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The Operation of China's Insurance Industry in the Context of Big Data: Dilemmas, Challenges and Countermeasures

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Abstract

Big data has a profound impact on the business philosophy of the traditional insurance industry. Applying big data to the field of insurance can not only prevent insurance fraud, but also greatly reduce the operating costs of insurance companies, deeply explore the potential demand of the market, improve the profitability of insurance, and drive the innovation of insurance products and services, the improvement of customer experience satisfaction and the transformation of the whole insurance industry. However, the widespread use of big data technology in the insurance industry has also brought challenges to the insurance industry, especially making it easy for personal information of parties to insurance contracts to be leaked and used illegally, which has raised higher requirements for personal information protection legislation. Therefore, it is necessary to analyze the challenges brought by big data to the insurance industry, especially in terms of personal information protection, and on this basis make targeted suggestions with a view to showing the direction for the development of the insurance industry.

Keywords

Big Data, Personalized Products, Insurance Fraud, Private Information

1. Introduction

In recent years, the insurance industry has been growing rapidly in the global financial sector and has a significant share in the global economic output. By 2021, global national and regional premium revenues have reached $68605.98 billion, or 6.96% of GDP, and per capita income will reach $874.3 (CBYXS, 2022). At present, China's insurance industry is facing the transition period of

changing the traditional growth mode, from high-speed development to high-quality development, and the wide application of modern science and technology has changed the traditional business concept of the insurance industry. The advancement of the digitalization of insurance will influence and even determine the future development trend of China's insurance industry, directly affecting the innovation of insurance products and services, indirectly affecting the pricing, marketing, claims and after-sales of insurance products, and playing an important role in the prevention of insurance fraud. However, the conclusion of the insurance contract needs to fully grasp all kinds of basic information of the insured as a prerequisite. While the insurance industry is booming, the use of insurance technology such as big data technology makes the personal information of the parties to the insurance contract very easy to be leaked and used illegally, especially in the life insurance contract, which mostly involves sensitive personal information such as biometric, medical and health of the insured, and once it is leaked or used illegally, it will easily lead to the infringement of the human dignity of the natural person. Therefore, the difficulty of protecting the privacy rights of the parties to insurance contracts has become a major obstacle to the widespread use of big data in the insurance industry. Therefore, after analyzing the value of the application of big data technology in the insurance industry, it is necessary to respond and propose effective countermeasures to the challenges it brings to the insurance industry.

2. Characteristics of Big Data Technology and Its Application in the Field of Insurance

2.1. Characteristics of Big Data Technology

With the increasing popularity of network and information technology, the amount of data generated by human beings is growing exponentially, and the birth of cloud computing has directly sent us into the era of big data. As the cutting-edge term of the day, Big Data is the ideal tool for performing a large number of continuous and segmented tasks and plays a pivotal role in driving innovation in management and operational models in many traditional industries. The etymology of Big Data dates back as far as the mid-1990s and is mainly used to refer to the processing and analysis of massive data sets. However, Big Data technology, as a product of modern technology development, was not gradually known and noticed by the public until 2008, and then became a business buzzword. As with many new concepts that are rapidly emerging, there are different views on the definition of the term "big data" as it involves different fields such as computers, mathematics, statistics, finance, and law. It is gratifying to note that most scholars generally agree that Big Data is a concept opposite to traditional data, and that it is distinguished from traditional data called "small data" in terms of volume, speed, and diversity, and refers to large amounts of data that cannot be processed or analyzed by traditional software or computing systems (Wang, 2021), It is generated through targeted, automated and voluntary sys-

tems. Compared with the traditional data application model, Big Data technology has significantly improved and innovated in both "quantity" and "quality", mainly in five aspects: data acquisition, transmission, storage, analysis and display (Zhao, 2019). In the Big Data model, data is acquired through modern information technology and personal terminals; transmitted through instant, multidimensional and distributed networks; stored in the cloud at massive scale; mined through multidimensional data correlation analysis; and displayed through multidimensional visualization. According to industry analyst Doug Laney, the most popular definition of big data is that it represents three dimensions called the 3Vs: volume, velocity and diversity. Although the 3V characteristics have been widely accepted for many years, the definition of Big Data has added a richer connotation with the advancement of computer technology (Hassan, Dhali, Zaman, & Tanveer, 2021). Nowadays, the standard of Big Data has evolved into the 4V characteristics of massive data scale, high-speed data flow, diverse data types and cost-effective output value, which elevates data analysis and management to a new level. In the context of the booming Internet technology, big data technology has been integrated into all walks of life, in addition to the application of banking, insurance, securities and other financial fields, but also the security field, energy, news media, telecommunications, e-commerce and other fields to bring new opportunities. For example, as one of the sources of massive data in the information age, video surveillance generates huge amounts of information data, especially the massive amount of unstructured video data in the security industry, as well as the rapid growth of feature data, bringing great opportunities for the construction and improvement of the security business.

2.2. The Application of Big Data Technology in the Field of Insurance

The insurance industry was one of the first industries to make extensive use of big data technology, and its application in the insurance industry can be roughly divided into three phases. First, the start-up phase in the 1980s, with the development of programming languages and procedures to achieve a paradigm shift from computerized order generation to traditional manual order generation. Second, the rapid development phase in the mid to late 1990s, when the use and popularity of fiber optic communication systems enabled the insurance industry to complete the transformation of its core business processes into electronic and networked ones. The third is the prosperous stage in the 21st century, which has basically realized the model transformation of data centralization, management digitization, operation intensification and process electronation by combining with insurance technologies such as big data, blockchain and cloud computing.

The promotion of insurance digitalization process has profoundly changed the relationship between insurance companies and users, such as blockchain technology can increase users' trust in insurance companies, IoT technology can

assess the risk level of drivers, road sections, traffic, weather, etc., and wearable technology can predict the risk of health information such as morbidity groups, diet and lifestyle habits, and age. In the future, technologies such as big data, Internet of Things and artificial intelligence will be developing at a high rate, and advanced insurers have already invested heavily in such insurtech to ensure that they gain a competitive advantage over the years through improved service quality, accurate pricing and efficient after-sales service. However, with the deep application of modern information technology in the field of insurance, there are higher requirements for innovation in the insurance industry. The operation and management of insurance companies should be guided by information technology or Internet of Things thinking, process reengineering, data mining and integration and analysis to promote the transformation of the traditional growth mode of China's insurance industry and realize the development from high speed to high quality.

3. The Value of Using Big Data in the Insurance Industry

The operation and management of insurance companies should be guided by information technology or Internet of Things thinking, process reengineering, data mining and integration and analysis to promote the transformation of the traditional growth mode of China's insurance industry and realize the development from high speed to high quality. However, while the global insurance industry is growing at a rapid pace, problems such as long claim settlement cycles, cumbersome insurance payment procedures, many consumer traps, and low industry transparency have long plagued the insurance industry. In order to seize the first opportunity in the fierce market competition and gain an advantageous position, many insurance companies have increased their investment in technology to solve the above-mentioned problems through technological means in order to gain a larger share of the market. With the creation and widespread use of big data analytics, it is quickly becoming a powerful tool for insurers to solve their challenges. Both financial institutions, which are regarded as global economic giants, and smaller, weaker insurers, have introduced big data analytics in order to improve their market competitiveness. These attempts and explorations have made the combination of big data and the insurance industry increasingly close, providing strong technical support for the development and prosperity of the insurance industry. Since big data analytics technology is mainly applied in the insurance operation, this paper will analyze the opportunities brought by big data technology to the insurance industry from five aspects: product development, accurate pricing, fraud prevention, refined operation and efficient claim settlement.

3.1. Develop Personalized Products and Services

In the traditional insurance industry, due to the lack of deep mining and analysis of customer information, insurance companies put many users above the same

level of risk, and the customer's policy does not completely solve the customer's various risk problems. With the in-depth development of big data technology, it is much less difficult to collect and mine data on customers' consumption preferences and to segment the market. Insurance companies can use voice recognition and text mining technology to collect basic user attributes and consumption preferences such as age, work, lifestyle, health status and geographic location of different groups, integrate users' online and offline related behaviors, and deeply analyze and mine various potential consumption points. At the same time, the key factors affecting customers' surrender or renewal can be filtered out by considering their insurance category, previous insurance outbreaks, and salesperson information, and through these factors and the model established, the surrender probability or renewal probability of customers can be evaluated, and timely warning measures can be taken for customers with high risk of loss, and retention strategies can be formulated to improve the policy renewal rate. In addition, insurance companies can also use big data analytics to correlate sales of products and services. Accurate marketing and personalized products and services drive scenario-triggered demand while stimulating the desire of the majority of consumers to purchase insurance products.

3.2. Achieve Accurate Pricing of Insurance Products

The price of insurance products is determined by risk and market supply and demand, and their pricing is based on the Big Data rule. In the traditional insurance industry, due to the asymmetry of information resources, it is difficult for insurance companies to obtain all the information of customers for individual risk assessment (Qiu, 2020). With the deep combination of big data technology and insurance industry, the difficulty of differentiated pricing of insurance products will be effectively solved. With the advantages of fast flow, large scale and variety of big data, the logic and method of future insurance pricing will be significantly changed under the role of big data technology, from "first pricing" based on traditional data processing technology to "later pricing" and "combination of successive pricing" dynamic calculation method (Chen, 2020). For example, many insurance agencies in the U.S. often use personalized pricing by installing in-car information monitoring systems on customers' cars.By analyzing the actual number of miles driven by customers recorded by in-vehicle devices, the monthly premium is divided into a static fixed premium and a dynamic mileage change premium, and the insurance agency will calculate the next month's policy premium based on the current month's mileage of the vehicle owner (Ji & Sha, 2021). This billing method can ensure the timeliness brought by the high-speed operation of big data, effectively attracting a large number of potential customers. The domestic insurance market has already introduced highly dynamic UBI-based auto insurance products, such as the "one person, one car, one price" pricing model launched by Ping An Insurance and the continuous adaptation pricing model based on risk appetite and credit system launched by

Ant Financial.

3.3. Prevent Insurance Fraud

Insurance companies often invest huge amounts in supervision to prevent incidents of insurance fraud, but advances in technology have made it more difficult to identify insurance fraud, leading to an increase in major insurance frauds year after year, causing incalculable losses to insurance companies. With respect to the current status of insurers' anti-car insurance fraud efforts, insurers have begun to take proactive measures to address car insurance fraud, making it an important part of internal risk control and incorporating it into car insurance claims management. Some insurance companies, drawing on international experience in combating insurance fraud, have implemented the insurance investigator system, setting up independent investigation agencies outside the second- and third-tier institutions with dedicated staff to investigate difficult cases and entrusting commercial investigation companies with the investigation of major difficult cases. Through perfect system and process design, we have comprehensively controlled the hidden danger of insurance fraud in business activities, and initially realized the transformation of anti-insurance fraud work from reactive to proactive. However, at this stage, the phenomenon of insurance fraud in China is still common, and the use of high-tech means to implement new types of insurance fraud is becoming more and more intense. The reason for this phenomenon is that, on the one hand, the legal regulation against insurance fraud is not sound in China, and there are still no laws and regulations specifically for anti-insurance fraud, only the crime of insurance fraud in Article 198 of the Criminal Law of the People's Republic of China and the Interpretation of the Supreme People's Court on Several Issues Concerning the Specific Application of Law in Hearing Fraud Cases, and limited by the amount of fraud, a significant portion of insurance fraud in practice cannot be strongly sanctioned, contributing to the unhealthy culture of insurance fraud. On the other hand, China has not yet established a unified agency against insurance fraud. Although the CIRC has launched a special campaign to combat the "three fakes" of fake agencies, fake policies and fake claims, the anti-fraud work of property and health insurance is limited to insurance companies' internal and commissioned investigation agencies, and no information sharing network has been established among insurance companies in the same industry, which makes it difficult to conduct anti-fraud investigations.

Due to the lack of valid data, traditional insurance claims can only be set up for a limited number of known fraud patterns, making it difficult to overcome the disadvantages of information asymmetry, leading to frequent health insurance fraud and abuse and auto insurance fraud. In health insurance, 80% of claim denials are caused by the insured's failure to comply with the duty to truthfully inform. In order to save the cost of investigation and avoid the situation that the insurance contract cannot be concluded for various reasons after

the investigation, insurance companies often adopt a more lenient investigation policy when underwriting, hoping that the policyholder can uphold the principle of utmost good faith to truthfully inform the basic situation, but it will also reserve the right to investigate afterwards. After receiving a claim, the insurance company usually conducts a claims investigation through the claims department or commissions an external investigation company to use existing historical data to find the most significant factors affecting insurance fraud and the range of values of these factors to build a prediction model. However, the problem of Medicare fraud and abuse in practice has not been properly addressed under the conditions of poor data availability in the traditional insurance industry. Compared to policy-based audits, quantitative decision models with big data can identify insurance fraud more effectively and prevent insurance fraud in real or quasi-real time based on internal and external corporate transactions and historical data. For example, when making health insurance claims, we can analyze the customer's past medical history to determine whether he or she is insured with a disease or over-medicated to eliminate moral risks; in auto insurance claims, we can verify the driver's license, vehicle number plate, and traffic accident liability certificate with the help of intelligent digital transportation, and make fraud prediction scores; in life insurance claims, we can apply live identification technology to identify the insured and prevent insurance fraud risks such as dead insurance benefits fraud.

3.4. Realize Refined Operation

The use of big data technology in the insurance industry can not only promote the innovation and upgrading of insurance products, but also enhance the service and management capabilities of insurance companies and promote the refinement of their operations. First, through inter-enterprise data sharing for risk warning and analysis of insurance fraud and other behaviors, it realizes automatic collection and processing of risk source data and calculation of key risk indicators to meet early warning for market, operational and operational risks and reduce business operation risks. Secondly, with the analysis of online business operation data, combined with the comparison of financial system, it can realize the mastering and monitoring of capital flow as well as information flow of the enterprise, and through the operation analysis of cost and benefit, it can predict the current business operation condition and realize the operation guidance for the enterprise. Thirdly, through automated business analysis reports, we regularly summarize and analyze quarterly operations, assessment programs, business development regions, and sub-channel types in order to provide risk alerts to companies and achieve window guidance for them. It can also analyze the company's internal and external operation, management and interaction data with the help of the big data platform, provide comprehensive statistics and forecast the company's operation and management performance, and make predictions on new market risks and operational risks. It can dig out the corres-

ponding costs and benefits by region, insurance type and sales channel, and implement the costs and benefits into specific policies, and analyze and judge the market with reference to the industry information platform data, determine the price and evaluate the risk, realize accurate pricing and precise management, and solve the problems of "inaccuracy" and "oversight" in traditional management. Finally, we can rely on the big data platform to select agents, based on their performance data, gender, age, years of work before joining the company, experience in other insurance companies and aptitude test of agents' thinking, etc., to find out the characteristics of sales personnel with relatively best sales performance and preferably select high potential sales personnel.

3.5. Provide Intelligent Underwriting and Claims Services

Convenience and efficiency of underwriting and claims processing have been the value goals pursued by the insurance industry, and with the deepening of artificial intelligence and blockchain technology, the industry goal of timely underwriting may be achieved in the future. By collecting information of the insured or insurance subject through big data, building a model based on existing underwriting samples, and then using blockchain technology, the policy is screened in real time and finally an underwriting plan is formulated (Yin, 2017). With the widespread use of big data technology in the insurance industry, insurance companies are trying to establish a claims-centric and customer-oriented smart claims model. This automated claims model is based on loss prevention, mitigation and repair, and is technically supported by the application of smart contracts. In short, the automated claims insurance policy is written into the smart contract, the achievement of the claim conditions is defined by the code and enforced automatically, and the whole claim process does not require human intervention, ensuring the transparency of the claim process and the fairness of the results.

4. Key Challenges and Responses to Insurance Legislation Brought about by Big Data Technology

4.1. Challenges: Insured Persons' Personal Information Is Highly Vulnerable to Infringement

In the era of Internet and big data, insurance institutions try to provide high quality and standard insurance services to users by means of computer technology. In the course of their services, insurance companies have a large amount of customer information, including both basic information such as the user's name, age, and job, as well as private and sensitive information such as health and life information and movement trajectory. In the event of improper collection, use, storage or disclosure of personal information, the insurance company and its principals may be subject to severe civil or even criminal liability. Therefore, the correct and legal collection and use of personal information in sales and services by insurance institutions is crucial to their survival and development. For exam-

ple, when a consumer purchases a medical product developed by an insurance company for a major illness, he or she is required to submit a series of personal information related to the insurance to the company, including the individual's ID card, mailing address, workplace, medical examination report, outpatient clinic visit record book, etc. When the insurance contract is concluded, the insurance agency notifies the user via SMS to complete the membership registration certification and bind any default sports equipment, otherwise the membership will be lost. As mentioned above, insurance companies can provide more accurate and personalized services to users by tying wearable sports devices, but are such mandatory SMS alerts an improper collection and use of user whereabouts information? In order to solve this problem, it is necessary to clarify the scope of personal information of users required for the conclusion of sales and services by insurance companies, as well as the rules for the use of personal information of users. According to Article 1034 of the Civil Code of the People's Republic of China, the whereabouts and health and physiological information belong to the category of sensitive personal information, and their collection, use, storage and disposal shall comply with the corresponding rules and have strong protective requirements. When collecting personal information from users, insurance companies should ensure that the type of personal information collected is directly related to the achievement of the business function of the product or service, and that the three principles of "lawfulness, propriety and necessity" are followed when collecting and applying personal information for use by the insured, and that the consent of the person being collected is obtained. In this case, the insurer collected information about the consumer's whereabouts by means of a removable device, which clearly exceeded the scope of the information required to enter into the contract. Such compulsory collection of information does not reflect the intention to seek the user's consent in advance, but rather highlights the company's commercial ambition to collect information on the insured's whereabouts at the time of service, which in effect infringes on the user's privacy and defeats the insurer's intention to provide better service to the user through the means of mobile devices.

4.2. Countermeasures: Attach Great Importance to the Interface between Data Mining and Personal Information Protection

In the age of information technology, the protection of personal information has become one of the most direct and realistic interest issues of the general public. The Personal Information Protection Law of the People's Republic of China, which will be implemented on November 1, 2021, establishes the principles of personal information protection, focuses on regulating personal information processing activities and protecting the rights and interests of personal information, builds the rules of personal information processing with the core of "informing and consenting", prohibits "big data killing", regulates automated decision-making, and strictly protects sensitive personal information. According to Article 4 of the Law of the People's Republic of China on the Protection of Per-

sonal Information, insurance companies must first follow the principles of "lawfulness, propriety, necessity and good faith" when collecting and using the personal information of policyholders. Insurance companies shall not fraudulently, entice or force personal information subjects to provide their personal information; shall not conceal the function of collecting personal information by products or services; shall not obtain personal information from illegal channels; shall not collect personal information that is expressly prohibited from collection by laws and regulations. The insurance company shall do so in such a way that the type of personal information collected is directly related to achieving the business function of the product or service. The frequency of automatic collection of personal information shall be the minimum frequency necessary to achieve the business function of the product or service; the amount of indirectly acquired personal information shall be the minimum amount necessary to achieve the business function of the product or service, etc. When the policyholder does not agree to provide non-essential personal information, it shall not refuse to provide the service or force the policyholder to agree to provide personal information. Second, it must follow the principle that the parties agree and disclose the collection and use rules in advance, and express the purpose, manner and scope of collecting and using information. Since the parties to an insurance contract are not necessarily the same person, if the insured, the insured and the beneficiary are not the same, the consent of the parties should be obtained separately. When collecting sensitive personal information, insurance companies should obtain the person's express consent, ensure that the person's express consent is a specific, clear and unambiguous expression of his or her wishes given voluntarily and on a fully informed basis, inform the person of the core business functions of the product or service offered and the sensitive personal information required to be collected, and clearly inform the person of the implications of refusing to provide or refusing to consent. Insurance companies shall allow personal information subjects to choose whether to provide or consent to automatic collection. Thirdly, it must be prohibited to obtain personal information of citizens through purchase, receipt or exchange, or to illegally collect personal information of citizens in the course of performing the duties of insurance practitioners or providing insurance services. Even if it is for the purpose of legitimate business and soliciting customers, otherwise, the insurance company and its directly responsible supervisors and other directly responsible personnel will face the adverse consequences of heavier penalties.

5. Conclusion

In the context of the big data era, the digital transformation of insurance companies is imperative. Applying big data to the insurance field can greatly reduce the operating cost of insurance companies, deeply explore the potential demand of the market, improve the profitability of insurance, and drive the innovation of insurance products and services, the improvement of customer experience satisfaction and the transformation of the whole insurance industry. However, the

vulnerability of policyholders' privacy to infringement has become a major obstacle restricting the wide application of big data in the insurance field. The application and connection with the Civil Code of the People's Republic of China and the Law of the People's Republic of China on the Protection of Personal Information should be strengthened to follow the principles of lawfulness, legitimacy, necessity and good faith for the reasonable use of personal information of parties to insurance contracts.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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