

Analysis of *Tesla's* Business Model: A Comparison with *Toyota*

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ABSTRACT

The rise of the electric vehicle industry led by Tesla indicates that the market will also challenge the traditional automobile industry. With the consumption of petroleum fuel and the development of new energy sources, electric vehicle companies like Tesla have attracted the public's attention and have mastered a particular market share in a few years. However, Tesla's development is not as good as it appears, and Tesla has made some business model adjustments in order to expand its market. In order to better understand the differences between the electric vehicle industry and the traditional automobile industry, we analysed the business models of Tesla and Toyota in the way of the business model canvas. At the same time, we analysed the influence of path dependence on Tesla's business model, mainly to supplement the analysis of value network factors missing from the canvas of the business model. Therefore, we also give some suggestions on Tesla's business model and current situation.

Keywords: Business model, Business model Canvas, Tesla, Toyota.

1. INTRODUCTION

Although technology is developing rapidly and people's concept of environmental protection is gradually increasing, energy shortage and environmental pollution still exist. To balance the needs of energy and environmental protection, new energy vehicles have become a meaningful way. Nevertheless, the use of new energy vehicles will still release CO₂. With the continuous development of clean power generation technology and the continuous improvement of clean power generation, new energy vehicles can effectively reduce environmental pollution. Accelerating the industrialization process of new energy vehicles can not only promote energy conservation and emission reduction in the field of transportation and the sustainable development of the automobile industry, but also enhance the innovation ability of automobile manufacturing enterprises and promote the technological progress of the automobile industry, which benefit the whole human race.

In 2020, the market value of Tesla increased by more than seven times, exceeding \$600 billion. It surpassed Toyota to become the world's highest car

company with the highest market value. It surpassed the combined market value of Exxon Mobil, Royal Dutch Shell, and BP, three international energy giants. Founded in 2003, Tesla has established a benchmark position in the electric vehicle industry in less than 20 years, and has continuously entered into new energy fields such as energy storage, power generation, and virtual power plant. The achievements Tesla reached cannot do without its unique business model.

However, the new energy ecology is still in its infancy, especially the distributed new energy power generation market is small, energy power enterprises are not enough to participate in the motivation, and the technical standards and market standards of enterprises in various countries are not unified. Tesla's real competitors in the field of new energy are not new energy operators but traditional energy companies and large-scale new energy developers. In the half-year of 2021, Tesla encountered a series of problems such as owner rights of protection, chip shortage, and delivery delay, which aroused wide attention of the market and public opinion. At present, Tesla, the heading of the capital market and the leader of the new energy vehicle industry, is far from being stable in its position. Its

future development is still restricted by multiple factors such as market, finance, capacity, and chip. Although Tesla achieved an annual profit for the first time in 2020, its net profit was only 721 million US dollars, far lower than traditional automobile and energy giants such as Toyota and Shell. Moreover, from the perspective of profit structure, it gained 1.58 billion US dollars from selling carbon emission credits, far exceeding its annual net profit, and its main business was still in a net loss. In the first quarter of 2021, Tesla achieved a net profit attributable to common shareholders of \$438 million. Still, the income from selling carbon credits was as high as \$518 million, and the deficit of the main business continued to exist. In the future, in addition to continuing the level of profitability, Tesla also needs to improve its profit structure and enhance the confidence of investors and consumers in its main business.

This paper wants to analyse the advantage of Tesla's business model and how it can take advantage of it to promote its development. We will analyse that through vehicle integration of new energy project development, equipment research, manufacturing, and energy usage, how Tesla can effectively promote cost reduction, quality improvement, and efficiency increase of the whole industrial chain. At present, essential parts of Tesla products, such as battery modules, solar tiles, and power electronic devices, are all produced by Tesla itself. It realizes the interconnection, digitalization, and intelligent collaboration of the whole value chain, making production, operation, and asset management minimalist, intelligent, and efficient. It forms an interdependent and coevolutionary ecological system within the company and forms a community of destiny with "value symbiosis" with other main bodies of the ecosystem. With the strong cohesion and radiation of the ecosystem, Tesla constantly enhances customer stickiness, develops more customers, and accelerates product iteration to form a benign ecological cycle.

This paper adopts the business model canvas analysis method of Oster Walder et al. [1], analyses Tesla's business models from different construction subjects from nine basic building blocks, and summarizes the business models corresponding to the construction subjects. The comparison with the giants of traditional car companies provides direction guidance for the sustainable development of Tesla in the future. A business model is a conceptual tool that contains a set of elements and their relationships and allows the expression of the business logic of a particular company

The business model describes the basic principles of creating value, delivering value and acquiring value. The business model of Tesla illustrates how Tesla integrates internal and external resources with the concept of system, and finally realizes the business logic of sustainable operation.

2. LITERATURE REVIEW

2.1. Business model

Since the business model was put forward in the 1950s [2], people from all walks of life have had a heated discussion on the business model. As the business model is constantly changing [3], there is still no consensus on understanding the business model. The business model is mainly used to solve strategic problems in companies, which is determined by two main factors: efficiency and novelty [4]. At the same time, as a centre, the business model is constantly squeezed by strategy, organization, and system. Of course, it is also suggested that the core of the company's business model should not be based on untested or speculative assumptions about the future [5]. The business model mainly refers to three aspects: company logic, company operation mode, and how to create value for stakeholders [6].

2.2. Business model canvas

The business model canvas was first proposed by Osterwalde. Business model canvas can be divided into four categories: Product, Customer Interface, Infrastructure Management, and Financial Aspects. And these four categories include a total of nine subcategories: Customer Segments, Customer Relationship, Channels, Key Partners, Key Activities, Key Resources, Value Propositions, Cost Structure, and Revenue Streams. These are nine interrelated factors, and the aspects expressed by these nine factors are also different. Business model canvas is a tool, which provides the company with the goals it needs to achieve, and analyses the strategic elements that have the greatest impact on the business [7]. We mainly use the business model canvas to study the business model of Tesla.

3. METHOD

3.1. Tesla's business model canvas

Table 1. Tesla's business model canvas

Key Partners 1. Panasonic 2. Ningde era 3. Solar city	Key businesses 1. Automotive 2. Energy generation and storage.	Value Proposition 1. Innovation towards vehicle: High performance and intelligent services 2. Innovation towards battery: high capacity and low cost Battery 3. Innovation towards infrastructure system: High performance recharging station	Customer Relation “Service Plus”.	Consumer segmentation 1. Individual customers who are environmentalists and performance enthusiasts; 2. Entry-level luxury buyers: Model X or S 3. Mass market customer segment for other car models. : Model 3
	Key resources 1. Intellectual property- electric powertrain 2. Engineering staff 3. Battery and solar plants		Channel 1. Tesla store 2. Website Design Studio 3. B2C model for selling its cars	
Cost structure equipment 20%, body 12%, chassis 7%, drive 15%, battery 35% and other 11%		Source of income 1. Automobile sales and leasing 2. Energy generation and storage 3. Services and others		

3.1.1. Key Partners

A key partner is a partner that a company seeks external help to maximize profits. Oil and engine restrict the traditional automobile industry, but restricting the new energy automobile industry is the battery and charging device. The battery is the main source of power supply for Tesla, and battery life is a competitive point for various new energy enterprises. More cars will be electric-only if the battery life is strong enough.

Panasonic has become one of the key battery supply partners of Tesla. In addition to Panasonic's concept of environmental protection, its battery performance is also very strong. To improve safety, ordinary electric vehicles usually choose to sacrifice efficiency, but Panasonic started from decades of profound research and development foundation of precision home appliances, not only pursue the bold of efficiency, but also developed layers of a protection monitoring system, and ensure the safety of the battery to ensure efficiency and technology at the same time. Ningde Era is also one of Tesla's key battery partners. At the end of 2019, Ningde Era announced that it would take the lead in adopting the modelless battery pack with the new CTP technology, which is a technology that other battery manufacturers do not have, and Tesla's Model 3 series

has The CTP battery of Ningde Era. Tesla completed its acquisition of Solar City in 2016. Solar City specializes in solar cells. Tesla aims to build an integrated, sustainable energy company with Solar City that will cover everything from energy creation and storage to energy transportation and consumption one day. The combination of the two companies will complement each other well.

3.1.2. Key businesses

Key businesses are the activities that a company must do to maintain its business model. According to Tesla's annual report, its key businesses are automotive and energy generation and storage. Automotive mainly accounts for about 85%, and the latter primarily accounts for about 15%. The automotive segment includes the design, development, manufacturing, sales, and leasing of electric vehicles and sales of automotive regulatory credits. Additionally, the automotive segment comprises services and others, including non-warranty after-sales vehicle services, sales of used vehicles, retail merchandise, sales by Tesla acquired subsidiaries to third party customers, and vehicle insurance revenue. The energy generation and storage segment include the design, manufacture, installation, sales, and leasing of solar energy generation and energy storage products and

related services and sales of solar energy systems incentives [8].

3.1.3. Value Propositions

Value Propositions mainly refer to products and services that create Value for specific customer segments. Tesla's value proposition is divided into three aspects: innovation in vehicles, innovation in batteries, and innovation in infrastructure.

Firstly, the innovation of cars is mainly autonomous driving technology and connection technology. It adds to the customer's connection to the outside world, such as the customer needs to recharge the navigation station and other applications. It further digitizes the network and connects service centres such as maintenance centres and infotainment centres to form a network. Secondly, the Tesla engine has a good understanding of the battery management system, which has a close relationship with battery suppliers Panasonic and Ningde Era development. Tesla owners can also have some control over the battery system. For example, when the ambient temperature is too low, tesla owners can control the battery system before getting in the car to make it safer. Finally, to meet customers' changing needs, Tesla has set up supercharging stations in different areas, so that customers can locate the location of charging stations to charge cars at any time through the screen in the car, which significantly reduces the anxiety of customers caused by car power.

3.1.4. Customer relations

The customer has a service network through which the customer and the brand are connected. Tesla's service network is one of a kind. It's called "Service Plus" and combines every step of the customer relationship with the brand in one place [9].

Customers can better connect with Tesla through the service network. Tesla digitally keeps an eye on every customer all the time. It is mainly manifested in these aspects:(1) In case of minor failures, customers can call the after-sale phone, which can provide customers with effective measures to save time. (2) If the customer service cannot solve the customer's problem, the company's engineers can make remote diagnoses to help the customer eliminate the fault. (3) If the car breaks down, the customer can contact Mobile Service, and the company will send the Mobile Service car and engineers to repair it. If the above problems cannot be solved, the customer needs to go to the service centre to solve them.

3.1.5. Channel

According to Tesla's annual report, Tesla generally sell products directly to customers, including through

our website and retail locations. Tesla sells its products to customers primarily through proprietary means, with no third-party trading. Tesla also often adopts the B2C e-commerce model, and the payment method is the combination of cash on delivery and online payment, which is also the difference between Tesla and other enterprises.

3.1.6. Customer segmentation

Tesla's customers as a whole are mainly environmental enthusiasts. But Module X and Model S are mainly aimed at high-income groups, while other products such as Model 3 and Model Y are mainly aimed at the mass market.

Table 2. The number of Tesla models delivered[10]

	Q1- 2020	Q2- 2020	Q3- 2020	Q4- 2020	Q1- 2021
Model S/X deliveries	12,230	10,614	15,275	15,275	2,030
Model 3/Y deliveries	76,266	80,277	124,318	124,318	182,847
Total deliveries	88,496	90,891	139,593	139,593	184,877

According to Tesla's annual, quarterly results, The Module X and Model S accounted for less than 20% of the total, while the Model 3 and Model Ely accounted for more than 80%. By contrast, Tesla is mainly mass-market.

3.1.7. Key resources

Key resources refer to the resources with large value space and are not easy to replace. Tesla has three key resources: patented technology, human resources, and infrastructure

3.1.7.1. Intellectual property- electric powertrain

A very low-cost and efficient single-speed gearbox mated with a continually improving motor, inverter, and the battery is the core competency of Tesla's powertrain team, and it is also our roadmap for future vehicles [11].

3.1.7.2. Engineering staff

Tesla's manpower includes a pool of engineers which contributes to the research and development of the company's vision [11].

3.1.7.3. Battery and solar plants

Tesla achieved lower cost of batteries and machine engines by generating its battery and alternative power supply [11].

3.1.8. Source of income

From the table, we can find that Tesla's revenue sources are mainly divided into three categories:

automotive revenues, Services and other, and energy generation and storage segment. Automotive revenues account for the largest proportion of annual revenue, while Services and other and energy generation and

storage segment accounts for the same amount of revenue

Table 3. Tesla's revenues during 2018-2020[8]

	Year Ended December 31,			2020 vs. 2019 Change		2019 vs. 2018 Change	
(Dollars in millions)	2020	2019	2018	\$	%	\$	%
Automotive sales	26,184	19,952	17,632	6,232	31%	2,320	13%
Automotive leasing	1,052	869	883	183	21%	(14)	-2%
Total automotive revenues	27,236	20,821	18,515	6,415	31%	2,306	12%
Services and other	2,306	2,226	1,391	80	4%	835	60%
Total automotive & services and other segment revenue	29,542	23,047	19,906	6,495	28%	3,141	16%
Energy generation and storage segment revenue	1,994	1,531	1,555	463	30	(24)	-2
Total revenues	31,536	24,578	21,461	6,958	28	3,117	15

3.1.9. Cost structure

The cost structure of Tesla includes equipment 20%, body 12%, chassis 7%, drive 15%, battery 35%, and other 11%. Its industrial chain includes a power system, electric drive system, charging, chassis, body, other components, central control system, interior, and exterior, etc., with more than dozens of direct and indirect suppliers.

3.2. Tesla's business model cobweb

We adopted the method put forward by Osterwalder, identified and coded the nine plates of Tesla, and this coding has three levels: low, medium, and high. According to this method, we made the Tesla business model cobweb. At the same time, through analysis, we found that Tesla mainly focuses on customer and infrastructure management. This business model focuses on value. Therefore, Tesla is a value creative business model, which creates primarily customer value by providing differentiated services.

Table 4. Tesla business model building block coding

Building block		Tesla
Customer Segments	identify code	Diversified and niche markets high
Customer Relationship	identify code	One-to-one service, self-service high
Channels	identify code	Own channel low
Key Partners	identify code	Strategic and cooperative cooperation high
Key Activities	identify code	external high
Key Resources	identify code	Diversity resources high
Value Propositions	identify code	Basic services low
Cost Structure	identify code	Fixed cost and variable cost low
Revenue Streams	identify code	Income from fixed assets low

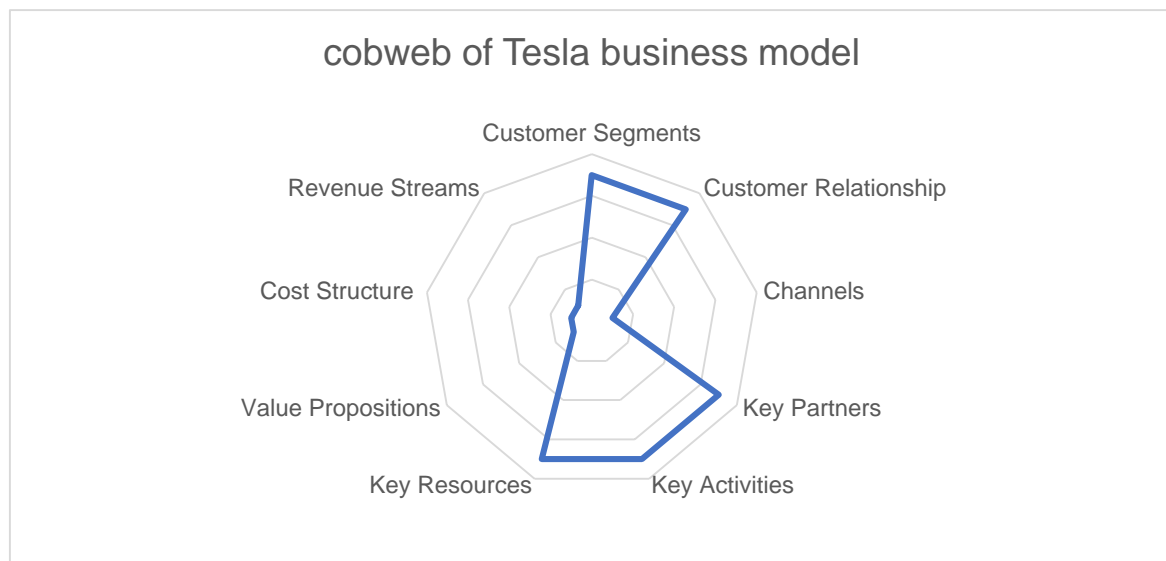


Figure 1. Cobweb of Tesla business model

3.3. Tesla's business model analysis

Apart from the business model painting framework, we also draw insights from Bohnsack and others. They proposed three aspects that may influence business model design: the value proposition, the value network, and the revenue/cost model [12]. Compared with the business model canvas, this business model adds the factor of the value network. This analysis method is mainly applicable to electric vehicles.

On the one hand, the value propositions of target customers are different, so the market segments selected by the company are also different. Therefore, this mainly reflects the target customers and corporate identity of the enterprise. On the other hand, the company's value proposition changes with the use of automobiles. This divides different automobile companies and also shows the reaction degree of each enterprise to electric vehicles. For example, this reaction degree indicates a series of constraints on whether the company can accept the current electric vehicle industry. Of course, when studying this business model, we also need to use path dependence to analyse it. In general interpretation, path dependence means that current and future states, actions, or decisions depend on the path of previous conditions, actions, or decisions [13]. Combining these two dimensions and path

dependence, four prototypes of electric vehicle business models are produced: luxury specific-purpose, luxurious multi-purpose, economy specific-purpose, and economy multi-purpose. Next is the analysis of Tesla, to express what is the applicable business model of Tesla.

The luxury specific-purpose model is the first EV business model, which mainly provides customers with expensive luxury EVs for particular purposes. At the beginning of Tesla's establishment, the initial target market group of products was luxury EVs. Because the target customers they targeted were mostly rich people, they were not very sensitive to the price of luxury EVs. Under this business model, the driving experience and image of the car are more important than the mileage of the vehicle. Because most of these customers own a second car or hold an exclusive charging service, these customers often regard Tesla as a status symbol. Therefore, Tesla has set special services for customers, promoting online ordering and offline test drives. Although Tesla lacks a dealer network, this method ensures high quality and lets customers know the advantages of EV. At the same time, the unique purpose value proposition is also closely related to the value network, and its luxury side is mainly reflected in sales and after-sales service.

3.4. Toyota's business model analysis

Table 5. Toyota's nine modules

Main Category	Deputy Category	Typical Data Citation
Customer Segments	Diversified customers	1. Several brands serve customers with different price needs.
Customer Relationships	One-to-one service	1. The use of e-CRB software system tries to promote sales and service.

Channels	Offline	1. Toyota store; 2. Corporation with local companies. 1. Mazda for complementary technology
Key Partnership	Government and other companies	2. Subaru for high performance engines 3. Aisin for components 4. Government support.
Key activities	External market connection	1. Car 2. Residential construction 3. Biological Engineering
Key Resources	Production management mode	1. Lean production
Value Propositions	Basic services	1. Avoidance of waste 2. Insurance of quality 3. Innovation of technology
Cost Structure	Fixed cost, management cost and investment cost	1. Automobile sales and leasing account for 85% of cost. 2. Financial services account for 5%. 3. Serving General account for 10%.
Revenue Streams	Cars, financial activities, services and government subsidies.	1. Automobile sales and leasing; 2. Services and others; 3. Maintenance plan; 4. Licensing agreements.

Table 6. Toyota business model building block

Building Block	Toyota	
Customer Segments	Identification	Diversified and niche market
	Code	High
Customer Relationships	Identification	One-to-one service
	Code	High
Channels	Identification	Self-owned and partner channels
	Code	High
Key Partnership	Identification	Strategic and collaborative cooperation
	Code	High
Key activities	Identification	External
	Code	High
Key Resources	Identification	Diversified resources
	Code	Medium
Value Propositions	Identification	Basic service
	Code	Medium
Cost Structure	Identification	Fixed cost
	Code	Low
Revenue Streams	Identification	Fixed-asset revenue
	Code	High

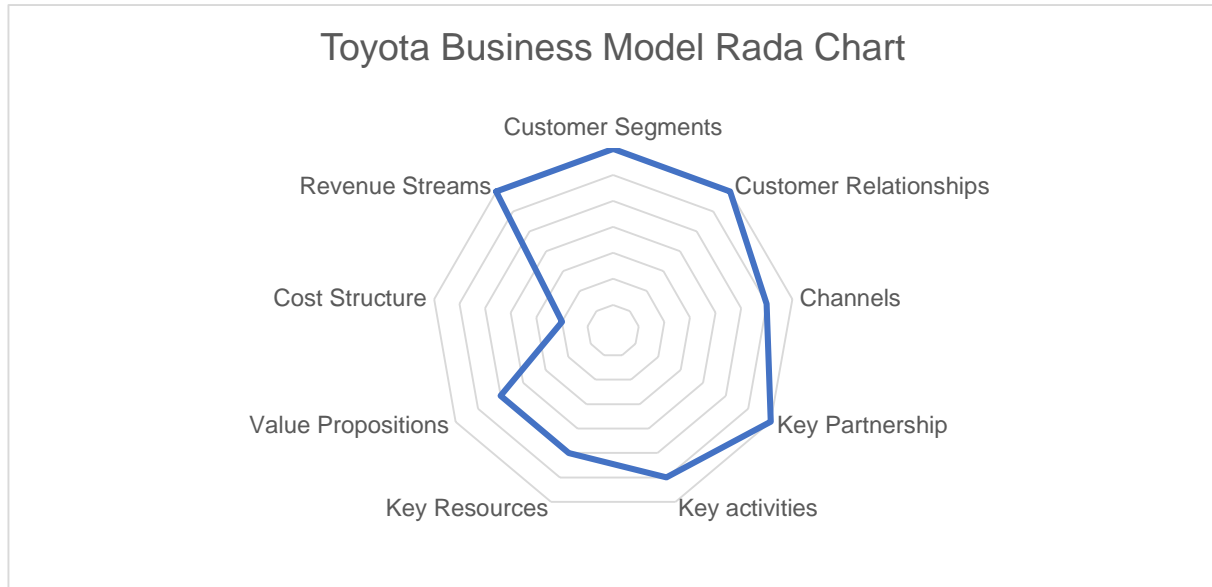


Figure 2. Toyota Business Model Rada Chart

Just as the chart shows, Toyota focuses on the customer and tries to a minimum the cost and time of production. When applying the Toyota Production Method, the manufacturing process must first be viewed from the customer's perspective, both internal at the later stages of the production line and external to the final product. In the Toyota way, the first question to think about is, "What does the customer want out of the process?" The thinking on this question is going to define value. From the customer's point of view, you can look at a process and distinguish between activities and steps that create value and activities and steps that don't. Toyota applies this approach to any process, be it manufacturing, information, or service. What Toyota does is pay attention to the operation time between receiving the customer's order and collecting the customer's account to eliminate the waste that cannot create value and shorten the operation time. To reach this target, "lean production" and 6 sigmas are promoted. Lean production is defined as 5 processes: customer value, value stream, flow, pulling, and striving for excellence. To be a lean manufacturer, the producer must try to conduct a flow without interruption. A pull production system based on customer demand is adopted. That is, the previous manufacturing process only produces the materials or parts that the following manufacturing process will receive for a short period.

For labour, Toyota believes that keeping employees busy producing raw materials or parts as quickly as possible is not necessarily the best practice. A company should have materials or parts according to the needs of its customers. Rapid production to use up the productivity of its employees creates another form of overproduction and leads to the hiring of too many workers.

A big point we can focus in Toyota's business model is its uninterrupted "flow".

A continuous process means that when a customer places an order, the process is instructed to obtain what the customer needs for the order, no more, no less. The raw materials are then immediately shipped to the supplier's factory, where workers add components and send them to another location.

The factory, which is assembled by workers immediately, completes the products required by the customer's order and finally delivers them directly to the customer. The whole process will take hours or days, not weeks or months. One example of this is that Toyota takes less than a year, on average, to launch a car in Japan, compared with two years for its competitors, because its engineering operations are conducted in a non-stop flow model. From the beginning to the end of the automotive design process, the engineering work, design decisions, prototyping, and tool building all form a seamless flow and "communication." In this kind of process, nothing is produced upstream unless the person or step downstream of the process asks for it.

Of course, the ideal of "one flow" is not an overnight reality, and Toyota is a fact-facing company. It will not simply tie the machine and the supplier together in an inappropriate place to force the implementation of "one flow". While it is not possible to do this today, the ideal of non-interrupted processes provides a clear direction. At Toyota, this means using smaller batches, bringing all the processes closer to each other, and allowing materials to move between them without interruption, rather than mass production that results in piles of waiting for inventory. Toyota's managers and engineers do not need to perform a detailed cost-benefit analysis every time they want to perform a task to improve the

process. Cost is, of course, a major consideration, but their philosophy is that wherever you can build a continuous process, go ahead and keep improving it to make it work better. Even where "one flow" is not possible and Toyota must strategically build up inventory as a buffer, it still tries to reduce inventory to improve processes.

4. DISCUSSION

4.1. Implications for Tesla

In the analysis, we find that Tesla pays too much attention to its commercial value, such as brand value, and does not put too much energy into its commercial channels and costs. We suggest that in terms of channels, Tesla can make transactions with third parties in addition to proprietary channels and save operating costs using logistics outsourcing. In terms of cost, it is suggested that Tesla pay more attention to cost control, reduce unnecessary cost waste and maximize profits.

4.2. Implications for new energy vehicles

4.2.1. Cancel unreasonable policies and unveil fresh policy

With the development of new energy vehicles, some unreasonable legal provisions and measures hinder the development of the new energy vehicle market and limit the public's desire to buy new energy vehicles. These outdated policies should be abolished to improve the utilization rate of new energy vehicles. New energy vehicles at the same time need new legal provisions and measures to be bound, the government in the abolition of unreasonable measures at the same time should introduce new measures further to standardize the order of the new energy vehicle industry, establish a fair competition market environment, to make the development of new energy vehicles smoothly

4.2.2. Strengthen research and innovation of new energy vehicles

The government should increase financial support for technological innovation of new energy vehicle enterprises. To provide patent protection for the development of new energy vehicle technology, it is necessary to vigorously support the introduction of talents in the new energy vehicles, promote the enterprises which research innovative technology independently, and strive to fill the gap in the field of new energy vehicle technology, to achieve technological innovation. Finally, we should constantly improve the safety performance of new energy vehicles. At the same time, the safety and reliability of the power control system and the safety of the car body design are

enhanced by improving the power protection technology of the car battery.

5. CONCLUSION

This paper mainly analyses the business models of Tesla, the representative of the electric vehicle industry, and Toyota, which represents the traditional automobile industry. Through the analysis, we have a systematic understanding of the business models of Tesla and Toyota. Firstly, the electric vehicle industry, and we talked about why it's necessary to develop and the opportunities for the electric vehicle industry. Secondly, we analysed the business model of Tesla and Toyota, respectively. Finally, we summarize some advice for Tesla and the electric car industry. The development of the electric car industry will have a better prospect in the future, but how to grasp the good opportunity and successful transformation is Tesla must be thinking of the problem.

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