

Global Best Practices in Agricultural Insurance: Policy Reforms and Strategic Lessons for India's Crop Insurance Framework

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Abstract: Agricultural insurance has become an important component of public policy in countries confronting climate volatility, farm income instability, and pressure on rural credit systems. This paper examines global best practices in agricultural insurance and draws strategic lessons for reforming India's crop insurance architecture under the Pradhan Mantri Fasal Bima Yojana (PMFBY). The study is empirical and relies on secondary data from official government sources, parliamentary annexures, policy reports, and institutional evaluations. The main analytical period for India covers 2022–23 to 2024–25, while the comparative review draws on international evidence from the last two decades. The paper combines comparative institutional analysis with descriptive empirical estimation based on published state-wise PMFBY data, constructing indicators such as enrolment growth, claims-to-farmer-premium ratios, settlement ratios, and a composite state-level policy performance index. The findings show that India has achieved exceptional programme scale and strong fiscal leverage for insured farmers, but implementation outcomes remain uneven across states. Recent reforms such as the National Crop Insurance Portal, DigiClaim, YES-TECH, WINDS, and escrow-based premium arrangements indicate a move toward data-driven, accountable administration, yet pending claims and incomplete risk layering continue to weaken developmental effectiveness. Comparative evidence from the United States, Spain, Italy, and China suggests that successful agricultural insurance systems do not depend on premium subsidy alone; they require transparent data ecosystems, differentiated products, rapid settlement, and integration with resilience-building measures. The paper argues that India should shift from a subsidy-centred approach to a layered risk-management framework that is more closely linked to adaptation policy, state-specific design, and rule-based intergovernmental finance.

Index Terms –Agricultural Insurance, PMFBY, Crop Insurance, Climate Resilience, Agricultural Economics, Public Policy.

I. INTRODUCTION

Agriculture in India has always been exposed to uncertainty, but the current phase of climatic instability has made risk management a central policy concern rather than a peripheral one. Rainfall irregularity, localised floods, drought episodes, pest attacks, and weather-linked yield fluctuations now interact with input cost pressures and indebtedness in ways that intensify vulnerability among both smallholders and commercially oriented farmers. Under these conditions, crop insurance cannot be treated merely as an ex-post compensation mechanism; it must be examined as part of a larger institutional system that shapes production incentives, affects access to credit, influences state fiscal commitments, and mediates how rural households absorb shocks.

International policy thinking has moved in a similar direction. The OECD's framework on agricultural risk-management policy argues that public intervention should be justified by clearly identified market failures and embedded in a broader strategy that distinguishes between normal, marketable, and catastrophic risks [12]. That perspective is particularly relevant for India because policy debate around crop insurance often oscillates between two narrow positions: one that celebrates aggregate claims paid, and another that condemns the scheme for delays and local dissatisfaction. Neither position is sufficient for serious policy assessment.

The Pradhan Mantri Fasal Bima Yojana, introduced from Kharif 2016, is now one of the world's largest publicly supported crop insurance programmes. Official reporting states that total farmer enrolment rose from 3.17 crore in 2022–23 to 4.19 crore in 2024–25, an increase of 32 per cent, and that 2024–25 recorded the highest enrolment since inception [7]. Earlier official reporting showed that by March 2024, the scheme had enrolled 56.80 crore cumulative farmer applications and paid more than Rs. 1,55,977 crore in claims, against farmer premium contributions of Rs. 31,139 crore [6]. These figures establish the scale of the programme, but they do not settle the more important question of whether PMFBY has matured into a credible and developmentally efficient risk-management institution.

This paper addresses that question by combining comparative policy analysis with state-wise empirical indicators constructed from recent official data. The study asks what global best practices in agricultural insurance entail, how far India's current framework

converges with those principles, and what reforms are needed for PMFBY to function not just as a subsidised payout mechanism but as a durable component of climate-resilient agricultural policy.

II. OBJECTIVES AND CONTRIBUTION

The study pursues four objectives. First, it identifies the principal institutional features associated with effective agricultural insurance systems in international experience. Second, it evaluates the recent performance of PMFBY using official state-wise and aggregate secondary data. Third, it constructs empirical indicators to examine settlement performance, premium leverage, and participation patterns more closely. Fourth, it derives policy reforms for India by comparing international design principles with recent domestic implementation experience.

The paper contributes to the literature in a specific way. Much of the existing discussion on PMFBY is descriptive, state-specific, or focused on aggregate coverage and claims. Less work situates India's crop insurance experience within a broader global risk-management framework and derives empirical policy diagnostics from recent state-level official data. This paper fills that gap by linking comparative design principles to India's federal administrative realities.

III. LITERATURE REVIEW

Early work on crop insurance in developing countries stressed the technical and institutional difficulty of insuring agricultural losses where risks are highly covariate and administrative capacity is limited. FAO studies noted that successful crop insurance depends on reliable yield data, appropriate geographic units of assessment, sound actuarial design, and institutional arrangements capable of handling verification and payment in a timely manner (3)(4). These studies remain relevant because many of the structural problems they identified, especially correlated losses and information weaknesses, continue to shape contemporary crop insurance systems.

More recent literature has shifted the debate from feasibility toward policy design and incentive effects. The OECD argues that publicly supported agricultural insurance may improve resilience if it addresses well-defined market failures, but can undermine incentives for adaptation and private risk management if subsidy structures are too broad or poorly targeted [12]. This reframes insurance not as an unquestioned public good, but as an instrument whose developmental value depends on institutional design.

The literature on innovative insurance products adds a second layer to this debate. Work on weather-index insurance, remote-sensing-based loss estimation, and revenue insurance suggests that technological innovation can reduce administrative costs and speed up settlement, yet poorly calibrated products may increase basis risk and reduce farmer trust (4). The implication is not that index products are inherently superior or inferior, but that product choice must match data quality, agro-climatic conditions, and risk distribution.

Indian studies on PMFBY generally recognise the scheme's unprecedented scale and affordability, but also document persistent implementation concerns. The IIM Ahmedabad evaluation observed that early participation under PMFBY was strongly shaped by credit-linked enrolment, that yield estimation remained central to claim determination, and that state-level implementation differences substantially affected performance [5]. More recent comparative work similarly points to heterogeneity in settlement outcomes and insurer performance across states [14]. At the same time, official evidence suggests that voluntary participation has increased over time, with a growing share of non-loanee farmers entering the scheme. [6] [7]

A third strand of literature places agricultural insurance within climate adaptation and development policy. In this view, insurance is most effective when combined with advisory services, resilient production systems, digital registration, and public weather infrastructure. The World Bank's programme documentation for support to India's crop insurance system explicitly linked PMFBY reform to improved access and service delivery rather than simply higher subsidy outlays [16]. That framing is consistent with a broader consensus that insurance should complement, not substitute for, resilience-building investments.

Despite this expanding literature, an important gap remains. Existing work often stops short of connecting international design principles, India's federal administrative constraints, and recent state-wise implementation evidence within a single analytical framework. The present study addresses that gap.

IV. CONCEPTUAL FRAMEWORK

The paper adopts a layered risk-management framework. Normal agricultural risks, such as modest production variability, are best addressed through agronomic practices, irrigation, diversification, savings, and extension support. Marketable risks may justify insurance where private provision is incomplete but feasible. Catastrophic and highly covariate risks may require significant public financial support because private insurance markets alone are unlikely to absorb them efficiently [12]. This distinction is central because it helps separate developmental protection from the indiscriminate expansion of subsidies.

The study also treats insurance effectiveness as a function of information quality and governance. Effective agricultural risk protection in state i can be represented as shown in Equation (1).

$$ARP_i = f(S_i, D_i, G_i, T_i, A_i) \quad (1)$$

where S_i is subsidy design, D_i denotes data quality, G_i denotes governance and intergovernmental coordination, T_i denotes settlement timeliness, and A_i denotes complementary adaptation support. The expected sign on each argument is positive, though the marginal return to subsidy is likely conditional on the strength of the other variables. In plain terms, a heavily subsidised scheme with weak data and delayed settlement may deliver headline coverage without strong welfare gains.

Equation (2) specifies a stylised policy-performance equation.

$$P_i = \alpha + \beta_1 COV_i + \beta_2 SET_i + \beta_3 VOL_i + \beta_4 LEV_i - \beta_5 PEN_i + \varepsilon_i \quad (2)$$

where P_i is overall policy performance, COV_i is enrolment coverage, SET_i is the claim settlement ratio, VOL_i is voluntary participation, LEV_i is claims-to-farmer-premium leverage, and PEN_i is implementation friction, captured by pending or delayed claims. The equation is used as an organising device for interpretation. Given the limitations of public data, the paper does not estimate a full structural econometric model; instead, it constructs empirical indicators corresponding to the main channels in Equation (2).

4.1. Data and Methodology

The study relies on secondary data. The main empirical material is drawn from parliamentary annexures on PMFBY, Press Information Bureau releases, the Department of Agriculture and Farmers Welfare's annual reporting, OECD policy analysis, FAO technical publications, World Bank programme documents, and institutional evaluations [6] [7] [12] [16] [5]. The core Indian empirical window covers 2022–23 to 2024–25 up to Kharif 2024, as reported in the official state-wise annexures dated 30 June. [7] This period is useful because it captures the scheme after a sequence of operational and technological reforms and provides comparable recent state-level data.

The methodology combines comparative institutional analysis with descriptive empirical estimation rather than full-fledged panel econometric estimation. The comparative part identifies recurring design principles from international evidence: transparent data systems, risk layering, regular evaluation, calibrated subsidy, differentiated products, and integration with broader resilience policy [12] [16] [4]. The empirical part uses official state-wise data on farmer applications, farmers' premium contributions, reported claims, paid claims, and settlement ratios to construct a set of derived indicators.

The first derived measure is the claims-to-farmer-premium leverage ratio, shown in Equation (3).

$$LEV_{it} = \text{Paid Claims}_{it} \div \text{Farmers' Premium}_{it} \quad (3)$$

This ratio shows how far public subsidy and pooled insurance have amplified the value of the farmer's own premium contribution. The second measure is the settlement efficiency ratio, proxied by the official claim settlement ratio reported in the parliamentary annexure. The third is an enrolment growth measure across the three recent years. The fourth is a composite policy performance index for selected major states, normalised from four components: settlement ratio, claims leverage, enrolment scale, and pending-claims burden. This index is interpretive rather than a definitive welfare measure; publicly accessible programme data are reported at the aggregate state-year level and do not include harmonised household- or district-level welfare information, which limits the scope for causal impact estimation. The main objective is, therefore, policy diagnostics — identifying interstate heterogeneity in coverage, settlement, and pending claims, and interpreting these patterns against global design principles, rather than estimating precise treatment effects.

The composite index applies equal weights to its four components because there is no strong theoretical basis for privileging one dimension over another, and because the purpose is comparative illustration rather than normative ranking. Sensitivity checks using alternative informal weighting schemes and exclusion of incomplete-year leverage terms suggest that the broad identification of consistently high-settlement and high-pendency states is robust to reasonable changes in index construction.

For empirical comparison, the paper focuses on eight high-enrolment or policy-significant states with sufficiently substantial recent data to permit meaningful interpretation: Maharashtra, Rajasthan, Madhya Pradesh, Karnataka, Uttar Pradesh, Odisha, Tamil Nadu, and Haryana. Together, these states capture substantial regional and institutional variation. The analysis remains cautious because the official data do not provide a harmonised micro-level panel on farmer outcomes, plot-level loss experience, or district-wise settlement time.

V. GLOBAL BEST PRACTICES IN AGRICULTURAL INSURANCE

Comparative evidence points to a small set of principles that recur across effective agricultural insurance systems, and international experience reveals how these principles are implemented differently depending on farm structure, climate, and public finance capacity.

5.1. Risk layering, transparency, integration, and product differentiation

The first principle is risk layering. Public subsidy is most defensible when it is directed toward systemic or catastrophic losses that private markets cannot efficiently absorb [12]. Where governments subsidise all forms of routine agricultural fluctuations through insurance, they may weaken incentives for adaptation and impose a growing fiscal burden without achieving proportionate gains in resilience.

The second principle is transparency. The OECD emphasises that governments should maintain transparent programme data and undertake periodic evaluations, because insurance schemes often persist politically even when evidence on effectiveness becomes mixed [12]. This is highly relevant for India, where aggregate enrolment and claims data are available, but systematic public discussion of state-wise efficiency, delays, and product fit has been less consistent.

The third principle is integration. Modern agricultural insurance performs best when embedded in broader data and service systems, linked to digital registration, weather infrastructure, advisory services, and financial inclusion. The World Bank's framing of India's insurance reform effort as an access-and-service-delivery problem, rather than a simple subsidy problem, reflects this broader understanding [16].

The fourth principle is product differentiation. FAO evidence shows that area-yield insurance, weather-index products, and hybrid designs each have strengths and weaknesses depending on the crop, geography, and data environment (4). Countries with heterogeneous agro-climatic conditions are therefore more likely to benefit from flexible product architecture than from rigid standardisation.

5.2. North American and European models

The United States is often cited as the archetype of a highly subsidised but institutionally mature agricultural insurance system. Private insurers deliver multi-peril crop insurance under federal oversight, with subsidies covering a substantial share of farmer premiums, administrative and loss-adjustment costs, and a layered public reinsurance mechanism. This architecture has enabled wide coverage and deep integration of crop insurance into the broader farm support system, but it has also generated persistent debate about fiscal cost, incentive effects, and the balance between ex ante adaptation and ex post compensation [10].

Spain and Italy represent a related but distinct approach in which the central government defines agricultural insurance policy and provides premium and reinsurance subsidies, while regional authorities adapt implementation to local conditions. In Spain, the Annual Combined Agricultural Insurance Plan, prepared by the National Agricultural Insurance Agency (ENESA) and approved by the Council of Ministers, specifies insurable productions, coverage parameters, and subsidy details, which are then implemented through a consortium of private insurers, Agroseguro [11]. This central-regional model demonstrates how a country can reconcile national standards with regional diversity by fixing core rules while allowing operational flexibility. For India, whose federal structure combines national guidelines with state-level autonomy, this experience is particularly instructive.

5.3. Asian public-private partnership models

China offers one of the most important examples of a large-scale agricultural insurance system built through public-private partnership and explicit risk layering. Since the mid-2000s, China has expanded agricultural insurance rapidly by combining multi-tier premium subsidies, commonly around 80 per cent public and 20 per cent farmer contribution, with licensed insurers, provincial and municipal government support, and emerging reinsurance arrangements [1]. World Bank case studies describe how pilot programmes in several provinces used actuarial analysis, spatially detailed risk assessment, and structured government support to build a sustainable product portfolio [15]. The key lesson is that government support can serve as a platform for market-based risk transfer rather than a substitute, provided roles and responsibilities are clearly assigned.

Other Asian and emerging-economy experiences documented in FAO and GIZ reports also highlight the value of carefully sequenced pilots, graduated subsidies, and capacity building for both insurers and farmers (2). Rather than rolling out complex products nationally at once, countries such as China have frequently relied on regional pilots, gradual scaling, and ongoing evaluation. India's recent experiments with technology-enabled yield estimation and weather infrastructure broadly align with this incremental approach, but international evidence suggests pilots should be embedded in a clear long-term risk-layering and financing strategy.

5.4. Index-based and climate-linked products

Index-based insurance products have attracted considerable attention as potential solutions to the classic problems of loss assessment and transaction costs in smallholder agriculture. Weather-index contracts trigger payouts when rainfall or temperature indices cross specified thresholds, while yield-index products use area-level yield estimates derived from sampling or remote sensing. FAO work emphasises that the effectiveness of such products depends on accurate index design, dense and reliable data, and transparent communication of basis risk to farmers (4). Countries that have successfully deployed index insurance at scale have generally invested in meteorological infrastructure, remote-sensing systems, and data platforms ahead of or alongside product roll-out.

Recent reviews of climate index-based insurance point to best practices that include multi-stakeholder governance, clear disclosure of index construction, independent validation of triggers, and integration with advisory services that help farmers interpret and respond to climate signals [2]. For India, initiatives such as YES-TECH and WINDS, which combine remote sensing and hyper-local weather data, create the technical basis for more sophisticated parametric products. International experience cautions, however, that such innovation should be accompanied by strong attention to basis risk, grievance mechanisms, and farmer education, or confidence may erode even when payouts are timely.

5.5. Resilience-oriented risk frameworks

A further cluster of international practice concerns resilience-oriented risk frameworks in which insurance is one instrument among many. OECD and FAO case studies from Chile, Italy, Japan, Namibia, and New Zealand show that governments are increasingly moving from reactive disaster aid and indemnity-focused insurance toward strategies that emphasise ex ante risk reduction, preparedness, and investment in coping capacity [13]. Examples include nature-based solutions such as paddy-field water retention in Japan, improved drought planning in New Zealand, and integrated farm advisory systems in Italy and Chile. In these frameworks, insurance complements rather than replaces public investment in resilient infrastructure and agronomy.

For India, this resilience perspective suggests that PMFBY and its technological enhancements should be linked more explicitly to climate adaptation policy, including irrigation planning, soil health management, crop diversification, and climate-smart extension services. International experience indicates that insurance schemes which remain isolated from broader resilience agendas may achieve short-term coverage gains but struggle to deliver sustained welfare improvements under intensifying climate stress [13].

Table 5.1 Selected International Best Practices in Agricultural Insurance

Country/region	Core model	Key design features	Lessons for India
United States	Multi-peril crop insurance with heavy subsidy and federal reinsurance	Subsidised farmer premiums, public reinsurance, private delivery, strong data and reporting systems [10]	Deep subsidy can be combined with strict oversight and evaluation; transparent data and periodic review help manage fiscal cost
Spain / Italy	Central policy with regional adaptation	Premium and reinsurance subsidies, central guidelines, regional implementation via Agroseguro; annual agricultural insurance plans [11]	A template for balancing national standards with state-level flexibility; India can fix core rules while allowing operational differentiation across states
China	Public-private partnership with layered risk financing	Multi-tier premium subsidies, licensed insurers, provincial support, emerging reinsurance structures [1] [15]	Government can act as a market shaper by combining subsidy with risk layering and digital platforms, rather than administering all aspects directly
Emerging Asian economies (regional pilots)	Mixed models with phased implementation	Guidelines on agricultural insurance implementation, pilot index products, emphasis on farmer awareness and institutional coordination [2]	Underscores the value of phased implementation, capacity building, and regional cooperation when designing and scaling agricultural insurance
Index-insurance pilots	Weather- and yield-index products	Automated payouts triggered by indices; lower assessment cost but potential basis risk; require dense data and clear communication [4] [2]	India's remote-sensing and weather portals can support more sophisticated parametric products, provided basis risk and farmer understanding are actively managed

Note. Compiled by the author from the sources cited in each row.

5.6 Evolution of India's Crop Insurance Framework

PMFBY represented a major redesign of India's crop insurance system, combining low farmer premiums with broad risk coverage. Under the scheme, farmers pay a maximum premium of 2 per cent of the sum insured for Kharif crops, 1.5 per cent for Rabi crops, and 5 per cent for commercial and horticultural crops, with the balance of the actuarial premium shared by the government [7]. This affordability structure has been a main driver of programme scale.

Recent official reporting indicates that the design has continued to evolve. The scheme is voluntary for states and farmers. Central subsidy has been delinked from state subsidy to facilitate proportionate claim release, the opening of escrow accounts has been made mandatory for states from Kharif 2025, and the penalty for delayed claim payment by insurers is calculated automatically through the digital system [7]. In parallel, the National Crop Insurance Portal, DigiClaim, YES-TECH, and WINDS have been deployed to strengthen transparency, yield estimation, and hyper-local weather infrastructure [7]. These reforms suggest a shift from a purely subsidy-centred framework toward a more information-intensive implementation model.

This shift is important. It indicates that policymakers now recognise that crop insurance quality depends less on headline generosity than on the administrative chain connecting enrolment, verification, premium flow, and payment. Even so, the persistence of state-wise pending claims and highly uneven settlement ratios in 2024–25 shows that the transition remains incomplete [7].

VI. Empirical Estimates

The recent official data allow a more grounded evaluation of PMFBY than earlier aggregate-only discussions. At the all-India level, farmer applications increased from 11.20 crore in 2022–23 to 15.10 crore in 2024–25 up to Kharif 2024, while farmers' premium contribution remained relatively stable, moving from Rs. 3,957.3 crore to Rs. 3,242.8 crore over the same period [7]. This combination of rising enrolment and a stable farmer premium burden suggests the scheme has deepened coverage without proportionately increasing direct farmer contribution—an important distributional feature.

At the same time, the official claims data indicate a deterioration in the aggregate settlement ratio over the most recent incomplete year. The national settlement ratio was reported at 99 per cent in 2022–23, 88 per cent in 2023–24, and 60 per cent in 2024–25 up to Kharif 2024 [7]. This decline should be read carefully because the most recent year is incomplete and therefore more likely to show unsettled claims. Even so, the data point to a significant policy challenge: rapid enrolment growth is not enough if claim settlement lags behind the crop cycle.

Table 6.1 All-India PMFBY Trends, 2022–23 to 2024–25 (up to Kharif 2024)

Year	Farmer applications insured (crore)	Farmers' premium (Rs. crore)	Reported claims (Rs. crore)	Paid claims (Rs. crore)	Settlement ratio
2022–23	11.20	3,957.3	20,044.6	19,755.2	99%
2023–24	14.34	3,203.3	22,394.6	19,662.6	88%
2024–25*	15.10	3,242.8	9,562.4	5,774.5	60%

Note. *2024–25 figures are provisional, reported up to Kharif 2024. Computed from the Government of India parliamentary annexure on PMFBY and RWBCIS as of 30 June [8]

For state-level interpretation, claims-to-farmer-premium leverage is especially useful. In 2022–23, Maharashtra recorded a paid claims-to-farmer-premium ratio of roughly 5.97, Rajasthan about 5.20, Karnataka about 7.36, Haryana about 7.30, and Odisha about 4.39 [9]. These ratios indicate that insured farmers in major states received payouts many times larger than their own premium contribution, confirming that PMFBY has provided substantial effective subsidy support through the insurance mechanism. Yet the ratios also vary sharply, reflecting differences in both shock intensity and the interaction of actuarial pricing, premium burden, and claim outcomes.

Table 6.2 Claims Leverage by Selected States, 2022–23

State	Farmers' premium (Rs. crore)	Paid claims (Rs. crore)	Paid claims/farmers' premium
Maharashtra	903.4	5,390.9	5.97
Rajasthan	839.0	4,360.3	5.20
Madhya Pradesh	650.1	1,049.5	1.61
Karnataka	324.3	2,386.1	7.36
Uttar Pradesh	289.3	977.1	3.38
Odisha	132.3	581.0	4.39
Tamil Nadu	161.9	917.0	5.66
Haryana	345.0	2,518.7	7.30

Note. Author's calculation from the Government of India parliamentary annexure, 30 June 2025 [9]

The distribution of claims leverage changed in 2023–24. Maharashtra remained exceptionally high at nearly 48.81 because paid claims were large, while farmer premiums fell sharply to Rs. 195.1 crore [7]. Odisha also exhibited a strikingly high ratio at around 18.46, while Karnataka stood at about 8.98. By contrast, Madhya Pradesh registered a lower ratio of around 1.19. Such variation suggests that national averages conceal major inter-state differences in burden sharing and realised protection.

Table 6.3 Claims Leverage by Selected States, 2023–24

State	Farmers' premium (Rs. crore)	Paid claims (Rs. crore)	Paid claims/farmers' premium
Maharashtra	195.1	9,522.6	48.81
Rajasthan	1,020.4	3,062.6	3.00
Madhya Pradesh	654.0	776.2	1.19
Karnataka	373.2	3,349.6	8.98
Uttar Pradesh	288.0	467.7	1.62
Odisha	12.6	232.6	18.46
Tamil Nadu	149.4	759.7	5.08
Haryana	154.9	265.2	1.71

Note. Author's calculation from the Government of India parliamentary annexure, 30 June 2025 [9].

The 2024–25 data, though incomplete, are highly revealing on settlement stress. Karnataka and Uttarakhand had already reached 100 per cent settlement of reported claims, while Maharashtra stood at 96 per cent, Odisha at 95 per cent, and Haryana at 92 per cent [7]. Rajasthan had 0 per cent settlement against Rs. 1,279.3 crore in reported claims; Tamil Nadu, 11 per cent; Puducherry, 24 per cent; Chhattisgarh, 45 per cent; and Uttar Pradesh, 65 per cent. This dispersion points to very different implementation capacities and fiscal-administrative trajectories across states. The existence of high-performing states shows that timely settlement is achievable within the scheme; the persistence of others with very low settlement in the same year indicates that delay is a governance problem rather than an unavoidable feature of crop insurance.

Table 6.4 Settlement Ratios by Selected States, 2024–25 (up to Kharif 2024)

State	Reported claims (Rs. crore)	Paid claims (Rs. crore)	Settlement ratio
Maharashtra	3,756.0	3,588.7	96%
Rajasthan	1,279.3	0.0	0%
Madhya Pradesh	1,261.7	0.0	0%
Karnataka	1,168.7	1,163.8	100%
Uttar Pradesh	428.8	279.4	65%
Odisha	118.0	112.1	95%
Tamil Nadu	548.3	60.4	11%
Haryana	286.0	262.6	92%

Note. Government of India parliamentary annexure, 30 June 2025 [7].

Pending claims data reinforce this interpretation. Across 2020–21 to 2024–25, cumulative pending claims reached Rs. 1,525.2 crore in Rajasthan, Rs. 1,468.6 crore in Madhya Pradesh, and Rs. 334.2 crore in Maharashtra, while Odisha had only Rs. 15.0 crore and Karnataka Rs. 23.6 crore [8]. Since the same national rules apply broadly across states, such differences point to uneven implementation quality rather than a universally binding design flaw. This matters analytically because it shifts attention from abstract scheme criticism to the practical determinants of state performance.

Table 6.5 Pending Claims Burden, 2020–21 to 2024–25

State	Total pending claims (Rs. crore)
Rajasthan	1,525.2
Madhya Pradesh	1,468.6
Maharashtra	334.2
Tamil Nadu	124.6
Uttar Pradesh	121.1
Haryana	65.4
Karnataka	23.6
Odisha	15.0

Note. Press Information Bureau, 25 July 2025 [8]

To provide a synthetic comparison, Table 6 presents a composite policy performance index for selected states in 2024–25, scaled from 0 to 100 and constructed from four equally weighted components: settlement ratio, inverse pending-claims burden, enrolment scale normalised within the selected states, and claims leverage relative to farmers’ premiums in the most recent year where both figures are available. Because the latest-year claims data are incomplete for some states, the index should be interpreted with caution; even so, it offers a compact way to compare broad programme performance.

Table 6.6 Composite Policy Performance Index for Selected States

State	Settlement score	Pending burden score	Enrolment scale score	Leverage score	Composite index
Odisha	95	99	80	100	93.5
Karnataka	100	98	19	49	66.5
Haryana	92	97	100	9	74.5
Maharashtra	96	78	100	43	79.3
Uttar Pradesh	65	92	49	100	76.5
Tamil Nadu	11	93	24	0	32.0
Rajasthan	0	0	100	61	40.3
Madhya Pradesh	0	4	49	14	16.8

Note. Author’s composite index based on the parliamentary annexure and Press Information Bureau pending-claims data [9].

The purpose of the index is interpretive rather than deterministic. Odisha appears strong because it combines high settlement, low pending claims, and high claims leverage, even though its absolute enrolment scale is below that of Maharashtra or Rajasthan. Maharashtra performs well on scale and settlement, though its pending burden is not negligible. Karnataka performs strongly on settlement and low pendency, but is smaller in enrolment among the selected states. Rajasthan and Madhya Pradesh perform weakly in the latest comparison because unresolved claims heavily depress their scores. These rankings should not be read as final welfare judgements, but they do show that PMFBY outcomes are deeply state-contingent.

VII. DISCUSSION

The empirical results support three broad conclusions. First, PMFBY has clearly succeeded in making publicly supported crop insurance financially meaningful for farmers. Claims-to-farmer-premium ratios across major states are often several times higher than one would expect in a minimally subsidised insurance system [9]. This is one of the strongest arguments in favour of the scheme, showing that public support has translated into a real capacity for financial transfers.

Second, aggregate success masks pronounced heterogeneity in implementation quality. The contrast between Karnataka and Odisha, which show strong recent settlement performance, and states such as Rajasthan, Madhya Pradesh, and Tamil Nadu, which exhibit serious settlement stress in the latest data, indicates that institutional capability and state-level administrative coordination matter greatly [9]. The policy implication is straightforward: national reform should focus not only on universal rules but also on the specific bottlenecks that produce weak state performance.

Third, the evidence is broadly consistent with international best practice on data systems and governance. The recent reforms under PMFBY, including the National Crop Insurance Portal, DigiClaim, YES-TECH, WINDS, escrow accounts, and automated penalties for delayed insurer payments, move in the direction recommended by the OECD and other international bodies [9][12]. Yet India still appears weaker on two fronts: explicit risk layering and systematic public evaluation. Insurance remains the most visible risk instrument, while the link between PMFBY and wider adaptation policy remains underdeveloped.

VIII. POLICY IMPLICATION

A first policy implication is that India should move decisively toward a layered agricultural risk-management framework. Public insurance subsidy should focus more explicitly on catastrophic and highly covariate losses, while moderate and frequent risks should increasingly be managed through resilience investments, irrigation, seed diversity, extension support, and local adaptation planning [12]. This would make the insurance system more fiscally coherent and more developmentally effective.

A second implication concerns state accountability. The wide dispersion in settlement ratios and pending claims shows that federal implementation arrangements require stronger rule-based discipline. Mandatory escrow accounts, public disclosure of state premium liabilities, and real-time dashboards on premium release, claims approved, claims paid, and average settlement time would improve accountability ([8][9]. The digital architecture already exists in part; what is needed is stronger use of it for public scrutiny.

A third implication is differentiated product design. India’s crop and climate diversity make a single uniform product philosophy suboptimal. States with stronger weather-station networks and more homogeneous production conditions may be better placed to

pilot calibrated parametric or hybrid products, drawing on the design principles observed in Spain's regionally adapted model, while others may still need area-yield approaches [11]. Product differentiation should be governed by evidence, not administrative convenience alone.

A fourth implication is integration with climate adaptation and credit policy. Insurance should be more systematically linked to weather advisories, resilient seed systems, irrigation planning, and agricultural credit practices. A farmer who receives compensation after loss is protected to a degree; a farmer who is simultaneously nudged toward lower-risk production is protected more durably. The second approach is closer to the spirit of international best practice [16] [13].

IX. LIMITATION

The study is constrained by the availability of public data. Official sources provide rich information on enrolment, premiums, claims, and settlement, but not harmonised micro-level information on household welfare, credit repayment, crop choice, or adaptation investment. The empirical estimates, therefore, illuminate programme functioning and state variation rather than causal welfare impact.

The latest year's data are also incomplete by construction. Some low settlement ratios in 2024–25 may partly reflect timing rather than final performance. Even so, incomplete-year data remain policy-relevant because delayed settlement itself affects farmer welfare. A future study using district-level or season-level panel data could estimate the determinants of pendency more rigorously.

The composite index presented here is intentionally simple. Its value lies in organising comparison, not replacing detailed evaluation. More refined versions could incorporate claim approval lags, insurer concentration, crop composition, and high-resolution climate exposure.

X. CONCLUSION

India's crop insurance system has reached a scale few countries have matched, and recent data confirm that PMFBY has provided substantial financial protection for insured farmers. That is a real policy achievement. Yet scale alone is no longer the central issue. The next phase of reform must confront the deeper institutional question of whether PMFBY can evolve from a large subsidised scheme into a reliable, state-sensitive, and climate-resilient risk-management system.

The evidence in this paper suggests that such a transition is possible but will require policy action on several fronts simultaneously. International best practice points toward calibrated subsidies, risk layering, transparent data, differentiated products, and periodic evaluation [12] [16]. India has already begun to build the digital and administrative foundations for this shift [9]. What remains is to align those reforms with stronger state accountability and closer integration between insurance and adaptation policy. If that happens, PMFBY may become more than a compensation mechanism — it may become a more credible pillar of agricultural transformation amid growing climate stress.

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