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# Research on the High-Quality Development of Agricultural Insurance in Guangxi Empowered by Technology under the Background of Rural Revitalization

**Linyun Deng[1], Yanmei Gan[1], Ting Yuan[1]**

1. Nanning University, Nanning, Guangxi. 530000

## Abstract

The implementation of the rural revitalization strategy has brought new opportunities and challenges to the development of agricultural insurance. Based on an analysis of the current status of agricultural insurance in Guangxi, this paper explores the necessity of technological empowerment in agricultural insurance, outlines the practical pathways for technology-driven agricultural insurance in Guangxi, and proposes corresponding countermeasures to address existing issues. The study aims to provide references for the high-quality development of agricultural insurance in Guangxi and contribute to rural revitalization.

**Keywords:** Rural revitalization; Technological empowerment; Guangxi; Agricultural insurance; High-quality development.

## 1. Introduction

The comprehensive advancement of the rural revitalization strategy has placed higher demands on agricultural insurance. As a crucial tool for mitigating agricultural risks and ensuring farmers' income, agricultural insurance plays an indispensable role in rural revitalization. Guangxi, as a major agricultural province, relies on the development of agricultural insurance to safeguard local agricultural production and farmers' interests. With continuous technological innovation and progress, technological empowerment has become a key driving force in promoting the high-quality development of agricultural insurance. This paper aims to explore how technological empowerment can facilitate the high-quality development of agricultural insurance in Guangxi under the background of rural revitalization, thereby better serving the rural revitalization strategy.

## 2. Current Status of Agricultural Insurance in Guangxi

### (1) Continuous Expansion of Agricultural Insurance Scale

Guangxi's agricultural insurance business transitioned to a policy-oriented operational model in 2006. Over the subsequent decade and beyond, until 2023, agricultural insurance premium income has achieved significant progress. This period can be roughly divided into three stages:

Rapid Growth Stage: In 2008, premium income growth reached an impressive 373.60%, surpassing the one-billion-yuan threshold. This remarkable achievement highlights the outstanding effectiveness of the policy-oriented operational model reform, which significantly propelled the rapid development of Guangxi's agricultural insurance business.

Fluctuating Development Stage: From 2009 to 2012, as policy support intensified, the number of pilot insurance types and coverage areas expanded. However, this also introduced new challenges, particularly the rapidly increasing demand for financial subsidies, which slowed down the growth rate of agricultural insurance. During this period, Guangxi experienced fluctuations in insurance development, with some years even witnessing negative premium income growth.

Steady Growth Stage: In 2013, the Guangxi government formulated a comprehensive and detailed plan for policy-based agricultural insurance, specifying concrete objectives, implementation measures, and a series of supporting policies. Under these strong initiatives, premium income steadily increased from 276.4 million yuan in 2013 to 6.015 billion yuan in 2023, marking a 21-fold growth over a decade. This substantial progress demonstrates that Guangxi's agricultural insurance has effectively safeguarded agricultural production, with both sectors closely interlinked in driving agricultural economic development.

### (2) Types of Agricultural Insurance

The specific insurance products are listed in Table 1. It can be seen that Guangxi offers a wide variety of agricultural insurance products, covering a broad range from major crops to locally distinctive agricultural products. Moreover, continuous innovation and optimization provide solid support for agricultural production and farmers' income growth.

**Table 1. Types of agricultural insurance in Guangxi**

| Types of insurance | Crops/Projects | Guarantee content/features |
|---|---|---|

| | | |
|---|---|---|
| Major crop insurance | Rice, sugar cane, corn, potato and other major crops | Rice full cost insurance and income insurance have been fully implemented, and the level of protection is high. Rice full cost insurance covers natural disasters, major pests and diseases, etc., and the protection limit can reach 80% of the output value per mu. |
| Local characteristic agricultural products insurance | Sugarcane, citrus, oil tea, walnut, passion fruit, kiwi fruit and other geographical characteristics of agricultural products | Covering planting and breeding. The aquaculture industry includes wind index insurance for shrimp and temperature index insurance for tilapia. |
| New agricultural insurance products | Yield index insurance, price index insurance, income insurance, oyster farming index insurance, egg futures price insurance, etc | Insurance products include new types of guarantees such as output, price and income, which expand the coverage of agricultural insurance and provide protection against specific risks, such as oyster farming and egg futures price insurance. |
| policy-guided agricultural insurance | Rice, sugar cane, breeding sows, fattening pigs, dairy cows, etc | The government supports insurance through financial subsidies, covering a number of areas. In 2020, the central government will allocate 64.5 million yuan for premium subsidies for agricultural insurance in Guangxi. |
| Insurance service innovation | Pig price index insurance, sugarcane income index insurance, regional production insurance, agriculture-related insurance, etc | The innovative model includes the "insurance + futures" model to solve the risk caused by the price fluctuation of agricultural products; Explore regional yield insurance and agriculture-related insurance to meet the needs of different farmers. |

Data source: Compiled from the Guangxi Government Portal website.

### (3) Increasing Government Support

From 2010 to 2023, financial subsidies for agricultural insurance showed a significant upward trend, with an average annual growth rate of 33.81%. This indicates that the government's emphasis on agricultural insurance has been increasing year by year, with growing support. Notably, in 2013 and 2021, the growth rates exceeded 100% and 45%, respectively,

demonstrating a substantial increase in financial subsidies for agricultural insurance in these two years. This growth trend plays a crucial role in promoting the development of agricultural insurance, enhancing the level of risk protection in agriculture, and advancing the implementation of the rural revitalization strategy.

## 3. The Necessity of Technological Empowerment in Agricultural Insurance

### (1) Improving the Efficiency of Agricultural Insurance Services

Traditional agricultural insurance processes are cumbersome, requiring substantial human and material resources for underwriting, claims processing, and risk management, resulting in low efficiency. The application of technology enables the automation and intelligent processing of agricultural insurance operations. For instance, big data technology can be used for risk assessment and precise pricing, while satellite remote sensing and drones facilitate rapid surveys and loss assessments, significantly enhancing the efficiency and quality of agricultural insurance services [1].

### (2) Enhancing Risk Management Capabilities in Agricultural Insurance

Agricultural production faces multiple risks, including natural disasters and market price fluctuations. Accurate risk assessment and effective risk management are key to the sustainable development of agricultural insurance. Technological tools can collect and integrate vast amounts of agricultural data, such as meteorological data, soil data, and crop growth data. Through data analysis and modeling, these technologies enable precise risk prediction and dynamic monitoring, providing scientific decision-making support for insurance institutions and reducing claims risks [2].

### (3) Driving Innovation in Agricultural Insurance

Technological innovation offers new approaches and methods for product and service innovation in agricultural insurance. For example, blockchain-based agricultural insurance ensures data immutability and transparent sharing, enhancing the credibility and security of insurance transactions. Additionally, mobile internet and IoT technologies enable the development of more convenient and personalized agricultural insurance service models, catering to farmers' insurance needs in various scenarios [3].

# 4. Practical Pathways for Technological Empowerment in Guangxi's Agricultural Insurance

## (1) Application of Big Data Technology

Risk Assessment and Pricing

By collecting agricultural production data, meteorological data, and market data across various regions of Guangxi, an agricultural risk database can be established. Utilizing big data analytics, the risk levels of different regions, crops, and livestock varieties can be precisely assessed, enabling differentiated pricing and enhancing the scientific and equitable nature of agricultural insurance [4].

Precision Marketing and Services

Through the analysis of farmers' planting and breeding habits as well as their insurance needs, personalized insurance product recommendations and targeted marketing services can be provided. Additionally, by analyzing farmers' claims records and risk preferences, insurance service plans can be optimized to improve customer satisfaction [5].

## (2) Application of Satellite Remote Sensing and Drone Technology

Survey and Loss Assessment

In the agricultural insurance claims process, satellite remote sensing technology can be used to obtain large-scale disaster images of crops, quickly identifying affected areas and the extent of damage. Combined with low-altitude drone photography, clearer and more accurate images of disaster details can be captured, providing strong support for precise loss assessment and improving claims efficiency and accuracy [6].

Crop Monitoring and Management

Regular monitoring of crop growth using satellite remote sensing and drone technology helps detect anomalies such as pests, droughts, and floods in a timely manner. This enables early warning information and management recommendations for farmers, helping them take preventive measures to reduce losses. At the same time, it provides valuable reference data for insurance institutions in risk prevention and control [7].

## (3) Application of Blockchain Technology

1. Data Management and Sharing

A blockchain-based agricultural insurance data management platform can be established to store farmer information, insurance contracts, and claims records on-chain, ensuring data authenticity and immutability. Additionally, it facilitates data sharing among insurance institutions,

government departments, and agricultural enterprises, breaking down information silos and improving the coordination efficiency of agricultural insurance operations [8].

2. Smart Contracts and Automated Claims

By leveraging blockchain's smart contract functionality, insurance claim conditions and processes can be embedded into smart contracts. When pre-set claim trigger conditions are met, the smart contract automatically executes the claims process, enabling fast payouts and enhancing the efficiency and credibility of agricultural insurance claims [9].

### (4) Application of Mobile Internet and IoT Technology

1. Development of Online Service Platforms

Mobile applications for agricultural insurance can be developed to provide farmers with one-stop services, including online insurance purchase, claims reporting, policy inquiries, and risk warnings. This enables farmers to handle insurance-related matters anytime and anywhere, enhancing the accessibility and convenience of agricultural insurance services [10].

2. Application of IoT Devices

IoT sensors, such as soil moisture sensors, temperature sensors, and water quality sensors, can be installed in agricultural production areas to monitor environmental conditions and crop growth in real time. The collected data is transmitted to insurance institutions, supporting real-time risk assessment and claims processing. Simultaneously, it provides farmers with precise agricultural production guidance, helping them optimize their farming practices [11].

## 5. Challenges in Technological Empowerment of Agricultural Insurance in Guangxi

### (1) Shortage of Technological Talent

The integration of agricultural insurance with technology requires interdisciplinary professionals who are knowledgeable in both fields. However, the insurance industry in Guangxi faces a shortage of technological talent, with limited expertise and skills, making it difficult to meet the needs of technological empowerment in agricultural insurance. This constraint hampers the research, development, and application of agricultural insurance technology projects.

### (2) Insufficient Data Resources

Although Guangxi possesses abundant agricultural data resources, several challenges exist in data collection, integration, and sharing. Different departments follow inconsistent data standards, and

the problem of data silos is severe, making it difficult to consolidate agricultural insurance data resources effectively. Data quality varies significantly. Additionally, in some areas, agricultural data collection still relies on manual statistical methods, leading to issues with data timeliness and accuracy, which affects the effectiveness of technology applications in agricultural insurance.

### (3) High Cost of Technological Application

Implementing technology in agricultural insurance requires significant financial investment, including the purchase of hardware equipment, development of software systems, data collection and processing, and personnel training. For some small and medium-sized insurance institutions and agricultural enterprises, bearing these costs is challenging. As a result, the adoption of technology remains limited, slowing the overall technological advancement of agricultural insurance.

### (4) Insufficient Regulatory and Policy Support

Currently, regulatory policies and industry standards for technological empowerment in agricultural insurance are not yet well-developed. Risk assessment and regulatory mechanisms for new technologies are relatively lagging. Moreover, government support in this area remains inadequate, with a lack of dedicated financial subsidies, tax incentives, and other incentive policies. This limits the enthusiasm of insurance institutions and technology companies for innovation.

## 6. Policy Recommendations

### (1) Strengthening the Cultivation and Recruitment of Technological Talent

Reforming Education in Universities and Vocational Schools

Encourage universities and vocational institutions in Guangxi to offer courses related to agricultural insurance and technology, cultivating professionals who meet the development needs of agricultural insurance technology. Strengthen collaboration with insurance institutions and technology enterprises to establish internship and training bases, providing students with practical opportunities to enhance their hands-on skills and employability.

Talent Recruitment and Training

Formulate incentive policies to attract outstanding technological talent and teams from both domestic and international sources to work on agricultural insurance technology in Guangxi. Additionally, enhance technological training for existing insurance professionals to improve their ability to apply technology and foster innovation, building a workforce that possesses expertise in both agricultural insurance and technology.

## (2) Improving Data Resource Development

Establishing and Standardizing Data Frameworks

Government departments should take the lead in collaboration with insurance institutions, agricultural agencies, and research institutions to develop unified standards and protocols for agricultural insurance data. Clear guidelines should be set for data collection, storage, transmission, and sharing to ensure data consistency and comparability.

Building a Data-Sharing Platform

Develop a Guangxi Agricultural Insurance Big Data Sharing Platform that integrates data resources from government agencies, insurance companies, agricultural enterprises, and research institutions. This platform should enable data interconnectivity and sharing while strengthening data security management. A comprehensive data protection mechanism should be established to ensure data privacy and security.

Enhancing Data Collection and Quality

Increase investment in agricultural data collection by adopting advanced data acquisition technologies and equipment to improve automation and intelligence in data collection. Strengthen data quality monitoring and management by establishing a data quality evaluation system, conducting regular data cleansing, verification, and updates to ensure data accuracy and reliability.

## (3) Reducing the Cost of Technology Adoption

Increasing Government Financial Support

The government should increase financial investments in agricultural insurance technology by establishing dedicated funds to support research, pilot projects, and infrastructure development. Insurance institutions and agricultural enterprises that purchase technological equipment or software systems should receive financial subsidies or tax incentives to lower their technology adoption costs.

Encouraging Multi-Party Collaboration and Resource Sharing

Encourage cooperation between insurance institutions, technology enterprises, and research institutions to share the costs of technology development and application. Establish strategic partnerships and industry alliances to promote resource sharing and complementary advantages, improving economies of scale and economic benefits in technological applications.

## (4) Strengthening Regulation and Policy Support

Improving Regulatory Policies and Standards

Regulatory authorities should closely monitor developments in agricultural insurance technology and promptly formulate and improve relevant regulatory policies and industry standards.

Strengthen risk assessment and regulatory measures for new technologies, and establish a comprehensive risk warning mechanism to prevent systemic risks associated with technological applications, ensuring the stable operation of the agricultural insurance market.

Providing Policy Incentives and Guidance

The government should introduce a series of incentive policies to encourage insurance institutions and technology enterprises to invest more in agricultural insurance technology. Beyond financial subsidies and tax incentives, priority support can be provided in areas such as project approvals, land use, and talent recruitment, creating a favorable policy environment to accelerate the technological advancement of agricultural insurance.

## 7. Conclusion

Against the backdrop of rural revitalization, technological empowerment plays a crucial role in the high-quality development of agricultural insurance in Guangxi. The application of technologies such as big data, satellite remote sensing, drones, blockchain, and mobile internet can significantly enhance the efficiency of agricultural insurance services, improve risk management capabilities, and drive innovation, thereby better supporting Guangxi's rural revitalization strategy.

However, challenges remain in the technological empowerment of agricultural insurance in Guangxi, including a shortage of technological talent, insufficient data resources, high costs of technology adoption, and inadequate regulatory and policy support. Therefore, effective measures should be implemented, focusing on strengthening the cultivation and recruitment of technological talent, improving data resource development, reducing the costs of technology application, and enhancing regulatory and policy support. These efforts will facilitate the high-quality development of agricultural insurance in Guangxi through technological empowerment, providing strong support for rural revitalization.

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