

# Analysis on the development direction of circular economy theory in automobile industry market and economic and technical conditions

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**Abstract.** With regard to the analysis of China's automobile industry market and development direction, we should not only consider the pulling effect of domestic economic growth, changes in consumption structure and industrial structure on automobile demand, but also the international experience of the relationship between per capita income level and automobile ownership rate, and more importantly, we should reflect on the traditional economic development model and find a new development model that effectively balances the relationship among economy, society, environment and resources. It is an inevitable trend for the development of automobile industry to take the circular economy mode, and it is the general trend of implementing the sustainable development strategy. In this situation, all kinds of technical ways to deal with the problems of resources and environment have their advantages and cannot be replaced. However, the research on circular economy of automobile industry in China has just started, and the basic material flow table and data analysis model of automobile products have not been established. This paper analyzes the traditional development mode of automobile industry, discusses the economic development direction of automobile industry and the development mode of circular economy in automobile industry, so as to keep up with the general trend of China's sustainable development strategy.

**Keywords:** Circular economy, Automobile industry, Economy, Technical condition.

## 1. Introduction

In the past 100 years, earth shaking changes have taken place in the world. From the industrial revolution to the third wave, from agricultural economy to knowledge economy, human society is developing and making progress at an unprecedented speed [1]. How to compete under economic globalization has become a hot topic for governments, international organizations and academia all over the world. It has important practical significance for China's deepening reform and opening up, stepping on the world economic stage and becoming a medium-sized developed country in the middle of this century [2]. Automobile has become an indispensable means of transportation for modern people. The automobile industry has played an important role in the economic growth of developed countries. It will also continue to play an important role in the industrial structure adjustment and economic catch-up of large developing countries like China [3]. At present, the technology of vehicle manufacturing has gradually become transparent, but foreign capital extends its control to the whole automobile production chain and is deeply in the hands of foreign investors. However, we are still at the bottom of the assembly and sales in the whole automobile production chain passively dependent on multinational corporations, and the top is the R & D and Creation Department of new products in the enterprise, and the core technology can not be touched at all [4]. Another key reason for China's vigorous development of the automobile industry lies in its great relevance to other industries. It not only brings huge economic and social benefits, but also serious environmental problems [5]. With the increase of vehicle use, the number of scrapped vehicles is also increasing day by day. The stacking of scrapped vehicles has caused serious land, air and water pollution [6]. Under the pressure of environmental protection and the shortage of resources, in order to seek long-term development, the development of circular economy has become an inevitable choice for the automotive industry. Therefore, it is necessary to deeply explore the development model of circular economy in the automotive industry.

## **2. Traditional development mode of automobile industry**

The traditional development mode of automobile industry mainly includes six links: raw material supply, automobile design, manufacturing, sales, use and scrapping. The supply of raw materials, such as steel, iron, aluminum, magnesium and metal, is the foundation of the development of the whole automobile industry and is related to the production mode of the whole automobile industry [7]. The type and quantity of raw materials used will limit and restrict the subsequent automobile design and manufacturing. China's auto parts industry enterprises are generally small in scale, backward in technology, low in repetitive production, and slow in product upgrading.

Since China joined WTO, attracting foreign investment, China began to pay attention to the development of automobile industry. At first, it wanted to introduce foreign-funded enterprises into China, expand market demand, change the backward situation of domestic automobile industry technology, and improve the independent research and development level and industry management ability of China's automobile industry as a whole through reference and technology spillover effect. Although China has a vast market, in the early days, due to its inexperience, it could only attract foreign investment by transferring part of the market, in order to acquire the technology we finally want from foreign investors. As a country that started the automobile industry in China, in addition to the early introduction of foreign technology, it is necessary to improve its product manufacturing capability and management level. The most important thing is to absorb advanced technology and experience, continuously develop and develop by itself, and have the ability of product innovation to meet the needs of the domestic market.

## **3. New mode of joint venture and cooperation in automobile industry under the concept of circular economy**

### **3.1 Strategic development of joint venture and cooperation in automobile industry**

China's automobile industry is in a weak position in the global competition pattern, so it is imperative to accelerate the upgrading of China's automobile industry structure and improve its international competitiveness. It is a very common phenomenon for multinational companies and competitors to carry out strong cooperation around common technology platforms, to carry out in-depth technology research and development, and to reduce research and development costs [8]. The joint development between Chinese and foreign automobile enterprises is of great significance, and it has established an effective cooperation mechanism for sharing benefits and risks. In order to further accelerate the integration of independent brand production and marketing in China's automobile industry, many policies and rules promulgated by the government in recent years have greatly supported the growth and development of national brands. The policy positively stimulates the consumer market, and to a great extent, it also drives the increase of some listed companies' stock markets. Under the background of global economic integration, how to achieve a win-win situation between joint venture brands and independent brands will determine the future development trend of Chinese automobiles. The big data integration framework of automobile industry is shown in Figure 1.

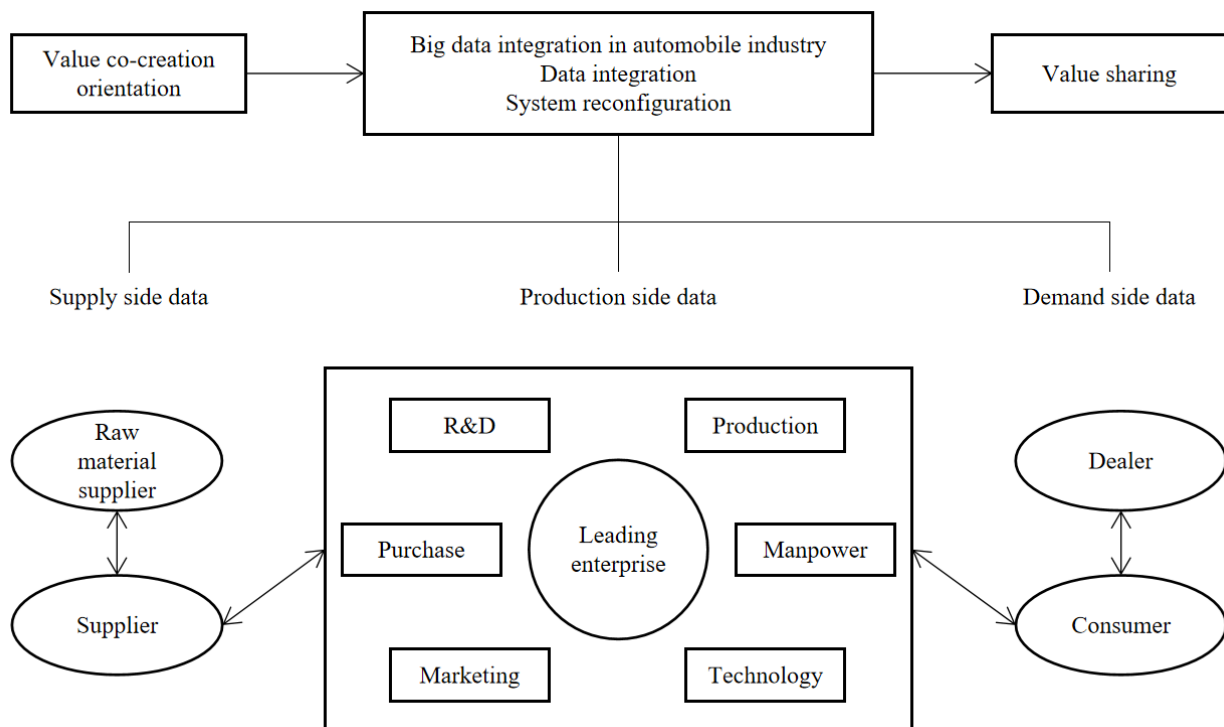


Figure 1 Big data integration framework for the automotive industry

In addition to the government's change of ideas, it is more important for enterprises to change their ideas. Enterprises should organize production and operation as soon as possible according to international standards, practices, market demand, products, prices and other requirements, promote technological progress and innovation, and gradually transform the operation mechanism of enterprises to international norms, and finally establish a new mechanism to adapt to domestic and foreign markets. In order to be in line with international standards, we must carefully absorb and learn from foreign advanced marketing methods. Advanced marketing methods provide the technical guarantee for the foreign automobile manufacturing industry to change from mass production to mass customization production. China's automobile after-sales service market still has great potential. The lag of automobile after-sales service and the lack of second-hand car market in China are not conducive to the circulation of used cars, which makes the upgrading of automobiles unable to be realized smoothly and hinders the rapid development of China's automobile industry.

### 3.2 Development model under circular economy

The practice of circular economy first took place in the western industrialized countries, and the most direct driving factors were the large land occupation, high cost and lack of resources when the traditional landfill method was used to treat wastes. This idea originated from garbage disposal, and then gradually expanded to the fields of production and consumption. Although China's environmental and economic situation is different from that of developed countries, with the rapid economic development after the reform and opening up, resource shortage and environmental deterioration have become major obstacles to China's development. In this situation, the concept of circular economy has been continuously put forward and deepened, and various development models have emerged as the times require to improve the traditional development model based on the massive consumption of resources and energy and environmental damage.

Reduction principle is one of the main principles of circular economy design. As far as the automobile industry is concerned, the principle of reduction is mainly reflected in the design and manufacture of automobiles. In the design and manufacture stage, the materials used, the use mode of materials, the manufacturing process, the sales strategy and the scrapping mode are considered, so as to reduce the amount of materials and energy, especially to control the use of non-renewable and

polluting materials. On the other hand, the principle of recycling is reflected in the complementary and symbiotic mode of automobile industry and other related supporting industries. For automobile industry, the choice of raw materials and energy consumption are the main sources of environmental problems [9]. The key to realize the development of circular economy in automobile industry is to change the open loop of traditional production mode into the closed loop of economical economy, and at the same time, reduce the generation of pollutants. The main materials of automobiles are steel, pig iron, rubber, paint, glass, aluminum alloy, copper, lead, plastic, etc. If the scrapped vehicles are not classified, disposed and recovered in time, the scrapped vehicles will occupy a large accumulation site, and will soon lose the value of recycling under the action of wind and rain [10]. The goal of circular economy is to form a closed circular process of "resource utilization-product-resource regeneration", and waste resource regeneration is the last key link. The improvement of materials includes research and development of new materials and recycling of waste, improvement of materials used in the manufacture of car bodies and internal components, and replacement of heavy materials with light materials that meet the strength requirements, so as to achieve the purpose of reducing resource consumption and saving energy. The circular economy management mode is shown in Figure 2.

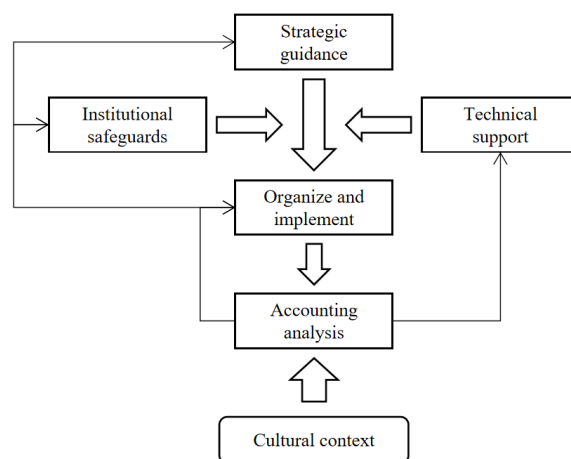


Figure 2 Circular economy management model

Using alternative energy sources and developing alternative fuel vehicles is another way to solve the petroleum energy crisis and environmental pollution problems. By organizing the material circulation among processes in the factory, the production chain is prolonged, the amount of materials and energy used in the production process is reduced, and the discharge of wastes and toxic substances is minimized. According to the principle of industrial ecology, through the material integration, energy integration and information integration among enterprises, the metabolic and symbiotic coupling relationship between industries is formed. Reduce resource utilization and energy consumption in the automobile manufacturing process, and realize remanufacturing to the maximum extent after the end of product life. The product design should consider the impact on the environment from the perspective of the whole life cycle of the automobile, unify the economic benefits, social benefits and environmental benefits, and fully consider the recycling of materials. The research can improve the environmental friendliness and the utilization rate of energy and resources in all stages of the product life cycle. The investment, production and marketing of enterprises are first considered from the domestic demand.

The construction of eco-industrial park is very important for the development of circular economy in automobile industry. Build a series of related supporting industries and mutually beneficial symbiotic industries together. Through the continuous use and recycling of products, the output of wastes is reduced and the service life of products is prolonged. The original intention of the construction of automobile eco-industrial park is to maintain the environmental friendliness and sustainable development of the industry. Compared with a single metabolic chain, the eco-industrial

network is more complex in form and more complete and comprehensive in function. It is a large system with several elements, such as production system, sales system, recycling system, etc., and all elements realize value-added through the flow of materials, which is not something that an enterprise can accomplish by itself. Because the automobile industry has a large correlation and a wide coverage, it needs a strong information network to organize these scattered elements. The leading enterprises in the industry have great advantages, and some groups have already seized the business opportunities and intervened in the circular economy, and gained great economic and social benefits.

#### 4. Conclusions

China's environment and economic situation are very different from those of overseas countries. Compared with China's large population, China's natural resources are poor and in short supply. In order to achieve rapid and sustained economic growth under the constraints of resources and environment, it is necessary to change the development model. The circular economy model of automobile industry is the inevitable outcome of cultural development, concept change and scientific and technological progress, which reflects the role and influence of contemporary ecological civilization on automobile industry. At present, China's automobile recycling and recycling enterprises with certain scale capacity are in the bud. In order to speed up the rise of circular development, it is necessary to have the active participation and support of leading enterprises in the industry. The correct policy orientation and mechanism can also quickly guide the prosperity and development of the industry, improve the quality and level of joint venture cooperation through independent development, cultivate the ability and conditions of independent development through joint venture cooperation, innovate the development of new energy vehicles, save energy and reduce emissions, and have both quality and quantity. We can learn from the industrial policies of developed countries, provide ideas for the development of China's automobile society, shoulder the burden of circular economy development of automobile industry, and seek a road of harmonious and sustainable development of resources, environment and social benefits for the development of automobile industry.

#### References

- [1] Wu Feimei, Chen Wanghai. Research on the development of my country's new energy vehicle industry from the perspective of circular economy [J]. Journal of Shandong Agricultural Engineering Institute, 2020, 37(5):5.
- [2] Lv Zheng, Fang Sheng, Tao Tianyi. Research on sustainable development strategy of semiconductor lighting industry from the perspective of circular economy [J]. Transportation Enterprise Management, 2019, 34(2):4.
- [3] Wang Jun. On the high-quality development direction of the scrapped automobile industry [J]. Resource Regeneration, 2019(7):4.
- [4] Zou Ruirui. The impact of the automobile industry on economic development [J]. Cooperative Economy and Technology, 2016(14):2.
- [5] Lu Yanhui, Chen Hui, Liu Jiashuo. Analysis of the Economic Impact of the "Double Points" Policy on the Development of my country's New Energy Vehicle Industry [J]. Chinese and Foreign Entrepreneurs, 2019, 635(09):126-127.
- [6] Xu Weiqi, Shu Fanghui. Cointegration Analysis of Automobile Industry and Economic Growth in Yancheng City under the Background of Economic New Normal [J]. China Collective Economy, 2020(19):3.
- [7] Xiao Lili. Economic Development Strategy of New Energy Vehicle Industry [J]. Marketing Industry, 2019(48):183-184.

- [8] Song Wanze. Reflections on revitalizing Jilin's economy based on the interconnected smart car industry [J]. Industry and Technology Forum, 2017, 16(16):2.
- [9] Xu Jiawei. Transformation, upgrading and pattern reconstruction of the automobile industry in the Central Plains Economic Zone [J]. Jiangxi Social Sciences, 2017, 37(2):8.
- [10] Zhang Yang. Analysis of the overall planning of domestic waste recycling economy industrial park [J]. Environmental Sanitation Engineering, 2018, 26(3):3.