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How to integrate the intelligent automobile industry chain

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Abstract: The COVID-19 has had an impact on the automobile industry chain. A good intelligent connected automobile ecological industry chain is not only conducive to the resumption of production, but also conducive to stabilizing economic expectations, which plays an important role in stimulating economic growth. This paper discusses the connotation and construction of the intelligent connected automobile ecological industry chain, compares the research status at home and abroad, takes Shenzhen intelligent connected automobile ecological industry chain as an example, analyzes the difficulties and shortcomings of the intelligent connected automobile ecological industry chain, and puts forward relevant countermeasures and suggestions. It provides reference for the construction of the ecological industrial chain of ICV.

Keywords: Intelligent connected vehicle; Ecological industrial chain; Predicament; Countermeasure research.

1. Introduction

In 2018, the Ministry of Industry and Information Technology issued the Action Plan for the Development of the Internet of Vehicles (ICV) Industry, which specifies the key technologies, standard systems, infrastructure, application services and security of the Internet of Vehicles.

The sudden COVID-19 epidemic has brought unprecedented impact to the economy. On the one hand, high-quality development of the manufacturing industry is facing unprecedented difficulties, and the long-term established traditional automobile industry chain has been hit hard; On the other hand, the epidemic has also led to a rapid decline in investment demand in traditional industries. The country has taken investment in new infrastructure (such as 5G) as the future direction of infrastructure construction, providing a strong starting point for the construction of the intelligent connected vehicle industry chain. A sound automobile ecological industrial chain is not only conducive to the resumption of production, but also conducive to stabilizing economic expectations, and plays an important role in stimulating economic growth.

2. Connotation and characteristics of the ecological chain of the intelligent connected automobile industry

2.1. Intelligent Internet of Things vehicle

The academia has not given a definition of the concept of ICV, which is defined by the industry (China Automobile Industry Association) as: carrying advanced on-board devices, integrating modern communication and network technologies, realizing intelligent information exchange and sharing between vehicles and Z (people, vehicles, roads, background, etc.), with complex environmental awareness, intelligent decision-making, collaborative control and other functions, enabling safer, more comfortable, energy efficient driving, And finally replace the new generation of cars . Its core features mainly include three aspects: 1) vehicles based on automatic driving technology (intelligence) gradually replace people, and continuously expand automatic functions to reach the level of unmanned driving; 2) Realize information exchange between vehicles and the outside world based on the Internet (network connection), such as vehicle road communication and vehicle vehicle communication; 3) Voice interaction system based on vehicle borne artificial intelligence technology (intelligence), etc.

2.2. Intelligent connected automobile industry chain

The upstream, middle and downstream of the ICV industrial chain respectively contain key systems, system integration and application services.

2.2.1. Upstream: key systems

The upstream covers the perception system, decision-making system and communication system. Among them, the sensor is the core part of the perception system, which can obtain accurate and comprehensive information for ICV; The function of the decision system is to predict the vehicles and make driving decisions instead of humans. Among them, the vehicle intelligent computing platform is the focus of the global intelligent networked vehicle decision-making system competition; The communication system is an information interaction platform that connects vehicles and (people, vehicles, roads and clouds).

2.2.2. Middle stream: integrated system

The midstream covers integrated systems such as intelligent cockpit, autopilot solutions and intelligent connected vehicles; Among them, the automatic driving solution has received much attention. At present, the automatic driving solution mainly includes two aspects: 1) the visual priority route proposed by the "BMW Intel Alliance", which tends to adopt low-cost camera solutions; 2) The multi-sensor fusion route proposed by the "Toyota Nvidia Alliance", in order to deal with the complex application scenarios of automatic driving, is more inclined to the fusion application of high cost laser radar, millimeter wave radar, ultrasonic radar, camera and other sensors. Toyota, GM, Daimler, Chang'an, Tesla, etc. are all laying out midstream integrated systems.

2.2.3. Downstream: application services

Downstream is mainly data value-added services, including travel services, logistics services and other application services. As the core of the downstream of ICV, data appreciation mainly includes decision control data, networked interactive data and industrial service data. By collecting and processing these derived big data, enterprises can provide users with more application scenarios and improve the business valuation of ICV.

2.3. Intelligent Connected Vehicle Ecological Industry

Wu Weifeng pointed out through analysis by comparing the business ecosystem with the traditional industrial ecosystem that the new industrial ecosystem is a new industrial ecosystem where many upstream and downstream industrial (enterprise) communities provide better consumer goods for end-users around the platform core enterprises, and then span the economic activities of multiple industries. Its core feature is that there is more "symbiotic cooperation" relationship between the platform core enterprises and the upstream and downstream industrial (enterprise) communities, and it provides specific needs for end-users and expands the user market. For example, Enterprise A in the downstream application industry (enterprise) community wants to provide services for both users of new industrial ecosystem I and users of new industrial ecosystem II to maximize the number of users.

3. Ecological analysis of Shenzhen ICV industry

3.1. Overall development of Shenzhen ICV industry

Shenzhen's intelligent connected automobile industry covers nearly 100 enterprises, with strong innovation ability. The overall technology is at the leading level at home and abroad. A number of intelligent and networked integrated solution enterprises and key enterprises for complete vehicles and key components have been cultivated. In 2018, the total output value of the city's intelligent connected vehicles and related industries exceeded 21 billion-yuan, accounting for 5.6% of the country's total. It is estimated that by 2021, the market size will exceed 120 billion yuan. At the same time, the Shenzhen ICV industrial chain cluster has widely and deeply served the major domestic vehicles and some international markets, with a very high market share. Huawei's market share in the global communication equipment field is 28%, ranking first in the world, ZTE's global market share is 13%, ranking fourth in the world, BYD's cumulative new energy vehicle sales volume is 24.78%, the market share is close to 10%, ranking first in the world; Shenzhen Hangsheng Electronics has an annual output of nearly 6 million sets of automotive electronic products, with a domestic market coverage of more than 90% and a market share of nearly 23%. It is the first and only enterprise in the domestic automotive electronics industry that has been awarded the "National Certified Enterprise Technology Center" by the National Development and Reform Commission, the Ministry of Science and Technology and other five departments.

3.2. Development characteristics of Shenzhen ICV industry

3.2.1. The industrial characteristics and competitive advantages are obvious, and the scale of the industrial cluster appears preliminarily

In terms of enterprises, Shenzhen has gathered leading enterprises in the fields of global information communication, artificial intelligence, new energy vehicles, unmanned aerial vehicles, unmanned ships, etc., providing a solid foundation for the development of intelligent network connected transportation system.

In the field of basic technologies such as mobile communication, Huawei is the world's largest provider of communication equipment and the world leader in 5G mobile communication technology. In key technology fields such as artificial intelligence, Tencent has actively deployed artificial intelligence and unmanned driving, released the "AIincar" ecosystem, and is committed to solving the driving intelligence of vehicles. In emerging application fields such as automobiles and UAVs, BYD's new energy passenger vehicles and Dajiang's consumer UAVs both rank first in the world. Yunzhou Innovation has become the domestic leader of unmanned ships, providing a good application foundation and carrier for the integrated application and interactive progress of mobile communications, artificial intelligence and intelligent networked transportation systems. In terms of scientific research achievements, Shenzhen has made domestic leading research achievements in key fields such as 5G technology, radar sensors, vehicle gauge level chips, on-board computing platforms, edge computing, etc. It has mastered a number of key core technologies and can realize functions such as V2X collision warning, blind spot monitoring, etc.

As a result of the above foundation, through the effective active guidance and cultivation and development of the Shenzhen Municipal Government, the scientific and technological level of intelligent connected vehicles in Shenzhen has reached the leading level in China, forming different industrial clusters, and some of the subdivided fields are among the world's top. At present, Shenzhen has more than 100 related enterprises engaged in the ICV industry, 36 enterprises above designated size, 21 high-tech enterprises, including ZTE, Huawei, Tencent, BYD and a number of world-class technology enterprises.

3.2.2. Good industrial structure and enterprise quality ecology

In terms of industrial structure, Shenzhen has formed a relatively complete upstream and downstream industrial chain supporting system in the three major fields of intelligent networked automobile industry, namely, intelligent vehicles, information interaction and basic support.

In terms of new products and new business formats, complete technologies, products and service systems have been formed in various fields such as vehicle design and manufacturing, artificial intelligence algorithms and chips, machine vision, laser radar, millimeter wave radar, advanced driving assistance system, V2X communication system, electronic control ECU system, intelligent transportation system, road test and testing, gathering hundreds of related enterprises, and the industry is showing explosive growth.

In terms of enterprise development quality, Shenzhen ICV industry has built a financing model based on supply chain collaboration. This mode refers to the leading backbone

driving the supply chain, forming about 10 large enterprises with outstanding driving ability, high level of resource integration and distinctive characteristics, such as 5G applications, automatic driving solution providers (Huawei, AUTOX), intelligent vehicles (BYD), command traffic (transportation center, Hailiang Technology), automotive electronics (Hangsheng Electronics, Jinyi Technology), laser radar (Sagitar Juchuang) Scientific research institutes (Advanced Academy of Chinese Academy of Sciences, Shenzhen Graduate School of Tsinghua University), industrial finance (Shenzhen Venture Capital), wireless charging (China Southern Power Grid), etc. have driven the in-depth coordinated development of upstream and downstream SMEs.

3.2.3. The industry collaborative technology innovation ecosystem has initially formed, and the level of industry university research cooperation is high

In terms of platform, Shenzhen has established a number of national, provincial and municipal intelligent networked automobile industry innovation carriers, including 10 national level technology innovation carriers and 30 provincial level technology innovation carriers, such as the National Engineering Laboratory of New Generation Mobile Communication Equipment and Terminal Technology, the National Key Laboratory of Wireless Communication Access Technology, the Key Laboratory of Human Machine Intelligent Collaborative System of the Chinese Academy of Sciences The National Engineering Laboratory of Comprehensive Transportation Big Data Application Technology, the Research and Development Center of Intelligent Collaborative Key Technology and Equipment Industry, the Electric Vehicle Research and Development Center of the Chinese Academy of Sciences, and the National Engineering Laboratory of Big Data System Computing Technology have gathered a number of famous universities and scientific research institutions.

In terms of industrial cooperation, Shenzhen's intelligent networking industry has widely carried out industry university research cooperation, relying on Shenzhen's industrial advantages and resources in automobile, transportation, telecommunications, software and other fields, actively carrying out interaction and cooperation of industrial resources and coordinated development; Carry out common technical breakthroughs in 5G communication, v2x technology, intelligent transportation special test facilities and equipment, promote the three-dimensional and in-depth integration of industry, capital and policy, and create a benign ecology of close cooperation between industry, education, research, capital and government. At the same time, we actively carried out cross regional cooperation and exchanges, and increased the cooperation between Shenzhen, Macao and Hong Kong in the industry of ICV. By the end of 2019, Hong Kong universities had set up nearly 100 scientific research institutions in Shenzhen, and some key laboratories had begun to operate.

3.3. Difficulties and deficiencies in the development of Shenzhen's intelligent networking industry

3.3.1. Inadequate industrial policies

In order to promote the development of ICV industry, the state has issued a series of favorable industrial policies to promote the development of ICV industry. However, the relevant industrial policies of China's ICV at the national level and in some regions are only limited to basic areas to shorten the gap between China and Europe, the United States, Japan and other countries. The consistent path dependence and overtaking strategy will lose themselves. Shenzhen also has imperfect and unsystematic policies.

3.3.2. Research and development of core technologies need to be strengthened

Compared with traditional industries, the Internet and artificial intelligence have become the two main lines of development, accelerating the transformation of traditional industries, and intelligent connected vehicles are no exception. Both Google and Tesla in the United States are strong evidences of their core technologies. However, China is only in the primary stage and is struggling; Shenzhen, as a special zone, ranks first in terms of technology in China, but it lags far behind developed countries and regions such as Europe, America and Japan.

3.3.3. Inadequate construction of product testing site and lack of evaluation standards

It is very important to test and comprehensively evaluate the R&D process of ICV. The United States has built test sites such as Smart Road, Mcity and Go Mentum Station to facilitate the test and development of automatic driving technology and V2X technology; The UK and Sweden have also built comprehensive test sites, which can test both intelligent transportation and V2X technology.

Compared with foreign advanced regions, China's test sites are seriously insufficient and standards are lacking. Although Shenzhen is a special zone, these problems still exist. Other domestic cities, such as Chongqing, have rebuilt and expanded the intelligent vehicle test site on the basis of the original traditional test site. For another example, Pingshan is building an intelligent connected vehicle test site, but the existing test site still cannot meet the needs of technology development.

4. Suggestions on improving the industrial ecology of Shenzhen's intelligent network

4.1. Issue and optimize special policies for ICV industry

(1) Properly position the function of industrial policy. At present, it is in the initial stage, and its policy objectives should be to support infrastructure and develop technical standards; However, with the development of the industry, the division of labor, new retail and marketization should be included in the strategic objectives.

(2) Innovate and optimize industrial policy tools. The goal of the policy is to make up for the shortage of the market to protect vulnerable industries. However, as the core force of market cultivation, demand and supply are equally important. For example, consumer credit is used to stimulate the intelligent network to become market demand.

(3) Improve industrial policy governance. Policy governance means that the policy should change with the change of the market, and cannot remain unchanged. Due to the division of knowledge, it is necessary to extensively organize the cooperation of "enterprises, universities, research institutes and governments" to form a united front, so as to form an effective governance of scientific decision-making and policy promotion.

4.2. Promote the R&D and industrialization of intelligent networking core technology

From the perspective of the Internet, we should actively develop highly accurate maps. People increasingly rely on various navigation software, such as Get Maps, Baidu Maps, etc; From the perspective of radar technology, the perception accuracy should be developed to improve security; From the perspective of integration technology, efforts should be made on mobile terminal chips to improve data processing.

It is possible to integrate enterprise resources in the fields of Shenzhen automobile, information communication and electronics, and carry out core technology research based on platforms such as Shenzhen Intelligent Network Test Center and Shenzhen Future Intelligent Industry Development and Innovation Center.

Promote enterprises, scientific research institutions and universities to jointly tackle major projects and special projects, and develop incentive measures, such as supporting enterprises to carry out collaborative research on key common technologies in the field of intelligent connected vehicles, and establishing an advanced innovation platform for future travel.

4.3. Accelerate the construction of test site and the formulation of test evaluation standards

The general idea is to build the site and standard "by stages and levels". First, speed up the construction of the test site in stages. Build the test environment of high-speed and urban roads and the actual operation environment of simulation roads in stages. Secondly, the 5G network will fully cover the site, while strengthening information security and encrypting the network; Third, lay out GPS base stations, support the Beidou navigation application system, and improve the accuracy of vehicle operation positioning. Finally, we should speed up the development of test and evaluation standards.

5. Conclusion

A good ICV ecological industrial chain is conducive to stabilizing economic expectations and plays an important role in stimulating economic growth. On the basis of building the connotation of ICV ecological industrial chain, this paper looks for the gap in China by comparing the research status at home and abroad. Taking Shenzhen ICV ecological industrial chain as an example, this paper analyzes the difficulties and shortcomings of ICV ecological industrial chain in terms of industrial policies, core technology research and development and evaluation standards. Relevant departments need to speed up the formulation of relevant industrial policies Accelerate the research and development of core technologies of ICV and develop evaluation standards.

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