The Summary of NEV Business Model Based on Four-Elements Model

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Abstract. With the remolding of the automobile industry and the reconstruction of the value chain, the traditional automobile giants have embarked on the digital transformation and ecological layout of the new energy business, so the business model's innovation and reform are imminent. This paper makes a comparative analysis of the business models of Tesla and NIO by combing the current business models of automobile enterprises in the sales and use links with the four-elements model proposed by Professors Johnson and Christensen of Harvard University. Finally, based on some auto companies' current business models, this paper provides some new ideas for the business model innovation in the new energy business layout of Chinese auto companies.

Keywords: New energy vehicles, Business Model, Sale.

1. Introduction
In 2019, China’s auto output was 25.721 million, down 7.5% over the previous year. Sales were 25.769 million, down 8.2% from a year earlier. This is the second year in a row that the domestic car market has seen sales decline, and the decline is 5.4% more than the previous year. New energy vehicles (NEVs) sold 1.206 million in the whole year, down 4.0% from a year earlier, accounting for 4.7% of the total automobile sales. New energy passenger vehicles' sales reached 1.06 million, with a growth of 0.7% over the previous year, accounting for 87.9% of the total number of NEVs and being the absolute main force. Among them, battery-electric passenger vehicles' sales reached 834,000, with a 5.9% growth over the previous year. And the sales of plug-in hybrid electric passenger vehicles reached 226,000, with a decline of 14.7% from a year earlier. With the sharp decrease of subsidies and the impact of the epidemic, many new car makers have withdrawn from the stage of history, and the output and sales of NEVs will inevitably decline this year. In such a problematic situation, industry differentiation intensified. On the one hand, Gm, Ford, and other giants have been laying off workers. On the other hand, Tesla, the new car makers leader, overtook Toyota to become the world’s most valuable auto company in June.

The remolding of the automobile industry and the reconfiguration of the value chain means that a new business model is needed to overturn the traditional thinking. This paper will sort out the current business models of NEV companies from the aspects of sales and use and make a comparative analysis of Tesla and NIO's business models by using the four-elements model proposed by Harvard Professors Johnson and Christensen.
2. Current situation of the new energy automobile industry

2.1. Value chain reconfiguration
In February 2019, Volkswagen, the world's largest automaker, announced its own software division formation. As the CEO, Herbert Diess put it at the Annual Meeting of the World Economic Forum in Davos: Soon, the automobile will become a software product. Volkswagen will become a software-driven company. Toyota President Akio Toyoda announced in 2018 that Toyota would transform itself from an auto company into a mobile transportation company and that its rivals would transform into tech giants like Google, Apple, and Facebook. Besides, BMW, Audi, Mercedes-Benz, Great Wall Motors, BYD, and other traditional auto giants have also incorporated "digital transformation" into their strategic plans. [2]

Information technology enterprises have already overturned the automobile industry's value chain, whose core value will shift from the powertrain of traditional cars to three-electric (battery, motor, and electronic control) on-board system and data service, etc. Auto companies are accelerating the promotion of electric, interconnected, Shared, and intelligent vehicles, upgrading from the pursuit of high-quality products to diversified services.

2.2. Business model disruption
As the auto industry changes, auto companies are accelerating the construction of their respective auto ecosystems. The focus of their business models will shift from manufacturing to sales and the use of cars. The traditional dealer's role in the sales model is weakening, while new sales models based on consumer experience are emerging. Auto companies' digital transformation is to make full use of the Internet and big data to provide consumers with services covering the whole life cycle.

3. Introduction of new energy vehicle enterprise business model

3.1. Sales section

3.1.1. Direct selling. In 2019, Tesla set up a factory in Shanghai, China, and adopted the B2C direct sales model. Tesla opened a direct experience store in a prime location and settled in TMAALL at the same time, opening the world's first Tesla official flagship store. Compared with the traditional dealer model, the direct selling model eliminates dealers' link and replaces the sales staff with well-trained product experts, has more direct contact with customers, and makes the price more transparent and lower the cost. In addition to Tesla, the model of selling cars online and delivering them to your door is also starting to emerge. Autohome online shopping mall cooperates directly with manufacturers for online sales.

Traditional auto companies are also eager to try the direct selling model. Mercedes has started direct sales in South Africa and Sweden with good results. By 2025, 25% of Mercedes' global sales will come from online channels, says Britta Seeger. But, traditional auto companies have to face a problem in the direct sales model: dealers. It can be noted that dealers play a pivotal role in the traditional sales model of automobile enterprises, while the direct selling model undoubtedly touches the "cake" of dealers and compresses their profit space. Tesla's success in the direct model is because Tesla has adopted this model from the very beginning. Therefore, traditional auto companies have to solve the dealer problem before starting the direct model.

Tesla has achieved results through the direct sales model. The seemingly perfect sales model is not easy for traditional automobile enterprises. First of all, BMW, Mercedes-Benz, Audi, Volkswagen, and other traditional auto companies have a huge market scale and sales network in the world. If they want to transform into a direct sales model, they need to reform many traditional ways and will definitely experience pains. Secondly, the focus of sales has shifted from offline to online. How to arrange human resources is a significant issue. Finally, in the new sales model, dealers' profits are significantly reduced, and how to deal with dealers is the most important issue.
3.1.2. **Vehicle and battery value separation.** This year, NEV charging and battery-swapping infrastructure were included in the new infrastructure. The Ministry of Industry and Information Technology (MIIT) has also made it clear that it is necessary to encourage the construction of charging and battery-swapping infrastructure and accelerate the interconnection and interworking. Although there were some failure cases in 2007, the battery-swapping model will become an innovative business model in nowaday superior technology and standards. There are many advantages of the mode. Firstly, the waiting time for battery-swapping is almost the same as the refueling time of the internal combustion engine vehicles (ICEVs). Secondly, centralized battery management with trough electricity prices can reduce charging costs and reduce grid load. Thirdly, the model can prolong the battery life, which is beneficcial to the recovery step utilization. The most important is to significantly reduce the purchase cost, while the residual value is guaranteed.

As early as 2016, BAIC BJEV announced a battery-swapping model of the Business-to-Business (B TO B) terminal, which provided services for buses, taxis, and logistics vehicles. Then in 2018, BAIC BJEV launched a business model of “vehicle and battery value separation,” in which users can choose to lease batteries without paying for problems such as battery performance degradation. The battery-swapping mode led by the automobile enterprises can better unify the battery pack specifications and solve the issues of scale and standardization. [4] By May 2020, BAIC BJEV has built more than 200 battery-swapping stations in 19 cities, including Beijing, Xiamen, Guangzhou, and Lanzhou, and put 18,000 taxis into operation.

On the other side, NIO is trying a battery-swapping model of the Business-to-customer (B TO C) terminal. In 2018, NIO launched the sales model of “vehicle and battery value separation,” which supports battery leasing. In August 2019, NIO launched the battery-swapping mode that the first owners of NIO ES8 and ES6 can get free battery-swapping for life. NIO’s sales in the first half of this year topped the list of new car makers thanks to its price advantage without batteries. In August 2020, NIO launched a mode named battery as a Service (BaaS) and put forward the concept of “battery bank”. Compared with the battery-swapping mode of the “B TO B” terminal, there are still many problems in the “B TO C” terminal. The mode requires a large number of battery-swapping stations distributed all over the country, and each battery-swapping station requires a large number of power batteries.

3.1.3. **Cooperation of government and business.** In the post-subsidy era, “Liuzhou model” is a successful attempt in the business model of government and business. The core of “Liuzhou model” has three points. First, it is market-oriented. It develops models that meet the market demand and can give full play to its electric advantages. Secondly, it is user-centered and develops promotion plans in various aspects. Finally, close cooperation between government and business. [5] Constructing the “urban model” of NEV is an effective practice of Baojun’s promotion of NEV in cities with non-restricted driving license plates.

3.2. **Used section**

3.2.1. **Charging.** There are multiple profit opportunities and added value in the layout of the charging business of automobile enterprises, but they also face challenges such as capital and multi-party game. In terms of public charging, automobile enterprises mainly arrange self-operated supercharging stations, cooperate with head operators or platform providers, and one-stop comprehensive service providers. In order to improve users’ charging experience and shorten charging time, Tesla, Xiaopeng, and NIO all operate their own supercharging stations. Tesla adopts self-built mode, while Xiaopeng and NIO adopt the franchising model. Porsche, BMW, and BAIC BJEV have adopted the business model of cooperating with leading operators or platform companies, and have reached strategic cooperation with Uniev, State Grid Electric Power, and Teld. Saic Motor has established Shanghai Anyue Charging Technology Co., Ltd. to build a one-stop comprehensive service provider for the investment, construction, and operation of supporting charging facilities for NEV.
3.2.2. Automotive Aftermarket. At present, the layout of the NEV aftermarket is still in its infancy. The establishment of the new energy ecosystem requires enterprises to make substantial progress in the layout of the major links, such as Over-The-Air (OTA) upgrade, residual value guarantee, and second-hand car circulation, so as to ensure the achievement of the enterprise’s new energy strategy.

OTA technology has been widely used in NEV as the vehicle becomes more and more intelligent. OTA is divided into two categories, Firmware Over-The-Air (FOTA) and Software Over-The-Air (SOTA). Currently, many auto companies have implemented SOTA, but Tesla is the leader in FOTA. Tesla introduced an acceleration upgrade service in December 2019 for both the dual-motor and long-endurance Model 3, reducing 0-60 mph acceleration time from 4.4 seconds to 3.9 seconds. OTA technology benefits both companies and consumers. For auto companies, OTA can fix bugs caused by software, avoid recall of cars due to system problems, and continuously launch new functions and applications according to consumer demand, bringing new profit models. For consumers, OTA technology can save time and increase residual values by remotely improving vehicle performance.

Due to the short cycle of battery and range of NEV, the second-hand car market is not mature, leading to low residual values. ICEVs lost an average of 39.1% of their value over three years, while NEVs lost an average of 52.9%. According to the 2019 China Auto Residual Value Report, the average three-year residual value of mainstream NEVs is only 32.31%. At present, in response to the low auto residual value, some enterprises have launched value-preserved repurchase services. The Tesla Model X and Model S were ranked first and second with a three-year vehicle residual value of 65.1% and 56.3%, according to the latest residual value rating released by the China Association of Automobile Dealers in June.

| Auto company     | Model      | Buyback plan                                                                 | Buyback price               |
|------------------|------------|------------------------------------------------------------------------------|-----------------------------|
| Tesla            | MODEL S    | The loan amount to purchase the MODEL S is more than 60% of the purchase price of the vehicle, and the driving range is less than 60000 km in three years. | 50% of the purchase price.  |
| Xiaopeng         | G3 2019    | After the vehicle is 34 months old, and the driving range does not exceed 80000 km. | 60% of the purchase price.  |
| WM Motor         | EX6 Plus 400| Two-, four- or six-year packages are available, and the company will repurchase them when they expire. | Two years 60%, four years 40%, six years 20%. |
| Great Wall Motors| ORA R1     | When owners buy full-series Great Wall vehicles with ORA R1, a third party company, will be appointed to recycle them. | A maximum of 70% of the purchase price can be achieved in the first year and a minimum of 50% in the third year. |
| Changan EV       | Benben E-Star| Within 60000 km in three years.                                             | 44% of the purchase price.  |

3.2.3. Mobility Service. In the new era, consumer demand is gradually changing from buying cars to buying mobility services. The layout of mobility services is conducive to digesting the inventory of auto companies, to broaden business boundaries, and improve profitability. At the same time, it can participate in Vehicle to Grid (V2G) and Vehicle to Home (V2H) in the form of fleets to realize profits. In addition to the mobility service platforms built by some new forces of car building, traditional auto companies have also built their own travel platforms. So far, a number of auto companies have laid out this field through two different modes: time-sharing rental and online car-hailing. Compared with Internet companies building mobility platforms, auto companies have advantages that they cannot match. First of all, auto companies have the benefits of automotive research and development. Secondly, auto companies have strong capabilities of production and marketing, so they can use their own cars to save operating costs.
Table 2. Comparison of the mobility service platform and the vehicles used.

| Mobility service mode     | Auto company            | Mobility service platform | Vehicle            |
|---------------------------|-------------------------|---------------------------|--------------------|
| Time-sharing rental       | Shou Qi Group           | GoFun                     | Chery EQ1          |
|                           | Changan Auto            | ChanganGo                 | Changan NEV        |
|                           | Beijing Auto            | MoReFun                   | BAIC NEV           |
|                           | Great Wall Motors       | OleSharing                | Ora NEV            |
| Online car-hailing        | Geely Auto              | CAO CAO                   | Geely NEV          |
|                           | FAW, Dongfeng Motor,    | T3                        | Changan EV460 and  |
|                           | Changan Auto            |                           | Dongfeng E70       |
|                           | Guangzhou Auto          | ON-TIME                   | GAC Motor NEV      |
|                           | Xiaopeng Auto           | YouPeng                   | XiaopengG3         |

4. Comparative analysis of the business models of Tesla and NIO

Throughout the NEV industry, Tesla is undoubtedly the innovator of automobile ecology and the leader of the electrification. The most significant change has brought to the automotive landscape by Musk's team is the business model. NIO, as the leader of the new force of domestic car manufacturing, also has its own unique business model. Professors Johnson and Christensen of Harvard University proposed a four-element model: customer value proposition, profit formula, key resources, and key processes. This model emphasizes the importance of new technologies to enterprise business models. [6] In this chapter, we will compare and analyze the business models of Tesla and NIO based on the four-elements model.

4.1. Customer value proposition

Through the “three-step strategy,” Tesla has developed its market positioning from the niche market at the beginning, through the high-end market, to the mass market now, and has gained certain brand advantages. NIO focuses on high-end NEV. Its target users overlap with Tesla to a certain extent, and its price has certain benefits driven by national policies.

Table 3. The customer value proposition of Tesla and NIO

| Customer value proposition | Tesla                          | NIO                        |
|----------------------------|--------------------------------|----------------------------|
| Value proposition          | A global leader in electric vehicles. | High-end NEV.               |
| Market positioning         | The current target is the middle-income group. | High-end consumer groups in first - and second-tier cities. |

4.2. Profit formula

Tesla has four vehicle manufacturers in the world, while NIO mainly relies on cooperation with OEM, so Tesla has more advantages in research and development.

Table 4. The profit formula of Tesla and NIO

| Profit formula | Tesla                                      | NIO                                      |
|----------------|--------------------------------------------|------------------------------------------|
| Revenue model  | Grasp the upstream research and development design and downstream brand operation, outsourcing the intermediate links. | Grasp the downstream brand operation, upstream research, and development design, and midstream car manufacturing are cooperating with OEM. |

4.3. Key resources

The essential resources are divided into technical resources, team resources, and brand resources. Tesla has industry-leading three-electric technology, OTA technology, and automatic driving technology. After the launch of Model Y, it will have a certain impact on NIO ES8 and ES6.
Table 5. The profit formula of Tesla and NIO

| Key resources       | Tesla                                                                 | NIO                                                                 |
|---------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|
| Technical resources | More than 100 core patents in BMS have been applied. Advanced OTA technology. Develop an Autopilot autonomous driving system. | With data exchange and FOTA upgrade capability. Develop NIO Pilot, a Pilot assistance system. |
| Team resources      | The management comes from the top platform of each industry, and the background of the automobile industry is profound. | The management team comes from 20 countries and regions, including senior executives of many auto companies. |
| Brand resources     | Battery (Panasonic, CATL), Autonomous driving chip (Nvidia), chassis parts (Bosch) | Battery (CATL), Autonomous driving chip (EyeQ4), chassis parts (Bosch, etc.) |

4.4. Key processes

The business model innovation of Tesla covers all the current sales and used sections, and NIO is not inferior to Tesla in this aspect. Both Tesla and NIO adopt the mode of “online official website car booking + offline direct sales center” instead of the direct sales model of traditional dealers. As for charging and battery-swapping, Tesla V3 Supercharger station technology thickening of the technical barriers to its products. Its charging cost and charging pile coverage are also apparent advantages. NIO has a one-button charging mode and battery-swapping mode. Users can choose according to the usage scenario. However, to have good experience for users, large-scale distribution is required, which leads to a substantial increase in cost. Tesla's OTA technology covers the upgrading of software and Firmware, and it is the first enterprise to realize OTA in a real sense. It is predicted that the future cellular data network and OTA upgrade fees will be the main profit range of the NEV aftermarket. Compared with Tesla, NIO’S OTA technology is slightly inferior. In terms of residual value guarantee, Tesla has implemented a three-year 50% discount buyback for Model S. However, relying on its years of accumulated brand advantages and technological advantages, it no longer depends on the buyback mode to guarantee the residual value. NIO separates the battery cost through BaaS mode, which also improves the residual value to some extent. As for mobility service, Tesla plans to launch the Robotaxi service this year, while NIO does not have such a layout for the time being. In terms of after-sales service, both of them can be booked online, which focuses on user experience. However, NIO’S service is more precise and comprehensive, involving every critical process.

Table 6. The critical processes of Tesla and NIO

| Key processes          | Tesla                                                                 | NIO                                                                 |
|------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|
| Sales model            | Direct sales mode of “online car booking + offline experience center.” | Direct sales mode of “online car booking + offline experience center.” Launch of battery rental service BaaS model. |
| Charging and battery-swapping | V3 Supercharger station.                                               | Charging pile and battery-swapping station.                        |
| OTA upgrade            | It can not only carry out a software update but also realize OTA update in the power system field and chassis field. | Both software updates and hardware remote upgrade can be achieved. |
| Residual value preserved | Buyback the qualified Model S at about 50% of the purchase price.      | The battery-swapping model removes the cost of the battery so that the user is not responsible for the battery |
| Mobility service       | Deploy the Robotaxi platform in the US.                               | -                                                                   |
| Aftermarket service    | Contact the service center to book vehicle inspection and maintenance services. | Through App communication and door-to-door business |

4.5. Summary

From the perspective of the customer value proposition, Tesla’s main advantage is technology, while NIO’s main advantage is service. The most apparent technological differences are in the field of three-
electric and the ability of automatic drive, which NIO cannot achieve in a short time. NIO’s service is very comprehensive, but many investors disagree with NIO’s enterprise orientation of focusing on service, light on research, development, and manufacturing.

5. Conclusions

Tesla’s successful business model is worthy of the traditional auto companies to layout the NEV business ecology and new car makers for reference, while NIO’s model of focusing on service, light research, development, and manufacturing may occupy part of the market in the short term, but it is not a long-term solution. When it comes to the sales section, the sales mode can be adapted according to local conditions and combined with its own circumstances, such as direct selling or vehicle and battery value separation. In the used section, NIO can be arranged in the charging and battery-swapping section to provide consumers with a variety of recharging mode. We can also launch buyback services like Xiaopeng and WM Motor to guarantee the residual value of used cars to promote new car sales. Data services such as OTA technology updates and cellular mobile monthly subscriptions will definitely bring new profit models in the future. Finally, the mobility service platform has become a vital project in the NEV industry.

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