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INNOVATION TRENDS OF THE CHINESE AUTOMOTIVE COMPANIES IN 2022

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ABSTRACT

Although China ranks first in global production and sales, there is still a gap between the innovation level of the Chinese automobile industry and its potential automobile power. China has to make more efforts to become global-scale leader in the automotive industry. Automotive industry means an industry with high capital, technology intensive and strong industrial relevance. It can not only promote direct and indirect employment and at the same provide tangible contribution to regional GDP production leading remarkable social and economic impacts. With the rapid development of China's automobile industry, it is bound to take the road of autonomy and internationalization, but the global open market and the competition of automobile giants will inevitably bring great challenges to this sector.

International leading Chinese automobile enterprises can dominate the global automobile market but to what extent mainly depends on their continuous innovation ability to obtain technical advantages, and then form a strong core competitiveness combined with their resource advantages, brand influence and first mover advantage. In order to survive in the strong market competition and develop sustainably, Chinese automobile enterprises have also improve their innovation ability. Innovation is a complex system engineering. It is a process to form the final product and meet the market demand through systematic market analysis, preliminary research, product planning, development and design, test and trial production. The different ways of combination and configuration of these elements and their structures constitute different modes of innovation. After half a century of development, China's automobile industry has formed a development path with distinctive Chinese characteristics from introduction to independent innovation.

Modern enterprise product innovation is a market-oriented system engineering based on the overall concept of products. From the perspective of a single project, product innovation manifested in the breakthrough and improvement of the quality of a technical and economic parameter of the product, including the development of new products and the improvement of old products complemented by minimizing the costs of production exploiting the existing capacities much better. From the overall investigation, product innovation runs through the whole process of product conception, design, trial production and marketing. It is a three-dimensional combined innovation of functional innovation, form innovation and service innovation.

In such an external environment, it is particularly important to carefully analyse the problems, advantages and disadvantages of China's automobile industry innovation and choose the correct strategic model, which is the main focal point of this review paper.

Keywords: Chinese automobile companies, Chinese innovation ecosystem, innovation ability, product innovation

1. Introduction

China has committed itself for taking into practice serious structural reform and transformation to maintain and speed up sustainable economic growth. Recognising innovation as crucial factor, China makes efforts to reshaping the country from previously low value-added manufacturer role into a global-leading designer and innovator. Through a large number of tailored initiatives and programs, significant efforts have been made by both central and local governments to facilitate nation-wide innovative development. Representing the majority of Chinese firms and the main foundation of the manufacturing base, Small and Medium-sized Enterprises (SMEs), which were historically considered as low-tech and resource-intensive manufacturers, have been the target of these supportive policy schemes and are becoming an emerging force for innovation. The rise of innovative SMEs in Chinese manufacturing sectors is fundamentally changing market structures and relationships, leading to the transition of China's innovation system. As the world's second-largest economy, China implemented unprecedented rapid economic growth gradually becoming the "driving force" and "stabilizer" of world economic growth largely due to its own high-quality development (Global Times 2021a)

According to the 2021 Fortune Global 500 lists, there are 143 Chinese companies on the list, including the Hong Kong Special Administrative Region (SAR) and the Island of Taiwan as well, which is significantly more than the United States with its 122 American companies. This clearly indicates making successful adequate alignment and exploiting the hidden opportunities linked to the digitisation era in the traditional industries resulting changes the Chinese culture such as emerging mass innovation and entrepreneurship (Zhifeng Shen et. al., 2020; pp.6.); (Global Times 2021b).

Manufacturing industry including the automotive industry has dominant importance in the Chinese economics based on smart manufacturing system and Artificial Intelligence (AI). These enterprises have been applying new technologies including R&D and design to produce more diverse and higher value added products, monitoring and collecting data about products and processes in real time during their value creation activities (MES systems).

The key is long-term development of enterprises and enhancement of their competitiveness by improvement of enterprise innovation ability, innovation ability, which can serve as a base for high value-added products, high corporate profits. The innovation potential of most domestic Chinese enterprises is insufficient, leads to low value-added products (<https://www.bjnews.com.cn/detail/154521894014907.html>). Due to development of global economic integration, it is necessary to improve the innovation ability of Chinese enterprises to occupy a direct place in the international competitive market, predominantly in the Chinese automotive sector. Some enterprises increase their investment in innovation, and their managers effectively promote their innovation activities, thus improving their innovation ability. Some laws and regulations in China have been improved so the development for SMEs to be more innovate. (<http://www.chinatax.gov.cn/chinatax/n810341/n810755/c5154821/content.html> Chapter 4.)

There are regional differences in the innovation ability of enterprises. The innovation ability of enterprises in the eastern region is higher than that in the economically developed regions in the central and western regions. Although due to the increasing market competition pressure, people's understanding of the importance of technological innovation has become more and more profound and consistent.

For an enterprise, corporate culture is its soul, the driving force of its development and creation, and the guarantee of its sustainable development. The key purpose of the construction of corporate culture is to mobilize "productivity" through "cultural power" and to a certain extent, enhance its cohesion, creativity, and ultimately improves its competitiveness. Therefore, building a good corporate culture is a key measure to promote the normal, healthy and sustainable development of enterprises (Peng Shuxiong, 2014).

Since China's share in global vehicle production was 32,5 % in 2021, it is definitely need to gain complex and relevant landscape about the Chinese automotive sector and understand its innovation ecosystem characteristics to improve the Chinese automotive companies innovation abilities for the global market competition (Statista 2022a).

2. Research methods and data

As a review paper, we mainly focused on the methodology based on secondary research analysing scientific publications, studies, online literature sources and relevant, Chinese and international documents (Deloitte, McKinsey), up-to date data bases (Statista) as well.

The conclusions drawn from the data and the recommendations reflect the subjective professional opinion of the authors.

3. The Chinese innovation ecosystem

In the 21st century, human society has entered an era of knowledge economy in which the most important factors are allocation, production, distribution and use of knowledge resources. The competition between enterprises is no longer a simple competition between capital and products, but relies more on talents, especially those, which master knowledge and have innovative talents. As a special resource, talent has become the most challenging, valuable and competitive capital of enterprises, so it is also the focus of competition among enterprises. Technological innovation needs talent, and talent is the foundation of technological innovation and the key to success or failure. Although in recent years, in China, the SME's started to recognize the importance and role of the talented people in technological innovation. Nevertheless, due to the lack of the state-of-the-art management and leadership knowledge, lack of capacities and capital, the majority of efforts to establish effective technology innovation, especially in the field of attracting, recruiting, onboarding, maintaining and career pathway development of talented labor workforce were doomed to failure.

The lack of creative and innovative talents means serious problems. (http://www.gov.cn/ztl/kjfzgh/content_883659.htm Chapter 7, 8,9)

The „Chinese-style” innovation ecosystem will become the mainstay of global innovation. The innovation advantage will gradually shift to the forefront of global industrial chain and challenge the unknown areas of humanity, such as Guizhou Fast (a super-point telescope), super-computer, aerospace technology, high-speed railway construction and related equipment manufacturing. The rapid iteration of the internet and traditional industries has shaped the Chinese culture such as mass innovation, entrepreneurship and maker culture. This indicates that China has entered into a new era of promoting innovation through the trinity of policy system, financial system and industrial ecology and initially formed an ecological circle of innovations and incentives but at the same time faces many emerging complex challenges. The

main focal points of this type of innovation: to create more added value with limited resources – speed up the innovation process, minimising the costs, learning from failure, collaborative sharing, developed solutions have be able to replicate and migrate between different countries, cultures and languages (Zhin Feng Shen et al. 2020, pp. 8-17). Basically, in China, you can distinct four types on innovation depending on the features of the industrial segments (Jonathan Woetzel et al. 2015, page 4):

Science-based innovation focuses the development of new products through the commercial application of fundamental research. Industries e.g. pharmaceuticals, biotechnology, and semiconductor design rely on scientific innovation and may spend 16 to 33 % of revenue on R&D and devote 10 - 15 years of effort to bring an invention to market. Trade intensity in these sectors looks like to be very high, which translates to higher competitive intensity for companies seeking to catch up with incumbents.

Engineering-based innovation is about the design and engineering of new products through the integration of technologies from suppliers and strategic partners. Industries, which based on engineering-based innovation means commercial aviation, auto manufacturing, and telecommunications equipment. These industrial sectors have moderate to high R&D intensity, spending 3 to 13 % of sales on R&D, and can have product life cycles of 5-10 years or longer.

Customer-focused innovation involves solving consumer problems through innovations in products and business models. Industries in this category: Internet software and services, appliances, and household products. These industries can be characterized by high marketing intensity (typically spending about 3 to 7 % of sales on marketing) and short development cycles of less than a year or two. Majority of products and services in these industries tend to be tailored to local needs.

Efficiency-driven innovation involves process improvements to reduce cost, shorten production time, and enhance quality. In industries dominated by this one companies compete on the basis of efficient use of resources. Efficiency-driven innovation is relevant in capital- and labour-intensive industries, such as commodity chemicals, textiles, electrical equipment, and construction machinery.

China's innovation clusters are concentrated in large cities. As far as the geographical distribution and the locations are concerned, China's innovation ecosystems have some distinct features. Beijing play a leading role in terms of innovation institutions and resources and other innovation-friendly environmental aspects (Beijing Tianjin-Hebei region). Furthermore, the Yangtze River Delta region is generally more advanced compared to other's regions innovation capacities and abilities. In the second line of the innovation ecosystem, you can find Hangzhou, Nanjing, Shanghai and Suzhou cities. The development of Guangdong-Hong Kong-Macau Greater Bay Area (GBA) has been led by Shenzhen. In addition to, more cities in Central and Western China have been reached significant progress and tangible results in rapid development of innovation ecosystem as well. (Deloitte 2019 pages 2-3)

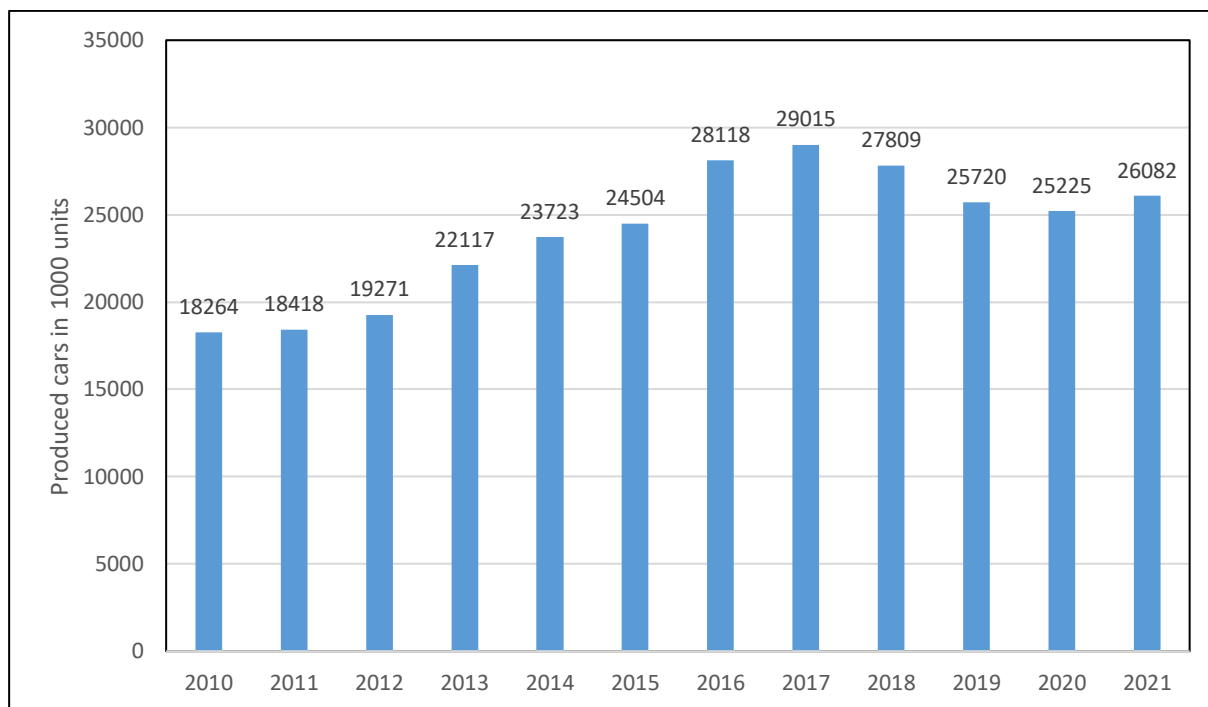
Autonomous driving means high level of automated driving technology based on AI in the automotive industry. China has taken the lead in autonomous cleaning trucks and autonomous electric trucks and autonomous electric delivery vehicle into practice. There are some outstanding companies such as Baidu-BAIC, which is competitive in the global autonomous driving market. In this context, there is a broad strategic partnership between the traditional car manufacturers (OEM) and internet companies, which can contribute transforming the traditional automotive technological solutions into autonomous driving applications. For instance Changan Automobile established strong links with Baidu, Ali and Intel aiming the ratio of the autonomous vehicle will be 10 % till 2025 in its product portfolio (Deloitte 2019, pages 36-37).

4. Facts about the Chinese automotive industry

Good policies and investment environment.

According to the data of the automobile industry association, as early as 2010, the production and sales of China's automobile industry exceeded 18 million, and has become the largest automobile production and sales country in the world. In the 1960s, the best and largest car companies in the world located in US or Europe, until the 1970s and 1980s when the Japanese and Korean automotive industry started taking over. Currently, many Chinese car manufacturers (predominantly state-owned), who are rapidly developing and becoming increasingly competitive including BYD Auto established in 2003, Geely entering in this sector in 1997, SAIC Motor Co., Changan Automobile, Dongfeng Motor Corporation, Great Wall Motors, FAW Group, Brilliance Auto Group. (Aaron J.S., 2021). The Tier1 level automotive companies concentrated in Beijing, Shanghai, Shenzhen and Guangzhou, the Tier2 level automotive companies located mainly in Nanjing, Chengdu and Wuhan, while the Tier 3 companies in Dongguan, Foshan, Zhuhai and Guiyang. (Deloitte, 2019, pp 2.); (Yuan Chen et al. 2020). The Figure 1 indicates the continuously growing trend of the Chinese car production output volume between 2010-2021 time-period.

Figure 1. Production of cars in China from 2010 to 2021 (in 1000 units)



Source: Own edition based on Statista 2022b

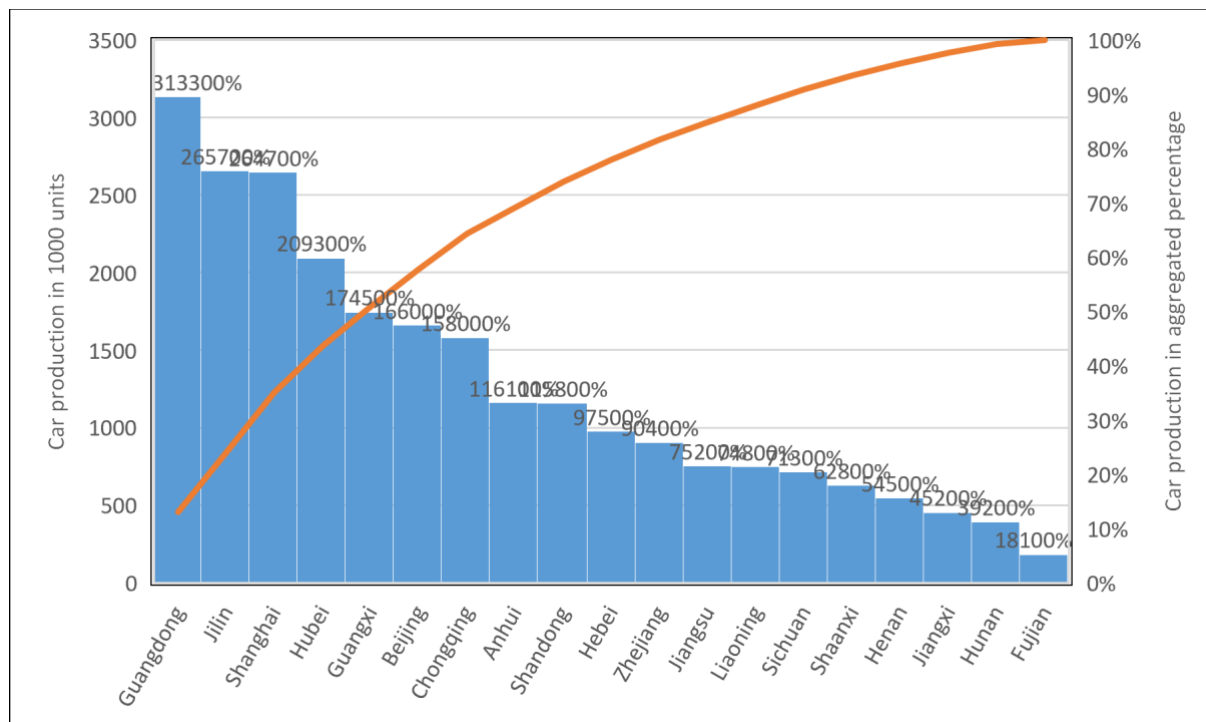
The policy of Chinese auto companies stipulates that after auto companies introduce manufacturing technology, they must localize their products, and they put forward a requirement for a localization rate of not less than 30% (mofcom.gov.cn, 2021).

As China's participation in internationalization continues to increase, and foreign investment in the auto and parts industry has increased, many well-known international auto parts companies have established wholly-owned or joint ventures in China, and many multinational companies have also included Chinese auto parts companies in their supply chains. The global procurement system and the establishment of domestic procurement agencies or offices, and some also set up technical and training centres in the country leading to a certain extent promote

the continuous improvement of the degree of industrialization of parts and components and the rapid development of parts and components enterprises.

As you can see on the below Figure 2, in 2020, Guangdong Province was the region with the highest number of vehicle produced in China, amounting to 3.1 million units. It was closely followed by Jilin Province, which produced nearly 2.7 million vehicles in China in that year.

Figure 2. Car production in China in 2020, by region (in 1,000 units)



Source: Own edition based on Statista 2022c

Cheap labour costs.

China’s vast land and resources and a large population, low labour costs are one of the important reasons for attracting investment, especially in the production of auto parts. At present, most companies are organizations with low added value and require a large amount of labour for production. The advantage of low labour cost to enhance the international competitiveness of its product innovation. The average salary of Chinese scientific and technological personnel is lower than the international level (sohu.com), which can also reduce the cost of product innovation of Chinese automobile enterprises.

Insufficient capital investment.

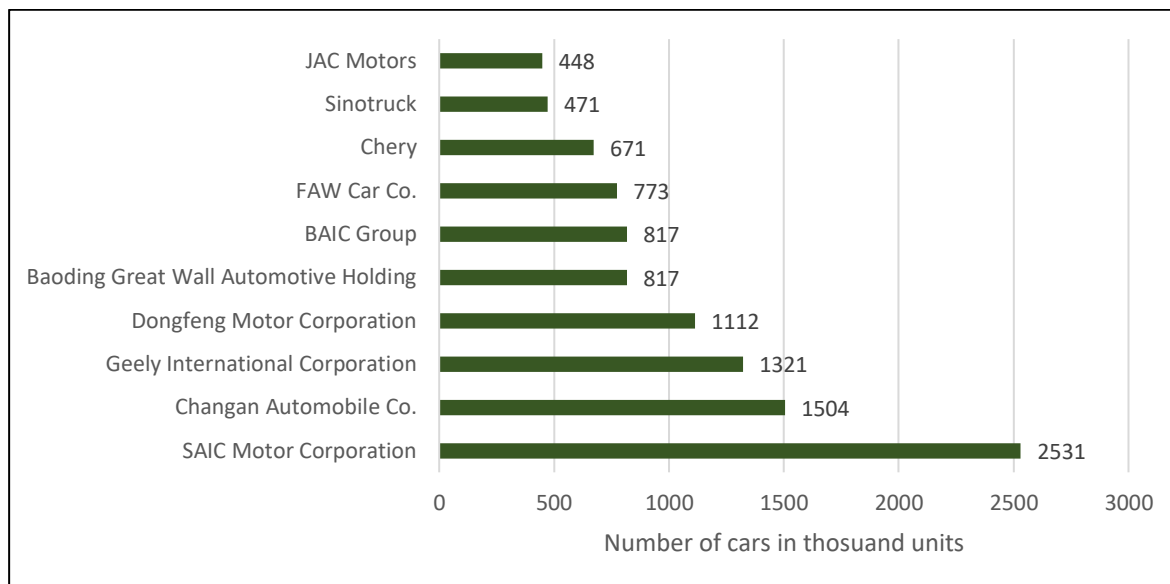
Automobile industry is a capital intensive industry so automobile enterprises need to invest huge funds in the whole process of product development, production and marketing. Especially in the innovation of automobile products, since the rapid renewal of automobile products and the lack of funds naturally affect the speed of product development, resulting in the disconnection between production and demand, which directly affects the survival of enterprises. Insufficient capital investment is one of the bottlenecks that inhibit the product innovation of Chinese automobile enterprises (cnr.cn).

Few independent brands.

The world's century old automobile industry has cultivated a series of world brands such as "Ford", "Mercedes Benz" and "Toyota", behind which are huge intangible assets. China's auto

industry has only a few brands such as "BYD" and "red flag", and it is not well-known and competitive. This is the reason why Chinese automobile enterprises cannot compete with foreign automobile groups in the short term despite of that Chinese carmakers try to make catching up fast (Aaron Joshua Spray, 2021); (GIZ, 2020). The Figure 3. illustrates the Chinese automobile manufacturers car sales volume in 2020.

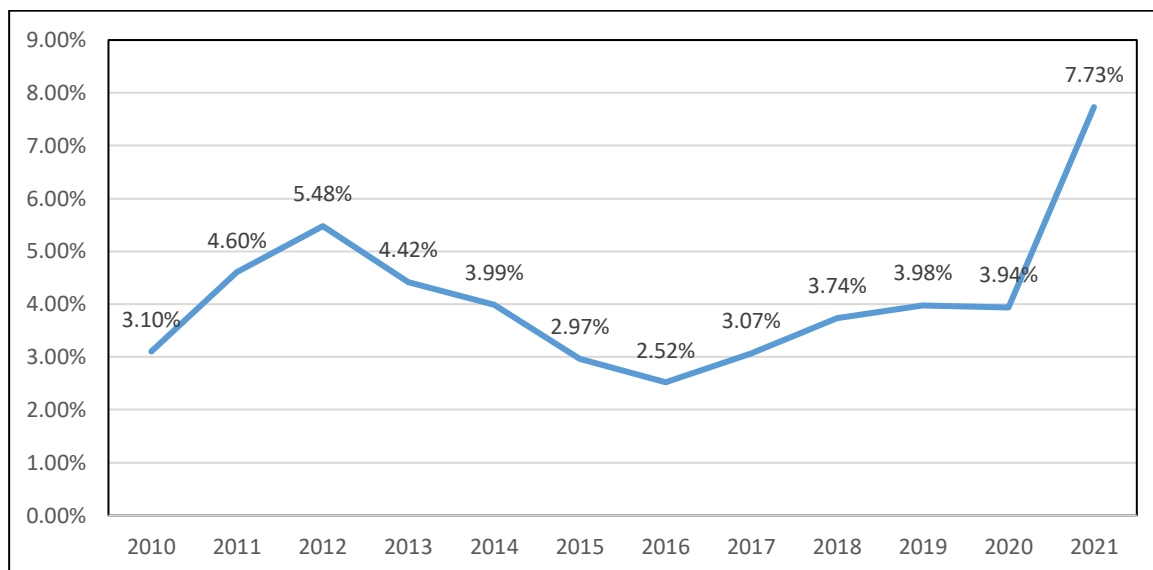
Figure 3. Leading domestic passenger automobile manufacturers based on number of cars sold in China in 2020 (in 1,000 units)



Source: Own edition based on Statista 2022d

The next Figure 4 highlighted the share of passenger cars and commercial vehicles produced in China, which were exported from 2010 to 2021. In 2021, approximately 7.73 percent of vehicles produced in China were exported to other countries.

Figure 4. Share of passenger cars and commercial vehicles produced for export in China from 2010 to 2021

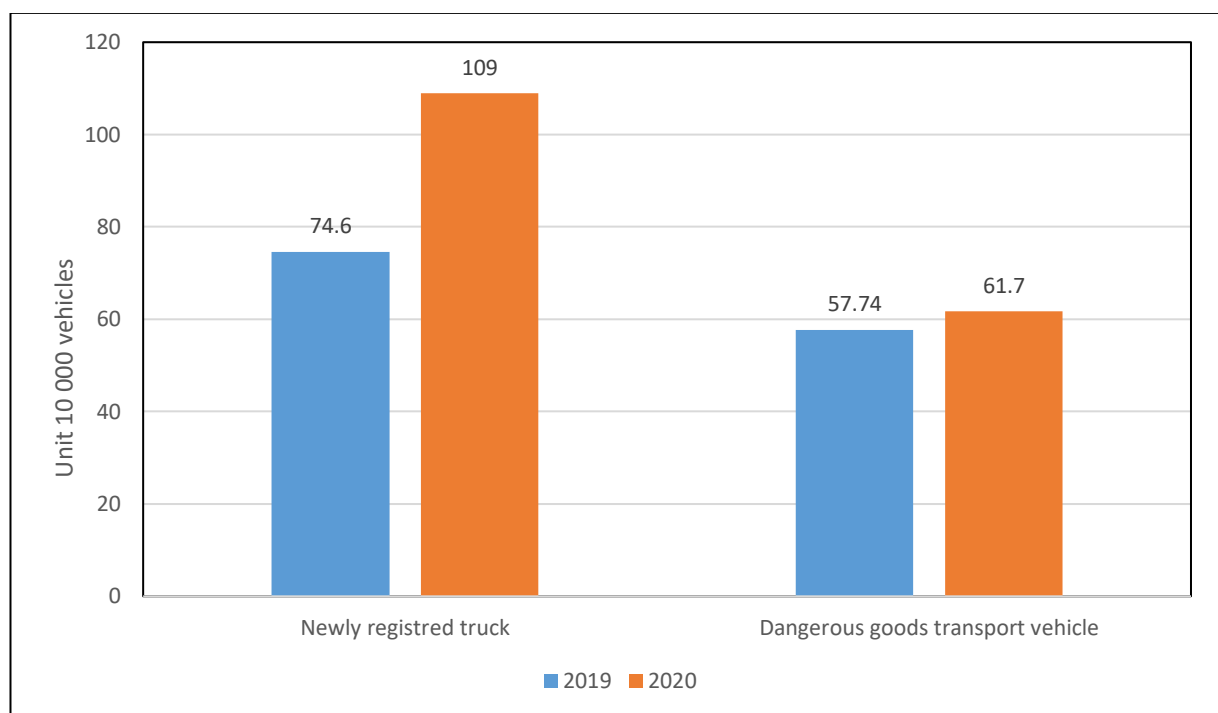


Source: Own edition based on Statista 2022e

Citizens' ability to purchase cars has increased.

In recent years, with the rapid development of China's economy, the people's income level has continued to increase, which has led to a rapid increase in automobile consumption, which in turn promotes the rapid development of industrial innovation. According to statistics from the Ministry of Public Security, in 2020, the number of motor vehicles nationwide will reach 365 million, of which 275 million are cars. In the first three quarters of 2020, 23.16 million new motor vehicles were registered nationwide, an increase of 545000 over the same period last year, an increase of 2.41%. In the third quarter of 2020, the number of newly registered trucks reached 1.09 million, an increase of 344000 compared with the same period last year, another record high. The number of dangerous goods transport vehicles reached 617000, an increase of 39600 over the same period last year. (Xinhua News Agency, 2020) as it is depicted on the Figure 5.

Figure 5. Newly registered truck/dangerous goods transport cars (2019-2020)



Source: Own edition based on Xinhua News Agency 2020

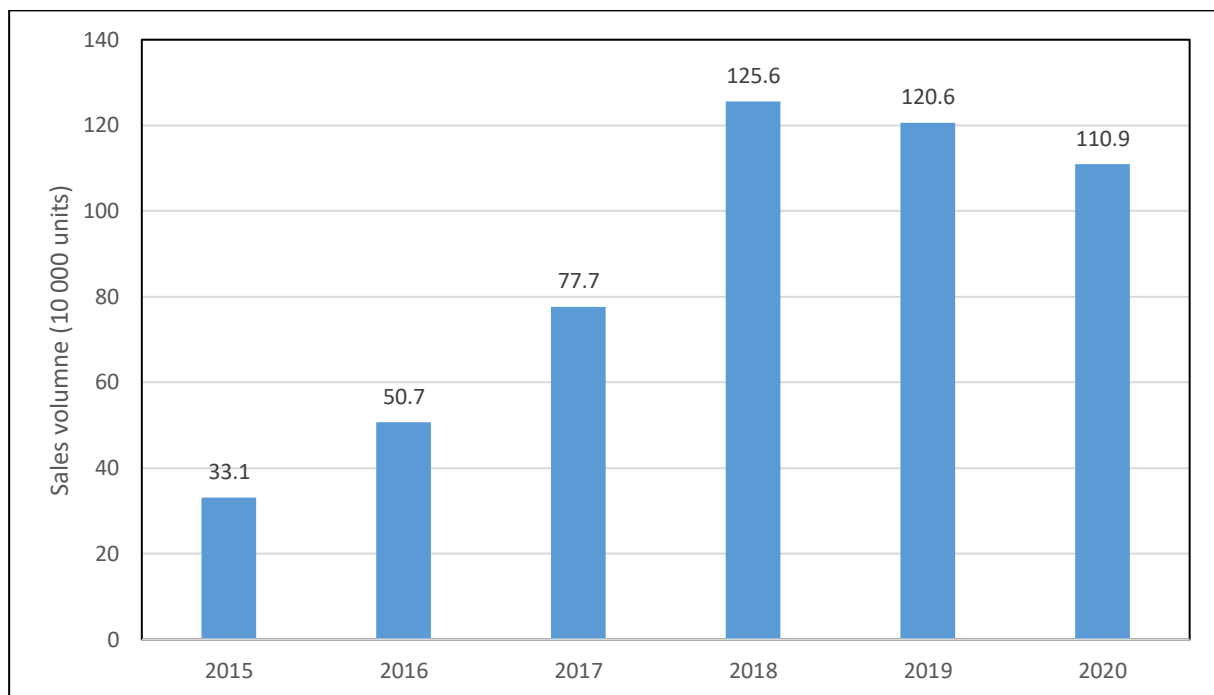
The above data shows that the Chinese people's demand for cars is very large because of the improvement in the quality of life. Under the pull of market demand, the product innovation of China's automobile industry enterprises will be further strengthened

New energy vehicles have great development potential but environmental protection standards should be improved.

With China's positive response to the development of low-carbon society, traditional motor vehicles are facing exhaust emissions and pollution problems. The automobile industry is developing from quantity to quality. The friendliness of new energy vehicles to the environment is an important strategic measure for the country to implement energy conservation, emission reduction and green development. At the same time, the state has also implemented more energy subsidies for the promotion of new energy vehicles, and various policy and financial guarantees have brought better development opportunities for new energy vehicle enterprises. In addition, China's market diversified and the potential of new energy development is huge. In recent years,

China's new energy vehicle sales have seen rapid growth, with the highest sales volume of 1 million 256 thousand in 2018, and the decline in 2019 and 2020 because of the impact of COVID-19 as you can see on the below Figure 6 (baijiahao.baidu.com).

Figure 6. Sales volume of new energy cars in China from 2015-2020



Source: Own edition based on China Automotive Technology and Research Center Co. Ltd 2021

A large number of automobile exhaust emissions lead to high pollution concentration in the air, which not only affects human health, but also has an adverse impact on global climate. The vehicle emission standards of advanced countries are also gradually improved. This will directly impact on energy mix and industrial structure of Chinese mainland, and then affect the development of the automobile industry. “China has gradually shifted from being government-oriented to being market-oriented in the policy formulating the process of the green automotive industry. In the coming development stages of the green automotive industry, advanced clean technologies and low-emission incentives may play key functions” (Lin-Shu Qiu et al., 2021).

5. Main research findings and recommendations

Currently, the different innovations in the Chinese automotive sector can be divided into four categories: marketing concept innovation, marketing organization innovation, service model innovation and customer management innovation. The innovation of marketing concept is conducive to create a new marketing concept, so as to optimize the marketing concept of marketing personnel, so as to drive the development of the whole automobile marketing career. The innovation of marketing strategy is to optimize the proficiency marketing personnel. The sales ability of personnel should multiplied and the improvement of automobile marketing business will bring tangible results in the near future. The innovation of service mode is to optimize the service mode and make the service more perfect, so as to increase customer satisfaction and lay the foundation for the success of automobile marketing in the future. The innovation of customer management is to improve the management of customer data, transform different marketing methods according to different customers, improve customer satisfaction from all aspects and speed up automobile sales.

Factors conducive to the innovation and development of automobile marketing strategic model.

Ensure a scientific and reasonable marketing strategy model.

If you want to promote the application and development of automobile marketing strategy, you should adopt a scientific and reasonable model. This kind of marketing strategy model is one of the important factors conducive to the innovative development of automobile marketing in the new era. Ensuring a scientific and reasonable marketing strategy model can not only improve the marketing amount of Chinese automobile, but also be conducive to the innovative development of automobile marketing in the new era. Innovation and development should be based on the smooth operation of scientific and reasonable marketing strategy model. To ensure the scientific background and rationality of the marketing strategy, it is necessary to investigate the current marketing environment of automobile. For example, the current marketing market, marketing brand and marketing trend of automobile in China in recent years. Only by accumulating materials from all aspects can we formulate a set of scientific and reasonable strategy belonging to automobile marketing, ensuring that the current automobile marketing model can drive automobile sales and contribute to China's automobile industry and marketing industry.

Scientific distribution of subject rights and obligations.

The innovation of automobile marketing model is not only the inevitable result of the development of the times, but also one of the effective ways to improve the development of China's automobile industry. Scientific distribution of subject rights and obligations requires us to clearly divide subject rights and obligations, and define the rights and obligations of subject roles such as automobile manufacturers, dealers, retailers and consumers. This behaviour can carry out relative classified planning for each subject participating in marketing, effectively lay the foundation for the formulation of marketing strategy and play a certain auxiliary role in the innovation and development of China's marketing strategy. The distribution of theme rights and obligations requires us to have a certain understanding of the current automobile brand, production mode and the audience. Automobile companies can first carry out market research activities, collect and summarize consumers' feedback on cars, and properly understand the automobile production engineering and integrate information. It can better lay a foundation for the scientific allocation of subject rights and obligations.

Pay attention to the application of third-party platforms.

With the continuous development of the network, the online marketing model has gradually occupied the mainstream of automobile marketing. Nowadays, automobile marketers have greatly developed the car sales platform software in order to meet the trend of social development and improve automobile sales. This behaviour is of great help to improve automobile sales. Nowadays, modern people pay more attention to convenience, and car selling software can not only see cars online, but also pay online, which saves the time of buying and selling cars, but also is very convenient and fast. Such a marketing strategy is deeply loved by young people. Paying attention to the application of third-party platforms requires us to find the right platform first, screen the used car platforms, and select those platforms that are really convenient and fast, cut the sales contract with legal effect, and have good consumer feedback, which is the basis for the third-party platform to really provide help for automobile marketing. When developing the third-party platform, we should also pay attention to the requirements of consumers and manufacturers, and develop software that can really improve automobile sales in combination with the opinions of both parties.

Strengthen the supervision of the marketing process.

Although China's current automobile marketing industry has basically taken shape and is in stable development, its supervision measures are essential. Strengthening the supervision measures in the marketing process can not only improve the work enthusiasm of salespeople, but also improve the work performance of salespeople at certain level. First of all, a special supervision department should be established to effectively supervise the marketing personnel, hold regular meetings to summarize the marketing situation, and summarize the work of the marketing personnel at the meeting. At the same time, reward and punishment measures shall be established according to the summary results, bonus reward shall be given to excellent and positive employees with certain sales performance, or post promotion shall be carried out, and corresponding punishment shall be given to employees with poor negative performance. This behaviour can greatly improve employees enthusiasm, strengthen employees sense of teamwork, accelerate the pace of innovation and development of automobile strategic model in the new era, and lay a foundation for it.

China should pay attention to the coordinated development of process innovation and product innovation.

There is dependence and interaction between the evolution of process technology and product technology, which makes the interaction between process innovation and product innovation obvious. The coordinated combination of product innovation and process innovation is attracting more and more attention in the automotive industry. Product innovation determines process innovation, but it is also subject to the process environment. The coordinated development of product innovation and process innovation is the key to the success of enterprise technology innovation. Only by taking the path of coordinated development of product innovation and technological innovation can product innovation and process innovation achieve the maximum effect. The realization of product innovation needs advanced technology as guarantee. Product innovation is conducive to promoting process innovation, that is, there is a certain correlation between process innovation and product innovation, synergies can strengthening each other to improve the labor productivity, reduce production costs, improve the comprehensive market competitiveness (Doblin, 1998).

Harmonising the innovation strategy choice “tailor-made way” with the mode of enterprises growth stage.

With the growth of enterprises, their comprehensive strength and innovation ability are constantly improving. Generally, the larger the enterprise scale, the stronger the comprehensive strength and the higher the innovation ability of the enterprise, which is conducive to the enterprise to choose the independent and leading innovation strategy. On the contrary, the smaller the enterprise scale, the weaker the comprehensive strength and the lower the innovation ability of the enterprise. It is more appropriate for the enterprise to choose imitation and introduction innovation strategy. However, due to the large gap in comprehensive strength between various stages of enterprise growth, enterprise innovation ability also shows obvious phased characteristics. Different growth stages of enterprises need to choose the enterprise innovation strategy model suitable for their characteristics, strength and ability.

Establish talent introduction, training and incentive mechanism.

Talents are the key actors of industrial technological innovations, because they can give full play to their enthusiasm and creativity directly related on the development and effect of technological innovation activities. In the past, due to the lack of attention to technological innovation and the lack of scientific talent management system, the Chinese companies generally suffered from lack of process innovation talents. For improvement of the technological innovation ability of enterprises and establish and improve various scientific human resource management systems, Chinese automotive sector has to pay attention to the

following aspects: attracting and respecting talents, improving the introduction mechanism of technological innovation talents. In this context, providing good living and working conditions for technological innovation talents. On the other hand, strengthening the scientific internal training system widening and deepening the innovation skills for the technical staff of the enterprise to enhance the quality and technological innovation ability of the staff.

Summary

The current environment has brought new development opportunities to China's automobile industry. At the same time, the development of innovation activities in the new environment will also have new characteristics and generate new problems. China has to face up to various constraints, improve innovation ability and ensure the sustainable success of automobile enterprises. This requires enterprises to correctly understand of innovation and the development law of innovation in China's automobile field, objectively analyse the current innovation ability of enterprises, and select a scientific innovation mode according to the current situation of innovation ability. Due to insufficient understanding, underestimating or overestimating of their own innovation ability, can slow-down corporate innovation process and affect negatively the future development of the enterprise. In addition, the choice of enterprise innovation strategy and the realization of innovation objectives are not only affected by the single factor of innovation ability, but impacted by the enterprise's qualification system, capital structure, profitability, ownership concentration and supply chain management system. While objectively analysing their own innovation ability and scientifically selecting innovation mode, we should also pay attention to other influencing factors in innovation activities. China's automobile industry should increase R & D investment, improve R & D capacity, and strengthen the flow of technological innovation between internal and external enterprises. A modern management system should be established within the enterprise to implement technological innovation. The government should reduce direct intervention in the micro economy, especially in state-owned enterprises. System innovation should be inevitable: implement the combination of government administrative regulation and market behaviour, pay more attention to micro innovation, further improve the innovation ability of China's automobile industry, improve financial policies, and ensure the capital of the automobile industry.

As China's pillar industry, the automobile industry will inevitably be seriously impacted by opportunities in the new environment of the world. As long as Chinese automobile enterprises correctly apply the decision-making model, make the choice of product innovation mode and implement the national automobile innovation project, they can promote development of China's automobile industry. Seize the initiative of a new round of world automobile industry development, so as to make Chinese automobile enterprises move towards the road of autonomy and internationalization.

The key point of realizing school enterprise cooperation and implement collaborative innovations with foreign partners.

Motivation for enterprises to participate in school enterprise cooperation includes: give priority to graduates through cooperation and order training, use school equipment, teachers and venues to carry out staff training, reduce internal training costs, use school technology to carry out new product R & D and production process transformation, and use school resources and services to reduce production costs, promote enterprise products and cultivate potential customers in schools. The school should be good at analysing the individual needs of enterprises, explore channels, fully tap the school's resource advantages in terms of site, technology, equipment and manpower and provide corresponding services for enterprises, so as to win the support and participation of enterprises in teaching work. Only the win-win cooperation can be long-term and stable.

In the process of innovation, the Chinese automotive sector is facing with the challenges related to lack of innovative talents and innovative funds, which is difficult to solve in the short term. This difficulty can overcome only after a stage of development and then gradually solved. Strengthening foreign technology transfer and cooperation and implementing collaborative innovation is a major way out for China's enterprises, which not only helps to solve the problem of lack of talents and funds for process innovation, but also can share the innovation risk and enhance the process innovation ability of enterprises. Collaborative innovation mainly includes two levels: one is the exchange and cooperation between enterprises and other domestic enterprises, consulting and research institutions. In the process of technological innovation. It is necessary to communicate and cooperate with foreign institutions. In a situation of increasing international market competition, collaborative innovation with foreign enterprises is the development trend of technological innovation for Chinese automotive enterprises. In the process of collaborative innovation, you should not only introduce foreign advanced technological innovation information and technological innovation achievements. China should also absorb the experience and lessons of their technological innovation on the road of development, avoiding hidden unknown pitfalls.

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