

Analysis of the Development Path of New Energy Vehicles Based on Technical Barriers to Trade -- Taking BYD as an Example

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Abstract. With the development of globalization, trade between countries is becoming more and more frequent. However, with the progress of society, the improvement of people's living standards in developed countries, and the enhancement of environmental awareness in various countries, people have more and more requirements for products. Therefore, the exploration and application of new energy are key topics today. The researchers found that the emerging new energy vehicle industry is in a stage of rapid development. However, the technical barriers to trade faced by new energy vehicles and their exports still lack a unified explanation. Therefore, this paper conducts a SWOT analysis of BYD by collecting its development status, business status, and competitors. In the context of globalization, BYD explores its development path in the face of technical barriers to trade. It is found that at this stage, BYD has alleviated the impact of technical barriers to trade by developing new energy technologies to a certain extent, but BYD still faces financial problems caused by the reduction of national financial support, and the after-sales service of new energy vehicles such as charging and insurance is not perfect. And put forward reasonable countermeasures and suggestions for the above problems.

Keywords: New energy vehicles; Globalization; Technical barriers to trade; BYD.

1. Introduction

1.1 Background

With the continuous strengthening of global relations, countries are interdependent in politics, economy, and trade [1]. The emergence of trade liberalization has promoted the expansion of international trade and the integration of the world economy. However, some countries, especially developed countries, protect the development of their own industries with standards and regulations, technical regulations and standards, and conformity assessment standards. Secondly, by participating in international conventions and international environmental protection organizations, countries around the world have formulated a series of environmental protection standards and systems. These reasons will restrict the entry of products and services from other countries to a certain extent. In order to deal with this situation, the development of new energy is particularly important. At the same time, China is also following the international trend. In recent years, the government has introduced relevant industrial policies to promote the electrification of public vehicles, energy conservation and emission reduction in the automotive industry, and green development.

1.2 Objective

BYD, which started with second-hand rechargeable batteries, has natural advantages in entering the new energy industry. However, with the decline of subsidies from national policies, Chinese new energy vehicle enterprises such as BYD will face a new problem. How can BYD formulate strategies to face this problem? How should BYD use its advantages to enter other countries under the technical barriers to trade? Therefore, this paper will analyze BYD's current business status and development status in order to answer the above questions.

2. Basic Descriptions of BYD

BYD (hereinafter referred to as BYD) is a listed company in Hong Kong and Shenzhen, with a current turnover and total market value exceeding 100 billion yuan. BYD is a high-tech enterprise with core competitiveness in product and technology innovation. It has been involved in many fields, such as automobile, rail transit, new energy, and electronics, and already has a perfect product and service matrix, laying a good foundation for its better development of the new energy automobile industry. At the same time, BYD is the world's first car company with three core technologies of new energy vehicles: battery, motor, and electronic control. Its battery capacity reached 28GWh in 2018, surpassing most battery manufacturers in the world [2]. At present, in the context of green technical barriers, the high requirements of other countries on vehicle emission standards limit the export of Chinese diesel vehicles. In order to deal with the barriers, the development of new energy vehicles is becoming increasingly important. Secondly, under the influence of globalization, some countries, in order to protect their own trade development, use their own technological and economic advantages to formulate technical standards, technical regulations, and technical certification systems that are more stringent than international standards or not mentioned in international standards to restrict imports of other countries [3]. In order to deal with technical barriers to trade, BYD's auto export strategy has become increasingly important. Finally, under the influence of the pneumonia epidemic in Xinguan, how to make an appropriate strategy is becoming increasingly important for BYD in the face of the challenge of shrinking global trade.

3. Financial strategy analysis of BYD

3.1 Solvency analysis

The current ratio and quick ratio are indicators to measure the solvency of short-term debts of enterprises. It is generally believed that the current ratio is close to 2 and the quick ratio is close to 1. The short-term solvency of enterprises is strong, while BYD's own current ratio and quick ratio have been improving gradually in the first four years. The asset-liability ratio and the property right ratio are the measurement indicators of an enterprise's long-term solvency, reflecting the extent to which the enterprise's assets protect the creditors' rights and interests. It is generally believed that the smaller the asset-liability ratio is, the stronger the long-term solvency of the enterprise is, and the better the equity ratio is close to 1:1. It can be seen from Table 1 that the government subsidy to BYD in 2017 was 1.275 billion yuan, accounting for 31% of BYD's net profit of 4.066 billion yuan [4]. The working capital of the enterprise is relatively sufficient, the liquidity ratio has risen significantly, and the short-term solvency has been enhanced. The substantial growth of BYD's operating costs, sales expenses, administrative expenses, R&D expenses, etc. in 2020 and 2021 will lead to a sharp decline in the current ratio and quick ratio and weaken its short-term solvency. BYD's solvency has basically maintained steady and slow growth in the first four years. In 2020, in order to cushion the impact of the new museum pneumonia, BYD's business structure changed slightly, resulting in a 74.48% increase in BYD's long-term loans to 11.947 billion, and all long-term loans were bank credit loans [5].

Table 1. BYD2017-2021 Debt paying Capacity Indicators (eastmoney. com)

	2021	2020	2019	2018	2017
Current ratio	0.97	1.049	0.99	0.988	0.978
Quick ratio	0.717	0.754	0.753	0.762	0.789
Asset liability ratio (%)	64.76	67.94	68	68.81	66.33
Equity ratio	2.015	2.401	2.344	2.425	2.148

3.2 Accounting performance analysis

According to the publicly released financial reports, the operating costs of BYD in the past five years were more than 100 billion and showed an upward trend in all years except 2019, when the operating costs decreased by 1.78%. Secondly, the reports of the first, second and third quarters of 2019 showed an upward trend of 22.50%, 14.84% and 5.44% respectively. It is reasonable to suspect that the abnormal value is caused by the global outbreak of Xinguan pneumonia. The downward trend of operating revenue continued to the mid-report of 2020, with the first quarter report of 2020 showing the most significant decline, reaching 35.06%. The same trend is also reflected in business success, with a decrease of 1.66% in 2019. However, the recovery of operating income, operating cost and consolidated net profit in 2020 shows that BYD's strategy during the epidemic has played a certain role. In 2019, consolidated net profit encountered the same problems as operating income and operating costs. However, in addition, the net profit in 2021 will decrease by 34.03%, which shows that while the operating income will increase significantly, the enterprise expenses will increase by a greater margin, mainly reflected in the increase of investment in research and development expenses in 2021.

Table 2. Development capacity indicators of BYD in 2017-2021 (baidu. com)

	The third quarter of 2022	2021	2020	2019	2018	2017
business income (billion)	267.7	216.1	156.6	127.7	130.1	105.9
Operating costs (billion)	225.1	188	126.3	106.9	108.7	85.775
Consolidated net profit (billion)	9.988	3.967	6.014	2.119	3.556	4.917

3.3 Profitability analysis

After falling in 2017, BYD's gross profit margin of sales in the past five years has maintained about 16% for two years, rebounded to more than 19% in 2020, but dropped significantly to 13.02% in 2021. In general, the net profit from sales is also in a downward trend, with a slight recovery in 2020 and only 1.84% in 2021, indicating a sharp decline in the company's profitability. BYD's return on equity and total assets showed a similar trend, which continued to decline from 2017 to 2019, rebounded to be similar to 2017 in 2020, and fell again after 2020, with the return on assets falling to 3.73% and the return on total assets falling to 1.6%.

Table 3. BYD Profitability indicators in 2017-2021 (eastmoney. com)

	2021	2020	2019	2018	2017
Gross profit margin (%)	13.02	19.38	16.29	16.4	19.01
Net interest rate (%)	1.84	3.84	1.66	2.73	4.64
Return on net assets (weighted) (%)	3.73	7.43	2.62	4.96	7.76
Return on total assets (weighted) (%)	1.6	3.03	1.09	1.91	3.04

4. Operation strategy analysis

4.1 Marketing analysis

4.1.1 Dividend analysis

BYD announced to payment of dividends of RMB 0.0204 per share on July 26, 2019. On August 18, 2020, the Company announced to pay dividends of RMB 0.006 per share for 2019 to shareholders. On August 6, 2021, a dividend of 0.0148 people per share will be announced, and on July 29, 2022, a dividend of 0.0105 yuan per share will be announced. See Table 4 for the specific dividend distribution of BYD in the recent five years. It can be seen from Table 4 that BYD's net assets per share are on the rise. Generally speaking, the higher the net assets per share, the stronger the company's economic strength. As the material basis for the future expansion of the company or the

future bonus shares transferred by shareholders, the larger the value of the common reserve per share, the better the company's profitability and development. In the past five years, the net assets per share also showed an upward trend. In general, BYD's profitability also shows an upward trend.

Table 4. BYD Dividends in 2017-2021 (eastmoney. com)

	2021	2020	2019	2018	2017
Net assets per share (RMB)	32.6572	20.446	19.1954	18.8049	18.7338
Accumulation fund per share (RMB)	20.8877	9.0533	8.9917	8.9894	8.971

4.1.2 Market share analysis

In 2019, BYD ranked second in global auto sales, just behind Tesla, reaching 10% [6]. In 2021, the sales volume of new energy vehicles will soar to 3.521 million, with a market share of 13.4% [7]. Since 2022, BYD's auto sales have continued to grow. According to the latest products and sales data released by BYD, in the first half of 2022, the company will sell about 641400 new energy vehicles, with a cumulative year-on-year growth of nearly 3.15 times, which has exceeded the annual sales of last year, with a market share of more than 28% [8].

4.1.3 Competitor analysis --- Tesla

BYD and Tesla have their own advantages and disadvantages in the process of internationalization. However, both of them will pose a threat to other new energy vehicle enterprises in terms of technology research and development and the number of patents. Through the SWOT analysis of BYD and Tesla, the similarities and differences between them are compared in depth to provide the development direction for other new energy vehicle enterprises [9].

Table 5. Comparison between BYD and Tesla [9] [10] [11]

enterprise	neutral	S (advantages)
BYD	Prefer commercial vehicles; The entry mode is divided into direct exit; Sole proprietorship and joint venture	Power battery technology is relatively mature; Focusing on research and development, the number of patents far exceeds the patent reserve of foreign new energy vehicles. [11]
Tesla	Prefer to passenger cars; From high-end to public gradually; The entry modes include franchise, sole proprietorship, and joint venture	Higher R&D costs; Leading electric driving technology; Market strategy of vertical integration
BYD	W (disadvantage)	O (Opportunity)
Tesla	Low brand value and market recognition; Insufficient capital strength	Various national subsidy policies; High demand in foreign markets
generality	Tesla and BYD's target markets are Europe, America and Asia Pacific region	

4.2 Marketing analysis

As of February 18, 2022, China has signed more than 200 cooperation documents with 147 countries and 32 international organizations to jointly build the "Belt and Road", and established more than 90 bilateral cooperation mechanisms [13]. However, this organization originally intended to promote international trade has formed trade barriers invisibly. Developed countries have used their technological advantages to set up more and more technical trade barriers to other countries in order to protect their own industries, such as standards and regulations, technical regulations, product packaging and labeling, conformity assessment procedures, etc. [14], which has had a certain impact on the process of globalization. With the development of global green environmental protection technology, major economies around the world are competing to make a "zero carbon commitment".

The gap between countries in green technology has caused the automobile industry to suffer a heavy blow [15].

4.3 Analysis based on existing theoretical models

SWOT analysis is based on the internal and external competitive environment and resources when enterprises formulate strategic plans. By analyzing S (strengths) and W (weaknesses) inside and outside the enterprise and O (opportunities) and T (threats) outside the enterprise, we can find out the advantages, disadvantages and core competitiveness of the enterprise, so that the enterprise can make subsequent tactical and strategic adjustments according to the analysis.

4.3.1 strengths

First, the government helps new energy vehicle enterprises expand the market and subsidizes consumers to promote the sales of new energy vehicles. Policies to support the development of the new energy vehicle industry has continued from breaking the local protection of the new energy vehicle market, carrying out new energy vehicle activities in the countryside to exempting new energy vehicle purchase tax [16].

Second, market financial support. Through monetary policy, we will strengthen the benign competition within the industry and guide the efficient and orderly development of the industry. In November 2021, the People's Bank of China launched the long-awaited carbon emission reduction support tool, giving 21 banks the right to issue carbon emission reduction credit, and a series of preferential credit policies effectively promoted the development of China's low-carbon cause [17].

Third, the enterprise's own production mode. BYD follows the vertical supply chain system and decentralized production base. Since 2000, BYD has published 9343 patents in the field of new energy vehicles as of December 31, 2020 [18]. BYD's technological dependence on other countries in automobile production is less than that of other new energy automobile enterprises

4.3.2 weaknesses

First, battery life and charging. Compared with traditional fuel vehicles, the problems of "weak endurance" and "difficult charging" of new energy vehicles have affected the sense of travel experience to some extent.

Second, corporate finance. BYD entered the new energy vehicle market in 2008. At present, it is still in the development stage. Although it has the advantage of self-production and self-marketing, it still can not cover a large amount of R&D and innovation costs invested by enterprises. At present, the internal debt ratio of the enterprise is also high, and the operating pressure and risk of the enterprise are high.

Third, the degree of automobile intelligence and brand value is at a disadvantage. Compared with Tesla, Volkswagen and other auto companies, BYD still needs to make continuous efforts in terms of intelligence and experience. Moreover, because BYD is mainly positioned in the low-end consumer groups, its brand value and market recognition are low.

4.3.3 opportunities

First, under the trend of global green development, the new energy vehicle market has increased. In the world's major economies competing to make the "zero carbon commitment", green technical barriers have increasingly strong restrictions on fuel vehicles, and global auto businesses and parts suppliers actively practice carbon reduction and decarbonization [19]. This provides an opportunity for BYD's new energy vehicles to enter other countries.

Second, BYD has recognition in some countries. In August 2021, BYD took the lead in building the first zero-carbon park headquarters of Chinese auto brands and promised to complete the construction in 2022. At the 4th International Expo, BYD was awarded the first SGS Carbon Neutralization Declaration Certificate [20].

Third, the layout of charging piles is developing. In April 2022, the State Council proposed to promote the development of green consumption, promote the construction of charging piles (stations) and other supporting facilities, so as to accelerate the development of a new energy industry [21].

4.3.4 threats

First, the number of industrial competitors increased. From the old brand industries that are transforming to new energy vehicles, such as Huawei. And the rise of new energy vehicle enterprises, such as Weilai.

Second, government subsidies for new energy vehicle enterprises have shrunk. In 2019, subsidies for various models decreased by 50-60% year on year. With the increase of R&D pressure, many enterprises could not make ends meet [9].

Third, the after-sales service of new energy vehicles is not perfect. At present, there is no special new energy vehicle insurance [6]. The current "vehicle loss insurance" and "self-ignition insurance additional insurance" are not perfect for compensating the accidents of new energy vehicles, the claims service is too complex, and the amount of the claim is not enough to compensate for consumer losses.

5. Suggestion

By solving the problem of charging piles, or by establishing a power station, as well as cooperating with insurance companies to establish insurance specifically for new energy vehicles, the owners of new energy vehicles in various countries can be provided with basic security. Solving the charging pile problem or establishing a power station in each city can help consumers reduce their charging anxiety after purchasing a car, and also help design the charging capacity of vehicles. Solving insurance and charging problems can help consumers reduce their worries and improve the competitiveness of new energy vehicles.

In the face of reduced national subsidies, actively seek alternative ways to find financial support to ensure the adequacy of R&D funds. Sufficient R&D funds help enterprises to have a better innovation environment, provide an economic basis for the development of automobile experience and functions, and enhance the core competitiveness of the brand. At the same time, we can continue to improve the battery, motor, and electric control of our superior products, and further improve their safety. The sources of external funds for enterprises are usually diverse, and they need to be expanded more widely in the face of the reduction of government subsidies. For example, Weilai Automobile Enterprise seeks financial investors, strategic investors, and bank loans to maintain the normal operation of its cash capital chain.

6. Conclusion

Through research, this paper finds that BYD auto enterprises, which are positioned as new energy vehicles, have overcome technical trade barriers to some extent and entered other countries. However, BYD has certain disadvantages in terms of experience, performance, and intelligence. Therefore, BYD needs to invest more R&D funds to develop it. However, due to the reduction of national policy subsidies, how should BYD find funding sources in the future? This conclusion makes up for the analysis and summary of various problems faced by automobile enterprises and new energy vehicles. It reflects the necessity of new energy vehicles under the influence of technical barriers to trade.

As the current research is a relatively new topic, there are few relevant studies, so the selected materials related to technical barriers to trade are limited. In addition, the search for relevant data is not deep enough, involving fewer data. The universality of the research object in the analysis of competitors also needs to be tested, and multiple enterprises can be compared.

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