China IoT UBI Car Insurance Regulatory Development Trend

Xiu Wen Ye, Ying Huang(✉), Min Ting Qin, and Xiao Ying Huang

Law, Yulin Normal University, Yulin 537000, Guangxi, China
2806422184@qq.com

Abstract. The innovation of China's electronic information technology has promoted the birth and development of the new IoT UBI auto insurance in China. IoT UBI auto insurance based on the Internet of things shows the unique functions and advantages of multi-dimensional construction and development, also put forward important requirements for China's multi-faceted supervision, among which the unstable external environment determines that IoT UBI needs stricter and more cautious supervision. Through literature analysis and quantitative analysis, it is found that the Chinese government lacks clear regulations, regulatory policies, and regulatory support for IoT UBI. Based on the lack of national supervision procedures and the difficulty in building the system, it is necessary to establish relevant supervision procedures and future corresponding policies and regulations to provide legal support for national supervision departments, to promote the supervision of IoT UBI in China to be more inclusive and comprehensive.

Keywords: Internet of things · UBI auto insurance · Government supervision · Big data

1 Introduction

As a new type of auto insurance developed gradually in China, UBI (Usage-based insurance) has ushered in a higher development stage with the continuous enhancement of China's Internet and electronic technology. Nowadays, some electronic information technology companies in China have developed IoT UBI-related products and businesses, such as IoT UBI hardware boxes, mobile phone software connected with customers, and systems providing digital computing, etc., which provide more perfect technical support for the formal development of IoT UBI. The development trend of IoT UBI is more inclined to the system development of scientific and technological products and insurance institutions. Via the matching of IoT UBI products developed by technology companies and IoT UBI of insurance institutions, more accurate IoT UBI policies are developed, which has greater technological innovation and digital development. However, it is based on the digital characteristics of IoT UBI, which collects a large amount of customer information for calculation, but also has potential safety hazards of excessive collection, disclosure and dissemination of customer information. Customers'

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privacy rights will be virtually violated. IoT UBI itself has powerful functions and multi-dimensional development characteristics, which involve a wide range of industries, so China has not yet built a perfect supervision system. This paper studies China's IoT UBI industry and its regulatory documents and relevant laws and regulations literature analysis and quantitative analysis, hoping to predict the development trend of China's IoT UBI regulation in the future from scientific evidence. Promote the steady and long-term development of IoT UBI auto insurance in China.

2 Introduction

China has become the fastest-growing country in the world with the continuous development of the economy. automobile insurance has become a major type of insurance in China due to the increase of national per capita income and automobile ownership. In the era of big data, the auto insurance industry gave birth to UBI with the rapid development of IOV. China's UBI is still in its infancy and has not been fully popularized so that there are few articles on UBI, which mainly focus on three aspects: driving behavior, risk assessment & building-related data models of UBI, and difficulties faced by China in developing UBI.

2.1 Research on Driving Behavior

Dai Jianguo (2015) pointed out that introducing UBI as additional insurance can reduce the information asymmetry in the auto insurance market. We should focus on the principle of balance between driving behavior insurance and consideration in the future and fundamentally solve the problems such as car-hailing service insurance by technical path, according to Han Changyin (2020). Zhang Haixia (2020) studied the necessity of intelligent IOV based on vehicle behavior analysis. Wu Xiangyou (2020) believed that the UBI pricing model based on driving behavior can reflect driving risk more truly.

2.2 Research on Risk Assessment of UBI and Construction of Related Data Model

Wang Li (2017) collected and processed vehicle behavior data, analyzed periodic behavior UBI, and built a preliminary risk model. Li Siyao (2017) studied the current process of UBI in China and the current situation of UBI-based auto insurance pricing model and pointed out that there is a lack of environmental factors in UBI risk factors at present. Liu Jian (2019) developed a reasonable UBI rate model for commercial vehicles based on the construction of the UBI big data analysis model and UBI big data analysis model of IOV.

2.3 Research on the Dilemma of UBI in China

Dai Jianguo (2015) believed that the promotion of UBI in China faces the inaccuracy of risk classification variables and the lag of national insurance policies. Zhu Jiazhen (2020) pointed out that the operation of UBI is still faced with the conflict between UBI

and the rules of disclosure obligation, with distortion risks and potential safety hazards of data. Jiang Yu (2020) believed that the promotion of UBI in China still faces the dilemmas that large insurance companies lack the motivation to develop UBI, too much investment in UB in the early stage, insufficient data analysis technology and privacy of user data. Sun Hongtao (2020) believed that although the development of UBI in China solves the problem of car-hailing service insurance, it still needs the unification of technical standards and the improvement of the supervision system. Shao Chengyin (2018) pointed out that it is difficult to establish an accurate actuarial model in China's UBI operation mode, the product quality and service quality are imperfect, and the personal information of users is easy to be leaked without knowing it.

To sum up, some scholars have studied driving behavior to meet the need to collect various data of drivers' driving behavior when developing UBI, so that accurate and personalized premium standards can be formulated; Studying the risk assessment of UBI and constructing relevant data model can provide the corresponding reference for insurance institutions when formulating personalized premiums; Studying the dilemma of developing UBI in China is beneficial to grasp the current situation of UBI development in China, and to learn experience for the optimal development of UBI. However, deficiencies still exist in the supervision system and development trend of UBI in China. Studying the development trend of UBI supervision in China will fill the deficiencies in system supervision and optimize the development environment of UBI, which is beneficial to the popularization of UBI in China.

3 Analysis of UBI in China

3.1 History of UBI in China

When UBI auto insurance became popular in European and American countries, some insurance and technology companies in China paid attention to this innovative auto insurance product, among which many well-known insurance companies and high-end information and electronic technology companies explored and tested together to build a UBI auto insurance development model combining insurance companies with technology companies, and achieved ideal results.

According to the representative achievements of development achievements, we select two insurance companies for demonstration research. PICC participated in many UBI research projects from 2016 to 2020, that is, in 2016, it cooperated to design the application of UBI premiums and jointly launched the research on data collection standards of car networking and the calculation of risk factors; In 2018, UBI passed the innovation product review of insurance organizations, and PICC was allowed to operate UBI products during the pilot period of independent pricing reform; In 2019, the automobile physical damage insurance clauses on UBI were released; In 2020, it signed a UBI contract with Business Car Cloud (Fig. 1). China Life Insurance Company developed a UBI data detection system with Rongzhi's car networking interconnection in 2015, and it reached a partnership with Changan Auchan and Shanghai Pingjia Network Technology Co., Ltd. to develop and promote UBI insurance business in 2016 (see Fig. 2). The combination system of insurance and technology has bridged a lot for the development

of UBI in China. Through the study of these two demonstration systems of the combination of insurance and technology, it is found that this combination development system has also achieved more benefits and achievements in the market development, which has achieved an exemplary role in the construction of the development system of UBI in China.

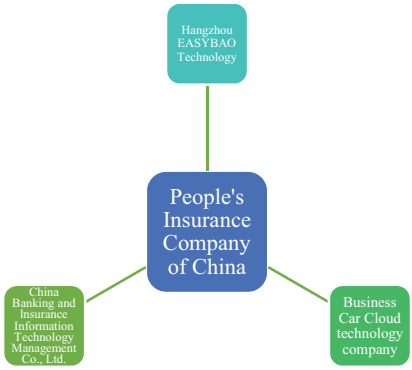

Fig. 1. UBI by People's Insurance Company of China. Data from: Researchers Data Collation

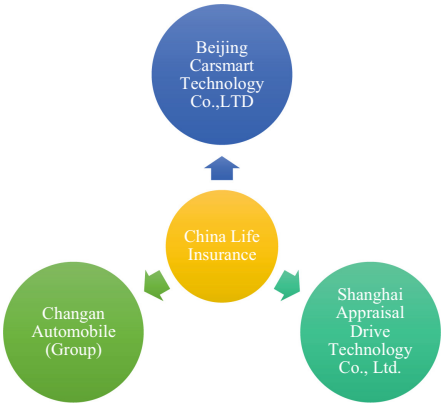

Fig. 2. UBI Relationship Diagram of China Life Insurance. Data from: Researchers Data Collation

3.2 UBI Technology in China

Driven by "Internet+" and scientific & technological innovation, "Insurance + Technology" has become a new development trend of the insurance industry and formed a new industry term "Insurance Technology". Insurance technology relies on the Internet platform to apply big data, cloud computing, and artificial intelligence technologies to the company's operation and insurance business development, to improve business

efficiency and change product form by infiltrating the whole process of the insurance business. Then, the way of service and interaction with customers is improved to give birth to a new business model and construct a new insurance ecology (Ren Yuan 2019).

Since UBI entered the Chinese market, many technology companies have actively carried out research and development of UBI's data monitoring system, intelligent calculation, user operation procedures, and other data and technologies, that is, using big data technology to collect users' driving static and dynamic information to establish a preliminary image system, which achieves research results in many fields. Some companies have realized the combination of hardware and software of computer systems to collect and process information and preliminarily calculate the driver's image system. The main business and product information of the following enterprises are inquired through the official system of Tianyancha, such as AUTO Software and AUTO Box of Beijing Carsmart Technology, TBOX Products, Didihu AI IOV Service System and Jiabao Box of Shenzhen Guanglian Saixun, PC Management Software LASO of Jiangnan Digital DNA Technology and GID Series of Intelligent Vehicle Terminal. Nanjing Renren Insurance's Chebao APP and Shanghai Appraisal Drive Technology Co., Ltd.'s Appraisal Baobao APP need to be used together with other hardware products to feedback the data to the platform; ICC of Shenzhen Yuanzheng Technology and the NICEGO of Hangzhou NICEGO Technology are hardware products that can quickly feedback data to the platform in real-time without being used with other software (see Table 1). Under the in-depth research and active exploration of many Chinese technology companies, UBI products in China and even in the world are richer, more complete, and diversified.

Table 1. .

– Company name	– Major business	– Representative UBI products	
		– Hardware	– System software
– Beijing Carsmart Technology Co., LTD	– Committed to the development of the IOV, IoT, and the Beidou industry	– AUTO Box, TBOX products, wireless driving recorder, VANET	– YangCheBao, CheDainTong, AUTO
– Nanjing Renrenbao Network Technology Co., Ltd	– Construct posture data and driving risk technology algorithm and turn it into a UBI business model of safe driving income through safe driving behavior	–	– Chebao

(*continued*)

Table 1. (*continued*)

– Company name	– Major business	– Representative UBI products	
		– Hardware	– System software
– Shenzhen Yuanzheng Technology Co., Ltd	– Develop R&D, production and sales of high-end automobile diagnosis, testing and maintenance products	– TBOX terminal (passenger car, commercial vehicle), ICC	–
– Shenzhen Guanglian Saixun Co., Ltd	– Provide SAAS platform and its data operation services for customers in different vertical industries with technologies such as IOV big data algorithm and artificial intelligence as the core	– Che Yunbao, WeChat Platform, DD BOX and Jiabao Box	– DidiHu AI IOV Service System
– Shanghai Appraisal Drive Technology Co., Ltd	– Focus on user behavior big data and independently develop UBI algorithm model based on driving behavior risk assessment	–	– Appraisal Baobao
– Jiangsu Digital DNA Technology Co., Ltd	– IOV solution provider, focusing on vehicle digital gene technology and creating the original technology of "Cloud & Pipeline & Terminal" architecture	– Intelligent vehicle terminal GID series, Driving images	– PC-side management software LASO
– Hangzhou NICEGO Technology Co., Ltd	– UBI Automotive Big Data Company based on ADAS adheres to the new model of two-wheel drive and focuses on the first stage industrialization of unmanned driving	– NICEGO	–

Data from: Researchers Data Collation.

In the era of big data, "Big Data + Insurance" is the inevitable development trend of the insurance business and big data provides preconditions for the mature development of IoT UBI. In the era of data sharing and circulation, the leakage of private information has become a common development problem. IoT UBI's data all rely on big data, so the problem that users' private information is illegally leaked and sold is more prominent. The adverse effects not only harm the interests of individuals and society but also will inevitably bring great obstacles to the rapid development of IoT UBI.

3.3 China IoT UBI Car Insurance System

After The unique tagging nature of RFID gives the IoT the characteristic of traceability, which in UBI makes it possible to keep track of the exact location of a vehicle and its surroundings. The M2M system framework is a core, networked application, and service with intelligent interaction of machine terminals that will enable intelligent control of objects. Based on the cloud computing platform and intelligent network, insurance companies can make decisions based on the data obtained from the sensor network, change the behavior of IoT UBI car insurance objects for control and feedback so that users can correct their bad behavior, report the vehicle's driving situation, their driving behavior and other information to the vehicle owner. Cloud computing can reduce the processing burden of the user terminal by continuously improving the " cloud " processing capacity, eventually simplifying it into a simple input and output device, and enjoying the powerful computing and processing capacity of the "cloud" on demand.IoT UBI car insurance obtains a large amount of data information through the IoT sensing layer. After transmission through the network layer, it is put on an insurance platform and then processed by a high-performance application layer to give these data intelligence in order to be finally converted into useful information for end-users. The sensor network is a vast network of sensors formed by micro-electro-mechanical systems (MEMS), giving ordinary objects a new life, giving them their data transmission pathways, storage functions, operating systems, and specialized applications. This allows the IoT to monitor and protect people through objects, and IoT UBI car insurance has the dual function of monitoring the safety and protection of car owners (see Fig. 3).

3.4 CHina's Auto Insurance Laws and Regulations

In China's auto insurance industry, it is not uncommon for enterprise personnel to illegally sell and disclose users' private information. UBI, a new type of insurance-related regulations system is not perfect, so this kind of phenomenon is more prominent, calling for reasonable and effective management methods. The action of protecting users' privacy needs users to improve their awareness of privacy information protection, and it also needs the solid strength of the government to supervise and standardize the auto insurance industry to promote the good development of UBI in China.

After sorting out and summarizing in PKULAW.com, it is concluded that the Chinese government's supervision of the auto insurance market has been going on for a long time, that is, since 2000, there have been relevant laws and regulations to supervise the auto insurance market. From only central regulations to adding local regulations and industry

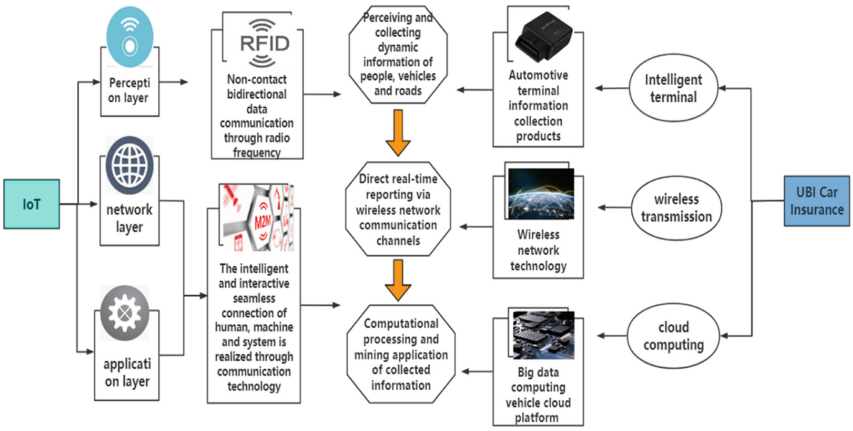

Fig. 3. China IoT UBI Car Insurance System. Data from: Researchers Data Collation

regulations, it can be seen that the Chinese government's supervision of the traditional auto insurance market tends to be mature and comprehensive (see Fig. 4).

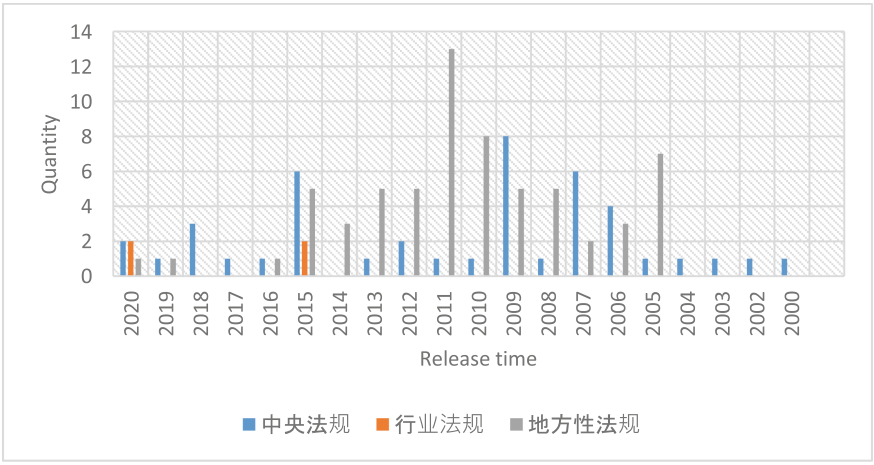

Fig. 4. Number of existing auto insurance regulations in China. Data from: Researchers Data Collation

For Different from it, UBI entered China's auto insurance market in 2014 and became a new type of insurance in China. Up to now, UBI has only been mentioned once in the auto insurance management documents of the Chinese government. Article 3 of the *Guiding Opinions on Implementing Comprehensive Reform of Auto Insurance* issued by China Banking and Insurance Regulatory Commission in 2020: "3. Expand and Optimize Commercial Auto Insurance Guarantee Services (IX) Enriching Commercial Auto Insurance Products" mentions UBI as an innovative product. But at present, the

special regulations for UBI have not yet appeared, from which we can see that the government's supervision of UBI still has a big improvement stage.

4 CHINA's Regulatory Measures for IoT UBI

4.1 Legislative Supervision

Because of the insufficient supervision of laws and regulations, the Chinese government can adjust and revise the relevant contents based on the original traditional auto insurance, improve the provisions and specifications of IoT UBI in the law, and build targeted provisions and specifications of IoT UBI characterized by big data and intelligence of IoT UBI. On the other hand, according to the characteristics of IoT UBI relying on big data, the legislation allows on-board diagnosis system and driving place in the data system besides video, video and audio as evidence of case trial. Set up industry-specific laws and regulations specifically for the network leakage of personal privacy information. Take IoT UBI privacy as an experiment to carry out preliminary effective management of privacy.

4.2 Supervision from Government

The government gives IoT UBI research assistance when necessary, but prohibits administrators from threatening money. Otherwise, it will eventually lead to the cessation of research, the company will face the consequences of bankruptcy, and the relevant personnel will be criminally punished for the crime of corruption. Administrative organs should relax the supervision of IoT UBI properly and not interfere with the development of IoT UBI in the auto insurance market too much. The government can give appropriate long-term preferential policies to technology companies that study IoT UBI, insurance companies that carry out IoT UBI business, network car platforms that purchase IoT UBI and individual car owners to stimulate the vitality of IoT UBI in the Chinese market.

Finally, since the fields and industries involved in IoT UBI are too complicated, the regulatory framework is unclear, and the system is difficult to establish, governments at all levels should standardize the specific regulatory authorities of IoT UBI in various regions, that is, clearly stipulate who supervises and how to supervise IoT UBI in many fields of the market.

4.3 Supervision of Enterprises

Enterprises should reasonably regulate the use of car owners' information rights, that is, they can access information data that does not touch the privacy of private car owners; For private information data involving car owners, it is necessary to seek the wishes of car owners, otherwise, relevant information data cannot be illegally accessed. If the circumstances are serious after illegal use, it can be cited in the field of criminal law. Companies that steal more than 5,000 people's data within one to five years should be criminally punished for the crime of occupational embezzlement; If there are no more than 5,000 people, the company shall be criminally punished for the crime of

infringing personal information. The research of data technology takes a long time and the results are different. The success of research needs more data information, so it is measured according to the number of illegal access; Third, it is stipulated that employees of enterprises shall not provide all the information of users to others or other units outside the public platform of the company without obtaining instructions from the company, and shall not illegally sell or provide private information of users to others or units. If employees violate the former, they will be punished according to the relevant articles of association; Violating the latter will be punished according to the crime of infringing personal information.

5 Conclusion

IoT UBI shows greater functional advantages and development prospects under the combination of technology companies and insurance institutions. Under such a new product with diversified functions, it can't achieve good development without the supervision and control of the government. The analysis of the combination of electronic information technology companies and insurance companies China IoT IoT UBI Car Insurance System and the existing auto insurance regulatory documents of the Chinese government shows that IoT UBI is in a good development trend in China; but, the supervision of IoT UBI by the Chinese government is still lagging, that is, the supervision policy is lacking, the supervision structure is unclear, and the system is difficult to establish. Due to the small length of the article and the limited data collected, it can not fully reflect the whole development system of IoT UBI in China and other subtle problems. However, the analysis of some representative insurance institutions and technology companies shows the general status quo and existing problems of IoT UBI development in China, that is, the mature development of IoT UBI in China in the future needs the strengthening of Chinese government supervision, the refinement of auto insurance laws and regulations, and the concretization of administrative supervision departments for the development of IoT UBI in China.

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