

Empowering Agriculture: Harnessing Technology and Crop Insurance to Mitigate Climate Change

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Agriculture stands as the cornerstone of the Indian economy, sustaining over 58 per cent of the population and contributing significantly to economic stability. However, the vulnerability of this vital sector has been underscored by the changing climatic patterns and the uncertainties of weather. In the face of these challenges, the threat to food security and economic stability has escalated dramatically. Recognizing the urgent need for resilience, climate-resilient agriculture emerges as a key imperative. Coupled with effective risk mitigation options such as crop insurance, it becomes pivotal in safeguarding our agricultural system and ensuring food security for the nation. Today, the agricultural landscape is witnessing transformative opportunities, driven by advanced technologies and financial support. The swift impact of climate change, marked by rising temperatures, recurrent heat waves, droughts, floods and intense cyclonic activities, has outpaced conventional mitigation efforts. In response to present scenario, the Ministry of Agriculture and Farmers Welfare has introduced Pradhan Mantri Fasal Bima Yojana (PMFBY) after replacing various previous insurance schemes. Several pioneering technological initiatives have been introduced under this scheme to enhance its efficiency. These initiatives aim not only to empower farmers but also to streamline operations for a more resilient agricultural sector.

Evolution of crop insurance in India

Crop insurance in India has a rich history, starting with J.S. Chakravarti proposing a rain insurance scheme in the early 1900s to protect farmers against drought. During post-independence period, Prof. Dandekar introduced the 'homogeneous area' approach in the mid-seventies. Significant milestones in crop insurance include the pioneering First Individual Approach Scheme (1972) and the Pilot Crop Insurance Scheme (1979). Subsequent developments include the Comprehensive Crop Insurance Scheme (1985) and the National Agricultural Insurance Scheme (1999-2000).

Innovations continued with the introduction of the Weather-Based Crop Insurance Scheme (2007) and enhancements in the Modified National Agricultural Insurance Scheme (2010-11), expanding coverage and effectiveness. Presently, two government-subsidized schemes, the Weather-Based Crop Insurance Scheme and the Pradhan Mantri Fasal Bima Yojana (PMFBY) are operational. The Pradhan Mantri Fasal Bima Yojana (PMFBY), inaugurated in 2016 and revamped in 2020, extends its protective umbrella over a diverse range of crops. Designed with the primary objective of stabilizing farmer's income, this innovative scheme represents a crucial stride towards fortifying the agricultural sector. Thus, this evolution reflects the adaptation of crop insurance in India to changing needs and challenges in the agricultural landscape.

Pradhan Mantri Fasal Bima Yojana

In a major move, the Indian government launched the Pradhan Mantri Fasal Bima Yojana (PMFBY) in February 2016, aligning with the One Nation-One Scheme vision (Singh and Singh, 2019). Going beyond its predecessors, PMFBY covers all crops with a capped premium of 2 per cent, 1.5 per cent and 5 per cent for Kharif, Rabi and commercial/horticultural crops, respectively (Inderjeet, 2019). PMFBY isn't just insurance; it is a catalyst for stabilizing farmer's income and fostering innovative agricultural practices. Tailored for the backbone of the nation, its primary goal is to support sustainable production by providing financial assistance to those facing crop losses due to natural calamities. Extending coverage beyond the expected, PMFBY addresses localized risks and post-harvest losses. It aims to boost crop insurance penetration by raising farmer awareness and maintaining low premium rates. Recognizing the need for improvement, PMFBY underwent a significant revamp in 2020, making the scheme voluntary for all farmers (Anonymous, 2023a). This reflects a commitment to flexibility and inclusivity, ensuring the

benefits of PMFBY reach a broader spectrum of farmers across the nation.



Source: <https://www.bajajallianz.com/blog/knowledge/bytes.html>

Integration of technology in crop insurance

Incorporating cutting-edge technology into crop insurance brings transformative initiatives to the forefront. Notably, the technology-driven Yield Estimation System (YES-TECH) manual under PMFBY emerges as a game-changer. Rigorously developed through extensive testing, it serves as a comprehensive guide for accurate yield assessments, empowering farmers with crucial insights. Another pioneering effort in this scheme is the WINDS portal, revolutionizing risk assessment by centrally managing hyper-local weather data. This not only informs decisions in crop insurance but also enhances capabilities in agricultural advisories and disaster mitigation. The YES-TECH Manual, crafted through extensive testing in 100 Indian districts, provides a robust guide for implementing the technology-driven yield estimation system at the Gram Panchayat level. In parallel, the WINDS Portal serves as a centralized hub for processing hyper-local weather data, empowering precise risk assessment and decision-making in crop insurance, agriculture advisories and disaster mitigation for the rural economy (Anonymous. 2023b). Adding to the innovation, the AIDE Android app streamlines the enrollment process, making crop insurance more accessible by bringing it directly to farmer's doorsteps.

Constraints

Inadequate compensation structures: The current compensation provided under the PMFBY is often

insufficient to cover the actual losses incurred by farmers in case of crop failure.

Protracted claim settlement process

Delays in processing and settling insurance claims significantly impede the timely financial assistance required by farmers.

Lack of awareness and information dissemination

Many farmers are unaware of the facilities available under crop insurance schemes, leading to a lack of participation and understanding.

Limited trust and farmer engagement

The negative attitude and lack of trust among farmers towards the insurance scheme hinder its success rate.

Suggestions

Creation of Awareness

Promoting awareness about insurance is essential to foster its widespread adoption, as it empowers individuals to comprehend the significance of financial protection, encourage informed decision-making and resilience in the face of unforeseen events.

Timely Payment of Compensation

Timely payment of compensation is imperative for the effective success of crop insurance, ensuring that farmers receive prompt financial support during adverse events, thereby strengthening the resilience of the agricultural sector.

Adequate Compensation

Ensuring adequate compensation is crucial to help farmers effectively mitigate crop losses, providing essential support for their livelihoods and fostering resilience in the face of unforeseen challenges.

Efforts by Government and Non-Governmental Organizations

The collaborative efforts and initiatives by both government and non-governmental organizations can enhance the success of PMFBY.

Active Participation of Stakeholders

Active engagement of stakeholders, including farmers, local authorities and community leaders in decision-making processes can significantly contribute to the success of crop insurance programs.

Along with that leveraging technology is pivotal for enhancing crop insurance. Integrating remote sensing, such as satellite imagery, enables accurate risk assessment and real-time crop monitoring. Advanced analytics can facilitate precise yield predictions, while the incorporation of block chain technology will enhance transparency and efficiency in the insurance process, collectively improving the overall effectiveness of crop insurance programs.

The Road Ahead

The future prospects of technology-driven crop insurance, particularly in the context of climate change, hold immense potential. Advanced technologies like satellite imagery, data analytics and machine learning offer the potential to adapt insurance models to evolving climate patterns, providing more accurate risk assessments and timely compensation for farmers affected by climate-related challenges. This intersection of technology and insurance stands as a crucial pillar for building resilience in agriculture amidst the uncertainties posed by climate change.

Conclusion

Addressing persistent challenges such as inadequate compensation and prolonged claim settlements, the narrative presents practical solutions while highlighting the essential roles of both governmental and non-governmental efforts. The significant technological advancements, demonstrated by the innovative YES-TECH manual, WINDS portal, and AIDE Android app within PMFBY, serve as catalysts for positive change. Additionally, the article underscores the urgent issue of climate change and explores how technologies like

satellite imagery and blockchain can assist farmers in adapting to changing weather patterns. In conclusion, while crop insurance and technological advancements are commendable steps towards securing India's agriculture, obstacles such as insufficient compensation, delayed claims, and limited awareness necessitate targeted solutions. Collaborative efforts from stakeholders, both governmental and non-governmental, along with increased awareness and prompt compensation payment, are crucial for the program's success. Looking ahead, integrating cutting-edge technologies holds promise for adapting insurance models to climate change. A comprehensive strategy, encompassing technology, stakeholder engagement, and streamlined policies, is essential to strengthen India's agricultural resilience and ensure food security amidst evolving challenges.

References

- Anonymous. (2023a). Revamped operational guidelines of Pradhan Mantri Fasal Bima Yojana. <https://pmfby.gov.in> (5.00 PM, 5 December, 2023)
- Anonymous. (2023b). Ministry of Agriculture & Farmers Welfare. <https://pib.gov.in> (8.00 PM, 15 December, 2023).
- Inderjeet. (2016). Study on the benefits of Pradhan Mantri Fasal Bima Yojna for farmers. *International Journal of Multidisciplinary Research and Development*, 6, 384-387.
- Singh AK. and Singh A. (2019). Pradhan Mantri Fasal Bima Yojna (PMFBY): A bunch of Benefits. *International Journal of Multidisciplinary*, 4, 1031-1035.

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