

# Transformation and Upgrading of Automobile Industry in China

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**Abstract:** This paper summarizes the current situation and development trends of the automobile industry in China, and then proposes the connotation of transformation and upgrading of the automobile industry in China from the aspects of new material, new structure, new technique, new equipment, new energy, new function, and new mode. It also analyzes and compares four new paths for the current transformation and upgrading practices, including independent technological innovation, cross-sector cooperative development, policy resource support, and business mode innovation. Finally, corresponding development proposals are put forward.

**Keywords:** automobile industry; transformation and upgrading; path analysis

The current global technological and industrial revolution has had a profound influence on the progress and development of the automobile industry. Systemic changes are sweeping through the technologies, products, and industries of automobiles, as well as other related forms of transportation. It is widely believed within and beyond the industry that automobile development is undergoing a revolutionary round of new changes [1,2]. These new changes introduce new products, and these new products establish new enterprises. New enterprises result in new industries, and the new industries will lead this new era. Within the general context of the automobile revolution, China is transitioning from a major automotive power into an automotive powerhouse. For China to seize the preemptive opportunities presented by the automobile revolution and accelerate its establishment as an automotive powerhouse, it must have an accurate grasp of the new situation, keep up with trends in this area, and bravely seize new opportunities in automobile development.

## 1 New situation confronting the Chinese automobile industry

### 1.1 Global automobile industry is undergoing a profound revolution

On the one hand, the design, validation, manufacturing, sale, and servicing of traditional automobiles have been transformed by revolutionary technologies such as next-generation information technology, new materials, big data, and artificial intelligence. This has inspired new business models and traffic management methods such as peer-to-peer (P2P) ridesharing, original equipment manufacturing, and vehicle-to-everything (V2X) communication protocols, which have become internal driving forces leading the progress of automobile technologies in a positive direction. On the other hand, the explosive growth of the automobile industry has led to the increased aggravation of various societal problems such as excessive energy use, environmental issues, traffic congestion, and safety issues, some of which are approaching or have exceeded the limits of what the world's societal and environmental resources can bear.

This has driven automobile development and transformation to shift toward becoming greener with lower carbon emissions, greater convenience, and higher efficiency. This creates external pressure that forces automobile

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technology to improve and the automobile industry to transform and upgrade itself. The combined effects of the two aforementioned factors has led the technological and business model developments of the automobile industry to become intertwined, the forms of automobile products and industries to be in a constant state of flux, and automobile development to become deeply integrated with the fields of energy, environment, and urban development. In summary, automobile development is currently facing major changes and restructuring.

### **1.2 Various new characteristics are appearing in the automobile industry**

Under the internal impetus of the technological revolution and the external motivation of social duty, the automobile industry has begun to exhibit many new characteristics: (1) Automation and intelligentization: In the future, intelligent automobiles will become fully autonomous and will effectively connect human beings, automobiles, and the environment in a harmonious relationship. (2) Customized production: A digitally driven, needs-based, personalized, and efficient intelligent automobile manufacturing system will be formed in the future; this system will also be thoroughly integrated with mobility services to serve the increasingly diverse mobility needs of the general public. (3) Cross-sectoral integration: A new cross-sectoral automobile industry will be formed through the integration of the automobile industry with different technological fields and industry types to form a new, diverse, and comprehensive automobile industry ecosystem. (4) Low carbon, environmental friendliness, and energy savings: Green concepts of low carbon, environmental friendliness, and energy savings will be incorporated throughout the life cycle and industry chains of automobile products. (5) Comfort, convenience, and efficiency: The quality of automobile products and mobility services will be continuously improved to make automobile travel more comfortable, convenient, and efficient for people. (6) Shared mobility ecosystem: Automobile sharing will fully utilize idle resources, alleviate the load on urban transportation systems, and create a green and efficient new mobility ecosystem.

### **1.3 Industry chains of automobile industry are undergoing a new round of readjustment and restructuring**

All of the industry chains in the automobile industry will face major changes. The automobile industry is gradually developing from a vertical and singular machinery industry into an integrated and multisectoral industry, encompassing a continuously enriching and ever-expanding range of subindustries and services. This has resulted in the readjustment and restructuring of the industry value chain as the chain gradually shifts from research and development (R&D), design, production, and manufacturing toward sales, maintenance, mobility, and services. Automobile companies are also transforming into integrated systems and mobility service providers. Likewise, the automobile innovation chain is also undergoing readjustment and transformation.

The focus of the automobile industry's innovation model is shifting from manufacturing to cross-sectoral integration and mobility services, triggering the restructuring of the innovation chain. Along with the continued development of the automobile industry, the Chinese automobile industry has steadily developed to a point where the level of its technological expertise is approaching leading standards in the world. Finally, the automobile industry chain will shift from low-end repetitive manufacturing toward high-end, complex, and diverse innovation. In addition, global cooperation in the automobile sector is manifesting in increasingly diverse forms, and a globalized high-end R&D and manufacturing system is gradually taking shape. Open cooperation is becoming the new norm in the automobile industry, and this concept will eventually diffuse into every aspect of this industry.

## **2 Development trends in the Chinese automobile industry**

The Chinese automobile industry has undergone almost 70 years of rapid growth through a continuous increase in scale and improvement in quality. As the automobile industry was one of the first industries in China to be opened up to the world after the reform and opening-up policy launched in 1978, it has been completely open for nearly 40 years. Therefore, it has established deep connections with the international community, kept up with international trends in terms of technological development, and developed a highly competitive, open, and cooperative market. As a whole, the Chinese automobile industry is rapidly transitioning into a phase of high-quality development and is currently looking toward transforming China into an automotive powerhouse.

### **2.1 Automobile industry is generally transitioning toward high-quality development**

First, the size of the Chinese automobile industry will continue to grow. In 2018, 27.809 million cars were manufactured and 28.081 million cars were sold, and automobile production and sales in China have consecutively

ranked top in the world for a decade. Although automobile production and sales in China have declined slightly from the previous year for the first time, the immense population of China and the mobility needs of this population ensure that the Chinese auto market still holds tremendous potential.

Second, the environment for the growth of the Chinese automobile industry will continue to improve. The push toward high-quality development in the manufacturing industries has become a major component of China's economic development strategy, and General Secretary Xi Jinping has stated that China will stay on course in its development goal of establishing itself as a manufacturing powerhouse with the automobile industry as a key manufacturing industry. Therefore, the establishment of China as an automotive powerhouse is a crucial step for ensuring the ascendance of China into a manufacturing powerhouse. In recent years, the government has successively promulgated policy documents such as the *Plan for the Medium- and Long-Term Development of the Automobile Industry* and *Provisions on the Administration of Investments in the Automotive Industry*, which have further strengthened strategic directions for encouraging the growth of the Chinese automobile industry.

Third, the Chinese automobile industry will steadily strengthen its basic capabilities. Significant breakthroughs have been attained in the areas of core technology, basic materials, basic processes, and basic equipment in the automobile industry, and China's homegrown automobile brands have essentially matched world-leading standards in terms of automobile production, manufacturing, and service standards.

Fourth, the business models of the Chinese automobile industry are becoming increasingly diverse. A vast number of business opportunities exist within the gigantic domestic market of China, and the utilization of technologies such as digital information, advanced control technology, and artificial intelligence has resulted in the rapid development of automotive mobility services with the emergence and proliferation of services such as P2P ridesharing and car sharing. Conventional automotive enterprises have also transformed into mobility service providers one after another. In addition, the increasingly rapid intelligentization and transformation toward the sharing of automobile R&D, production, and manufacturing has led to the emergence of novel business models such as original equipment manufacturing, global R&D, and talent sharing. Therefore, in terms of innovative business models, vast opportunities and possibilities are waiting to be discovered within the Chinese automobile industry.

## 2.2 China's automobile technologies are keeping pace with world-leading standards

First, China's automobile products have continuously launched iterations and upgrades. After many years of improvement, the overall technological standards of China's automobile products are now comparable with those of advanced nations such as Europe, the USA, and Japan. The reliability, safety, ease of operability, and comfort levels of China's homegrown automobile products are on par with those of advanced nations. Some of China's advanced car models are even superior to those of other countries or regions in the world, entering into the auto market earlier than other comparable models.

Second, China's automobile technologies are developing in multiple directions. Energy-efficient vehicles and new energy vehicles (NEVs) are being developed simultaneously, which has resulted in sustained improvement in the efficiency levels of advanced internal combustion engines and the development of various NEVs (e.g., pure electric vehicles, plug-in hybrid electric vehicles, hydrogen fuel cell vehicles, and methanol fuel vehicles). The construction of complementary facilities such as charging stations (piles) and hydrogen refueling stations is also experiencing a development boom.

Third, automobile electrification is now an irreversible trend. Over the past decade, the NEV industry has developed from an industry limited to pilot demonstrations and reliant on government subsidies into one that is now gradually taking flight and entering into the developmental stage of marketization. The progress of the NEV industry has been facilitated by the breakneck pace of lithium battery development, which has reduced the cost of NEVs and enabled continuous growth in their mileage. Owing to these improvements, NEVs are now competitive in certain scenarios.

Fourth, the progress of automobile intelligentization is constantly advancing. It is widely believed that automobiles are ideal vehicles for the implementation of intelligent technologies. China's research institutes have actively participated in the development of intelligent autonomous vehicles, and many automotive enterprises have begun to work in this direction. Internet companies such as Huawei, Alibaba Group, and Baidu have also begun to work on automobiles, and 5G technologies are being developed in conjunction with intelligent vehicles. China has already issued 101 license plates to enterprises such as Baidu for self-driving cars, and a "5+2" demonstrative

configuration for testing intelligent connected vehicles is gradually taking shape. This has effectively accelerated the practical implementation of autonomous vehicles in China.

### 2.3 Automobile market is a highly competitive, open, and cooperative scene

First, competition is intensifying in the automobile market. A new state of competition has emerged between old and new car makers, and car manufacturing groups from other countries are now competing with homegrown automobile brands in the massive Chinese automobile market. This is causing continuously intensifying competition in the automobile market between old and new as well as foreign and domestic automobile enterprises.

Second, the level of cooperation between automobile companies is steadily increasing. In view of the new situation, many car makers have chosen to form cooperative and win-win partnerships with each other as their development path. Not only are partnerships between domestic automobile groups being furthered (such as the T3 mobility service platform, which is a joint venture between First Automotive Works, Dongfeng, and Changan), but deep partnerships are also being formed between several domestic and overseas automobile enterprises. For example, Geely Group and Daimler have entered into a joint venture to establish high-end mobility services.

Third, domestic and overseas markets have opened up completely. The development of the automobile industry has been accelerated by measures to increase access to the Chinese auto market, such as the de-restriction of joint venture ratios and reduction of import tariffs for assembled cars and automobile parts. The construction of a fully foreign-owned car plant in China by Tesla, Inc., and the increase of BMW's stake in its venture with Brilliance China Automotive Holdings to 75% in 2022 generated significant impacts on the development of the Chinese automobile industry. From a long-term perspective, opening up the Chinese auto market fully is a necessary step for the development of the Chinese automobile industry in the new era, as this will force Chinese car makers to improve homegrown brands and eventually dominate the global competition.

Fourth, cross-sectoral integration in the automobile industry is being strengthened continuously. The automobile industry is already a multisectoral and comprehensive industry that encompasses various material industries (e.g., steel, rubber, glass, and new materials), the electronic control industry, and the telecommunications industry. Big data, next-generation information technology, and artificial intelligence have also become increasingly integrated with the automobile industry. In addition, cars, traffic management, energy, the environment, and urban systems are becoming increasingly connected over time. Therefore, the trend of integrated development in the automobile industry is being strengthened.

## 3 New content of “transformation and upgrading” in Chinese automobile industry

At present, the Chinese automobile industry is transitioning from a major player in the global auto market into an automotive powerhouse, and this new industrial revolution has brought about challenges and opportunities. In the current stage, a fair and open market environment and globalized resource allocation are necessary for the future development of the Chinese automobile industry. To confront the new situation and new challenges, it is imperative that the Chinese automobile industry transform and upgrade itself.

Currently, the Chinese automobile industry has already begun to transform and upgrade itself, and the core driver of this process is independent innovation in every aspect. Independent innovation in the automobile industry should focus on seven areas: new materials, new structures, new processes, new equipment, new energies, new functions, and new models, as shown in Fig. 1.

### 3.1 New materials

Materials play a fundamental role in automobile development. Automobile materials cover a wide range. Hundreds of different materials are used in automobiles, including steel, glass, rubber, ceramics, grease, plastic, and leather. Along with improvements in material technology, many new materials have been utilized by the automobile industry and have significantly improved the quality and performance of automobile products. For example, car bodies were previously made from ordinary steel, but they are now made from high-strength steel, carbon fibers, and composite materials. The use of high-performance materials has decreased the weight of car bodies significantly and improved safety and cost efficiency. Therefore, material innovation plays an important role in driving and supporting progress in the automobile industry. In the future, discovering high-performance new materials to be applied in automobiles will be an important direction for innovation.

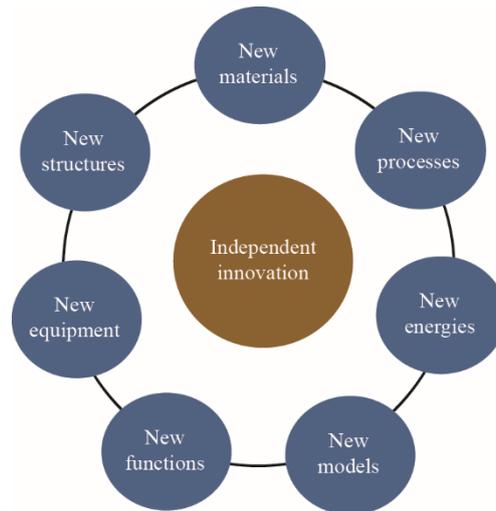


Fig. 1. Core content of “transformation and upgrading” in automobile industry.

### 3.2 New structures

An important part of automobile technology is the processing of high-performance materials into carefully engineered structures to form components with special functions. An automobile product consists of thousands of components of different structures. These structures work together to guarantee the realization of various automobile functions. Car designers have always sought to design better-optimized component structures. Disruptive changes have already occurred in four major parts (engine, chassis, car body, and electrical equipment) and five major systems (fuel injection system, lubrication system, cooling system, ignition system, and engine starting system) of conventional automobiles. Innovation in component structures is an important aspect of independent automobile innovation. With improvements in advanced design and manufacturing technologies, automobile structures will also improve in tandem, enabling the emergence of new structures and raising the overall standards of automobile technology.

### 3.3 New processes

Automobile processes generally refer to the technologies and methods used in car production and manufacturing. This includes the production, processing, and assembly of car parts, and the vehicle commissioning process. Scientifically advanced processing technologies are critical for improving the quality of car parts and automobile performance. They can also significantly increase production efficiency. Technological progress is changing and disrupting conventional automobile processes. With the development of intelligent factories, new processes will emerge and improve conventional automobile production and manufacturing methods, thus ensuring the steady development of manufacturing technologies.

### 3.4 New equipment

Advanced manufacturing equipment forms the foundation upon which the automobile industry is built and guarantees the development of new automobile structures and processes. Currently, the standards of intelligentization, informatization, and precision of automobile manufacturing equipment are constantly improving, and the functions of the mechanical systems, electronic control systems, and information management systems comprising such equipment are constantly expanding. This has resulted in ever greater levels of complexity. As automobile manufacturing equipment forms an important part of automobile technology, advanced manufacturing equipment can significantly improve the precision and quality of automobile manufacturing processes, and improve the cost efficiency and resource utilization of the automobile industry. In the future, constantly improving the manufacturing equipment will ensure the realization of high-quality developments in the automobile industry.

### 3.5 New energies

In the context of the energy and environmental revolution, the proportion of clean and renewable energy in the energy ecosystem has steadily increased over time. Owing to the advent of safe, high-capacity, and long-lasting automobile batteries, as well as clean and efficient fuel-cell technologies, the proportion of NEVs in the auto

market is growing tremendously. The current fossil-fuel-dominated situation of automobile energy sources is undergoing comprehensive transformation, as car makers around the world are now looking to employ renewable energy sources (e.g., solar power, hydropower, wind power, nuclear power, and biomass energy) in automobiles. The relevant technologies and their levels of industrialization are also constantly improving. In the future, clean, efficient, low-carbon, and green energy will become an important direction for the development of the automobile industry, and the utilization of new energy will be the defining trend of progress in automotive technology and development in the automobile industry.

### 3.6 New functions

The fundamental function of a car is to serve as a mode of transportation. The rising demand for quality in automotive travel has driven an increase in the quantity and quality of car functions. The augmentation of basic functions (e.g., antilock braking systems (ABS), electronic power steering (EPS), and airbags) has made cars safer, more convenient, and reliable. The addition of auxiliary functions (e.g., onboard audio/video systems, entertainment systems, and auxiliary services) has improved the travel experience of car users. New functions are emerging and proliferating throughout the auto market, and the development of intelligent and sharing functions has further enriched existing car functions. These functions are also expected to alleviate traffic congestion and prevent road accidents to a large extent. In the future, cars can become an integrated transportation, office, and living environment to better serve the travel needs of people.

### 3.7 New models

New business models are the catalyst for accelerating the development of the automobile industry. In the market economy environment, new business models have emerged in all stages of the automobile industry. For example, powerful information processing systems are now being used in new R&D models to tackle complex and diverse problems and produce automotive products that satisfy the needs of car users. Intelligent manufacturing models effectively shorten the R&D period of car products by using intelligent factories as a carrier to “intelligitize” key manufacturing processes. New industrial cloud platforms facilitate information sharing throughout the life cycle of automobile products by coordinating the various stages of the automobile industry chain. New mobility models (which are inclined toward car-sharing models) improve the flexibility and convenience of automobile products for car users. In the future, new business models will determine the development direction of the automobile industry to a certain extent.

The seven abovementioned aspects of automobile innovation (the 7 Ns, i.e., new materials, new structures, new processes, new equipment, new energies, new functions, and new models) are interconnected by complementary and synergistic relationships and are the focal points for independent innovation in the Chinese automobile industry. It should be noted that the realization of the 7 Ns is not an instantaneous process but rather requires a steady accumulation of experience, improvement, and innovation. The transformation and upgrading of the automobile industry can only be truly promoted through a commitment to the establishment of an independent innovation system and to making breakthroughs in core/key technologies in order to enable China to transcend its role as a major automobile country to become an automotive powerhouse.

## 4 New paths to transform and upgrade the Chinese automobile industry

Currently, all of areas and enterprises in China are hoping to gain a competitive edge in the current industrial revolution, and all are working hard to transform and upgrade the Chinese automobile industry. Car enterprises form the main driving force behind industrial transformation and upgrading as well as independent innovation within the automobile industry. Here, we summarize four main development paths for car enterprises to achieve transformation and upgrading: independent technological innovation, cross-sectoral partnership development, policy and resource support, and innovative business models. An analysis of strengths and weaknesses was performed for each path (Table 1).

### 4.1 Driving technological innovation through mobilizing the power of change

The development of the automobile industry is primarily driven by technological innovation. At present, the major automobile groups of China are seeking to improve their capacity for independent technological innovation and to transform and upgrade themselves. They have formulated strategies and action plans centered around the

core of independent technological innovation, actively established independent innovations to upgrade their manufacturing systems, and rapidly constructed and implemented platformized, modularized, electrified, and intelligentized technology platforms.

Typical examples include the “Innovation in Motion” and “Connectivity Strategy 2025” strategies announced by SAIC Motor, and the “Blue Geely Initiative” and “G-Pilot” strategies announced by Geely. In the long term, independent technological innovation is a necessity for transforming and upgrading the automobile industry. By building this capacity at a steady pace, China’s automobile companies will be able to sustain their core competitiveness. However, the downside of this approach is that it requires sizeable financial investment and may result in longer product development cycles.

**Table 1.** Analysis of classic paths for transforming and upgrading China’s automobile industry.

Method	Strengths	Weaknesses
Independent innovation	<ol style="list-style-type: none"> <li>1. The company will have full autonomy in product development and be able to establish product development standards and a reserve of technical knowledge.</li> <li>2. Product upgrades and updates can be performed quickly, and the company will possess the ability to develop progressively, thus ensuring the sustainability of its competitiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Independent innovation requires a large financial and talent investment, and involves the risks of product development failure and talent loss.</li> <li>2. Product development cycles will be longer before results can be observed.</li> </ol>
Cross-sectoral partnership development	<ol style="list-style-type: none"> <li>1. The technical and capital advantages of both parties will be thoroughly integrated.</li> <li>2. It is possible to employ the optimal methods in rapidly developing products that are suitable for the market, thereby gaining large profits.</li> </ol>	<ol style="list-style-type: none"> <li>1. There is a risk of uncertainty in cross-sectoral partnership developments, such as in rights of ownership to technology and the allocation of property rights.</li> <li>2. Maintaining enthusiasm in partnerships and establishing rational partnership mechanisms are challenges for cross-sectoral partnership development.</li> </ol>
Policy and resource support	<ol style="list-style-type: none"> <li>1. The risk of external dangers to budding companies is minimized.</li> <li>2. Generous policy and financial support are provided.</li> </ol>	<ol style="list-style-type: none"> <li>1. Policy support can only go so far, as a company must be tested through marketization after it reaches a certain size.</li> <li>2. Policy support is detrimental to the development of core competitiveness.</li> </ol>
Innovative business models	<ol style="list-style-type: none"> <li>1. Efficient resource organization methods can be used to drive sufficient activity and cater to the needs of the market to the largest extent.</li> <li>2. Innovation in the development of the automobile industry can be driven continuously.</li> </ol>	<ol style="list-style-type: none"> <li>1. It is very difficult for new business models to become profitable in the early stages.</li> <li>2. Many unknown risks, such as market and technology risks, and many uncertainties exist in this approach.</li> </ol>

#### 4.2 Achieving positive results by combining advantages through partnerships and information sharing

Owing to the influence of industry convergence and the prevalence of intelligentization and information sharing, conventional car makers have found it very difficult to adapt their businesses to current development trends. Therefore, it has become necessary for enterprises with different technological and capital advantages to engage in cross-sectoral partnerships to jointly transform and upgrade themselves. The advantage of this approach is that the partnering companies can grow very rapidly by combining their technological and capital advantages in a complementary manner.

However, it is often difficult to maintain the partners’ enthusiasm in these partnerships over the long term, and a suitable mechanism must be developed in order to address the challenges of partnership-based development. Currently, joint ventures between Internet companies such as Alibaba, Baidu, and Tencent and conventional car makers, as well as the entry of capital-rich enterprises such as Gree Electric and Country Garden into the military automobile industry by partnering with other companies, are classic examples of cross-sectoral partnership development. Although time will tell whether this mode of development will be successful, there is no doubt that cross-sectoral partnership development is a unique approach for transforming and upgrading the Chinese automobile industry.

#### 4.3 Nurturing the growth of companies through policy and resource support

The automobile industry has always attracted the attention of local governments owing to its tremendous role in driving socioeconomic growth. In the process of developing the Chinese automobile industry, many car makers have been strongly or wholly supported by local governments. Although many large and competitive business groups have emerged in their midst, many enterprises have disappeared owing to mismanagement or inappropriate government policies. The advantage of government support is that it shields budding car makers from external risks and ensures that these companies receive generous policy and financial support. However, the disadvantage is that this support is ultimately limited in scope, and it is difficult to maintain these incentives after the companies reach a certain size or expand their businesses to a certain range. In addition, government support is detrimental to the development of core competitiveness.

#### 4.4 Combining core resources to encourage creation of new business models

Owing to the competitiveness of the auto market, business models have a profound impact on the development of the automobile industry. Efficient and novel business models are a unique approach to transforming and upgrading the current automobile industry. The advantage of this approach is that it enables the use of efficient resource organization methods to drive sufficient activity and cater to the market's needs to the largest extent, and also allows for innovation to emerge continuously in the industry. However, one must contend with the disadvantage of tremendous market risks and uncertainties. Currently, the new players in the auto market are classic representatives exploring new business models. Tesla and NIO are automobile companies that have transformed and upgraded themselves by combining innovative resources through new business models. This approach is starting to show its strength and vitality, and may become a viable method for revolutionizing and disrupting the automobile industry in the future.

### 5 Conclusions

The Chinese economy is currently transitioning from a phase of rapid growth to a phase of high-quality development. Accelerating the establishment of China as an automotive powerhouse is an important part of this process, and accelerating the transformation and upgrading of the Chinese automobile industry is the primary means by which this goal shall be realized. In the current stage, the successful transformation of and upgrades to the automobile industry have significant stimulatory influence and high practical value. The following recommendations were formed from the analyses conducted in this study:

First, the current trends of the automobile industry revolution and the importance of independent innovation must be recognized in depth. New paths for transforming and upgrading the automobile industry should be actively investigated based on the 7 Ns of independent innovation, and breakthroughs in key technological capabilities and the enhancement of industry competitiveness should be treated as core issues for the transformation and upgrading of the automobile industry. Only in this way can China be driven to seize opportunities as they arrive and emerge as the ultimate victor in the global automotive market in the future.

Second, the significance of the 7 Ns for the transformation and upgrading of the automobile industry must be developed in full. The 7 Ns are focal points for independent innovation and are also the aspects in which the Chinese automobile industry must endeavor to achieve technological breakthroughs, as they are also its current shortcomings. In the process of transformation and upgrading, the industry must focus its resources and research efforts on the 7 Ns to bring about synergistic breakthroughs in these areas.

Third, the path for the transformation and upgrading of the Chinese automobile industry should be selected in a scientifically informed manner. In the market economy, there are various paths in which the transformation and upgrading of the Chinese automobile industry can proceed. This may occur via one of the four abovementioned paths or a combination of different paths. It is also possible for an entirely new path to emerge over time. Each company should select the optimal path suited for its own development, focus on its core competencies, and fully utilize advantages and resources to accelerate its growth and development.

Finally, the government should provide comprehensive assurance to the automobile industry by formulating strategic plans, policies, and standards. The government should seek to establish a fair, competitive, open, and free market environment by leveraging the advantages of China's socialist economy, thus promoting the realization of self-improvement of the industry through competition. In addition, the government should promote market openness by a larger extent by providing larger driving forces for reforms in order to adapt to the globalized

competitive environment.

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