the cost of sales

Table 1. The consolidated income statement of Xpeng (source: Xpeng)

Xpeng, Inc 2019, 2020, & 2021 Consolidated Income Statement (in thousand RMB)			
	2019	2020	2021
Vehicle Sales	2,171,231	5,546,754	20,041,955
Service & others	149,988	297,567	946,176
Total Revenues	2,321,219	5,844,321	20,988,131
Total Cost of sales	-2,879,360	-5,578,332	-18,365,576
Gross Profit/Loss	-558,141	265,989	2,622,555
Operating Expenses			
R&D	-2,070,158	-1,725,906	-4,114,267
SG&A	-1,164,569	-2,920,649	-5,305,433
Total Operating Expense	-3,234,727	-4,646,555	-9,419,700
Other income	12,294	86,830	217,740
Loss from Operations	-3,780,574	-4,293,736	-6,579,405
Interest income	88,843	133,036	743,034
Interest expense	-32,017	-22,451	-55,336
Fair Value gain on longterm investment			591,506
Fair value gain on derivative liabilities	27,679	1,362,025	79,262
Other non-operating income, net	4,397	90,364	383,833
Loss before income tax expenses	-3,691,672	-2,730,762	-4,837,106
Income tax expenses	-1	-1,223	-25,990
Net loss	-3,691,673	-2,731,985	-4,863,096

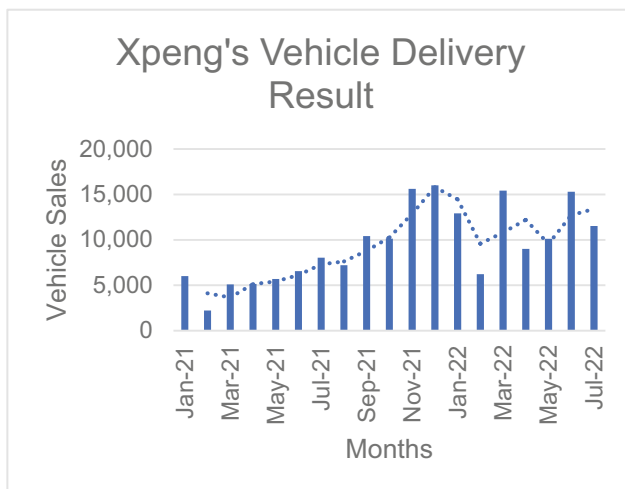


Fig. 1. Xpeng's Vehicle Delivery Result (source: Xpeng)

(direct material cost, direct labor cost, manufacturing overhead cost, etc.) also increased year by year as the sales went up, the gross profit increased and reached 12.5% in 2021 (Table 2), suggesting an improvement in Xpeng's profitability. According to Xpeng, this is due to a reduction in material costs and increased production efficiency.

However, the increased gross margin did not contribute to a positive net income. In contrast, Xpeng generated negative profit in all these three years, and in 2021, the net loss reached RMB - 4,863,096. According to Xpeng, Inc's 2021 audited financial report, developing new vehicle models and salary increases for technical staff doubled Xpeng's R&D investment in 2021 compared to 2020. Furthermore, Xpeng's significant investment in advertising and sales network also caused Xpeng's Selling, general and administrative expenses to rise to RMB 530,433. The higher R&D and marketing expenses dragged down Xpeng's profits, leaving Xpeng facing a cumulative loss of RMB 20.5 billion [20].

3.2 Profitability Analysis

Although investment in R&D and S&GA is inevitable for the company's long-term growth, Xpeng 2022's performance in the first two quarters did not meet the investment expectations.

From the perspective of sales, January 2022's sales received the effects of the 2021 year-end promotion and still maintained a high level. However, with the Chinese New Year holiday, the sales dropped from 12,992 units to nearly 6,000 units. In fact, this decline in sales coincided with the market pattern of electric vehicles in China [7]. In addition, the impact of supply chain blockage, oil prices, government subsidies, and raw material prices caused a series of fluctuations in sales in the following months (Fig. 1). Still, it was far below Xpeng's sales expectations in the first half of 2022 [21].

Table 2. Xpeng, Inc's 2019, 2020 & 2021 annual gross profit margin

Year	2019	2020	2021
Gross profit Margin	-24.0%	4.6%	12.5%

From the perspective of marginal profit, Xpeng is not competitive in the electric vehicle industry. A company's marginal profit is the recognized revenue after subtracting the cost of goods sold (direct material, direct labor, manufacturing overhead), reflecting the company's profit-generated ability. According to Xpeng, Inc's 2021 financial report, the improvement of Xpeng's production facilities and the drop in material price contribute to the rise in gross profit margin in the first three quarters of 2021. However, the disruption of the vehicle supply chain in the first half of 2022 drove up the material cost in the electric vehicle industry and thereby led the gross profit margin to drop to less than 11% in the second quarter of 2022. Compared to Tesla, NIO, BYD, Li, and its major competitors, Xpeng's gross profit margins are at a disadvantage (Fig. 2). Though the increased material cost impacted nearly the entire electric vehicle industry, Xpeng's gross profit margins are at the lowest level among its competitors in the first two quarters of 2022.

3.3 Operation Analysis

From the perspective of financial structure, Xpeng's Total Asset, current, and non-current liability have been on the rise for the first two quarters of 2022 (Fig. 3). However, Xpeng's shareholders' equity has shrunk to some degree. According to Xpeng's 2022 first and second quarter unaudited financial report, Xpeng's shareholder's equity was RMB 42,146,578 at the year-end of 2021, but it diminished to RMB 39,978,426 on March 30th 2022.

The debt-to-equity ratio reflects a company's capital structure and its dependency on the creditor. In general, the higher the debt-to-equity ratio, the more the company relies on the creditors and the risk the company has. Though Xpeng's liability is growing and its owner's equity is shrinking, Xpeng's solvency is relatively strong among its competitors (Table 3). A debt-to-equity ratio of 0.73 gives Xpeng a low-risk profile in the electric vehicle industry. In contrast, BYD, China's electric vehicle leader, has extremely high debt levels due to problems such as bad debt and therefore has relatively poor solvency [12]. Table 3 shows that Tesla and Nio have a debt-to-equity ratio of 0.85 and 1.46, respectively, while BYD's debt-to-equity ratio is 2.01. These high debt-equity ratios add a lot of risk for investors in these companies. Therefore, to reduce investment risk and appeal to more investors, Xpeng should maintain a lower debt-to-equity ratio in the future.

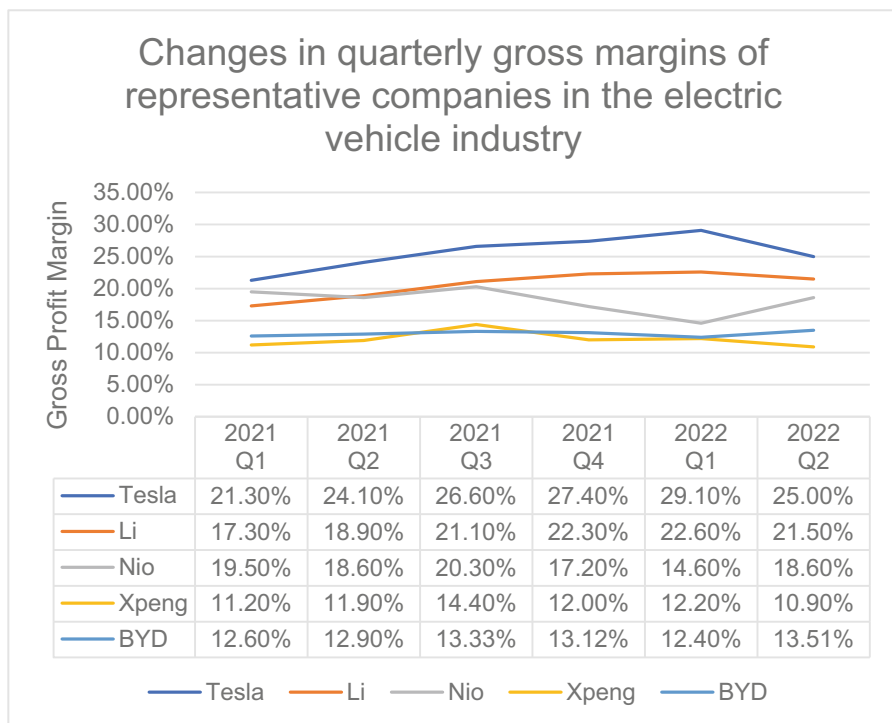


Fig. 2. Changes in gross margins of representative companies in the electric vehicle industry (source: Xpeng)

Table 3. Asset composition of several EV companies

	BYD (¥)	NIO (¥)	Li (¥)	Tesla (\$ million)	Xpeng (¥)
Current Liability	189,583,715,000	31,912,309	17,812,059	21,821	22,141,104
Non-current Liability	22,118,169,000	17,795,730	12,023,170	9,034	7,161,706
Total Liability	211,701,884,000	49,708,039	29,835,229	30,855	29,302,810
Shareholder's equity	105,371,879,000	34,141,614	42,651,726	36,376	39,978,426
debt-to-equity ratio	2.01	1.46	0.70	0.85	0.73

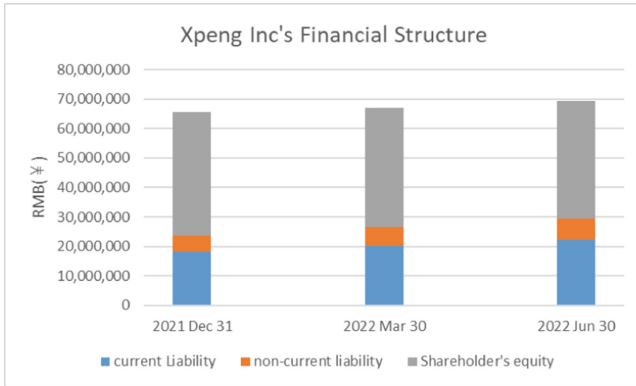


Fig. 3. Xpeng, Inc's Financial Structure (source: Xpeng)

4 Xpeng's SWOT Analysis

The SWOT analysis is a general model in business research. The analysis focuses on a company's strengths, weaknesses, opportunities, and threats in its market; and proposes development recommendations based on these four perspectives.

4.1 Strengths

Technological research and development, the core of developing new energy vehicles, is an area where Xpeng excels. In recent years, Xpeng has further increased its R&D efforts to enhance its core competitiveness through independent R&D and third-party cooperation. As shown in Fig. 4, from 2019 to 2021, Xpeng's R&D investment will increase from RMB 2.07 billion to RMB 4.1 billion, a nearly two-fold increase, with a compound annual growth rate of up to 40.97%. In the future, Xpeng will continue to increase R&D investment in each technical aspect and introduce a large number of highly superb technicians to consolidate its R&D advantages. Since its establishment, Xpeng has attracted technical personnel from various fields and accumulated much experience in critical technologies.

4.2 Weakness

Although Xpeng has made certain technical breakthroughs in its automotive intelligent operating system and electric architecture, and the newly released G9 will also be equipped with a new assisted self-driving system, Xpeng still has technical barriers. However, Xpeng has increased the research and development in recent years but is limited to the vehicle appearance and operation system application. The essential part of the hardware and software within the electric vehicle is still underdeveloped, which will hamper the company's long-term development. Furthermore, on 10 August 2022, the Xpeng was involved in a collision with a death toll. This accident has led to customer concerns about Xpeng's assisted driving system. For new energy vehicles, technicians and core technologies are especially important, and only by quickly mastering core technologies can Xpeng better control production costs and profit.

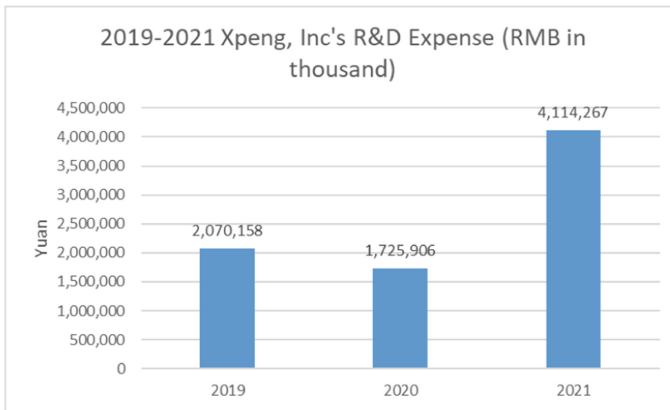


Fig. 4. 2019–2021 Xpeng, Inc's R&D investment (source: Xpeng)

4.3 Opportunities

With global warming and the depletion of available energy, people are paying more and more attention to a low-carbon life. The disadvantages of traditional cars are more prominent to the public, and new energy vehicles have undoubtedly become the focus of sustainable development. From 2015 to 2018, sales of new energy vehicles in China surged, with sales of 1.256 million greenery vehicles in 2018 representing a 226.28% increase over 2015 sales [13]. According to the National Development and Reform Commission of the People's Republic of China, the carbon-neutral policy classified the electric vehicle industry as a priority sector for development. As a result, China's new energy sales reached 1.367 million units in 2020 despite the epidemic's impact [22]. By the end of 2020, China's new energy vehicle production and sales are the highest in the world for six consecutive years, with cumulative sales exceeding 5.55 million units.

In addition, government subsidies for new energy vehicles in China are gradually moving from the supply side to the demand side [7]. The government prefers electric cars with high battery ranges for manufacturing subsidies. The tendency of this government's incentive supports lowering production costs for electric vehicle producers while also fostering research and development for the driving range of electric vehicles.

4.4 Threat

With foreign electric vehicle companies entering the Chinese market, the survival of Chinese domestic electric vehicle companies has been challenged. Compared with domestic electric car companies, overseas vehicles such as Tesla, Nissan, and Ford have immense capital strength and advanced technical support. At the same time, their customer size should not be underestimated. These external challenges put a lot of pressure on Xpeng's future development.

5 Suggestion

Since Xpeng has a favorable Solvency rate in terms of financial structure, its debt-to-equity ratio is better than that of its rivals in the electric automobile market. In order to draw in more investors, Xpeng should work to keep this excellent financial structure. To accomplish this, Xpeng can prioritize equity financing while lowering the proportion of debt financing. However, Xpeng's gross profit margins have recently lagged behind those of its competitors in terms of revenue and production costs. Ineffective management or high production expenses could be the cause of this issue. The first step in solving this problem is for Xpeng to work vertically and actively with upstream raw material suppliers to drive down raw material costs as much as possible. Second, in order to reduce production costs, Xpeng can horizontally collaborate with other electric car manufacturers to develop critical software and hardware for electric vehicles, including batteries, operating systems, and driver assistance systems. Outsourcing the production and assembly of low-value-added components can effectively reduce costs. Xpeng, Inc can outsource non-core businesses such as parts production and assembly to companies with substantial advantages in this field. The company can outsource its non-core business to companies with substantial advantages in this field to reduce production and manufacturing costs while ensuring product quality and maintaining the overall low-cost advantage. Third, to improve effectiveness, Xpeng may trim its production management team and enhance management quality. Even though Xpeng's research expenditures are growing significantly every year, technical obstacles are still present. The backbone of industrial development is technology. However, when it comes to technological innovation, Xpeng must preserve its own system [23]. Additionally, since consumers are now having issues with Xpeng's intelligent assisted driving system, it is even more important for Xpeng to step up research and development in this field to address the issues.

6 Conclusion

The growth of the new energy market will accelerate with the support of government environmental regulations and customer attitudes. The main representative of the new energy is the electric cars industry. This study examines Xpeng's recent financial reports and market performance. The study shows Xpeng has a robust financial structure but low gross profit margins. This also foreshadows the difficulties Xpeng would have managing the production. In terms of the market condition, Xpeng benefits from China's carbon neutrality strategy, and increasing oil prices will motivate more individuals to purchase electric cars. In addition, Xpeng must deal with overseas competitors and technical difficulties. This study is a resource for Xpeng and other electric car startups to create their strategy through financial and SWOT analysis. This article can only offer a broader indication of future improvements in the core technologies because it does not evaluate the technical aspects of Xpeng in enough depth. In addition, the price of petroleum, the cost of raw materials, climatic changes, consumer tastes, governmental legislation, and so forth all impact how the market for electric vehicles grows. The multi-factor issue makes the planning process of new energy electric car manufacturers like Xpeng unpredictable. Therefore, colleagues in the academic community should conduct more

in-depth research on other aspects of the electric vehicle market. Overall, the future of the new energy vehicle market remains worthy of in-depth study. As environmental awareness takes root, the market value of new energy electric vehicles will also have great potential.

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