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Agricultural Risk Mitigation In Andhra Pradesh: Challenges and Prospects of PMFBY and RWBCIS

Article History:

Name of Author:

Subbarayudu Thunga¹, M V A L Narasimha Rao², Lavanya P B³, Laliseti Ganesh⁴

Affiliation:

¹Associate Professor, Vignan's Foundation for Science, Technology & Research, Vadlamudi 522213, Andhra Pradesh, India

²Associate Professor, Department of MBA, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh

³Assistant Professor, Department of MBA, Lakireddy Bali Reddy College of Engineering, Mylavaram. Andhra Pradesh, India

⁴Assistant Professor, Vignan's Foundation for Science, Technology & Research Vadlamudi-522213, Andhra Pradesh, India

Corresponding Author:

Subbarayudu Thunga

rayudu.thunga@gmail.com

How to cite this article:

Thunga S, et. al Agricultural Risk Mitigation In Andhra Pradesh: Challenges and Prospects of PMFBY and RWBCIS. *J Int Commer Law Technol.* 2025;6(1):604-610.

Received: 08-09-2025

Revised: 22-09-2025

Accepted: 05-10-2025

Published: 23-10-2025

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Abstract: Agriculture in Andhra Pradesh faces significant risks from climate change, market fluctuations, and natural disasters, underscoring the need for effective risk mitigation strategies. The Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Restructured Weather-Based Crop Insurance Scheme (RWBCIS) were introduced to offer financial security to farmers. This study aims to analyse the challenges and prospects of these schemes in mitigating agricultural risks in Andhra Pradesh. Based on a survey of 150 farmers across eight villages in Guntur district, the research identifies key challenges, including low awareness, delayed claim settlements, complex documentation requirements, accessibility issues, and technological inefficiencies. The findings highlight the need for policy reforms, improved stakeholder coordination, and greater technological integration to strengthen agricultural insurance in the state.

Keywords: Agricultural insurance, PMFBY, RWBCIS, Risk mitigation, Farmer awareness, Technological advancements

INTRODUCTION

Agriculture remains the mainstay of India's economy, providing livelihood to nearly 58% of the population (FAO, 2021). However, the sector is highly vulnerable to various risks, including climate change, extreme weather events, pest outbreaks, and market fluctuations. Andhra Pradesh, with its diverse agro-climatic zones and dependence on monsoon rains, is particularly susceptible to these risks (Government

of Andhra Pradesh, 2023). Frequent occurrences of droughts, floods, and cyclones have led to significant crop losses, affecting farmers' incomes and livelihoods. To counter these challenges, the Government of India has introduced agricultural insurance schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Restructured Weather-Based Crop Insurance Scheme (RWBCIS) to provide financial protection to farmers against yield

losses due to natural calamities (Ministry of Agriculture & Farmers' Welfare, 2022).

Despite these initiatives, the implementation of agricultural insurance in Andhra Pradesh faces several challenges, including low awareness, delayed claim settlements, inadequate coverage, and operational inefficiencies (Raju & Chand, 2021). Farmers often encounter difficulties in enrolling, understanding policy terms, and receiving timely compensation, reducing their trust in these schemes. Additionally, the shift from the earlier National Agricultural Insurance Scheme (NAIS) to PMFBY and RWBCIS has raised concerns over premium costs and the role of private insurers (Gulati et al., 2022). On the other hand, these schemes also present opportunities, such as improved technological interventions, satellite-based assessment, mobile application-based claim processing, and better integration of insurance with government subsidies (World Bank, 2023).

This study aims to critically examine the challenges and opportunities in the implementation of PMFBY and RWBCIS in Andhra Pradesh, highlighting policy gaps and potential solutions to enhance their effectiveness. The findings will contribute to ongoing discussions on agricultural risk mitigation and inform stakeholders, including policymakers, insurers, and farmer organizations, about the necessary reforms to make crop insurance more accessible, efficient, and farmer-friendly.

LITERATURE REVIEW

Agricultural risk mitigation has been a key area of concern for policymakers and researchers, especially in agrarian economies like India. The introduction of crop insurance schemes, such as PMFBY and RWBCIS has been a significant step toward protecting farmers from yield losses and income instability. However, the implementation of these schemes faces multiple challenges in states like Andhra Pradesh, including low awareness, procedural inefficiencies, and delayed claim settlements (Raju & Chand, 2021). Agriculture in India is inherently risk-prone, with approximately 52% of the country's farmland dependent on monsoon rains (FAO, 2021). Climate change-induced risks such as droughts, floods, hailstorms, and pest infestations significantly impact agricultural productivity (Deshpande, 2020). To mitigate these risks, the Government of India introduced agricultural insurance schemes to stabilize farm income and encourage investment in modern farming techniques (Gulati et al., 2022). Andhra Pradesh, being a coastal state, frequently experiences cyclones and unpredictable weather patterns, making insurance an essential tool for farmers (Government of Andhra Pradesh, 2023).

The PMFBY scheme launched in 2016, designed to offer comprehensive risk coverage to farmers. It provides low premium rates as low as 2%, 1.5% and 5% for Kharifi, Rabis, and horticultural crops respectively (MoAFW, 2022). The loanee farmers must mandatorily opt for this scheme and is optional for non-loanee farmers and subsidy of premium is shouldered by both state and central governments (Chakravarty & Chand, 2021). On the other hand RWBCIS scheme, focuses on weather parameters (such as rainfall, temperature, and humidity) instead of actual yield loss (Mishra & Awasthi, 2021). This scheme benefits farmers facing weather-related risks but has been criticized for inadequate weather station coverage and delayed claim settlements (World Bank, 2023). Studies indicate that a significant percentage of farmers remain unaware of agricultural insurance schemes, leading to low enrollment rates (Rathod et al., 2021). Even among those aware, complex documentation requirements and lack of financial literacy discourage participation (Sharma & Patel, 2020). One of the most critical issues in PMFBY is the delay in insurance claim settlements. Farmers have reported waiting several months for compensation, primarily due to delays in yield estimation, data discrepancies, and insurance company inefficiencies (Ghosh et al., 2022). According to a study by Singh & Verma (2023), nearly 40% of farmers in Andhra Pradesh faced delays in receiving their insurance claims under PMFBY. Although PMFBY offers subsidized premiums, the burden of premium payments on state governments has led to some states, including Andhra Pradesh, opting out of the scheme temporarily (MoAFW, 2022). Additionally, farmers have expressed concerns about rising premium costs and low claim ratios (Reddy & Prasad, 2021).

RWBCIS, which relies on automated weather stations, faces technical issues, including inadequate weather station coverage and data inaccuracies (Mishra & Awasthi, 2021). Furthermore, farmers often find weather-based triggers too rigid, leading to situations where they suffer losses but do not receive compensation (Gulati et al., 2022). The integration of remote sensing, satellite imagery, and AI-based yield estimation can improve claim assessment and reduce delays (World Bank, 2023). Several pilot studies in Andhra Pradesh have shown that drone-based crop assessment can expedite the insurance process by 30-40% (Ghosh et al., 2022). Mobile applications such as PMFBY App and digital platforms can simplify enrollment and claim tracking, making insurance schemes more accessible to small and marginal farmers (Raju & Chand, 2021). A stronger collaboration between government agencies, private insurers, and financial institutions can improve service delivery and transparency in agricultural insurance (Sharma & Patel, 2020). Moreover, the

implementation of real-time weather monitoring and automatic claim settlement models could address many of the current inefficiencies (World Bank, 2023).

OBJECTIVES OF THE STUDY

This study examines how demographic, economic, and technological factors influence farmers' awareness, enrolment, and preference for digital platforms in agricultural insurance schemes. It also investigates the challenges hindering the effective implementation of PMFBY and RWBCIS in Andhra Pradesh. Furthermore, the study explores policy interventions and technological advancements to

improve the efficiency and effectiveness of these schemes in mitigating agricultural risks.

RESEARCH METHODOLOGY

This study relies on both primary and secondary data sources. A structured questionnaire was administered to collect the primary data. 150 farmers from eight villages in the Guntur district of Andhra Pradesh were chosen as sample using a convenient sampling method. Secondary sources include published journals, literature reviews, and annual reports of PMFBY and RWBCIS.

DATA ANALYSIS AND RESULTS

Null Hypothesis (H_0): There is no significant association between awareness of government agricultural insurance schemes (PMFBY and RWBCIS) and the factors being analysed.

Alternative Hypothesis (H_a): There is a significant association between awareness of government agricultural insurance schemes and the factors being analysed.

Table:1- Chi-Square Tests on association between awareness of government agricultural insurance schemes and demographic, social, and economic factors

Are you aware of government agricultural insurance schemes like PMFBY or RWBCIS?		Value	df	Asymp. Sig. (2-sided)
1	Pearson Chi-Square	19.843 ^b	4	.001
	Likelihood Ratio	23.581	4	.000
	N of Valid Cases	103		
2	Pearson Chi-Square	23.247 ^c	2	.000
	Likelihood Ratio	29.731	2	.000
	N of Valid Cases	47		
Total	Pearson Chi-Square	17.897 ^a	4	.001
	Likelihood Ratio	20.948	4	.000
	N of Valid Cases	150		

Source: Compiled by authors using SPSS

Inference: Since the p-values are all below 0.05, H_0 (null hypothesis) is rejected. It indicates that the association between awareness of PMFBY and RWBCIS and the factors being analysed is statistically significant. This implies that certain demographic, social, or economic factors might be influencing the level of awareness of these agricultural insurance schemes in Andhra Pradesh.

Null Hypothesis (H_0): There is no significant association among preference for using a mobile app or online platform to check insurance status and the factors being analysed.

Alternative Hypothesis (H_a): There is a significant association among preference for using a mobile app or online platform to check insurance status and the factors being analysed.

Table:2- Chi-Square Tests on **association** among the preference for mobile/online platforms for checking insurance status and certain demographic, technological factors.

Would you prefer using a mobile app or online platform to check your insurance status?		Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
1	Pearson Chi-Square	18.539 ^b	4	.001		

	Likelihood Ratio	22.041	4	.000		
	N of Valid Cases	102				
2	Pearson Chi-Square	24.000 ^c	1	.000		
	Continuity Correction ^d	21.094	1	.000		
	Likelihood Ratio	30.553	1	.000		
	Fisher's Exact Test				.000	.000
	N of Valid Cases	48				
Total	Pearson Chi-Square	17.897 ^a	4	.001		
	Likelihood Ratio	20.948	4	.000		
	N of Valid Cases	150				

Source: Compiled by authors using SPSS

Inference: Since all the p-values are below 0.05, A statistically significant relation exists between the preference for mobile/online platforms for checking insurance status and certain demographic, technological, or behavioural factors and hence, reject the null hypothesis (H_0). This suggests that factors such as education, digital literacy or access to technology might influence a farmer's preference for using digital platforms to manage their agricultural insurance

Null Hypothesis (H_0): There is no significant association among enrolment in agricultural insurance schemes and the factors being analysed.

Alternative Hypothesis (H_a): There is a significant association among enrolment in agricultural insurance schemes and the factors being analysed.

Table:3- Chi-Square Tests on <i>association</i> among enrolment in agricultural insurance schemes and factors such as awareness, accessibility, economic status to adopt insurance.						
Have you ever enrolled in any agricultural insurance scheme?		Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
1	Pearson Chi-Square	29.863 ^b	4	.000		
	Likelihood Ratio	33.842	4	.000		
	N of Valid Cases	103				
2	Pearson Chi-Square	9.239 ^c	1	.002		
	Continuity Correction ^d	7.030	1	.008		
	Likelihood Ratio	12.332	1	.000		
	Fisher's Exact Test				.004	.002
	N of Valid Cases	47				
Total	Pearson Chi-Square	17.897 ^a	4	.001		
	Likelihood Ratio	20.948	4	.000		
	N of Valid Cases	150				

Source: Compiled by authors using SPSS

Inference: Since all the p-values are below 0.05, it means that the association is statistically significant between enrolment in agricultural insurance schemes and factors such as awareness, accessibility, economic status, or willingness to adopt insurance. The null hypothesis (H_0) is rejected. This indicates that certain demographic or socioeconomic factors may influence a farmer's decision to enrol in agricultural insurance.

Null Hypothesis (H_0): There is no significant association between experiencing crop loss due to natural calamities and the categorical variables.

Alternative Hypothesis (H_a): There is a significant association between experiencing crop loss due to natural

calamities and the categorical variables.

Table:4- Chi-Square Tests on **association** between facing crop loss due to natural calamities (such as droughts, floods, and hailstorms) and factors such as location, crop type, preparedness.

Have you ever faced crop loss due to natural calamities (drought, flood, hailstorm, etc.)		Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
1	Pearson Chi-Square	24.023 ^b	4	.000		
	Likelihood Ratio	26.983	4	.000		
	N of Valid Cases	127				
2	Pearson Chi-Square	5.367 ^c	1	.021		
	Continuity Correction ^d	3.389	1	.066		
	Likelihood Ratio	7.539	1	.006		
	Fisher's Exact Test				.052	.026
	N of Valid Cases	23				
Total	Pearson Chi-Square	17.897 ^a	4	.001		
	Likelihood Ratio	20.948	4	.000		
	N of Valid Cases	150				

Source: Compiled by authors using SPSS

Inference: Pearson Chi-Square = 17.897, df = 4, p = 0.001 (Significant at 5% level). Since the p-value ($0.001 < 0.05$), we reject H_0 (null hypothesis). It is concluded that there is a statistically significant association between facing crop loss due to natural calamities (such as droughts, floods, and hailstorms) and factors such as location, crop type, preparedness, or participation in insurance schemes. This suggests that natural calamities play a crucial role in agricultural risks.

DISCUSSION

The study found a statistically significant association between demographic factors and awareness of agricultural insurance schemes. A large proportion of farmers remain unaware of PMFBY and RWBCIS, which limits their enrolment in these schemes. Farmers with lower education and digital literacy are particularly less likely to access these schemes, highlighting a gap in outreach and financial inclusion. Farmers often experience long delays in receiving claim settlements under PMFBY and RWBCIS. Issues such as slow yield estimation, bureaucratic inefficiencies, and insurer delays contribute to these setbacks. Such delays reduce trust in these schemes, discouraging farmers from participating in them in the future. Many farmers struggle with complex documentation requirements for enrolment and claim processing. Rural farmers, especially smallholders, face difficulties in submitting proper documentation due to a lack of awareness and institutional support.

Accessibility to insurance offices remains a major barrier, particularly in remote villages, further limiting farmers' ability to enrol in and benefit from these schemes. Some farmers perceive premium costs as high, particularly for horticultural crops. Additionally, the financial burden on state governments in subsidizing premiums has led to

temporary withdrawal from PMFBY in some cases. RWBCIS also does not always compensate for crop losses due to limitations in weather station coverage and rigid weather-trigger mechanisms, making the scheme less effective for certain farmers. The study identifies technological inefficiencies in claim processing, particularly under RWBCIS, where weather station data is sometimes inaccurate. Farmers in Andhra Pradesh report difficulties in accessing online platforms to track their insurance status, and the lack of real-time monitoring and automated claim settlement leads to manual inefficiencies. The study confirms that natural calamities significantly affect crop losses, reinforcing the need for effective insurance coverage. However, delays in compensation and rigid claim criteria often prevent farmers from receiving timely financial support after disasters, further weakening the effectiveness of agricultural insurance schemes.

To enhance awareness of agricultural insurance schemes, targeted campaigns should be conducted in rural areas through farmer cooperatives, panchayats, and agricultural extension officers. Digital platforms and mobile applications should be utilized to provide easy-to-understand information in regional languages. Collaboration with banks, NGOs, and self-help groups can further help educate farmers about the benefits and processes of insurance, ensuring wider outreach. Technological advancements should

be leveraged to improve efficiency in insurance claim processing. AI-based remote sensing and satellite imagery can be implemented for faster and more accurate yield assessments. Additionally, strengthening grievance redressal mechanisms and enforcing strict timelines for claim settlements will ensure that farmers receive timely support. Penalties should be introduced for insurer delays to enhance accountability in the system.

Simplifying the enrolment process is crucial for improving farmer participation. A farmer-friendly approach should be developed by introducing simplified procedures, including online registration via mobile applications. Village-level facilitation centers and dedicated helplines should be established to assist farmers with documentation. Digitization of land records and crop data will help minimize paperwork and make the process more accessible. To make insurance more affordable, premium rates should be periodically reviewed and adjusted based on risk assessments. Government subsidies should be increased, particularly for small and marginal farmers, to ensure their participation in insurance schemes. Expanding RWBCIS weather station networks will improve data accuracy and reliability, making claim settlements more precise and fair. The use of mobile applications should be promoted to enable farmers to check their insurance status, file claims, and receive timely updates. Blockchain technology can be integrated into the insurance system to ensure transparency in claim processing and prevent fraud. Drone-based crop assessments can be encouraged to expedite loss evaluations, reducing delays in compensation. A holistic approach should be taken by integrating PMFBY and RWBCIS with climate adaptation programs. This includes promoting drought-resistant crop varieties, improving irrigation support, and providing emergency relief funds to farmers while they wait for claim settlements. Further investment in agro-climatic research can enhance risk prediction models, helping farmers and policymakers make informed decisions to mitigate agricultural risks effectively.

Table:5- Summary of Hypothesis Testing Results

Hypothesis	Chi-Square Value	df	p-value	Inference
H ₀₁ : No significant association between awareness of agricultural insurance schemes (PMFBY & RWBCIS) and demographic.	19.843, 23.247, 17.897	4, 2, 4	0.001, 0.000, 0.001	Rejected-Significant association exists.

social, and economic factors.				
H₀₂: No significant association between preference for mobile/online platforms for checking insurance status and demographic/technological factors.	18.539, 24.000, 17.897	4, 1, 4	0.001, 0.000, 0.001	Rejected- Significant association exists.
H₀₃: No significant association between enrolment in agricultural insurance schemes and awareness, accessibility, and economic status.	29.863, 9.239, 17.897	4, 1, 4	0.000, 0.002, 0.001	Rejected- Significant association exists.
H₀₄: No significant association between experiencing crop loss due to natural calamities and categorical factors (location, crop type, preparedness).	24.023, 5.367, 17.897	4, 1, 4	0.000, 0.021, 0.001	Rejected- Significant association exists.

SCOPE FOR FURTHER STUDY

Future research can explore the effectiveness of digital interventions in enhancing farmers' awareness and participation in agricultural insurance schemes. A comparative analysis of PMFBY and RWBCIS across different states can provide valuable insights. Additionally, investigating the integration of AI, blockchain, and remote sensing technologies in insurance claim processing can enhance efficiency and transparency. Furthermore, assessing the impact of climate change on crop insurance requirements will aid in developing adaptive and resilient insurance policies.

CONCLUSION

The study highlights critical challenges in the implementation of agricultural insurance schemes, including low awareness, delayed claim settlements, complex documentation requirements, accessibility issues, and technological inefficiencies. Addressing these concerns requires a multi-faceted approach involving targeted awareness campaigns, digital and AI-driven innovations, simplification of procedures, and improved accountability mechanisms. Strengthening the institutional framework and expanding financial support for small and marginal farmers will further enhance the effectiveness of these schemes. A well-integrated strategy, combining insurance with climate adaptation measures, will ensure sustainable risk mitigation for farmers,

ultimately securing their livelihoods and promoting agricultural resilience.

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