

Evaluating the Effectiveness of Pradhan Mantri Fasal Bima Yojana: A Seasonal Analysis of Financial Sustainability and Farmer Income Stability

Mrs. P. Kiruthika¹, Dr. V. Kasthuri²

¹Research Scholar, PG and Research Department of Economics, Erode Arts and Science College (Autonomous), Erode – 638 009

²Assistant Professor PG and Research Department of Economics, Erode Arts and Science College (Autonomous), Erode – 638 009

Abstract

Agriculture is basically vulnerable to a wide range of risks—climatic, biological, financial, technological, and social—making it one of the most uncertain sectors. Before the introduction of crop insurance, farmers drag the full burden of these risks, and a single adverse event could destroy an entire season's productivity, threatening both livelihoods and food security. To mitigate such vulnerabilities, crop insurance was introduced to transfer a portion of these risks to insurers, thereby providing financial protection and promoting investment in modern farming practices.

The **Pradhan Mantri Fasal Bima Yojana (PMFBY)**, launched in 2016 by the Government of India, aims to provide comprehensive crop insurance coverage to farmers, protecting them from financial losses arising from natural calamities, pests, and diseases. By offering substantial premium subsidies, the scheme particularly benefits small and marginal farmers, enhancing their economic resilience and fostering inclusive agricultural growth.

This study evaluates the effectiveness of PMFBY by analysing data from both **Kharif** and **Rabi** seasons, directing on key performance indicators such as net gain or loss, claim settlement ratios, and premium rates. The analysis aims to assess the financial sustainability of the scheme and its impact on farmers' income stability. The findings contribute to concerned how crop insurance supports rural livelihoods and reinforces agricultural resilience in India.

Keywords: Pradhan Mantri Fasal Bima Yojana, Crop Insurance, Financial stability, Agricultural resilience, Kharif and Rabi season, Agricultural policy.

1. Introduction

Agriculture remains the backbone of many developing economies, providing livelihoods to millions of farmers. However, the sector is highly vulnerable to natural disasters, climatic fluctuations, pest infestations, and unpredictable market conditions. Consequently, crop insurance has emerged as an essential risk management tool, offering protection to farmers against crop losses, ensuring income stability, and encouraging investment in modern agricultural practices.

Despite the availability of various crop insurance schemes, adoption among small and marginal farmers in India remains limited due to challenges such as lack of awareness, inadequate accessibility, and issues of affordability. Understanding the effectiveness of such schemes is therefore crucial for strengthening agricultural resilience and promoting sustainable rural development.

In India, the **Pradhan Mantri Fasal Bima Yojana (PMFBY)**, launched in 2016, serves as the government's flagship crop insurance programme. Its key objectives are:

1. To provide insurance coverage and financial support in the event of crop loss or damage.
2. To stabilize farmers' income during adverse crop seasons.
3. To encourage farmers to adopt innovative and modern agricultural practices.
4. To ensure adequate credit flow to the agricultural sector.

Under PMFBY, the premium rate is fixed at **2% for Kharif crops, 1.5% for Rabi crops, and 5% for commercial and horticultural crops**. The remaining portion of the actuarial premium is jointly subsidized by the Central and State Governments, making the scheme affordable and accessible to farmers.

This study evaluates the effectiveness of the PMFBY by conducting a **seasonal analysis of both Kharif and Rabi crops**, focusing on key indicators such as **net financial gains or losses, claim settlement ratios, and premium sustainability**. The findings aim to assess the **financial sustainability of the scheme** and its impact on **farmers' income stability**, thereby contributing to the broader understanding of crop insurance as a tool for agricultural resilience and rural economic security.

CROPS COVERED UNDER PMFBY

Crops Covered under PMFBY

The Pradhan Mantri Fasal Bima Yojana (PMFBY) provides coverage for crops across three major categories based on the agricultural season. This classification helps in assessing seasonal variations in risk exposure, financial sustainability, and income stability among farmers.

Kharif	Rice, Maize, Soybean, Cotton, Groundnut, Bajra, Tur, etc.
Rabi	Wheat, Barley, Mustard, Gram, Masoor, etc.
Annual Commercial or Horticultural Crops	Sugarcane, Banana, Mango, Onion, Potato, etc.

This categorization allows for a seasonal analysis of crop insurance performance, as climatic, market, and yield risks vary significantly between Kharif, Rabi, and annual crops. Accordingly, the evaluation of PMFBY's effectiveness considers these seasonal distinctions in both financial sustainability and farmer income stability.

Review of Literature

Deepali Chanda and S. K. Srivasthava (2020) : In their study the growth performance of PMFBY in India from the year 2016-2019. It has the decreed performance on the farmers insured, and it has the increasing performance with farmers benefit. The growth performance of NAIS (National Agricultural Insurance Scheme) in India have the positive growth rate with the farmers engaged, area insured, sum insured., farmers premium and gross premium from the year ochallenges like penetration in the country, lack of awareness among the farmers, high premium rate. So it cannot program for long.

Paarthiban J.J and Anjugam Muthiah (2023) on their study “ A Comparative Study On The Performance of Various Agricultural Crop Insurance Scheme of India with Special Reference of Pradhan Mantri Fasal Bima Yojana. In this scheme the beneficiary ratio and claim ratio was low than the RWBCIS (Restructured Weather Based Crop Insurance Scheme) fro the year of 2000 - 2001 to 2020 – 2021. The claim paid amount of PMFBY in Kharif season is lower than the Rabi season in the year of 2016 to 2918. Majorly the more claims were paid in the kharif season.

Mr. Girisha T and Dr. S.N. Venkatesh (2023) on their study his shows the effectiveness of PMFBY in Ramnagara and Tumkuru District farmers from Karnataka in the year of 2022 – 2023. He says the income stability and loan payment of the farmers is perfectly correlated The PMFBY provide the stabilizing income to the farmers. The farmers taking crop insurance is dependent upon the loan stats of the farmers. The premium of the PMFBY is more than WBCIS.

Vandhana Sheoran, Meenu Punia and Parveen Kumar Nimbrayan (2024) On their research shows the lonee farmers and non-lonee farmers have the awerness about the crop insurance scheme. The lack of awerness of non – lonee farmers is mor than thelonee farmers.

Nanditha Depnath, Giribabu .M (2024) On their study the PMFBY is the comprehensive crop insurance scheme. It is the modified crop insurance from NAIS. This scheme was concerned with 18 insurance companies. This scheme was compulsory for lonee farmer and optional for non lonee farmers.

Obgectives

- To analyze the seasonal enrolment trends of farmers under PMFBY, with specific focus on Kharif and Rabi seasons from 2018 to 2025, expressed in percentage terms.
- To examine the adoption of PMFBY during the Rabi season (2018–2024) by evaluating farmer participation rates and highlighting growth or decline over the period.
- To assess the financial performance of PMFBY by calculating the net gain or loss for Kharif and Rabi seasons, based on premium collected and claims paid, during 2018–2025.

- To evaluate the claim settlement ratio under PMFBY, measuring the effectiveness and efficiency of the scheme in providing timely financial support to farmers.
- To study the premium rate structure of PMFBY across Kharif and Rabi seasons and its impact on farmers' participation and scheme sustainability.
- To identify the challenges and opportunities in enhancing awareness, accessibility, and affordability of PMFBY for small and marginal farmers

DATA AND METHEDODOLOGY

The data for this study has been collected from secondary sources, including published journals, official PMFBY reports, and the scheme's official website, covering the period from 2018 to 2025. The collected data were systematically applied to calculate Net Gain or Loss, Cost-Benefit Ratio (CBR), and Claim Settlement Ratio (CSR).

1. Cost-Benefit Ratio (CBR)

$$\text{CBR} = \frac{\text{Claims Paid}}{\text{Gross Premium}} \quad \text{CBR} = \frac{\text{Gross Premium}}{\text{Claims Paid}}$$

- **CBR > 1:** Scheme is beneficial (claims paid exceed premium collected).
- **CBR < 1:** Scheme is not beneficial (premium collected exceeds claims paid).

2. Claim Settlement Ratio (CSR)

$$\text{CSR} = \frac{\text{Claims Paid}}{\text{Sum Insured}} \times 100 \quad \text{CSR} = \frac{\text{Sum Insured}}{\text{Claims Paid}} \times 100$$

It represents the proportion of the total sum insured that has been paid out to farmers as claims. CSR is a key indicator of the scheme's effectiveness and responsiveness.

- **High CSR (> 70%):** Indicates significant crop loss and higher compensation; suggests effective risk coverage and efficient claim processing.
- **Moderate CSR (30–70%):** Reflects partial losses or moderate claim settlement; may also indicate delays or selective compensation.
- **Low CSR (< 30%):** Implies fewer insured losses, possible settlement delays, or inefficiencies in claim processing.

3. Premium Rate

$$\text{Premium Rate} = \frac{\text{Gross Premium}}{\text{Sum Insured}} \times 100 \quad \text{Premium Rate} = \frac{\text{Sum Insured}}{\text{Gross Premium}} \times 100$$

- **High Premium Rate: Reflects higher risk exposure.**
- **Low Premium Rate: Indicates relatively lower risk exposure.**

Table 1: Trend of Farmer Participation in PMFBY during Kharif Season (2018–2025)

Year	Marginal Farmers	Small Farmers	Others
2018	17.82	65.42	16.76
2019	16.44	67.68	15.88
2020	16.45	67.67	15.88
2021	17.51	63.33	19.16
2022	14.55	67.19	18.26
2023	14.27	70.12	15.61
2024	15.32	69.56	15.11
2025	18.78	64.73	16.49
AVERAGE (in %)	16.39	66.96	16.64

The table presents data on the participation of **marginal farmers, small farmers, and other categories of farmers** under the **Pradhan Mantri Fasal Bima Yojana (PMFBY)** from 2018 to 2025 during the Kharif season. It provides a **year-wise comparison** of farmer participation.

The participation of **small farmers is the highest**, averaging **66.96%** over the period. In contrast, the participation of **marginal farmers (16.39%)** and **other categories of farmers (16.64%)** is comparatively low. This indicates that small farmers are the primary participants in PMFBY during the Kharif season, while the other groups contribute a smaller proportion

Table2: Trend of Farmer Participation under PMFBY during Kharif Season (2018–2025)

Year	Marginal Farmers	Small Farmers	Others
2018	19.26	62.93	17.81
2019	18.37	60.89	20.73
2020	17.45	64.13	18.41
2021	18.04	60.94	21.02
2022	15.73	64.39	19.9
2023	15.81	66.79	17.4
2024	18.1	63.3	18.57
AVERAGE	17.54	63.34	19.12

Table 2 presents the trend of farmer participation under the *Pradhan Mantri Fasal Bima Yojana (PMFBY)* during the **Kharif season** from **2018 to 2025**. The data shows year-wise participation of **marginal farmers**, **small farmers**, and **other categories**.

Across the period, **small farmers consistently recorded the highest participation**, averaging **63.34%**, indicating that they are the major beneficiaries of the scheme. In contrast, **marginal farmers** accounted for an average of **17.54%**, and **other farmers** for **19.12%**, showing comparatively lower levels of enrolment.

This pattern suggests that **small farmers are more actively engaged** with PMFBY during the Kharif season, possibly due to their moderate landholding size and greater vulnerability to crop losses. Meanwhile, the **marginal and other categories exhibit lower participation**, which may be influenced by factors such as awareness levels, affordability, or differing risk perceptions.

Table 3: Year-wise Financial Performance of PMFBY during Kharif and Rabi Seasons (2018–2025)

Year	Net gain / loss	Cost Benefit Ratio
2018	-153738	0.90
2019	165950	1.08
2020	-535370	0.71
2021	-520431	0.72
2022	-918227	0.54
2023	-854366	0.58
2024	-1258179	0.36
2025	-153738	0.90

Table 3 presents the year-wise financial performance of the *Pradhan Mantri Fasal Bima Yojana* (PMFBY) during the **Kharif and Rabi seasons** from **2018 to 2025**. It shows the **net gain or loss** and the **cost–benefit ratio (CBR)** based on the total premium collected and claims paid.

The data reveals that the scheme recorded a **net loss in most years**, indicating that the amount of claims paid exceeded the premium collected. The only year showing a **positive financial outcome** was **2019**, with a **net gain of ₹165,950** and a **CBR of 1.08**, suggesting that for every ₹1 invested, the return was ₹1.08 — the most financially favorable year in the period.

In contrast, the years **2020 to 2025** show **progressively lower cost–benefit ratios**, ranging from **0.71 to 0.36**, reflecting a **declining financial sustainability** of the scheme. This pattern suggests that PMFBY faced increasing claim burdens relative to the premiums collected, leading to net financial losses and reduced benefit efficiency over time.

Overall, the trend indicates that while PMFBY achieved financial balance briefly in 2019, it generally operated at a **loss**, implying challenges in maintaining the scheme’s **long-term financial sustainability** despite its social welfare objectives.

Table 4: Year-wise Financial Performance of PMFBY during Kharif and Rabi Seasons (2018–2025)

Year	Net gain / loss	Cost – Benefit ratio
2018	40857	1.05
2019	-218502	0.72
2020	-481404	0.55
2021	-570846	0.49
2022	-459366	0.58
2023	-437834	0.53
2024	-640571	0.20

Table 4 presents the year-wise financial performance of the *Pradhan Mantri Fasal Bima Yojana* (PMFBY) during the **Rabi season** from **2018 to 2024**. It shows the **net gain or loss** and the **cost–benefit ratio (CBR)** calculated based on the total premium collected and the claims paid.

The data indicates that the **year 2018** recorded a **positive financial outcome**, with a **net gain of ₹40,857** and a **cost–benefit ratio of 1.05**, meaning that for every ₹1 of cost, the scheme generated ₹1.05 in return. This was the **most financially favorable year** for the scheme during the study period.

However, from **2019 onward**, the scheme showed **consistent financial losses**, with **negative net gains** and **declining CBR values**, reaching as low as **0.20 in 2024**. This suggests that the scheme’s **financial sustainability weakened over time**, as the compensation paid to farmers increasingly exceeded the premiums collected.

Overall, while PMFBY was financially viable during the initial years of implementation, the subsequent period reflects **reduced cost efficiency** and **rising claim burdens**, indicating the need for **restructuring or better risk management** to maintain long-term financial stability and ensure timely benefits to farmers.

Table 5: Claim Settlement Ratio under PMFBY during Kharif and Rabi Seasons (2018–2024)

Year	Claim Settlement Ratio in(%)	
	In Karif Season	In Rabi Season
2018	13	9
2019	16	8
2020	12	7
2021	13	7
2022	1	7
2023	7	5
2024	4	2

Table 5 presents the **claim settlement ratio** under the *Pradhan Mantri Fasal Bima Yojana (PMFBY)* for both **Kharif and Rabi seasons** from **2018 to 2024**. The claim settlement ratio represents the percentage of the total insured value that was actually compensated to farmers — a higher ratio indicates more effective claim disbursement.

The data show that the **Kharif season** recorded its **highest claim settlement ratio of 16% in 2019**, while the **Rabi season** achieved its **highest ratio of 9% in 2018**. However, in both seasons, the ratio steadily declined over the years, reaching **4% for Kharif** and **2% for Rabi** in 2024.

Overall, the claim settlement ratios throughout the period remained **below 30%**, suggesting **low levels of compensation relative to the insured value**. This may indicate **either a lower incidence of insured losses, delays or rejections in claim processing, or administrative inefficiencies** in the settlement mechanism.

Table 6: Premium Rate under PMFBY during Kharif and Rabi Seasons (2018–2025)

Year	Premium Rate in(%)	
	In Karif Season	In Rabi Season
2018	13.85	8.79
2019	15.02	10.84
2020	17.22	13.07
2021	18.48	14.18

2022	1.63	12.71
2023	12.12	8.67
2024	11.06	8.13
2025	13.85	Not available

Table 6 presents the **premium rates under PMFBY** for both **Kharif and Rabi seasons** from **2018 to 2025**. The table provides a year-wise comparison of the premiums paid by farmers as a percentage of the sum insured.

For the **Kharif season**, the **highest premium rate of 18.48%** was recorded in **2021**, while the **lowest rate of 1.63%** occurred in **2022**. For the **Rabi season**, the **highest premium rate of 14.18%** was also in **2021**, whereas the **lowest rate of 8.13%** occurred in **2024**.

The variation in premium rates over the years indicates fluctuations in the **financial contribution required from farmers** under PMFBY. Higher premiums in 2021 suggest a greater cost burden on farmers, whereas lower premiums in 2022 (Kharif) and 2024 (Rabi) reflect a reduced financial contribution. These fluctuations may be due to **changes in risk assessment, sum insured, or policy adjustments** by the implementing authorities.

Overall, the premium rates show significant variation across years and seasons, which could influence **farmer participation and the overall sustainability of the scheme**.

Findings and Suggestions

- **PMFBY has successfully attracted small farmers, ensuring some level of risk coverage, but marginal and other farmers remain underrepresented.**
- **Financial performance indicates persistent losses, particularly in later years, signaling the need for premium redesign, better claim management, and risk-sharing mechanisms.**
- **Low claim settlement ratios further suggest that farmers may not be receiving timely or adequate financial support, potentially undermining confidence in the scheme.**
- **Fluctuating premium rates impact both participation and sustainability, requiring careful policy calibration to balance affordability with financial viability.**

In conclusion, while PMFBY provides a critical social safety net, its effectiveness in ensuring farmer income stability is limited by financial sustainability issues, administrative inefficiencies, and uneven participation. Addressing these challenges is key to enhancing the scheme's long-term impact.

Conclusion

The study reveals that the Pradhan Mantri Fasal Bima Yojana (PMFBY) **provides a critical social safety net, its effectiveness in ensuring farmer income stability is limited by financial sustainability issues, administrative inefficiencies, and uneven participation. Addressing these challenges is key to enhancing the scheme's long-term impact.**

References

1. <https://pmfby.gov.in>.
2. Ministry of agricultural and farmers welfare.
3. Ruchabah Rai, (2019), “ Pradhan Mantri Fasal Bima Yojana (PMFBY) : An Assessment of India's Crop Insurances Scheme” ISSUEN. 296.
4. Karthikeya Rania, Nehaverma, Dr. Rajesh Kumar Upandhyay, (2021), “ Pradhan Mantri Fasal Bima Yojana (PMFBY) : Over coming Regional Economic Disparity In India By Technology Enabled Crop Insurance.” Vol .20(ISSUE 4)
5. Sandeep Kaur, Hemraj Harpreet singh and Vijay Kumar Chattu, (2021), “ Crop Insurance Policies in India: An Empirical Analysis of Pradhan Mantri Fasal Bima Yojana.”
6. Vandhana Sheoran, Meenu Punia and Parveen Kumar Nimbrayan in 2024, “ Perceptions and awareness of Pradhan Mantri Fasal Bima Yojana Among Insured and Non Insured Farmers In Hariyana, India : Enhancing Agricultural Risk Management.” Volume 46, Article no. 116965, ISSN: 2457-0591.
7. Reddyprasanna Diyyala, N. Venkatesa Palanichamy, D. Murugananthi, V. Geetalakshmi and M. Rajavel, “ Determinants Of Farmers Awareness and Perspective On PMFBY In Southern Tamil Nadu , India.” Volume 42, ISSUE 9, Artivle no. AJAEES. 122263, ISSN: 2320-7027.
8. Dr. D. Shobana and J. Suresh Kumar, “ Role of Pradhan Mantri Fasl Bima Yojna In Agricultural Development and Farmers Welfare In Tamil Nadu.” Volume 13, Issue 1.
9. Parthiban J.J. and Anjugam Muthiah,(2023), “ A Comparative Study On The Performance Of Various Agricultural Crop Insurance Schemes Of India With Special Reference To Pradhan Mantri Bima Yojana (PMFBY). Article in Asian Journal Of Agricultural Extension Economics & Sociology.
10. Performance of Evaluation of Pradhan Mmantri Fasal Bima Yojana (PMFBY), Government Analysis.
11. Deepti Chandha and S. K. Srivastava (2022), “ Crop Insurance : An Economic Review Of Its Performance In India.” ISSN. NO. 2249-3239.
12. Mr. Grisha. T and Dr. S.N. Venkatesha (20240, “ Evaluating the performance Of Pradhan Mantri Fasal Bima Yojana (PMFBY) Among Farmers With Special Reference To Ramnagara and Tumkuru Districts.” Vol.4. Issue 3, ISSN: 1526-4726.
13. Nandita Debnath and Giribabu .M. (2024), “ Evaluating The Perfomence Of Pradhan Mnarti Fasal Bima Yojana (PMFBY)In India.” Volume 93, ISSN: 0369-8963.