

Crop Insurance as A Financial Risk Management Tool: A Study of Farmers' Income and Livelihood in Vellore District

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Abstract--Agriculture is inherently exposed to various financial risks arising from unpredictable weather conditions, natural calamities, pest infestations, and market fluctuations, which adversely affect farmers' income and livelihood. Crop insurance has emerged as an important financial risk management tool that protects farmers against production losses and promotes economic stability. The present study examines the effectiveness of crop insurance as a financial risk management tool and its influence on farmers' income and livelihood in Vellore District. A descriptive research design was adopted for the study, and primary data were collected from 75 farmers using a structured questionnaire through simple random sampling. The collected data were analyzed using percentage analysis and Analysis of Variance (ANOVA). The findings indicate that crop insurance significantly contributes to reducing financial risks, safeguarding agricultural investments, and stabilizing farmers' income. The study further reveals that demographic variables such as age, educational qualification, landholding, and annual farm income significantly influence farmers' perception of crop insurance as a financial risk management tool, whereas gender does not show a significant difference. The study recommends enhancing financial literacy, improving claim settlement mechanisms, strengthening institutional support, and expanding insurance coverage to improve the effectiveness of crop insurance. The findings provide valuable insights for policymakers, insurance providers, financial institutions, and researchers in promoting sustainable agricultural finance and strengthening farmers' financial resilience.

Keywords-- Crop Insurance, Financial Risk Management, Farmers' Income, Livelihood.

I. INTRODUCTION

Agriculture is the foundation of India's rural economy, contributing significantly to employment, food security, and economic development. However, the agricultural sector is characterized by a high degree of financial uncertainty due to its dependence on weather conditions, natural calamities, pest attacks, crop diseases, and market price fluctuations. These uncertainties expose farmers to substantial financial risks, often resulting in crop losses, declining farm income, indebtedness, and reduced livelihood opportunities.

Unlike many other sectors, agriculture involves investment decisions that are highly vulnerable to external factors beyond the control of farmers. Consequently, effective financial risk management has become an essential requirement for ensuring the sustainability and profitability of agricultural activities.

Financial risk management refers to the process of identifying, assessing, and minimizing the financial losses arising from uncertain events. In agriculture, it enables farmers to safeguard their investments, stabilize income, and maintain economic resilience during adverse situations. Various financial risk management strategies such as crop diversification, savings, institutional credit, contract farming, and agricultural insurance have been introduced to reduce the economic vulnerability of farmers. Among these, crop insurance has emerged as one of the most effective financial instruments for mitigating production risks and protecting farmers from unexpected financial losses.

Crop insurance is a contractual arrangement through which farmers receive financial compensation for crop losses caused by natural disasters, adverse weather conditions, pests, diseases, and other unforeseen events. It functions as a risk transfer mechanism by shifting a portion of the financial burden from individual farmers to insurance providers. This mechanism enables farmers to recover from losses without exhausting their savings or relying excessively on informal borrowing. By providing financial protection, crop insurance reduces income volatility, strengthens repayment capacity, improves investment confidence, and contributes to long-term financial stability in the agricultural sector.

Recognizing the importance of agricultural risk management, the Government of India has implemented several crop insurance programmes over the years. The Pradhan Mantri Fasal Bima Yojana (PMFBY), introduced in 2016, represents a significant milestone in agricultural insurance by offering comprehensive risk coverage at affordable premium rates. The scheme incorporates modern technologies such as satellite imagery, remote sensing, drones, and digital claim processing to improve transparency and efficiency.

Its primary objectives include protecting farmers against crop losses, stabilizing farm income, promoting the adoption of modern agricultural practices, and ensuring the continued flow of institutional credit to the agricultural sector.

Crop insurance extends beyond compensation for crop loss. It functions as a financial risk management tool that supports efficient financial planning, enhances farmers' access to formal credit, improves capital investment decisions, and reduces the likelihood of financial distress. Insured farmers are generally better positioned to invest in quality inputs, adopt innovative farming technologies, and undertake productive agricultural activities with greater confidence. Moreover, financial institutions often view insured farmers as less risky borrowers, thereby facilitating easier access to agricultural loans and strengthening rural financial inclusion.

Vellore District is one of the agriculturally important districts of Tamil Nadu, where a considerable proportion of the population depends on farming and allied activities for their livelihood. Major crops cultivated in the district include paddy, sugarcane, groundnut, millets, pulses, vegetables, and horticultural crops. However, farmers frequently encounter financial risks due to erratic rainfall, water scarcity, pest infestations, rising cultivation costs, and fluctuating market prices. These challenges adversely affect agricultural profitability and increase financial vulnerability among farming households. In such circumstances, crop insurance serves as an important financial safeguard that helps farmers manage production risks and maintain income stability.

Although crop insurance schemes have been widely implemented, their effectiveness as a financial risk management tool depends on several factors, including farmers' awareness, financial literacy, accessibility of insurance services, affordability of premiums, claim settlement efficiency, institutional support, and government policies. Evaluating these aspects is essential for understanding whether crop insurance genuinely contributes to reducing financial risks and improving farmers' economic well-being.

Against this backdrop, the present study, "Crop Insurance as a Financial Risk Management Tool: A Study of Farmers' Income and Livelihood in Vellore District," aims to assess the effectiveness of crop insurance in managing agricultural financial risks and strengthening farmers' income and livelihood. The study is expected to provide valuable insights for policymakers, insurance companies, financial institutions, and agricultural administrators in designing more efficient, inclusive, and sustainable crop insurance programmes that promote financial resilience and long-term rural development.

II. FACTORS INFLUENCING CROP INSURANCE AS A FINANCIAL RISK MANAGEMENT TOOL

- a. *Financial Literacy*: Financially literate farmers are better able to understand insurance policies, assess financial risks, and make informed decisions regarding crop insurance adoption.
- b. *Awareness of Crop Insurance Schemes*: Awareness about insurance benefits, premium structure, and claim procedures encourages farmers to participate in crop insurance programmes.
- c. *Premium Affordability*: Affordable premium rates increase farmers' willingness to insure their crops and reduce the financial burden of risk protection.
- d. *Timely Claim Settlement*: Quick settlement of insurance claims enables farmers to recover from financial losses and continue agricultural operations without interruption.
- e. *Access to Institutional Credit*: Farmers with access to banks and cooperative credit institutions are more likely to adopt crop insurance as part of their financial risk management strategy.
- f. *Government Support*: Government subsidies, policy initiatives, and awareness campaigns enhance the effectiveness and adoption of crop insurance schemes.
- g. *Climatic and Production Risks*: Frequent droughts, floods, pest attacks, and crop diseases increase farmers' demand for crop insurance to minimize financial losses.
- h. *Farm Size and Investment*: Farmers with larger landholdings and higher agricultural investments are generally more inclined to insure their crops against potential financial risks.
- i. *Accessibility to Insurance Services*: The availability of insurance providers, banking facilities, and digital enrollment platforms improves farmers' access to crop insurance services.
- j. *Technology Adoption*: Digital technologies such as online registration, satellite-based crop assessment, and mobile applications improve the efficiency and transparency of crop insurance.
- k. *Risk Perception*: Farmers who perceive agriculture as a high-risk economic activity are more likely to adopt crop insurance to safeguard their financial interests.
- l. *Income Stability*: Farmers with stable income sources are more capable of paying insurance premiums and maintaining continuous insurance coverage, thereby strengthening their financial resilience.



III. REVIEW OF LITERATURE

Keerthikumara and Kumari (2025) evaluated the effectiveness of crop insurance under the Pradhan Mantri Fasal Bima Yojana (PMFBY) using secondary data and a field survey of pigeon pea farmers in Karnataka. The study found that insured farmers received claim amounts that exceeded the premiums paid and were more willing to invest in quality agricultural inputs. However, the direct impact of crop insurance on farm income was statistically insignificant; suggesting that insurance primarily reduces financial risk rather than directly increasing income. Crop insurance functions as a financial risk mitigation instrument by protecting farm investments and reducing financial uncertainty rather than acting as a direct source of income enhancement.

Kanase (2026) examined financial risk management practices among Indian farmers by integrating crop insurance, institutional credit, and sustainable agricultural planning. The study concluded that crop insurance, when combined with access to formal credit and sound financial planning, significantly improves farmers' financial resilience and reduces vulnerability to agricultural shocks. Crop insurance is most effective when it forms part of an integrated agricultural financial risk management strategy.

Dhivyadharshini and Chinnu (2026) assessed the performance of PMFBY in improving agricultural sustainability and financial protection. The study reported that the scheme enhanced farmers' confidence, stabilized agricultural investments, and reduced financial losses arising from natural calamities. Nevertheless, delayed claim settlements and inadequate awareness continued to affect the overall effectiveness of the programme. Efficient claim settlement and greater farmer awareness are essential for strengthening crop insurance as a reliable financial risk management tool.

The National Institute of Agricultural Extension Management (2023) evaluated the implementation of PMFBY with a focus on farmer awareness and enrolment. The study observed that awareness campaigns significantly improved farmers' participation in crop insurance schemes, while limited financial literacy and inadequate dissemination of information remained major barriers to effective implementation. Financial awareness and extension services are critical determinants of successful crop insurance adoption and effective agricultural risk management.

Patankar (2026) examined the changing actuarial framework of PMFBY and emphasized the importance of technical pricing, reinsurance, and improved risk-sharing mechanisms for the long-term sustainability of crop insurance.

The study argued that strengthening actuarial practices and transparent risk-sharing models would improve the financial viability of crop insurance for both farmers and insurers. Sustainable crop insurance requires robust financial management, scientific pricing, and effective risk-sharing mechanisms to ensure long-term protection for farmers and stability for insurance providers.

IV. IMPORTANCE OF THE STUDY

Agriculture is inherently exposed to financial risks arising from climate change, natural disasters, pest infestations, and market uncertainties, making income stability a major concern for farmers. Crop insurance has emerged as an important financial risk management tool that safeguards farmers against unforeseen crop losses and promotes economic resilience. Evaluating the effectiveness of crop insurance is essential for understanding its contribution to reducing financial vulnerability and ensuring sustainable agricultural development. The present study is significant because it examines crop insurance from a commerce and financial management perspective, emphasizing its role in protecting farmers' investments, stabilizing farm income, and improving livelihood security in Vellore District. The findings will provide valuable insights into the extent to which crop insurance supports financial risk management and influences farmers' economic well-being. The study will also help identify the factors affecting the effective utilization of crop insurance schemes and highlight areas requiring policy intervention. Furthermore, the results will assist policymakers, insurance companies, financial institutions, and agricultural departments in strengthening crop insurance programmes through improved financial planning, timely claim settlement, and enhanced farmer awareness. The study will also contribute to the existing body of knowledge in the fields of commerce, agricultural finance, and risk management, serving as a useful reference for researchers, academicians, and stakeholders involved in promoting sustainable rural finance and farmers' financial security.

V. STATEMENT OF THE PROBLEM

Agriculture is one of the most risk-prone sectors of the economy, where farmers frequently encounter financial uncertainties due to unpredictable weather conditions, natural disasters, pest infestations, rising input costs, and fluctuations in market prices. These risks often result in crop failures, reduced farm income, increased indebtedness, and financial instability among farming households.

Although crop insurance has been introduced as a financial risk management tool to protect farmers from such losses, its effectiveness in ensuring income stability and livelihood security continues to be debated. Issues such as low awareness, limited financial literacy, procedural complexities, inadequate insurance coverage, and delays in claim settlement have reduced the confidence of many farmers in crop insurance schemes. In Vellore District, agriculture remains a major source of livelihood, and farmers are increasingly exposed to production and financial risks. While government initiatives such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) have expanded insurance coverage, the extent to which crop insurance contributes to managing financial risks and improving farmers' economic well-being has not been adequately examined. There is a need to assess whether crop insurance functions as an effective financial risk management tool that supports income stabilization, protects agricultural investments, and enhances livelihood security. Hence, the present study attempts to evaluate the role of crop insurance in managing financial risks and strengthening the income and livelihood of farmers in Vellore District.

VI. OBJECTIVES OF THE STUDY

1. To examine the effectiveness of crop insurance as a financial risk management tool among farmers in Vellore District.
2. To assess the impact of crop insurance on farmers' income and livelihood in Vellore District.
3. To suggest appropriate measures for strengthening crop insurance schemes to enhance farmers' financial security and livelihood sustainability.

VII. LIMITATIONS OF THE STUDY

- The study is confined to Vellore District; therefore, the findings may not be applicable to farmers in other districts or states with different agricultural and socio-economic conditions.
- The study is based on data collected from a sample of 75 farmers, and the findings depend on the accuracy and reliability of the responses provided by the respondents.
- The study focuses on crop insurance as a financial risk management tool and does not consider other financial risk management strategies, such as crop diversification, contract farming, savings, or

government income support schemes, which may also influence farmers' income and livelihood.

VIII. RESEARCH METHODOLOGY

- *Research Design:* The study adopted a descriptive research design to examine crop insurance as a financial risk management tool and its impact on farmers' income and livelihood in Vellore District.
- *Area of the Study:* The research was conducted in Vellore District, Tamil Nadu, where agriculture is one of the primary economic activities and crop insurance schemes are widely implemented.
- *Sources of Data:* The study was based on both primary and secondary data. Primary data were collected from farmers using a structured questionnaire, while secondary data were obtained from books, journals, government reports, research articles, official websites, and insurance-related publications.
- *Population of the Study:* The population of the study comprised farmers enrolled in crop insurance schemes in Vellore District.
- *Sample Size:* A total of 75 farmers were selected for the study.
- *Sampling Technique:* The respondents were selected using the Simple Random Sampling technique to ensure equal opportunity for participation.
- *Research Instrument:* A structured questionnaire was used to collect primary data. The questionnaire included items relating to demographic characteristics, financial risk management, crop insurance, income stability, and livelihood improvement.
- *Statistical Tools:* The collected data were analyzed using the following statistical techniques: Percentage Analysis, Mean and Ranking Analysis and ANOVA Test

IX. SCOPE OF THE STUDY

The study focuses on evaluating crop insurance as a financial risk management tool and assessing its contribution to farmers' income and livelihood in Vellore District. It also identifies the factors influencing the effectiveness of crop insurance and offers suggestions for strengthening agricultural financial security through improved insurance practices.

X. DATA ANALYSIS

Table 1.1 Demographic Profile of the Respondents (n = 75)

Particulars	Category	Frequency	Percentage
Gender	Male	56	74.7
	Female	19	25.3
	Total	75	100.0
Age (Years)	Below 30	14	18.7
	31–40	24	32.0
	41–50	21	28.0
	Above 50	16	21.3
	Total	75	100.0
Educational Qualification	Illiterate	8	10.7
	Primary School	18	24.0
	Secondary School	28	37.3
	Graduate & Above	21	28.0
	Total	75	100.0
Land Holding	Below 2 Acres	30	40.0
	2–5 Acres	26	34.7
	Above 5 Acres	19	25.3
	Total	75	100.0
Annual Farm Income	Below ₹1,00,000	18	24.0
	₹1,00,001–₹2,00,000	32	42.7
	Above ₹2,00,000	25	33.3
	Total	75	100.0

The majority of the respondents (32.0%) belonged to the 31–40 years age group, 74.7% were male, 37.3% had secondary school education, 40.0% owned less than 2 acres of land, and 42.7% earned an annual farm income between ₹1,00,001 and ₹2,00,000.

Table 1.2 Level of Awareness of Crop Insurance

Awareness Level	Frequency	Percentage
Highly Aware	20	26.7
Moderately Aware	33	44.0
Slightly Aware	16	21.3
Not Aware	6	8.0
Total	75	100.0

The majority of the respondents (44.0%) were moderately aware of crop insurance schemes, indicating a satisfactory level of awareness among farmers.

Table 1.3 Primary Purpose of Enrolling in Crop Insurance

Purpose	Frequency	Percentage
Financial Risk Protection	28	37.3
Government Subsidy	17	22.7
Protection against Crop Loss	15	20.0
Bank Loan Requirement	9	12.0
Others	6	8.0
Total	75	100.0

The majority of the respondents (37.3%) enrolled in crop insurance primarily for financial risk protection, highlighting the importance of insurance as a financial management tool.

Table 1.4 Satisfaction with Claim Settlement

Satisfaction Level	Frequency	Percentage
Highly Satisfied	16	21.3
Satisfied	34	45.3
Neutral	12	16.0
Dissatisfied	9	12.0
Highly Dissatisfied	4	5.4
Total	75	100.0

Nearly half of the respondents (45.3%) were satisfied with the claim settlement process, indicating a positive perception of crop insurance services.

Table 1.5 Perceived Effectiveness of Crop Insurance as a Financial Risk Management Tool

Perception	Frequency	Percentage
Very High	19	25.3
High	31	41.3
Moderate	15	20.0
Low	7	9.4
Very Low	3	4.0
Total	75	100.0

A majority of the respondents (41.3%) perceived that crop insurance had a high effectiveness as a financial risk management tool, while 25.3% rated it as very highly effective, indicating its significant contribution to managing agricultural financial risks.

Table 1.6 ANOVA: Difference in the Perceived Effectiveness of Crop Insurance as a Financial Risk Management Tool across Demographic Variables

Demographic Profile	F-value	P=	Result
Age (Years)	4.286	0.008	Significant
Gender	1.184	0.280	Insignificant
Educational Qualification	5.142	0.003	Significant
Land Holding	6.018	0.001	Significant
Annual Farm Income	4.731	0.005	Significant

Level of Significance: 5%

The ANOVA results indicate that there is a significant difference in the perceived effectiveness of crop insurance as a financial risk management tool with respect to Age, Educational Qualification, Land Holding, and Annual Farm Income. However, Gender does not show a significant difference in perception.

XI. MAJOR FINDINGS

- The majority of the respondents (32.0%) belonged to the 31–40 years age group, indicating that economically active farmers were more inclined to adopt crop insurance.
- Most of the respondents (74.7%) were male farmers, while female participation in crop insurance schemes was comparatively lower.
- A majority of the respondents (37.3%) had completed secondary school education, indicating a moderate level of educational attainment among the farming community.
- Most of the respondents (40.0%) possessed less than 2 acres of agricultural land, reflecting the predominance of small and marginal farmers in the study area.
- The majority of the respondents (42.7%) earned an annual farm income between ₹1,00,001 and ₹2,00,000.
- Nearly 44.0% of the respondents were moderately aware of crop insurance schemes, indicating satisfactory awareness but highlighting the need for further financial literacy programmes.
- The primary reason for enrolling in crop insurance was financial risk protection (37.3%), followed by government subsidy (22.7%), demonstrating that farmers primarily view crop insurance as a financial safeguard.
- Nearly 45.3% of the respondents expressed satisfaction with the claim settlement process, indicating that crop insurance contributes positively to farmers' financial confidence.
- A majority of the respondents (41.3%) perceived that crop insurance is highly effective as a financial risk management tool, enabling them to reduce financial uncertainty, safeguard agricultural investments, and stabilize farm income.
- The ANOVA results revealed that Age, Educational Qualification, Land Holding, and Annual Farm Income showed significant differences in the perceived effectiveness of crop insurance as a financial risk management tool, whereas Gender did not show any significant difference.

XII. SUGGESTIONS

- *Enhance Financial Literacy:* Regular financial literacy programmes should be organized to educate farmers about agricultural risk management, insurance planning, and financial decision-making.
- *Improve Claim Settlement Efficiency:* Insurance companies should adopt technology-driven claim verification systems to ensure faster, transparent, and hassle-free claim settlements.
- *Strengthen Digital Insurance Services:* Mobile applications and online platforms should be promoted to simplify policy enrolment, premium payment, and claim tracking.
- *Increase Awareness of Crop Insurance:* Government agencies, banks, and agricultural extension departments should conduct continuous awareness campaigns to improve farmers' understanding of crop insurance benefits.
- *Strengthen Institutional Credit Linkages:* Banks and financial institutions should integrate crop insurance with agricultural credit to reduce lending risks and improve farmers' access to formal finance.
- *Expand Risk Coverage:* Crop insurance schemes should provide comprehensive coverage against climate-related risks, pest attacks, crop diseases, and other emerging agricultural uncertainties.
- *Promote Public–Private Collaboration:* Stronger coordination among the Government, insurance companies, financial institutions, and farmer organizations should be encouraged to improve the efficiency and outreach of crop insurance programmes.
- *Develop Sustainable Financial Risk Management Strategies:* Crop insurance should be integrated with other financial risk management practices, such as savings, agricultural credit, climate-resilient farming, and investment planning, to strengthen farmers' long-term financial security and livelihood sustainability.

XIII. SOCIAL CONTRIBUTION

The study contributes to society by emphasizing the importance of crop insurance as a financial risk management tool that protects farmers from economic losses caused by climatic uncertainties and agricultural risks. By reducing financial vulnerability and promoting income stability, crop insurance enhances the economic resilience of farming households and supports sustainable rural livelihoods.

The findings of the study will benefit farmers by improving their understanding of financial risk management and encouraging informed participation in crop insurance schemes. The study also provides valuable insights for policymakers, insurance companies, financial institutions, and agricultural departments to strengthen crop insurance programmes through better financial planning, efficient claim settlement, and wider insurance coverage. Ultimately, the study contributes to promoting financial inclusion, strengthening rural economic development, and building a more resilient agricultural sector in Vellore District.

XIV. CONCLUSION

Crop insurance has emerged as an essential financial risk management tool that enables farmers to mitigate the adverse financial consequences of agricultural uncertainties. The study reveals that crop insurance plays a significant role in reducing financial risks, safeguarding agricultural investments, stabilizing farm income, and strengthening the livelihood of farmers in Vellore District. By providing financial protection against crop losses, insurance enhances farmers' confidence to invest in improved agricultural practices and supports long-term economic sustainability.

The findings further indicate that factors such as age, educational qualification, land holding, and annual farm income significantly influence farmers' perception of crop insurance as a financial risk management tool. Although the overall perception of crop insurance is positive, issues relating to awareness, accessibility, financial literacy, and timely claim settlement require continuous improvement. Therefore, strengthening collaboration among government agencies, insurance companies, financial institutions, and agricultural extension services is essential for enhancing the effectiveness of crop insurance schemes. A well-designed and efficiently implemented crop insurance system will not only improve farmers' financial resilience but also promote rural financial inclusion, sustainable agricultural growth, and inclusive economic development in Vellore District.

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