

Summary of Research on Automobile Power Strategy in the New Era (II)

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Abstract: In the first part of the strategic research paper about building automobile power, we conclude that China should seize the great opportunity of starting a new revolution in the automotive industry and accelerate the building of automobile power in the new era. Based on this, the paper investigates the problems in the automotive industry and determines 34 constraints arising from seven aspects that are hindering the establishment of the automobile industry. We analyze the constraints and summarize them into ten points. Then we describe the principal contradictions and carry out the strategic thinking on the construction of automobile power combined with the current situation and constraints. We conclude that China should accelerate implementing the strategy of building automobile power in the new era, and propose core measures and key suggestions to promote it.

Keywords: automobile power; strategic research; constraints; principal contradiction; strategic thinking

1 Introduction

The Summary of Research on Automobile Power Strategy in the New Era (I) analyzes the circumstances and development trends facing the current stage of Chinese automobile industry development and explains the implications and characteristics of the new generation of automobile powers, in addition to discussing the major significance of establishing an automobile power. As such, China desperately needs to seize major opportunities of the new automobile revolution and accelerate the process of establishing itself as an automobile power by increasing the quality and efficiency of the automobile industry, and coordinating the development of society and the automobile industry.

In the new era, China faces the major question of how to es-

tablish itself as an automobile power. This paper organizes and analyzes some factors constraining the current establishment of an automobile power and attempts to use a problem-guided approach to explore ways of thinking about, paths toward, and measures for the establishment of an automobile power in the new era.

2 Analysis of constraints on the establishment of an automobile power

In its current stage of development, China's automobile industry is large but not strong. This is primarily evident in the poor quality of China's automobile industry development and the uncoordinated development of China's automotive society.

Received date: January 30, 2018; **Revised date:** February 5, 2018

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Funding program: CAE Advisory Project "Research on Automobile Power Strategy"(2015-XZ-36)

Chinese version: Strategic Study of CAE 2018, 20 (1): 011–019

Cited item: Zhong Zhihua et al. Summary of Research on Automobile Power Strategy in the New Era (II). *Strategic Study of CAE*, <https://doi.org/10.15302/J-SSCAE-2018.01.002>

Previously, most strategic studies in the field of automobiles addressed the automobile industry as their subject. This paper expands this research perspective and is conducted from the viewpoint of the overall development of the automobile industry and of the automobile society. It analyzes the many factors constraining the establishment of an automobile power and investigates the reasons for the development of a large but weak automobile industry.

2.1 Extraction of constraints

On the basis of previous research [1–13], this paper summarizes the many factors constraining the establishment of an automobile power at the current stage, in addition to conducting a systematic organization and analysis (Fig. 1). Constraining factors generally exhibit the following characteristics:

2.1.1 Existence of many factors which relate to a breadth of issues

There are a great many constraining factors that relate to a breadth of issues. In order to facilitate overall analytical research, many constraints have not been described in detail, such as aftermarket automobile factors including maintenance, financial insurance, and used cars. These issues are not identical, and the most obvious problem is that, currently, there

is no standardized management of aftermarket issues in the automobile industry. As such, this paper only addresses this issue generally and summarizes it as the “need for aftermarket regulation.”

2.1.2 Complex and intertwined relationships

The relationships between constraints are complex, with each factor having many effects, and each effect being the result of many factors; as such, reciprocal causation is extremely common among these factors. Taking the example of weak independent innovation capacity (Fig. 2), we see that this factor has relatively direct causal relationships with 27 other constraints, including 15 factors that result in weak independent innovation capacity, such as imperfect market competition, imperfect innovation systems, and imperfect standards and regulations. In addition, weak independent innovation capacity is the cause of seven factors, such as low product quality levels and low brand influence. Weak independent innovation capacity also has a reciprocal causal relationship with five factors such as low industrial concentration and lagging component development.

2.1.3 Long-term presence of constraints of differing degrees

In one regard, most constraints have developed into bottlenecks preventing the transformation of the automobile industry from large to strong; a systematic solution to this problem is

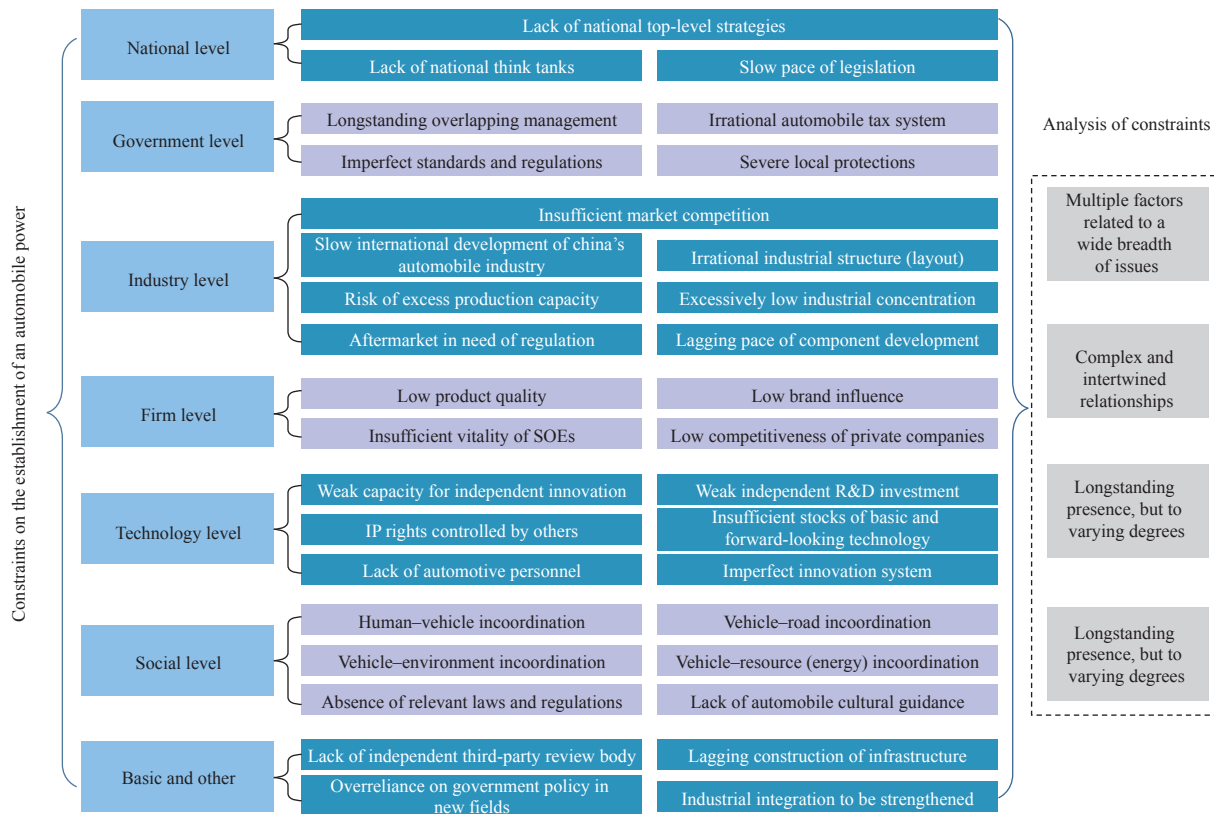


Fig. 1. Organization and analysis of constraints on the establishment of an automobile power.

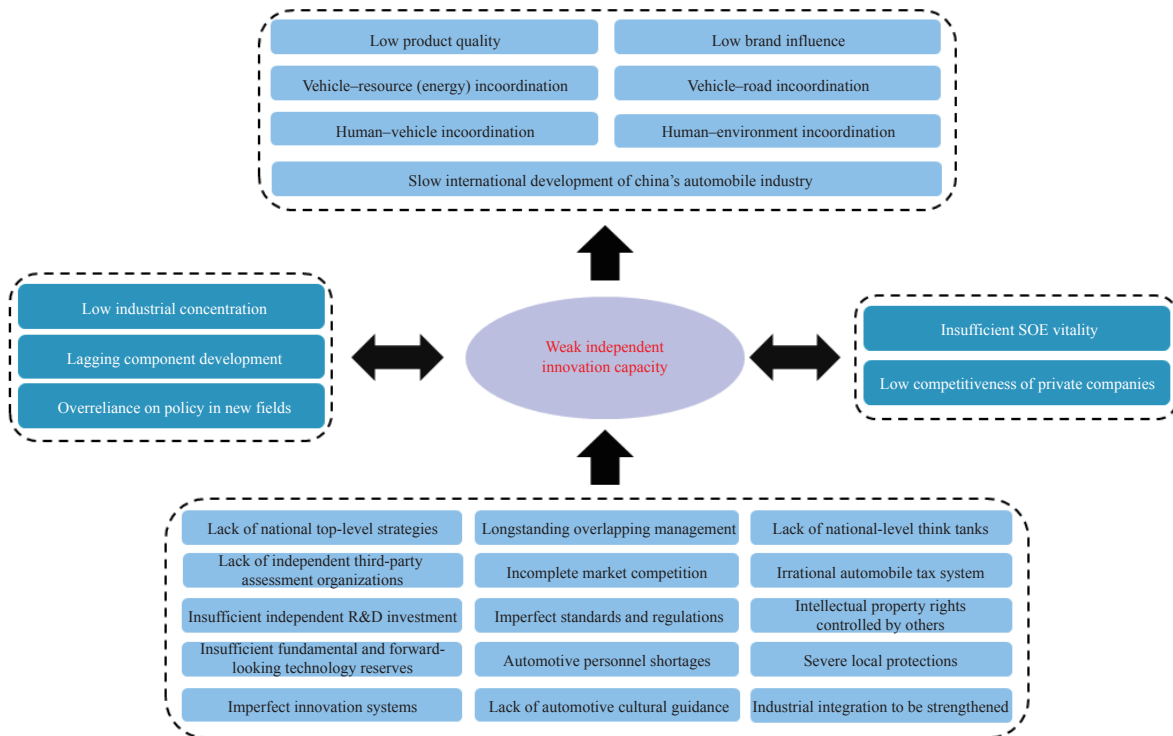


Fig. 2. Causal relationships related to weak independent innovation capacity.

urgently needed. For example, the long-existing problems of the lack of top-level strategy, severely overlapping management, and weak independent innovation capacity have increased in severity over time and are severely unsuited to current development requirements for the automobile industry. In another regard, the influence of each constraint varies. For example, imperfect market competition is a core factor affecting the size and strength of the automobile industry and directly inhibits the achievement of national power objectives. In addition, intellectual property rights are under the control of others, although they are weakly related. The interactive and mutual influences of each factor vary in degree. For example, weak independent innovation capacity has a direct influence on low brand influence and low product quality, but has a relatively weak influence on human-car incoordination and car-resource (energy) incoordination.

2.1.4 Coexistence of problems and challenges

The large but weak development of China's automobile industry is the result of the combined influence of many factors. A large number of problems have existed for a long period, but effective solutions have yet to be found. At present, the current automobile industry revolution is arriving rapidly, and new technologies, models, and industrial patterns are emerging one after another. The relationship between automobiles and society is becoming increasingly close, presenting significant challenges to automobile industry development. China's automobile industry faces coexisting problems and challenges; longstanding problems have yet to be solved, and new challenges have emerged,

thereby increasing the complexity of establishing China as an automobile power.

In summary of the above, China's establishment as an automobile power faces extremely complex circumstances. In order to achieve objectives related to its establishment as an automobile power, China still needs to undertake some formidable tasks. It is noteworthy that in just over a decade, China has developed an automobile industry of a scale that took developed countries decades, even over a century, to develop. However, this style of rapid development is necessarily accompanied by many problems. As such, while existing problems are objectively addressed, it is more important to affirm the successes and progress that China's automobile industry development has achieved.

2.2 Bottleneck issues

In order to organize and analyze constraints, the "Strategic Research on Automobile power" project team held several seminars to organize a breadth of discussions from more than one hundred experts from various regulatory departments, companies, industry organizations, and institutes of higher education. On the basis of gathering industry consensus, the project team found ten bottleneck issues related to the establishment of an automobile power.

2.2.1 Lack of top-level national strategy

Top-level designs for the development of China's automobile industry include the 1994 and 2004 versions of automobile

industry policy. At present, major changes have occurred with regard to the circumstances, environment, foundation, and conditions facing automobile development, and neither version of industry policy is suited to current development needs. At present, overall national top-level strategies such as the Comprehensive Deepening of Reform, Made in China 2025 and the National Strategy of Innovation-Driven Development each have a guiding significance for automobile industry development, but cannot provide clear strategic leadership and precise strategic guidance for the unique field of automobiles. In addition, the industrial policies proposed by various ministries related to certain elements of the automobile industry do not fit the current development scale, influence, and interconnectedness of the automobile industry, making it difficult to achieve an overall strategic leadership role. Higher-level (including the overall national strategy system), broader (including the automobile industry and automobile society), and deeper (more targeted and feasible) strategies are urgently needed. In particular, China currently lacks a national-level think-tank in the automobile industry, making it difficult to provide scientific support for automobile industry development.

The lack of clear top-level design directly results in the ambiguous position of China's automobile industry development. There have been repeated misjudgments regarding the scale of Chinese automobile industry development, negatively affecting the development of the automobile industry, and national development as a whole [14].

2.2.2 Long existence of overlapping management

China's automobile industry has long exhibited the problem of overlapping management. As the connotations and denotations of automobiles have expanded continuously, the problem of multiple regulators with overlapping authority has grown more severe. Relevant research finds that there are currently eighteen departments related to Chinese automobile oversight, as shown in Table 1 [1]. Generally, their functions overlap or intersect; they lack communication and coordination, and cannot easily form an effective combined force. Overlapping management has made it difficult for government departments to adopt a general or long-term perspective in the establishment of strategic arrangements and plans, and firms are at a loss as to how to handle regulatory instructions from multiple departments. The problem of overlapping management in China's automobile industry has existed and been criticized for a long period, and has yet to be effectively resolved during this time. To a large extent, this problem restricts the healthy and orderly development of China's automobile industry.

2.2.3 Weak independent innovation capacity

The weak independent innovation capacity of China's automobile industry has been well known for a long time; this is the most serious problem its development faces. This weakness is

primarily apparent in the industry's weak grasp of the technologies behind key core components such as automatic transmissions, engines, automobile electronics, electric vehicle batteries, and vehicle-borne radar; as such, China is severely dependent on foreign investment and joint ventures. The data presented in Table 2 shows that joint-venture firms and foreign-funded enterprises generally earn triple the profits of Chinese brands, indicating China's significant lag in core technological areas. In addition to historical factors such as the late emergence of the Chinese automobile industry and the failure of achieving desired results through market-for-technology programs, this is also closely linked with insufficient investment in innovation and imperfect innovation systems. Taking the example of R&D investment by major global automobile companies in 2016 (Fig. 3), the combined R&D investment by the top-ten Chinese companies was less than half of Toyota's R&D investment, and only one-third of Volkswagen's [15]. China's investment in the introduction and absorption of technology is severely insufficient, with a ratio of 1:0.07, compared to a ratio of about 1:8 for Japan and South Korea during their stages of introduction and absorption [16]. In addition, core technologies are the main objective of technological investment, and a large volume of investments must be maintained in order to bear fruit. With regard to innovation systems, problems with the innovation chains used by government, industry, academia, and research organizations are ubiquitous, and the scientific research results of higher-education institutes and research bodies are rarely effectively used in the industrialization process. As such, China's technology outputs rate and patent conversion rate are much lower than those of developed countries.

2.2.4 Slow progress of legislated management

For a long period, China's government has relied primarily on administrative regulations and government documents to manage the automobile industry, and there is lack of high location-step law relating to the automobile industry for a long time. Each department relies primarily on relevant provisions of ordinary laws to establish department-level management documents, which are implemented separately. This method readily results in the lack of effective convergence of upstream and downstream management, lack of effective unification of the oversight steps executed by different departments, or even complete failure in these regards. In addition, many existing ordinary laws provide a legal basis for automobile regulation. However, these laws only touch on some areas and segments of automobile regulation, and automobiles only constitute a part of the large regulatory content of these laws. These regulations tend to be very principled, general, and fragmented. The longstanding lack of clear legislated management has led automobile management to become disorderly and ineffective. This is also one of the fundamental reasons behind the problems of overlapping management.

Table 1. List of major links and management departments for China's automobile industry.

Management department	Investment	Production	Production	R&D	R&D	New vehicle sales	Secondhand vehicle sales	Finance	Maintenance, recall	Maintenance, recall	Registration, annual inspection	Disposal	Recycling, disassembly	Reproduction
Development and Reform Commission	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ministry of Industry and Information Technology	X	X	X	X	X				X			X	X	X
Ministry of Commerce	X			X	X	X	X	X	X	X	X	X	X	X
Administration for Industry and Commerce	X				X	X	X	X	X	X		X		
State-Owned Assets Supervision and Administration Commission	X													
General Administration of Quality Supervision, Inspection, and Quarantine			X		X				X		X			X
Ministry of Environmental Protection	X		X		X	X	X		X		X	X	X	X
Ministry of Science and Technology				X		X							X	
Ministry of Transport			X					X	X					
Ministry of Finance	X			X	X	X	X	X				X	X	X
State Administration of Taxation	X			X	X	X	X	X						
General Administration of Customs	X				X									
Ministry of Land and Resources	X													
Ministry of Public Security						X	X				X	X	X	
People's Bank of China								X						
China Banking Regulatory Commission								X						
China Insurance Regulatory Commission										X				
Certification and Accreditation Commission			X		X									

Note: X indicates that the managerial duties of a given government ministry or body are related to a given link in the industry.

Table 2. Comparison of Chinese brands and joint-venture/foreign-funded companies in terms of components' production value and profits (%).

Proportion	Passenger vehicle engines	Passenger vehicle automatic transmission	Suspension system	Active and passive security systems	Steering system	Braking system	Body system	New energy vehicle components
Proportion of production value comprised by Chinese-brand components	50	25	65	50	60	50	50	75
Proportion of production value comprised by joint-ventures/foreign-funded companies	50	75	35	50	40	50	50	25
Proportion of profits constituted by Chinese-brand components	25	16.5	52.5	25	33.8	33	25	50
Proportion of profits constituted by joint-ventures/foreign-funded companies	75	83.5	47.5	75	67.2	67	75	50

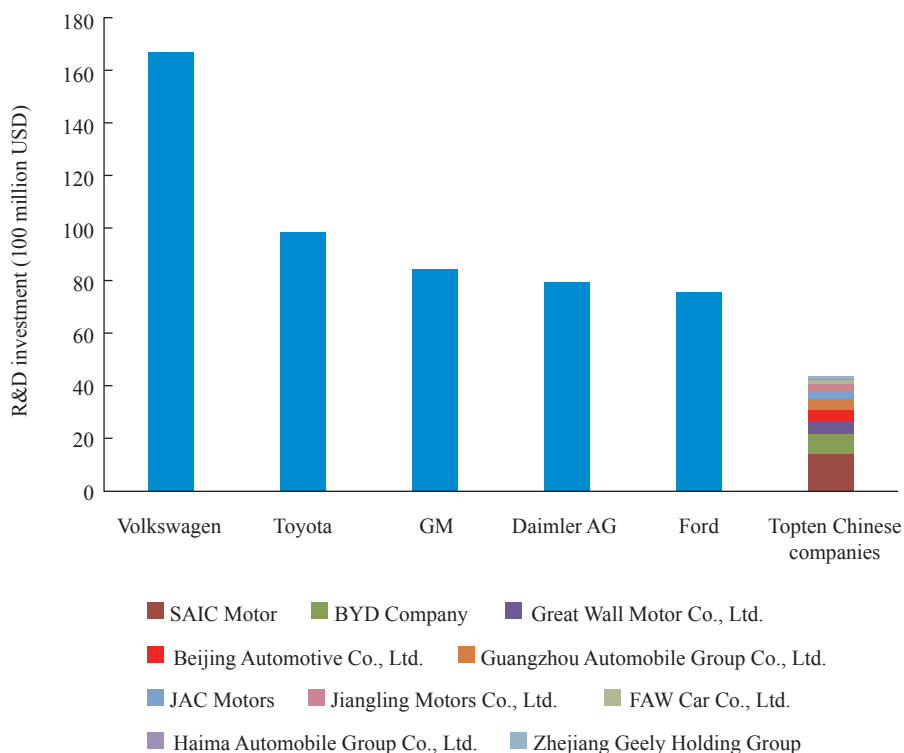


Fig. 3. Comparison of some Chinese and foreign automobile companies in terms of R&D investment

2.2.5 Imperfect market competition

For a long time, China has implemented strict management and control over the automobile industry, and has adopted relatively strict examination and review systems, in addition to establishing relatively high thresholds for corporate investment, market access, and product certification. These regulations have, to a certain extent, restricted the development of weak Chinese firms. In addition, the joint-venture model adopted to help the Chinese automotive sector to catch up has caused many state-owned enterprises (SOEs) to become dependent on the formation of joint ventures, without being able to achieve the objective of improving core technological competencies. In addition, imperfect mechanisms for Chinese automobile companies to exit the market have exacerbated unfair market competition and slowed the process of the survival of the fittest, thereby restricting the

healthy and sustainable development of China's automobile industry. Another manifestation of imperfect market competition is the strict local protections. In China, local protections related to automobile industry investment, construction, production, and use are ubiquitous, leading to redundant construction and structural adjustment problems. These measures have made it easy to squeeze out market competition for local automobile firms and deviate from the objective of establishing a unified national market environment.

2.2.6 Irrational automobile-tax system

China's automobile-tax system structure is irrational, and has been unable to give full play to its guiding role in achieving "less ownership and more use" among users. This phenomenon is harmful to achieving intensive use of automobile products. Tax

rates for China's current vehicle-consumption taxes, vehicle and vessel taxes, and other taxes have generally been established according to engine capacity, leading many companies to focus on reducing engine capacity rather than improving fuel-efficiency technology, a situation that does not help improve efficiency or reduce emissions. In addition, tax rates have not been established according to fuel-consumption volumes, which does not help to guide the market toward energy-saving consumption. The uneven distribution of tax-collection responsibilities among China's central government and local governments has led to a situation in which local governments "promote production and restrict consumption," and encourage local protectionism, thereby harming efforts toward low-carbon environmental protection. Because taxes levied on vehicle purchases and consumption taxes are established according to vehicle prices, taxes for high-tech products are increased, which is harmful to the promotion of energy-saving and new energy vehicles.

2.2.7 Insufficient strength and vitality of SOEs

The incomplete appointment and incentive mechanisms for the market-guided selection of personnel in SOEs, in addition to the insufficient intensity of employment and salary-incentive mechanisms, have led to the failure to form a competitive employment system suitable for modern corporate development. The phenomenon of administrative leadership among corporate managers has yet to be changed, and this system tends to over-emphasize the maintenance and increase of state-owned assets and operational performance during an executive's term in office, and is not effective for long-term sustained investment. Corporate administration structures remain imperfect, and review mechanisms and checks and balances suited to the principles of automotive development have yet to be effectively formed. Many SOEs only satisfy short-term development objectives, and lack strategic thinking for long-term development, while overlooking the need to improve their own independent capabilities. As such, there remains a significant gap between state-owned automobile companies and strong automobile companies in terms of long-term strength, vitality, and competitiveness.

2.2.8 Talent development needs to be strengthened

Currently, the number and quality of personnel in China's automobile sector is relatively low, and there is a notable shortage of R&D and technological personnel, making it difficult to satisfy the demands of automotive development. If we take the case of automobile manufacturers, in 2015, China had 3.6 million personnel engaged in the automobile industry, and 493 000 automotive technology personnel, constituting only 13.7% of the total, compared to around 30% in developed countries. China's automotive R&D personnel totaled 217 000, accounting for only 6% of total personnel; by comparison, this figure is more than 10% for major global automobile companies. In Chinese

automobile firms, mid- to high-level technicians generally account for fewer than 15% of personnel, significantly lower than the figure for major foreign automobile companies (generally more than 40%). In addition, elements such as the personnel structure of China's automobile industry personnel, level of academic experience, and accumulated professional experience lag significantly behind countries with developed automobile industries. In addition, the education of China's automotive personnel is far from able to satisfy development requirements, with automotive-engineering programs (including automobiles, tractors, locomotives, and military vehicles) in China's higher-education system all being secondary disciplines, and facing restrictions related to the status of program objectives and curriculum establishment. In addition, along with the growing connotations and connotations of automobile industry development, simple personnel-training models are unable to satisfy the interdisciplinary personnel requirements for automotive development in new and emerging fields

2.2.9 Prominent contradictions between automotive and social development

At present, the uneven development of a variety of factors in China's automobile industry and society, such as energy resources, environment, transportation, safety, and culture, has severely restricted the development of the automobile industry, and national development as a whole. One reason for this is the severity of energy resource consumption; automobiles consume a large volume of energy over their life cycle, in addition to a great deal of resources including steel, aluminum, rubber, and glass. In China, more than 50% of total petroleum consumption comes from automobile energy consumption, significantly threatening China's energy security. The second reason for this phenomenon is that the environmental pollution caused by automobiles is growing more severe, and automobile exhaust has become the primary cause of air pollution in major cities. In addition, improper automobile manufacturing and disposal processes severely pollute bodies of water and soil. The third reason for the above situation is that Chinese urban traffic congestion is commonplace, and the difficulty of operating or parking a vehicle in the city, and the disorderly traffic situation, are becoming increasingly severe. Fourth, China has poor road traffic safety, and China ranks first in the world in terms of the number of fatalities from road traffic accidents. The total number of traffic accidents is large, and the fatality rate is high, especially the number of terrible traffic accidents is large. Fifth, China lacks macro-level guidance and micro-level practices for the establishment of a car culture. Few national policies are related to car culture, and there is insufficient guidance related to key cultural qualities such as environmental friendliness, innovation, energy savings, convenience, civility, or sharing. In addition, outside cultural influences are strong, leading to the lack of a car culture with Chinese characteristics. As China's car ownership increases

rapidly, the influence of automotive society will become deep and wide-ranging. As a result, the establishment of an automobile power should not be confined to the strong development of the automobile industry itself, but care should also be taken to encourage the development of an environmentally friendly cycle including each link in the automobile industry chain. In addition, it is important to work vigorously toward the coordinated and balanced development of the automobile industry and society.

2.2.10 Severe development challenges in emerging fields

First, China is overly dependent on policies for the development of emerging fields. For example, China's early policy support methods for the development of new energy vehicles were overly broad and simple, and adopted methods such as direct subsidies based on volumes of electric vehicle batteries. Although these policies were somewhat effective initially, they had poor sustainability. Second, substantive global breakthroughs in core technological areas such as electric vehicle batteries, hydrogen fuel batteries, and autonomous driving have yet to be achieved, leading to significant uncertainty related to the future development orientation of the automobile industry. Third, China lags significantly behind other countries in terms of its technological standards in emerging fields, in addition to lacking fundamental technological reserves. For example, with regard to high-tech sensor technologies including laser radar and millimeter wave radar used in smart vehicles, or key fundamental components, core products and key technologies such as automotive electronics, electronic control systems, and specialized chips are still controlled by foreign companies. Fourth, new operational models such as asset-light OEM manufacturing, platform economies, and vehicle sharing have brought significant opportunities for the development of the automobile industry through transformation and upgrading. However, these developments also bring with them significant challenges.

3 Strategic thinking for the establishment of an automobile power in the new era

3.1 Analysis of principal contradictions

Based on the above research analysis, this paper will now describe principal contradictions currently facing automobile industry development from the perspectives of the automobile industry and automotive society.

The principal contradiction facing the development of China's automobile industry is the incompatibility between increasing development needs of the automobile industry and the overall environment of development. This means that China has not yet been able to formulate a top-level design for industrial development based on the connotations and denotations of the continuous expansion of the automobile industry and the inherent principles governing market competition. In general,

China has yet to establish a healthy development environment for the operation of the automobile industry, leading to the long-standing situation in which China's automobile industry has exhibited superficial prosperity, while actually being relatively weak.

The principal contradiction facing the development of China's automotive society is the incompatibility between the growing public demand for automobile travel and China's social resource-carrying capacity. With continuous social development, increases in people's income levels, and the large-scale popularization of automobiles, China's energy resources, environment, and road infrastructure have either approached or surpassed their maximum automobile-carrying capacities, and the severity of a series of social problems such as energy-resource shortages, environmental pollution, road safety issues, and urban congestion have damaged the public's automotive travel experience, and put public health and overall social development in jeopardy.

The above contradictions can be summarized as the disequilibrium between China's automotive development and overall socioeconomic development. This contradiction is also closely linked with a statement by President Xi Jinping at the 19th CNC National Congress: "What we now face is the contradiction between unbalanced and inadequate development and the people's ever-growing needs for a better life." From the above, it is evident that the principal contradiction facing the development of China's automobile industry is also prominent a principal contradiction currently facing Chinese society.

3.2 Strategic and tactical orientation

On the basis of the above research analysis, it is also apparent that the establishment of an automobile power is a complex and systematic project. In order to execute a systematic project, systematic thinking is required, and so this paper suggests the following strategic and tactical orientations.

First, reform leadership and drivers of innovation must be provided. In one regard, with help from the current trend of "comprehensive deepening of reforms," it is necessary to fundamentally resolve prominent issues that have long resisted resolution. Strategies such as "demolishing the old in order to construct the new," "demolishing first and then constructing," and "large-scale demolition and large-scale construction", are good guide to solving longstanding problems. In order to solve these problems, bold and resolute reform measures are necessary. In another regard, innovation is the central driver of automobile industry development, and in order to address issues of automobile industry development in the new era, China should strongly promote innovation on various levels, such as conceptual innovation, management innovation, technological innovation, and business-model innovation.

Second, China must generally promote the automobile industry and make key breakthroughs. Automobile industry develop-

ment is a systematic project that relates to a wide breadth of topics, has a strong influence and strong correlations, and concerns complex constraining relationships. This means that if one link is weak, this can easily lead to a “weakest link effect.” As such, at the current stage, China must generally consider how to promote the establishment of an automobile power from the perspective of overall development. At the same time, in order to manage complex problems, China must make key breakthroughs, become adept at grasping key links, locate “breakthrough points,” find important clues in complex situations, and solve complex problems with decisive action. Using these methods, China will be able to address these problems with effective strategies and techniques.

Third, China must lay a strong foundation in order to expand its advantages. At present, China possesses a healthy foundation for automobile industry development, and even boasts competitive advantages in some areas. Under these conditions, China must continue to build a strong foundation and strive more vigorously to improve quality. This is especially true given the arrival of the current automobile revolution. In this context, China should expand its existing advantages, give full play to the institutional advantages of the concentrated power of socialism in the accomplishment of major projects, and actively establish new advantageous positions.

Fourth, China must identify methods of adjusting to changing circumstances and strive to move forward. In one regard, modern development circumstances change rapidly, and technological reform moves quickly. Only by adopting a continuously observant and flexible attitude is it possible to adapt to the rapid pace of modern automotive development; this outlook also happens to be the spirit of the modern Internet industry. As such, through a strong ability to identify and respond to changes in automobile industry development, it is possible to overcome competition. In another regard, deception and the failure to carry out stated intentions are intolerable in automobile development. Rather, it is necessary to act according to current circumstances, find solid ground upon which to move forward, increase the intensity of reform and technological investment, and truly strive to improve the quality of products and services.

In summary of the above, China must give full play to its various unique advantages and organically integrate them with the fundamental principles of current automotive development. In doing so, China can construct a clear and appropriate strategy and highly efficient and practical tactics in order to determine a Chinese path to establishing itself as an automobile power in the new era.

4 Principal measures and key orientations

4.1 Principal measures

The first important measure that should be adopted is the

establishment of a new-era automobile power strategy to promote top-level design and guidance for the establishment of an automobile power. Based on the precondition of coordinating automotive and social development, the objective of an automobile power strategy is to transform the automobile industry from a large to a powerful industry. In the process of establishing and implementing this automobile power strategy, one should focus on making early breakthroughs in key fields and jointly implementing short-, medium-, and long-term strategies. This means that the strategy for establishing an automobile power in the new era requires that the status of the automobile industry within the national economy must be affirmed, and macro-level guidance for the coordinated and balanced development of the automobile industry and society must be provided.

The second measure that should be adopted is to establish leading groups for the establishment of an automobile power. As an overall body for the development of the automobile industry, such a group would conduct centralized planning and promotion for the establishment of an automobile power. A leading group would carry out centralized oversight of automobile industry development, while also coordinating relevant sectors and resolving cross-sector, cross-industry, and cross-field automotive and social problems. It is noteworthy that centralized management does not necessarily equate to stronger management. Rather, in order to develop the large automobile industry into a powerful industry, excessive management functions should yield to market forces, and the role of the “invisible hand” of the market should be given full play.

Third, China should strengthen its support for think-tanks and use scientific decision making and leadership to achieve automobile industry development. Combining top-tier expert resources from government, corporations, industrial organizations, scientific research bodies, and institutes of higher education to establish an automobile power expert consultant committee to serve as a permanent state-level think-tank for automobile industry development will make it possible to provide decision-making consulting for the establishment and execution of automobile power strategies. China should establish a China automobile development strategy research institute to lead continuous rounds of topical research, conduct survey studies on key or general issues related to the establishment of an automobile power, and timely propose development tactics and program recommendations, thereby providing decision-making support for the execution and promotion of the automobile power strategy.

4.2 Key orientations

The first key orientation that should be adopted is the deepening of institutional and mechanism reforms. According to the overall implementation of “comprehensive deepening of reforms,” China should accelerate the implementation of institutional and mechanism reforms in the automotive sector,

eliminate ideological and institutional barriers that restrict automotive development, revise longstanding institutional rules that hamper the development of the automobile industry, and give full play to the decisive role of the market in resource allocation. First, with regard to the reform of management systems, boundaries between the government and the market should be clarified; oversight roles of the government should be optimized; existing oversight structures should be revised; and the management in middle and post stage should be greatly strengthened. In addition, China should continue to simplify administration and decentralize power, return decision-making power over automobile industry development to market actors, and adopt a free and fair market–environment orientation with regard to government management. Second, with regard to tax system reforms, China should promote the establishment of a tax system that encourages environmental friendliness, optimizes the tax structure, and guides the transition of tax collection from manufacturing to consumption, thereby shifting from a tax system that “suppresses purchase and encourages widespread use” to one that “encourages purchase and suppresses use.” Third, the promotion of reforms among state-owned automobile companies should be accelerated, and diversified ownership system reforms and corporate organizational structure reforms, which encourage corporate vitality and efficacy, should be strongly promoted.

For the second key orientation, China should promote the advancement of law-based management. Law-based management is commonly employed to manage the automobile industries in developed countries and is a necessary tool and path for achieving the modernization of the automobile industry and for the sustainable development of an automotive society. At present, China must gradually promote automotive legislation. In the short term, it should establish Regulations for the Management of Vehicle Production, and in the long term, it should learn from the experiences and practices of countries with developed automobile industries and establish a Road Vehicle Act to clearly regulate the closed loop of the entire life cycle of automotive products through law-based management. In addition, it must accelerate the improvement of systemic technical regulations for automobile management, promote the standardized construction of automobiles, and explore new methods such as government-led and market-led standard-setting. In addition, China should accelerate the establishment and improvement of a standard system that is suitable for China’s situation and that is internationally compatible. Furthermore, the law-based management of the automobile industry is also a fundamental path for resolving issues of overlapping management.

Third, China must be resolute in its continued expansion of market openness. Investment review and approval processes and production and market-entry thresholds should be scientifically determined for the automobile industry in order to allow qualified market actors to freely enter the automobile industry, and the focus of management should be shifted from “firm manage-

ment” to “product management.” In an orderly manner, in separate stages for different sectors, China should remove restrictions on maximum investor equity percentages; improve mechanisms for automobile firms to exit the market; vigorously remove local protections; and generally produce a free, fair, competitive, orderly, and open market environment in order to promote the home-field advantages of Chinese brands and companies. In particular, the government and industry must take note of the current wave of joint ventures in the field of new energy vehicles and adopt certain measures and methods to avoid dependence on joint ventures from recurring.

Fourth, China must commit to innovation leadership. Technological and managerial innovation in automobile industry development can guide the overall development of innovation throughout China’s industrial system and thereby lead to overall technological progress. First, market development dividends can be awarded in exchange for technological innovation in order to incentivize industries and firms to expand their investment in innovation. Second, China should establish a national automobile industry innovation development fund, a Chinese automotive innovation council, and a modern national automobile industry joint innovation center to combine innovation resources and link the innovation chain of technological innovations from theories into market application. Third, fiscal and funding support should be provided to fundamental generic key technologies and forward-looking technologies, and a technology reserve system for fundamental and forward-looking technologies should be gradually established.

Fifth, the coordinated development of the automobile industry and society should be promoted. Achieving the healthy and coordinated development of the automobile industry and society is not only a requirement for overall national development, but is also a responsibility and duty of the development process of the automobile industry, in addition to being the basis and precondition for the healthy, stable, and sustainable development of automobiles. When determining and implementing strategies for establishing an automobile power, it is necessary to fully consider the coordinated development between the automobile industry and society, which must be promoted through overall national planning, and cooperation between industries and corporations. The focus of current development is placed on coordinating the development of automobiles with areas such as new energy, the environment, road safety, and urban transportation. The experiences of developed countries show that supply-side efforts such as broadening roads and restricting automobile production and sales cannot easily resolve conflicts between automobiles and society. Learning from the experiences of advanced countries, China should increase the intensity of demand management with regard to automobile and social development. In addition, China must strengthen its establishment of automotive-cultural soft power and guide automotive development toward innovation, energy savings, environmental protection, environmental friend-

liness, safety, and convenience.

Sixth, China should respond actively to new technologies, new models, and new industrial patterns. In one regard, Chinese new energy vehicles and intelligent vehicles are currently at a critical breakthrough stage of development, but have yet to form competitive advantages when compared to advanced global competitors. As such, strategies for the establishment of an automobile power should emphasize the fields of new energy and intelligent vehicles, and encourage the government to make proposals to guide sustainable development. In addition, this strategy should improve management practices and relevant laws, regulations, and standards, and promote technological innovation, industrial development, the establishment of an automotive component system, and the construction of basic infrastructure in a planned, step-by-step manner. In another regard, China should lead industrial transformation and upgrading through technological innovation by vigorously developing advanced technologies such as lightweight technologies, autonomous driving technologies, smart transportation technologies, wireless charging technologies, and 3D printing technologies. At the same time, it must quickly remove local protections in the development process for new energy vehicles and reduce administrative intervention by the government.

Seventh, China must boldly develop overseas markets and find a path for foreign expansion. In order for China's automobile industry to develop from a large one into a powerful one, it must expand its development outside of China. Among the world's automobile powers, moving from the domestic to the global market is a necessary principle governing automobile industry development. In China's strategy for its development as an automobile power, it must first clearly propose sub-strategies for automobiles from Chinese brands to enter the global market, and form a top-level strategy for this process of entering the global market. By actively negotiating trade agreements and bilateral investment protection agreements, China can create a healthy policy environment for its automobile companies to enter the global market. Second, it must take advantage of the opportunities for expansion and opening provided by the Belt and Road Initiative, and actively engage in international development by increasing its support through funding, taxation, R&D, personnel, and various services. Third, China's government decision makers, corporate managers, and all actors throughout the industry should establish an open and innovative view of connecting with the outside world.

Eighth, China should continue the cultivation of automobile industry talents. Personnel are the most valuable resource and the core force behind all business successes. Personnel are the force driving the sustainable development of the automobile industry and the foundation for the establishment of automobile powers. Talented personnel come from highly effective personnel-training systems, and China currently needs to establish a multi-level interdisciplinary personnel-training system in response to the

demands of automobile industry development. In addition, it should strengthen the development of human resources, support the combination of personnel introduction and cultivation, and promote the establishment of a series of high-quality, specialized automobile industry personnel teams, including management, R&D, technical, marketing, and service teams. At the same time, it should strengthen vocational education and skills training, and open up channels between ordinary education and vocational education. With regard to ordinary education, there is an urgent need to strengthen the establishment of specialized automotive disciplines and increase the status of the Vehicle Engineering discipline to a first-tier academic discipline. The establishment of automobile industry personnel requires joint efforts and coordinated promotion by multiple departments, including the Ministry of Industry and Information Technology, the Ministry of Science and Technology, and the Ministry of Human Resources and Social Security.

5 Conclusions

The next thirty years will coincide with China's leapfrogging transition period from a large country into a powerful one. In addition, this period will be the core development stage of a round of technological revolutions and industrial reforms. This will provide China with major opportunities to develop its automobile industry; as such, it is crucially important for China's overall development that it grasp this series of opportunities for automobile industry development and accelerate the overall improvement of automobile industry development. China must improve its ability to identify and seize opportunities, boldly greet challenges, and adopt the courageous spirit of reforms to break through all manner of constraints. It must heartily encourage competition, expand openness, support independent innovation, and actively develop a strategic high ground for automobile industry development. In addition, China should expand and strengthen its brands; actively participate in international competition; accelerate the coordinated, balanced, and sustainable establishment of an automotive society; and take advantage of the major driving role of the development of the automobile industry in overall national development. These actions will contribute significantly to the achievement of the Chinese dream of national rejuvenation.

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