



# Insurance Technology Makes China's Agricultural Insurance Intelligent

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**Abstract.** With the continuous development of insurance technology, agricultural insurance has ushered in new development opportunities. Smart agricultural insurance integrates modern information technology and agricultural insurance organically, promotes the transformation, upgrading and innovative development of the agricultural insurance industry, and provides strong support for agricultural modernisation and rural revitalisation. This paper discusses how insurance technology can be applied to agricultural insurance and promote the quality and efficiency of agricultural insurance and high-quality development.

**Keywords:** Agricultural Insurance; Smart Farming Insurance; InsurTech.

## 1 Introduction

Agricultural insurance plays an important role in agricultural production and operation, which can effectively disperse and reduce the risks faced in agricultural production. However, there are some problems in the traditional agricultural insurance model, such as the single product type, which is difficult to meet the diversification and complexity of China's agricultural production; The claims process is cumbersome and inefficient, so that farmers are not able to get insurance compensation quickly after suffering losses; High moral hazard, some farmers in order to obtain higher compensation and some insurance fraud, etc., are not conducive to the good development of China's agricultural insurance market.

With the rapid progress of a new generation of information technology, agricultural insurance has ushered in new development opportunities<sup>[1]</sup>, and the development of insurance technology has made the concept of smart agricultural insurance come into being. Smart agriculture insurance can not only assess risks more accurately, but also provide customized insurance solutions to effectively protect the interests of farmers<sup>[2]</sup>. At the same time, with the help of emerging technologies, such as big data, remote sensing technology and the Internet of Things, smart agricultural insurance is expected to achieve more efficient claims settlement and disaster warning. With the help of insurance technology, agricultural insurance will have broad development prospects and provide more solid and powerful support for the sustainable development of agriculture<sup>[3]</sup>.

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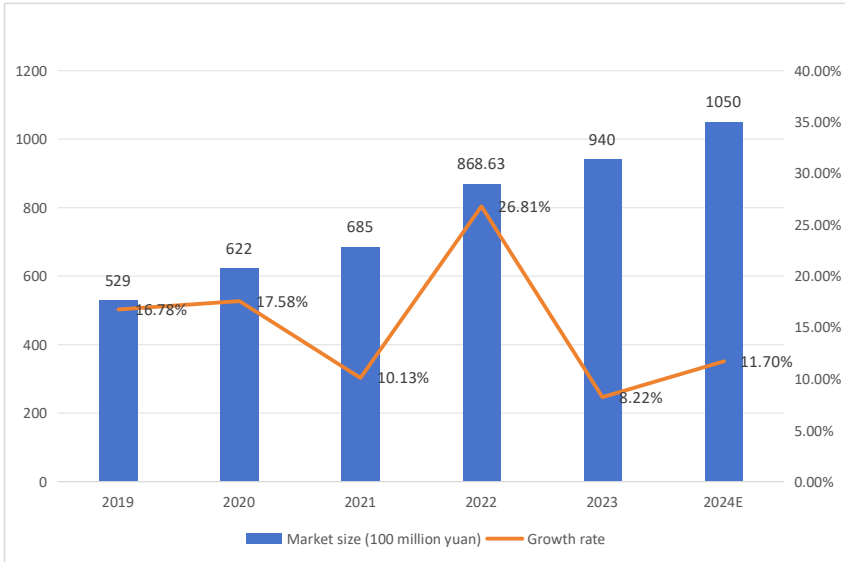
## 2 Introduction to Common Insurance Technologies in Agricultural Insurance

Smart agricultural insurance is a new insurance model that uses advanced scientific and technological means to deeply transform and innovate traditional agricultural insurance<sup>[4]</sup>. It integrates cutting-edge technologies such as big data, artificial intelligence, and the Internet of Things to realize the digitalization, intelligence, and refinement of agricultural insurance business. Table 1 shows the five common technologies and specific application areas in smart agricultural insurance.

**Table 1.** Top five common tech technologies in smart agri-insurance

Technical name	Define	Insurance Industry Application Opportunities
Big data	Analyzing large amounts of data as a means of predicting trends and providing recommendations accordingly	Helping insurance companies to promote accurate product design, pricing, underwriting, marketing, etc.
Artificial intelligence (AI)	Computing systems capable of simulating human consciousness, thinking and behavior, instead of performing tasks such as visual perception, speech recognition, decision-making, etc.	Ability to replace humans to efficiently complete claims, user services, etc., reducing costs
Internet of Things (IoT)	Communication and exchange of information by connecting items to the Internet with real-time, reliability and accuracy	Helping insurance companies increase user interaction, acquire more customer information, and facilitate new insurance product design
3S technology	Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) integration, is a modern information technology used for the collection, processing and application of spatial information	Help insurers improve underwriting and claims accuracy, drive insurance product innovation, and optimize risk management strategies
Blockchain	A decentralized distributed ledger technology that guarantees secure data storage and tamperability through encryption algorithms and consensus mechanisms	Integrate multi-channel customer information to achieve unified management of user accounts and data sharing.

Although the development of smart agriculture started late in China, thanks to the increasing attention paid by the state and society to the development of smart agriculture in recent years, China's smart agriculture has ushered in a golden period of rapid development. According to Figure 1, the market size of smart agriculture has maintained an upward growth trend since 2019. As of 2023, the scale of China's smart agriculture market has reached 94 billion yuan, and it is expected to reach 105 billion yuan in 2024.



**Fig. 1.** China Smart Agriculture Market Size and Growth Rate, 2019-2024<sup>E</sup>

Source: China Business Industry Research Institute, "2024-2029 China Smart Agriculture Development Trend Analysis and Investment Pattern Forecast Report"

### 3 Insurtech Empowers Innovation in All Aspects of Agricultural Insurance

#### 3.1 Business Online

In the external business development of the insurance companies' business personnel, the mobility of agricultural insurance business shortens the business chain and reduces the manpower and time costs of manual record keeping in the past. Business personnel can complete online insurance in a few minutes by collecting basic customer information, online publicity, electronic signature, online payment and other operations through PDA. Based on OCR recognition, face and other biometric technologies can quickly identify customer information and simplify the process of information entry and other processes.

Relying on the popularity and development of mobile Internet and smart terminals, many agricultural insurance institutions have gradually built up an "online + offline" mobile operation system and realised networked, mobile and self-service handling of business, which has greatly improved the service efficiency and expanded the service scope of agricultural insurance<sup>[5]</sup>.

Based on WeChat apps, mobile apps and other mobile platforms, farmers are able to carry out self-insurance and self-claims. This increased autonomy and participation of farmers has helped insurance companies to expand a larger range of services with lower working costs.

At present, many insurance companies, including PICC, PICC and Ping An, have opened WeChat public numbers, applets or mobile apps dedicated to the agricultural insurance business, which allow policyholders to check policy information and claims progress on their mobile phones anytime, anywhere.

In addition, the platform also pushes information on agricultural weather and price fluctuations to insured farmers, and reminds insured farmers to do a good job of disaster defence and agricultural product sales plans, so as to reduce insured farmers' losses due to disasters and price reductions. For example, Ping An Property and Casualty Insurance's "Ping An Ai Nong Bao" WeChat mini-programme has opened a "Price Centre" section, which pushes information on pig market<sup>[6]</sup> and egg and poultry market for insured farmers, while the "Taipao e Farming Insurance" WeChat mini-programme has launched a "Price Centre" section, which pushes information on pig market and egg and poultry market for insured farmers. The WeChat programme "TaiPao e-Agricultural Insurance" launched the "General Knowledge of Agricultural Insurance" section, which provides insured farmers with knowledge of agricultural techniques and regulations on the supervision of agricultural insurance.

Table 2 shows the online application systems designed by some insurance companies using technology to integrate with agricultural insurance. These systems have greatly facilitated the use of insurance companies and farmers in their daily business through simple and easy-to-use interfaces and powerful functions, enhancing the efficiency and quality of agricultural insurance services.

**Table 2.** Names and Functions of Online Applications for Selected Businesses Operating in Agricultural Insurance

Corporations	Online application	Functionality
People's Property Insurance (PPI)	Platform A for agricultural insurance	Image docking, online mapping, automatic tracking, photo watermarking, card recognition, etc.
China United Property Insurance	promote agriculture insurance	Map Engineering Mobile Collection System, Watermark Camera, Flash Claims Function, Underwriting Plots on Map, Online Renewal, One-Click Reporting, On-Site Survey, Catastrophic Weather Alerts
PICC	eAgricultural Insurance	Acreage measurement, one-click claims, electronic scales, OCR customer information capture, subject matter repository, geographic information capture system, storm system, self-insurance
China Life Insurance Company	iFarmers Insurance	Real-time live streaming of disasters, AI recognition of crop types, and automated processing of disaster assessment
Zijin Financial Insurance	Zinong Insurance Company (PRC)	Mobile platform information collection, one-click renewal, e-policy, remote survey, online claim settlement, etc.

Source: Manually collated from publicly available sources.

### 3.2 Underwriting and Bid Checking Sessions

In the agricultural insurance underwriting business, the confirmation of the number, location, ownership and other information of the insurance subject has been facing high time and money costs, and is also the hardest hit by false cost violations. Now, through the use of remote sensing technology and drone technology, it can not only greatly reduce the intensity of manual underwriting, but also improve work efficiency and increase the accuracy of underwriting, and reasonably avoid the risk of false underwriting violations<sup>[7]</sup>.

Remote sensing technology can be used to efficiently and accurately obtain information data on the planted area of farmland, crop types, growth conditions, etc., and to clearly identify crop cultivation in different plots of land by means of high-resolution remote sensing images<sup>[8]</sup>. By comparing with the information provided by farmers, the authenticity of farmland information can be verified, such as determining whether farmers have truthfully reported the cultivation and risk status of their farmland, which helps to prevent the occurrence of insurance fraud and maintain the fairness and order of the insurance market.

Drones are cost-effective and easy to operate, saving labour costs and improving efficiency in smart agricultural insurance<sup>[9]</sup>. For example, in the process of providing insurance for the farming industry, PFI chose an external electronic ear tag with internal temperature sensors, which can monitor the body temperatures of breeding sows, dairy cows and meat goats in real time and, by observing the fluctuations in body temperatures, is able to determine whether the livestock has died, thus achieving accurate underwriting.

Table 3 shows examples of applications of remote sensing technology as well as UAV technology, etc., applied to agro-insurance planting and farming.

**Table 3.** Examples of agricultural insurance underwriting bid validation under big data

Sector	Mechanism	Concrete content
Plantation	PICC	Collecting aerial image data through low-speed drones and using computers for image information processing to accurately grasp the growth of markers in large field areas
	China General Insurance Company (CGCI)	A multi-rotor drone was used to carry out pest census and labelling in close proximity. Precise location of dead pine trees to improve census efficiency and accuracy <sup>[10]</sup>
Cultivation industry	PICC	Adopting external electronic ear tag, real-time monitoring of livestock body temperature and judging whether the livestock is dead or not by body temperature.
		Underwriting Tender Inspection through Pig Face Recognition Technology
	Zongan Science and Technology Co., Ltd.	Chicks are tagged with chicken tags and accurately underwritten by their tag numbers.

Source: Manually collated from publicly available sources.

### 3.3 Disaster Prevention and Loss Prevention Links

Technology also plays an important role in disaster prevention and loss prevention. Through the use of modern scientific and technological means, smart agricultural insurance can realize real-time monitoring, early warning and assessment of agricultural risks, and then provide farmers with more accurate risk management services.

For example, when Typhoon Sura passed through Guangdong, Guangdong Agriculture Insurance, the AI digital agriculture comprehensive service platform of PICC Guangdong Branch, played a crucial role. Based on big data analysis technology, the platform intelligently researched the damage of different crops under the influence of the typhoon, issued disaster warnings in a timely manner, and adopted the "land + meteorology + insurance" approach to track the typhoon's changes in real time, which not only helped the local government to do a good job of emergency relief work, but also automatically issued warnings to farmers to prevent disasters, which greatly reduced the number of farmers and local government officials' involvement in the typhoon. This has greatly reduced the losses of both farmers and the local government.

Table 4 illustrates some examples of the use of technology to achieve risk management in agricultural insurance.

**Table 4.** Examples of technology contributing to disaster and loss prevention in agricultural insurance

Sector	Mechanism	Concrete content
plantation	PICC	"Guangdong Agriculture Insurance" AI digital agriculture integrated service platform issues timely disaster warnings <sup>[1]</sup>
	Pacific General Insurance	The "Agricultural Insurance Storm System" conducts 360-degree risk inspections of farmland, fruit groves and aquaculture through drones, and infrared thermography inspections of engineering projects to rule out electrical fires.
cultivation industry	PICC	"Intelligent cloud goose farm" through disease monitoring, prevention and control, timely warning, response to disease risk, reduce disease losses.
	Pacific General Insurance	The "TaiBao e-inspection station" helps to build a specialised aquaculture system for disaster prevention and loss reduction, quality and safety, and scientific detection of fish diseases.

Source: Manually collated from publicly available sources.

### 3.4 Survey and Loss Adjusting Session

In the survey and loss determination stage of agricultural insurance, the traditional on-site survey mode has many problems, such as high cost, low efficiency, large errors and difficulties in loss determination. These problems have led to the insurance companies have no choice but to take the form of negotiation with the sample loss or the village committee to clarify the amount of compensation, which has led to the emergence of

several cases of misrepresentation, fraudulent insurance and fraudulent compensation and other moral hazards. However, the integration of satellite remote sensing, drone technology and global positioning system and other insurance technology can be a good solution to these problems. These high-tech means not only improve the efficiency and accuracy of surveying and loss determination, but also reduce the cost of insurance companies, while also helping to prevent the occurrence of moral hazard and other incidents.

In the field of plantation insurance loss determination, a loss determination system that integrates "space, air and land" is most commonly used. The system skilfully integrates space satellite remote sensing technology, unmanned aerial vehicle technology, ground-based manual surveys and mobile galactic collection technology, thus successfully creating a multi-scale and all-round loss determination system<sup>[12]</sup>. For example, Ping An General Insurance has launched an all-process, all-encompassing agricultural insurance survey and loss determination model. This model is mainly used to accurately delineate the affected area by using satellite remote sensing technology to obtain information on large plots, drone technology to obtain information on small plots, and then combining artificial intelligence technology to obtain multi-spectral features of crops and back analyse meteorological information in the coverage area. In the heavy rain disaster that occurred in Liaoning Province in September 2021, when some crops fell over, Ping An General Insurance used the watermark camera function of Ping An AI Farming Treasure APP and combined it with the spectral and climatic characteristics of the corn so as to quickly confirm the damage and make timely claims to the insured farmers. The insurance company used the watermark camera function of the Ping An AI AgroBao APP and combined it with the spectral and climatic characteristics of the corn to quickly identify the damage and make a timely claim to the insured farmers.

In the field of aquaculture insurance claims, the intelligent identification system based on 3S technology, IoT and AI technology has attracted much attention in recent years, which is able to carry out automatic measurement of body length, intelligent identification of dead individuals and remote video survey and other operations. The use of these advanced technologies not only makes loss determination more scientific and rapid, but also effectively reduces non-insurance claims and duplicate claims, and ensures the fairness and accuracy of insurance claims. In addition, farmers can use the "watermark camera" function in the claims app to take photos of the spatial information of the subject matter of the insurance, and can quickly save and upload them remotely, which greatly improves the convenience and efficiency of the claims process. For example, on this basis, Ping An General Insurance innovatively introduced the composite model of "mobile terminal + watermark camera + remote video", and successively piloted the application of advanced technologies such as NFC electronic ear tags and cow face recognition. By integrating remote video and multi-party call-in technology, Ping An General Insurance has successfully combined scientific and technological means with standardised processes, thereby significantly reducing the risk of false claims and bringing higher efficiency and accuracy to insurance claims in the farming industry.

More and more enterprises see the benefits of using insurance technology in insurance survey and loss determination, so they also invest more in the integration and innovation of insurance technology and survey and loss determination, and Table 5 shows

the cases of some enterprises to promote the survey and loss determination of planting and breeding industry through technology.

**Table 5.** Examples of innovations in planting and farming surveying and damage assessment

Plantation	Yanzhao Property and Casualty Insurance	In the 2019 rice chlorosis disaster in Luannan County, two drones were deployed to take aerial photographs of 800 acres of affected rice, and 540 acres of rice were eventually approved to be at risk <sup>[13]</sup>
	Zijin Insurance	Determine the distribution of the disaster situation based on the results of the disaster assessment, and carry out damage surveys at different levels to improve the efficiency of claims settlement
	PICC	During the 2020 drought in Pingquan City, Chengde, TPCI initiated a remote sensing loss determination programme and completed the survey of hundreds of thousands of mu of affected areas within seven days
Cultivation industry	PICC	Use radio frequency identification (electronic ear tags) and biometrics to identify and verify the entire life cycle of beef cattle; use blockchain traceability systems to record information on the entire process of breeding, supply and consumption of individual beef cattle
	Ping'an Property and Casualty Insurance	Through remote video tracking, real-time access to the body temperature of pigs and alerts in case of abnormality, on the one hand, notify the user in time for investigation, and on the other hand, reduce the risk of epidemiological diseases.

Source: Manually collated from publicly available sources.

## 4 Conclusion

With the continuous development of the agricultural insurance industry and the continuous innovation of technical means, the in-depth application of insurance technology in the field of agricultural insurance is bound to be the general trend. For example, the use of satellite remote sensing and drone technology, comprehensive monitoring of crops in the insured area, and through the agricultural experts and the company's on-site survey, basically can accurately complete the disaster distribution map of the reported area, while according to the degree of disaster to make the farmers satisfied with the claims programme. In the role of these insurance science and technology means, the traditional agricultural insurance exists in the cumbersome procedures, inefficiency and other problems have been solved to a certain extent. In addition, all kinds of insurance science and technology means can also be better in the field of agricultural insurance operations to achieve cost reduction and efficiency, significantly improve the efficiency of agricultural insurance operations.



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