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Research on the Future Development Trends of New Energy Vehicles in China

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Abstract: With China's economy expanding quickly, the extreme increase in demand for automobiles, and the rapid rise of the automobile industry, one of the world's biggest marketplaces for automobiles is now China. However, because the energy used in traditional cars is petroleum-based traditional energy, environmental pollution problems such as the greenhouse effect and global warming have also emerged. In order to protect the "Lucid waters and lush mountains", a sustainable development strategy is proposed by the country. New energy vehicles can lessen China's reliance on conventional energy sources that are dependent on petroleum under this plan. This paper analyzes the future development trend of new energy vehicles in China and its reasons from the perspective of risk management. At the national level, the price risk, country risk, and risk cost of oil are analyzed, and it is concluded that the country will introduce more relevant policies to encourage the creation of new energy vehicles. At the enterprise level, the study of price risk and enterprise income risk clarifies the reasons for enterprises to invest in the manufacture and sales of new energy vehicles. At the individual level, the analysis of environmental risk, income risk, and loss control cost reveals the reasons individuals buy new energy vehicles. The analysis of the above three levels leads to the conclusion that China's energy vehicles are able to develop rapidly in the future.

Keywords: new energy vehicles, development trends, causes, risk management

1. Introduction

Hannan et al. argued that people's next-generation transportation is likely to be plug-in hybrids and all-electric vehicles [1]. According to Li et al., China would vehemently promote the intelligent development of electric vehicles. Li et al. suggested that the merging of fuel cell and electric vehicles is an essential path in future automotive development, while major automotive companies need to make timely layouts, carry out scientific and reasonable planning for their development, and further improve their R&D and industrialization strength [2]. According to Cai and Wu, China should conduct investigation into the innovation of the "technology-society" system mechanism of the industry of new energy vehicles, and let the market play its full role under the direction and regulation of the government. This will enable new energy vehicle companies to further develop their independent innovation and R&D capabilities and actively adjust to the market [3]. According to Wang et al., there is now global agreement that new energy vehicle development is necessary. Moreover, China has achieved significant advancements in the field of alternative fuel cars, and

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multi-industry integration is the trend in the future [4]. According to Zuo et al., China's renewable energy vehicle sector is going through a crucial transition from explosive growth to high-quality growth and from policy-based to market-driven development [5]. Despite facing several obstacles like shifting policy and ferocious market rivalry, it should accelerate the construction of an ecosystem for the new-energy car sector and seize the strategic opportunities of cross-industry integration with energy, transportation, and communications. According to Xu et al., China's renewable energy vehicle market has reached the "S" growth curve's acceleration phase at the beginning of the 14th Five-Year Plan, and the introduction of relevant incentive policies and increased innovation and R&D are the main reasons for the growth of renewable energy vehicles [6]. The continuing substitution of conventional vehicles with new energy vehicles will be further encouraged by the gradual restriction on the sale of fuel-powered vehicles.

The vehicle sector has expanded significantly in recent years along with China's economy, which has been growing at an exponential rate. With the increase in car ownership, the country's demand for oil is increasing, and the serious problem of shortage of supply is becoming more and more prominent, and the country has become seriously dependent on imported oil. At the same time, the increase in cars has caused serious pollution to China's environment, which is contrary to the concept of "Lucid waters and lush mountains are invaluable assets." Additionally, China's average car ownership is now much lower than that of the world's industrialized nations. There is no doubt that with the swift economic growth of the nation, the number of cars in China will increase significantly, which will bring a greater test to the country's oil supply and the environment. In the face of this challenge, the market for new energy vehicles has formed. In this new field, Chinese auto companies are on the same starting line as other auto giants around the world. China places a high value on the creation of new energy. The "New Energy Vehicle Industry Development Plan (2021-2035)" was released by the General Office of the State Council in November 2020. It calls for a complete execution of the national plan for the development of energy-efficient vehicles, the promotion of the high-quality and long-term growth of China's new energy vehicle industry, and the quickening of the construction of automobile power. In 2022, 5.35 million clean energy vehicles were registered, making for 23.05% of all newly registered cars, an increase of 2.4 million or 81.48% from the year before. New energy vehicle registrations are increasing quickly, from 1.07 million vehicles in 2018 to 5.35 million vehicles in 2022.

The analysis of the future development of clean energy vehicles in China is important at a time when renewable energy vehicle ownership is growing rapidly. By looking at risk management, we can understand why the state, companies, and individuals are supporting the improvement of new energy vehicles for risk management purposes. Such a study will not only help us to strengthen our confidence in the development of renewable energy vehicles but also to see the essence of the fast development of clean energy vehicles through the phenomenon.

2. National-level Reasons

As renewable energy vehicles can reduce the risk and the cost of risk brought by oil, the country will introduce various policies to support new energy vehicles and make their development enter the fast lane.

2.1. Avoiding Oil Price Risk

The National Bureau of Statistics reports that China produced 191 million tons of crude oil in 2019, which is an increase of 1.1% over the same period in 2018. Although China is the sixth largest oil extractor in the world, it surpassed the U.S. in 2018 alone to become the world's top oil importer. In 2019, China's oil imports were 506 million tons, up 9.55% annually, with a 72% foreign dependence

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on oil. Data from the China Petroleum and Chemical Industry Federation show that domestic apparent crude oil consumption increased by 7.4% annually in 2019 to 696 million tons. [7]. Overall, China is a significant oil consumer, with annual increases in demand, but the amount of oil produced in China is far from enough to meet the consumption, so it has to rely on large amounts of oil imports. In China's annual consumption of oil, vehicles account for more than 55% of the oil consumption. If renewable energy vehicles can be developed, the consumption of oil can be greatly reduced, and therefore the risk posed by oil can be reduced.

Currently, lithium batteries make up the majority of the energy storage batteries used in pure electric vehicles, and China is the third-largest producer of lithium in the world. Currently, rare earth minerals are often required for the rotor of permanent magnet synchronous motors in pure electric vehicles. China is a huge country with abundant rare earth resources, holding the world's largest reserves and a majority of the global market for rare earths. At the same time, China has abundant coal production, rapid development of clean energy production, large electric energy production, and abundant energy for pure electric vehicles. Therefore, China has the energy advantage to develop new energy vehicles. Coupled with China's large population base and high demand for automobiles, renewable energy vehicles have a broad market. Moreover, China is rich in coal reserves, the utilization rate of solar energy, wind energy, and other new energy sources is gradually increasing, and the production of electric energy is huge, so the risk brought by the energy required for renewable energy vehicles is much lower than the risk brought by traditional vehicles.

State incentives for new energy vehicle development can reduce price risk. So far, the pricing power of oil is still in control of developed Western countries, so there is some commodity price risk. Currently, the New York Mercantile Exchange's WTI crude oil and the London International Petroleum Exchange's Brent crude oil have a big impact on global oil prices. Despite introducing a crude oil futures variation on March 26, 2018, the Shanghai Futures Exchange's influence is still inferior to that of WTI crude oil and Brent crude oil. As a result, there is a considerable risk associated with the price of commodities because China's oil import prices are largely passive monitored by the West.

At the same time, the improvement of renewable energy vehicles can also reduce the exchange rate risk caused by oil. Since the dollar is the main denomination currency in the international oil market, fluctuations in the exchange rate of the dollar will cause imbalances in the global oil market. For countries with currencies other than the U.S. dollar, a rise in the US dollar's rate of exchange will put oil-importing countries at a disadvantage, while a decrease of the U.S. dollar can cause oil prices in these importing countries to become cheaper, which will lead to an increase in domestic demand for oil and eventually cause the global price of oil to rise in U.S. dollar terms.

The vigorous development of new energy vehicles can reduce country risk. In terms of corridor security, China's oil import corridors are getting better, but there are still some country risks. The Strait of Malacca serves as China's primary shipping conduit for oil imports, however China lacks control in the control of tanker fleets and transport routes, with 90% of the transportation still being carried out by foreign tanker fleets. Of the three countries near the Strait of Malacca, Malaysia, Indonesia, and Singapore, Singapore allows the U.S. military to use military bases within its borders, which gives the U.S. a foothold next to the Strait of Malacca that can quickly cut off shipping through the Strait when needed. Once the Straits of Malacca are blocked, China's oil supply will fall off a cliff, causing oil prices to soar, further causing prices to soar and creating inflationary risks. China's energy safety will be much more at risk if Sino-US trade and financial tension worsens.

2.2. Reducing the Cost of Risk

In order to maintain the safety of the route, China has reclaimed islands and built airports in the South China Sea. In order to prevent the threat of rampant piracy for cargo ships, the Chinese Navy's fleet

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escorted patrol. Not only that, but China has also expanded the port of Huangjing in Malaysia, and since then China has been a support point in the Straits of Malacca. At the same time, in order to diversify its oil import routes, China has built several oil pipelines, the four main ones being the China-Myanmar crude oil pipeline, the Central Asia oil and gas pipeline, the China-Russia oil and gas pipeline, and the China-Pakistan oil and gas pipeline. All of the construction that China has spent huge amounts of money on is not a risky cost for oil imports. If the country vigorously develops new energy vehicles, the demand for oil will be significantly reduced, and therefore the risk cost invested by the country will also be significantly reduced.

3. Enterprise-level Reasons

Enterprises invested in the manufacture of renewable energy vehicles can reduce the risk of input and output prices and reduce the risk of enterprise income.

3.1. Reducing the Input Price Risk

As a large country in auto sales and production, China's auto industry is mainly engaged in the assembly and manufacturing of non-core components, with low technological content and low economic efficiency. The key component technologies, such as engines and transmissions, are monopolized by European, American, and Japanese car companies, which take most of the profits from car sales. In the early stage of China's auto industry development, the strategy of "market for technology" was mainly adopted, and foreign auto enterprises in China mainly developed the market through joint ventures. Since foreign car companies provide the core technologies such as engines, Chinese companies seriously lack the motivation to innovate and develop their own brands. Moreover, foreign car companies firmly grasp the core technology of key components of automobile development and design, and Chinese companies cannot obtain the needed core technology from them. Therefore, the core technology of Chinese automobiles is controlled by foreign companies, and once foreign companies maliciously raise the price of core technology, it will cause a huge input price risk.

In the new field of renewable energy vehicles, everyone is at the same starting line, no matter domestic or foreign. Therefore, if Chinese traditional car companies can seize the opportunity of the current new round of industry competition, they are expected to master the core technology in the field of renewable energy vehicles and take the lead to achieve "overtaking" and reduce the input price risk.

3.2. Reducing Corporate Revenue Risk

Similarly, if foreign car companies stop supplying core components for Chinese cars, many Chinese companies would face huge indirect losses and suffer huge corporate revenue risks [8]. Once the lack of core components stops production, Chinese car companies, but their operating costs remain uninterrupted and their profits are seriously threatened. If it lasts too long, it can lead to corporate bankruptcy.

Analogies can be drawn to the chip sector where China's core technologies are also held by foreign companies [9]. ZTE, the second-largest communications equipment manufacturer in China and the fifth-largest in the world, has businesses in a variety of sectors, including cloud computing, mobile terminals, optical transmission, broadband access, data communications, wireless networks, and core networks. However, its primary business sectors heavily rely on imported chips.Activating a seven-year denial order that had been suspended by a prior settlement agreement, the U.S. Department of Commerce imposed a seven-year export ban against ZTE on April 16, 2018. The ban forbids ZTE and its wholly owned subsidiaries from requesting, using, or buying, selling, or participating in any

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transaction consisting of any item, software, or technology covered by the U.S. export control laws. On June 8, 2018, after three rounds of U.S.-China negotiations, ZTE reached an agreement with the U.S. government to pay a $1.4 billion fine and replace the entire board of directors in exchange for the ban being lifted. During this period, ZTE's stock experienced eight drops. The U.S. sanctions against ZTE have caused ZTE to suffer huge losses.

Also in the field of automobiles, from the technical point of view, the traditional automotive industry has always had extremely strict criteria for the mechanical structure design of engines, transmissions, and other elements. Until now, foreign, especially European and American automobile makers in the last hundred years of development have had an unshakable position, with a wealth of technical experience and technical barriers. Therefore, once foreign automakers stop supplying core components, the loss of Chinese automakers will be incalculable. If traditional car companies can develop new energy vehicles, they can have the opportunity to compete with foreign car companies for core technology, making the production of products no longer subject to others.

3.3. Reducing the Output Price Risk

The state has introduced a number of rules in an effort to boost the market for new energy vehicles. For instance, the "New Energy Vehicle Industry Development Plan" was approved at the State Council executive meeting in October 2020. According to the Plan, no less than 80% of new or updated public sector vehicles, including those used for rental, logistics, and distribution, public transportation, and other key areas for the prevention and control of air pollution, will be used starting in 2021. In April 2020, the National Development and Reform Commission published the Notice on Several Measures to Stabilize and Expand Automobile Sales, which extended the policy of buying subsidies for renewable energy vehicles and vehicle purchase tax policy. In April 2020, the National Development and Reform Commission issued the Notice on Several Measures to Stabilize and Expand Vehicle Sales, which prolonged the car purchase tax and new energy car buying incentive policies until the end of 2022 [10]. Policies such as these have greatly boosted the sales of renewable energy vehicles, making it possible to avoid situations where no one is interested in new energy vehicles, making their sales prices and profits relatively stable, and reducing the output price risk of enterprises.

4. Individual-level Reasons

The use of renewable energy vehicles can reduce environmental risks, income risks, and damage control costs, so many consumers tend to buy renewable energy cars and support the development of renewable energy vehicles.

The use of new energy vehicles can reduce environmental risks. The energy used in fuel cars is gasoline, and since China relies heavily on imports for gasoline, its price is heavily influenced by political aspects. So the use of petroleum may pose a significant environmental risk to consumers. After the outbreak of the Russia-Ukraine conflict, Russia's oil exports were sanctioned by the United States and other countries, which ultimately caused gasoline prices in China to soar. In the first half of 2022, domestic gasoline prices went through 10 rounds of adjustments, and after the tenth round of adjustments on May 31, the unit price of gasoline in China had already "broken 9". The huge increase in gasoline prices has caused consumers to suffer direct losses. If consumers buy new energy vehicles, the environmental risks they suffer are greatly reduced. The energy required for renewable energy vehicles can be produced by China itself and is less affected by international politics. The domestic political environment is more stable, so the impact will not be too great.

Additionally, the fast development of renewable energy vehicles can reduce the risk to people's income. New industries must have professional and technical staff as well as professional and

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technical equipment to support the development and use of new energy, and new industry growth must be backed by a strong industrial base. As a result, a large number of jobs will be created, and the employment prospects for people with new energy-related skills and knowledge are good. As a result, the risk of people's income caused by unemployment will be reduced.

Using new energy vehicles can reduce the cost of damage control for consumers. Consumers tend to maintain their cars every year in order to maintain good performance, prevent accidents, and reduce the frequency and extent of damage, and the cost of maintenance is the cost of damage control that consumers need to spend. Generally speaking, new energy pure electric cars are serviced when the mileage reaches 7,500 km, and it is enough to check the battery and electric motor in the 4S store. Many new energy-pure electric vehicles have long warranties, and in a competitive market, various new energy companies have many free maintenance policies. Therefore, the cost of damage control for new energy vehicles is very low. In contrast, ordinary fuel cars require routine maintenance such as oil changes and oil filters, which are more expensive and require high annual damage control costs.

5. Conclusion

This paper synthesizes the analysis of new energy vehicle risk management at the national, corporate, and individual levels and concludes that new energy vehicles in China will grow rapidly in the future. Because renewable energy vehicles can reduce the price risk, country risk, and risk costs associated with oil, the state will continuously introduce relevant policies to support the development of renewable energy vehicles. The development of new energy vehicles can reduce the input and output price risks and reduce the income risks of enterprises, so related enterprises will actively invest in the production and sales of new energy vehicles. Because the use of renewable energy cars can reduce environmental risk, income risk, and loss control costs, individuals will also support the development of renewable energy vehicles. This paper analyzes the development of clean energy vehicles from the perspective of risk management, which fills the gap of looking at the development of clean energy cars from that perspective and facilitates the analysis of the development of new energy vehicles from multiple perspectives. This paper does not fully consider the impact of international companies as well as capital on the development of clean energy cars in China from the perspective of risk management, and more data in this area can be collected for analysis in the future to facilitate in-depth research on this topic.

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