

# Cultivating Resilience: An In-depth Exploration of Agricultural Insurance Initiatives and Their Transformative Role in India's Farming Landscape

Bijin Philip<sup>1,\*</sup>, Suresh G<sup>2</sup>

<sup>1</sup>Research Scholar, Department of Commerce, Imayam Arts and Science College, Kannanur, Thuraiyur– 621206 Tiruchirapalli District 2, Affiliated to Bharathidasan University Tamilnadu, India

<sup>2</sup>Assistant Professor and Research Guide, Department of Commerce, Imayam Arts and Science College, Kannanur, Thuraiyur– 621206 Tiruchirapalli District 2, Affiliated to Bharathidasan University Tamilnadu, India

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**Abstract** In many developing countries, agriculture continues to be the backbone of the economy and plays a vital role. Enabling the development of food value chains and enabling poor farmers to increase their income, agricultural finance plays a crucial role in the effort to feed the world's anticipated 9 billion people by the year 2050. In 2022, yearly investments of at least \$80 billion are required to meet the projected 70% increase in global food consumption by 2050. Agricultural insurance is a critical safety net that is in line with Sustainable Development Goal 2 (SDG2), which aims to end hunger, guarantee food security, and advance sustainable agriculture. Agricultural insurance works best when it protects farmers from natural calamities, makes sure they are creditworthy for the next growing season, and promotes sustainable farming methods. This article explores the policy efforts that are now being pursued in India's agriculture insurance industry, providing a thorough analysis of both the performance and developmental elements. Using a content analysis approach, the research examines the current environment and suggests a model intended to improve the effectiveness of the farm insurance programme. More involvement from governments and development agencies is necessary to meet the goals of sustainable agriculture. Enhancing the agriculture insurance framework requires cooperation with commercial reinsurers, technology suppliers, input

suppliers, and financial institutions. In addition to optimising current programmes, this cooperative approach seeks to match them with the larger goal of sustainable agriculture, guaranteeing farmers' prosperity and resilience in the face of changing difficulties.

**Keywords** Agriculture Insurance, PMFBY, Sustainable Development Goal, Sustainable Agriculture

## 1. Introduction

In many developing nations, agriculture plays a significant role in the economy by providing rural households with a reliable source of income and food security. In addition to providing for local food needs, the agriculture industry makes a substantial contribution to overall exports and is the main supplier of raw materials for a wide range of agro-based industries. Agricultural policy has historically attempted to protect farmers from the uncertainties associated with natural disasters and market price swings, acknowledging the inherent unpredictability of agriculture. Despite economic and technological developments, farmers continue to experience continuous insecurity, as highlighted by the National Agriculture

Policy (NAP) of 2000. This susceptibility is especially noticeable during dry spells, as reported by farmer suicides in different parts of the country [1]. In India's agricultural landscape, crop insurance emerges as a crucial tool in response to these issues, offering farmers a financial safety net against the inherent volatility of their line of work. Apart from crop insurance, additional tools in India's agricultural policy toolbox include open market operations at minimum support prices (MSP) and calamity relief funds. These diverse strategies seek to build a resilient agriculture sector that will support farmers in difficult times and provide a more stable environment for their means of subsistence.

India has the largest crop insurance programme in the world, with 25 million farmers covered. 95 million farmer households lack coverage as a result of programme problems, which have been mostly attributed to design issues and delays in claims settlement, even with significant government support [2]. The Indian government moved decisively to address these concerns and to deepen the crop insurance programme by increasing coverage. The Joint Group's 2004 study's recommendations provided a strategic roadmap for development. The creation of actuarially sound design and pricing techniques in line with international best practices, as well as a comprehensive examination of current underwriting practices, were among the primary action items. It was intended for these approaches to serving as the cornerstone for the shift to an ex-ante, market-driven crop insurance programme. Furthermore, the study suggested developing distinct pricing and product design strategies for new weather index insurance products. The study suggested investigating reasonably priced disaster risk financing methods in order to further strengthen the resilience of the public crop insurance organisation. In order to provide a more comprehensive and secure crop insurance programme for the country's farmers, the Government of India sought to solve the issues at hand and clear the path for this program's implementation by implementing these recommendations.

The Indian government launched the ground-breaking Pradhan Mantri Fasal Bima Yojana (PMFBY) with the goal of stabilising farmers' incomes and encouraging the use of contemporary farming techniques. This programme provides coverage in the event that harvested produce is harmed by pests, diseases, or natural disasters. It also covers loss of unsown land and failed crops. The strategy highlights the necessity of improving crop insurance's efficacy, transparency, and farmer-centric approach in light of the significance of technological improvements in this field. The successful implementation of the PMFBY is contingent upon the proper use of technology, given the intricate nature of Indian agriculture, which is marked by tiny and dispersed land holdings, notable eco-geographical variability, yield fluctuations, and unpredictable weather patterns. Innovative technology integration is thought to be essential for tackling the challenges posed by the

agricultural environment. These technologies are essential for increasing the insurance industry's efficacy and efficiency and guaranteeing that farmers get the program's benefits more widely. The PMFBY aims to improve claim settlement transparency, expedite procedures, and ultimately develop an insurance framework that is more farmer-friendly by utilising technological solutions. This forward-looking strategy recognises the dynamic character of Indian agriculture and emphasises the significance of capitalising on innovations to strengthen crop insurance as a means of assisting and protecting the livelihoods of the country's farmers.

India's economy depends heavily on agriculture, which employs a large percentage of the rural population and adds significantly to the GDP of the nation [3]. Even while agriculture employs over two thirds of the workforce in developing countries like India, it is nevertheless vulnerable to the effects of unfavourable weather patterns. Under these circumstances, agricultural insurance becomes an essential financial tool that helps farmers under difficult circumstances reduce the production risk they face. In India, agricultural insurance was first introduced in 1972. But operational flaws have continued, resulting in inconsistent and inefficient delivery of essential protection to farmers. Since 1972, the Indian government has launched new agriculture programmes roughly every 10 years in response to feedback about areas in need of development. These programmes are all designed to address the shortcomings found in the previous efforts. The agriculture insurance programme is updated with new features every time iteration, which are designed to reflect lessons learnt and improvements in its implementation. This iterative process recognises how agriculture is changing and how insurance policies must change to accommodate farmers' evolving demands. The government's persistent efforts to enhance and modernise agriculture insurance schemes demonstrate its commitment to providing farmers with strong protection and assistance, thereby strengthening the resilience of India's crucial agricultural industry.

The financial risks farmers face from unanticipated events like crop failures, natural disasters, and other undesirable circumstances are minimised by India's agricultural insurance programmes. This framework allows for the implementation of effective policy interventions that can enhance the resilience of the agriculture industry. Public-Private Partnerships (PPPs), Climate Resilience Initiatives, Weather Forecasting and Early Warning Systems, Research and Innovation, Promotion of Technology Adoption, Capacity Building and Awareness, Customised Insurance Products, Premium Subsidies and Support, Risk Assessment and Data Management are just a few of the new policy interventions which the government implemented in this contest. By adopting these policy measures, India may strengthen its agricultural insurance systems and increase the resilience and sustainability of the agriculture sector as a whole.

## 2. Review of Literature

In numerous developing nations, agriculture remains a dominant force, serving as the primary employer and a substantial contributor to the gross national product. The vulnerability of underprivileged farmers to natural calamities is pronounced in these regions. Crop insurance emerges as a crucial tool, offering financial protection against volatile market prices and losses due to severe weather and natural disasters. This essay delves into the existing literature on India's agricultural insurance programs. India boasts the world's most extensive crop insurance scheme, covering 25 million farmers. Despite significant government subsidies, design flaws, particularly in the delay of claims settlement, have left 95 million farmer households without coverage [2]. While agricultural insurance is a risk management strategy, accessibility remains a challenge for most Indian farmers. The government introduces new agricultural programs every decade, yet operational inefficiencies mar each attempt [4]. Jain [5] challenges the perception that crop insurance cannot finance itself or enhance output, asserting its potential contribution to both. However, hindrances in rural areas, such as restrictive regulations, impede the swift expansion of the insurance industry. Implementing crop insurance in developing nations reveals critical issues. These include estimating claims outlay at 15% of crop value, limited coverage of specific risks, challenges in obtaining reliable long-term agricultural data, and various impediments like land tenure systems, lack of skilled staff, and insufficient support from reputable reinsurers. While government-run crop yield insurance programs, minimum support prices, and calamity relief funds shield Indian farmers, only 10% of the seeded area is covered by crop insurance, with associated premium claims. Despite the enormous potential demonstrated by the agricultural insurance market, it struggles to gain traction in the farming community after four decades. The underutilization of production capacities for agricultural machinery, heavy reliance on imports for resources, and farmers' perception of little value in insurance further compound the challenges [6]. The lack of awareness and complexity of registration and claims procedures deter farmers from engaging with agricultural insurance [7]. Accelerating the public-private partnership (PPP) process and involving independent private insurers could enhance coverage [8]. Fisher & Surminski (2012) emphasize the role of both sectors in adapting to agricultural risks, underscoring the need for effective engagement. Recognizing crop insurance as a crucial risk management tool, the Indian government introduced the Comprehensive Crop Insurance Scheme (CCIS) in 1985 and the National Agricultural Insurance Scheme (NAIS) in 1999–2000 [9]. However, these efforts have fallen short of expectations. The study recommends improvements to the NAIS, aiming to increase coverage levels significantly [10]. The challenges of limited access to agricultural insurance, driven by illiteracy and a

preference for relief payments, persist due to state-level implementation issues [4]. Blockchain-based crop insurance systems have been proposed as a viable, cost-effective solution [11]. Leveraging advanced technology, such as the JAM trinity, to link farmers' land records with Aadhaar numbers and bank accounts can expedite claim evaluation and resolution [12]. A centralized portal connecting crop insurance and Core Banking Solution (CBS) with real-time information is urgently needed, capitalizing on India's strength in information technology.

### Objectives of the Study

- To investigate potential policy interventions within the framework of India's agricultural insurance systems.
- To analyse the performance of existing agricultural insurance programs in India.
- To develop a model employing content analysis aimed at enhancing the performance of agricultural insurance in the Indian context.

## 3. Methodology for Review

A thorough examination of the existing literature was conducted across prominent databases, including Scopus, Web of Science, ProQuest, AGRICOLA, AGRIS, and through Google search engines. Additionally, pertinent information was obtained from the annual reports of the Ministry of Agriculture and Farmers Welfare, Government of India. The search strategy involved utilizing keywords such as Crop Insurance, Agriculture Loans, National Agriculture Schemes, and India, ensuring a focus on the Indian context. The identified articles were meticulously compiled, eliminating any duplicates, and stringent quality control measures were implemented. Two researchers independently reviewed the selected articles to ensure accuracy and reliability. In addition to academic sources, valuable insights were extracted from government ministry websites and annual reports, serving as the foundational basis for the results and discussion section.

## 4. Agriculture Insurance in India - Evolution

The Agriculture Insurance Company of India Limited (AIC) is the organisation that is comparable to managing crop insurance activities in India. AIC was founded on December 20, 2002, and it started working on April 1, 2003, under the direction of the Ministry of Finance [13]. Figure 1 shows the four stages that make up the history of India's agricultural insurance programmes: the Initial phase, exploration, development, and progression.

**Phase of evolution (first phase) (1947–1971):** Following its 1947 independence, India began

investigating agriculture insurance as a result of a pledge made in the Central Legislature by the Ministry of Food and Agriculture (MOFA). In 1947 and 1948, a particular research set the groundwork for crop and animal insurance. A measure pertaining to crop insurance was presented to parliament in 1965; nevertheless, it was examined by experts in 1970. As a result, the topic of agricultural insurance was continuously discussed for more than 20 years [14].

**Phase of exploration (1972–1999):** Utilising the "Individual approach," the first crop insurance programme was introduced in 1972 and ran for six years. Then, in 1979, the "Area concept"-based pilot crop insurance system (PCIS) was unveiled and functioned until 1984. The "homogenous approach" was used to create the Comprehensive Crop Insurance Scheme (CCIS), which ran for fifteen years until 1999 [15]. During this phase, policymakers investigated area-based and individual approaches to crop insurance.

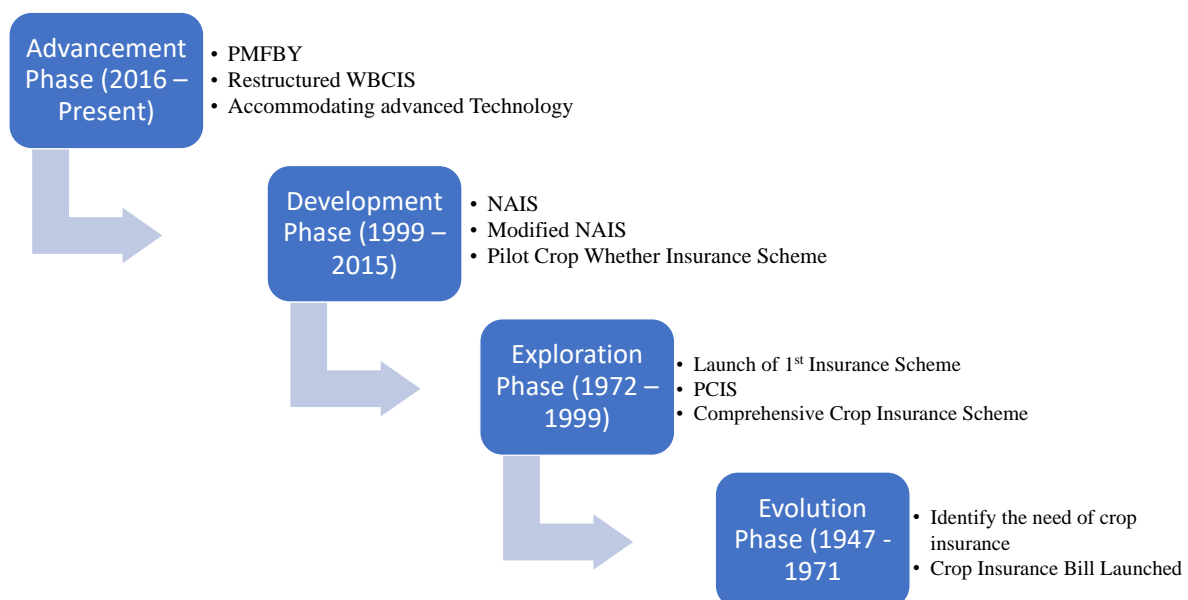
**Phase of development (1999–2015):** In 1999, the National Agriculture Insurance Scheme (NAIS) was unveiled, combining an area method for more frequent disasters and an individual plan for smaller-scale calamities [10]. Up until 2011, NAIS ran for twelve years. The "Area approach" was the foundation for the 2011-enacted Modified National Agricultural Insurance Scheme (MNAIS), which ran for five years until 2015. In addition, a trial programme known as Weather Index-Based Crop Insurance Scheme (WBCIS) was introduced in 2007 and utilised an area-based strategy with weather index limits. During this time, NAIS, which was run by the Agriculture

Insurance Company of India Limited (AIC), was the main crop insurance programme at the national level.

**Phase of advancement (2016–2019):** On February 18, 2016, the Pradhan Mantri Fasal Beema Yojna (PMFBY) and the Restructured Weather Index-Based Crop Insurance Scheme (RWBCIS) were made available statewide [16]. During this period, public-private partnerships (PPPs) allowed private sector insurers to participate more actively in crop insurance and saw the deployment of modern technology, such as satellite images and remote sensing.

## 5. Current Status of Agriculture Insurance in India

According to Bhushan [17], India has the largest agriculture insurance programme in the world, covering 2.5 crore farmers who are insured. Despite its size, a startling 95 million farmers lack insurance coverage due to problems with insurance design and inadequacies in the claim payment procedures [2]. Currently in existence in India are two significant crop insurance programmes: PMFBY (Pradhan Mantri Fasal Beema Yojna) and RWBCIS (Restructured Weather Index-Based Crop Insurance Scheme). On February 18, 2016, the government implemented these programmes under the Public-Private Partnership (PPP) approach. In this method, the insured volume, the amount of the subsidy, and the strategy of the insurance service are all largely controlled by the government.



**Figure 1.** Phases of agriculture insurance in India

**Present Agriculture Insurance Scheme - Performance assessment**

Since 2016, the Restructured Weather Based Crop Insurance Scheme (RWBCIS) and the Pradhan Mantri Fasal Bima Yojana (PMFBY) have played a significant role in India's agriculture insurance market.

The Indian government's revolutionary PMFBY programme seeks to stabilise farmers' incomes and encourage the use of contemporary farming techniques. Numerous technological options, such as digital photography, smartphones, remote sensing technologies, new statistical methodologies, modelling approaches, and information technology/information and communication

technologies (IT/ICTs), have been introduced to improve the effective implementation of PMFBY. More proof is necessary, though, to support the broad use of these technologies throughout the nation's many agroecological zones [16]. Crop insurance saw a significant boost in budgetary allocation in 2020, rising from Rs. 16.95 billion in 2019 to Rs. 156.95 billion [18]. Despite this substantial investment, farmer participation in the PMFBY programme has significantly decreased, falling by 30% once it was made optional in 2020. This emphasises how crucial it is to deal with issues and streamline the execution of agricultural insurance plans in order to provide efficient coverage and assistance for the farming community.

**Table 1.** Enrolment Data from 2018-2022 (Kharif Season)

Year	2018	2019	2020	2021	2022
<b>Season: Kharif</b>					
States/UTs	22	20	19	19	19
Districts	475	463	391	404	383
Insurance Units	1,47,836	1,56,520	1,27,553	1,21,733	1,27,127

Source: <https://pmfby.gov.in/adminStatistics/dashboard>

**Table 2.** Enrolment Data from 2018-2022 (Rabi Season)

Year	2018	2019	2020	2021	2022
<b>Season: Rabi</b>					
States/UTs	21	19	18	19	17
Districts	486	445	389	410	408
Insurance Units	1,35,020	1,26,843	1,12,539	1,14,591	1,12,639

Source: <https://pmfby.gov.in/adminStatistics/dashboard>

**Table 3.** Farmers Coverage Data from 2018-2022.

<b>Coverage (Kharif)</b>					
	2018	2019	2020	2021	2022
Farmers	2,16,63,395	2,00,50,883	1,68,70,111	1,50,95,028	1,53,81,333
<b>Coverage (Rabi)</b>					
Farmers	1,46,85,273	96,60,447	1,00,07,688	98,09,987	81,54,403

Source: <https://pmfby.gov.in/adminStatistics/dashboard>

**Table 4.** PMFBY & RWBCIS Combined - State-Wise Business Statistics as on 31.08.2021

<b>PMFBY &amp; RWBCIS Combined - State Wise Business Statistics as on 31.08.2021</b>			
<b>State/UT Name</b>	<b>Reported Claims</b>	<b>Paid Claims</b>	<b>Farmer Applications Benefitted (Lakh)</b>
A & N Islands	0	-	-
Andhra Pradesh	1,259.01	1,254.03	13.533
Assam	17.27	-	-
Bihar	-	-	-
Chhattisgarh	1,314.60	1,296.59	15.025
Goa	0.01	0.01	0.001
Gujarat	354.89	111.67	0.927
Haryana	932.26	927.45	5.552
Himachal Pradesh	64.6	58.01	1.505
Jammu & Kashmir	-	-	-
Jharkhand	25.46	-	-
Karnataka	1,357.79	1,215.35	6.869
Kerala	85.9	85.9	0.457
Madhya Pradesh	5,905.48	5,811.75	30.546
Maharashtra	6,755.92	6,747.05	87.895
Manipur	1.14	1.14	0.032
Meghalaya	0.18	0.18	0.005
Odisha	1,177.91	1,139.48	12.078
Puducherry	7.16	-	-
Rajasthan	4,920.44	4,920.31	25.574
Sikkim	-	-	-
Tamil Nadu	1,090.13	1,056.84	13.213
Telangana	402.28	-	-
Tripura	0.81	0.8	0.077
Uttar Pradesh	1,116.75	1,092.74	9.343
Uttarakhand	103.18	103.17	0.949
West Bengal	-	-	-
<b>GRAND TOTAL</b>	<b>26,893</b>	<b>25,822</b>	<b>223.6</b>

Source: <https://pmfby.gov.in/adminStatistics/dashboard>

Tables 1, 2, 3 & 4 show enrolment details, farmer's coverage, and statewide claim reported and settlement data from 2018 to 2022. Although PMFBY has proven successful in a number of states, there is recognition that there is room for development in terms of wider adoption by the target audience. This information can be very helpful in improving this important welfare metric for farmers. To improve the plan's efficacy and acceptance, cooperative federalism—which emphasises greater involvement from states, districts, and village-level authorities—is recommended [19].

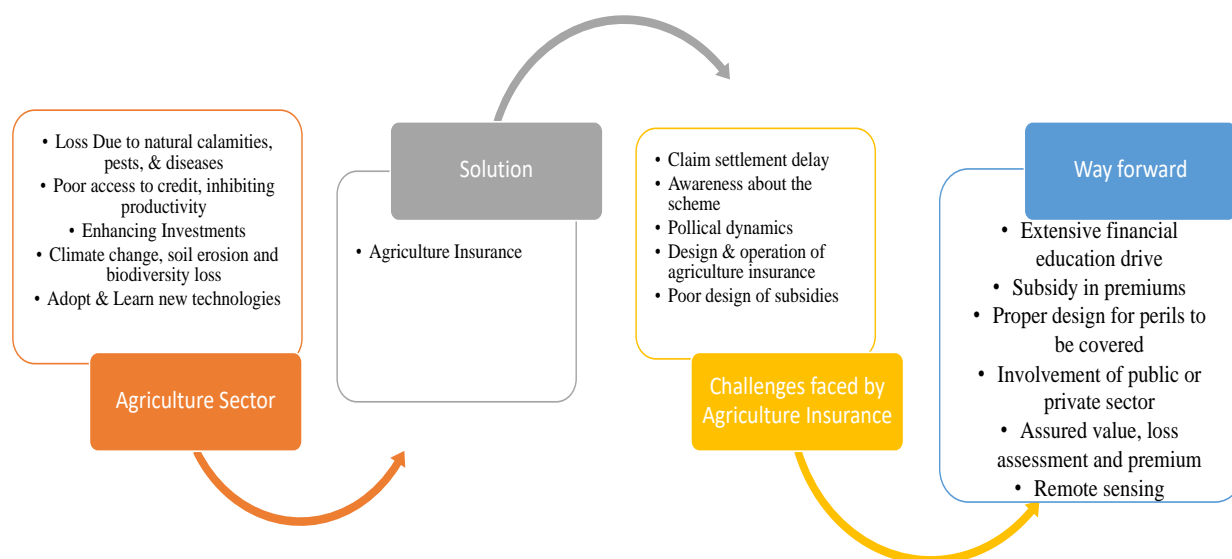
On the other hand, PMFBY encounters difficulties like

inadequate government backing, an unworkable subsidy system, a protracted claim processing period, and an unequal benefit distribution. It is stressed that crop insurance decisions should not be influenced by politicians and that in order for PMFBY to be truly beneficial to farmers, it must be characterised by verifiability, diversity, and speed [18]. It is underlined that in 2020, the supply-side push strategy—which included requirements for all lone farmers—will give way to an optional programme. Farmers are still deterred from actively pursuing crop insurance, nevertheless, by demand-side obstacles such as bureaucratic inefficiencies, unjustified claim settlement

delays, procedural complexity, and a lack of technological adoption in PMFBY plan administration. Concerns about trust and confidence stem from a lack of political will and what is viewed as the indifference of insurers and administrators of the PMFBY system. Thus, in order to drive the required improvements, a thorough study of the performance of various units in PMFBY's implementation as well as an in-depth examination into the project's performance across its various phases is required.

The country's agricultural insurance market has seen difficulties, with little use of the new policies that are often introduced. The amount of land, the number of farmers, and the total value of agricultural production are still quite minimal. Many programmes face financial difficulties, and farmers who are affected but live outside of the compensated area are frequently left out of area-based indemnity payments. Agricultural industry faces a number of difficulties, including harsh weather, fluctuations in input-output prices, problems with the availability of finance, distortions in the market, biological risks such as diseases and pests, contaminants, degraded soil, and political risks [20]. In order to assure programme viability and benefits for more farmers, extending crop insurance coverage would need thorough programme revisions and result in a large increase in government investment. This emphasises the need for fresh government initiatives to create appropriate policies and offer financial assistance for agricultural insurance, with a focus on crucial and simple-to-understand services for rural communities. The general insurance market offers an opportunity due to the interest of the private sector in participating in it. To fully utilise this potential, it could be necessary to permit several general insurance companies to insure against particular

goals that correspond to the GDP contribution of agriculture to the country. It is emphasised that successful development projects, particularly the smooth running of crop insurance programmes, depend on good governance. In addition, it promotes the expansion of the agricultural industry, offers financial flexibility in times of shock, and has the ability to generate employment opportunities while lowering the danger of financial fraud and corruption [21]. A solution that offers extra, balancing, and value-enhanced services for agricultural insurance is the introduction of new remote sensing technology. With the use of this technology, insurers can get vital services like yield modelling, area-sown permission, and crop health status monitoring. According to Bhende [22], it is viewed as a strategy to improve insurers' standing in the reinsurance market. Applications for agriculture insurance could be as follows: identifying inconsistencies in over-insurance; calculating actual acreage seeded at the insurance unit level; tracking crop health during the crop term; investigating yield decline early on the ground; assessing the accuracy and dependability of Comprehensive Crop Estimation (CCE) data; and developing crop production models based on satellite data for different crops. Given that private insurers have not made a large entry into this market, it is thought vital to encourage private sector involvement in crop insurance. The Insurance Regulatory and Development Authority of India's (IRDA) business targets need to be significantly raised in order to elicit their participation. For insurance coverage to increase and insurance plans' long-term viability to be strengthened, government support for private sector insurers is considered essential [22].



Source: Combined from Authors ("The model was developed using a combination of original data and information gathered from various articles. The dataset used in this study was collected from literature review method")

Figure 2. Model representing improving the efficiency of Agriculture Insurance

## 6. Conclusions

In many developing countries, agriculture is still a vital industry, and funding in this field is essential to the expansion of food value chains and the financial empowerment of rural poor farmers. By 2050, there will likely be a 70% rise in the world's food demand, requiring investments of at least \$80 billion year to keep up with the demand. However, the agricultural industry faces a number of difficulties, including harsh weather, fluctuations in input-output prices, problems with the availability of finance, distortions in the market, biological risks such as diseases and pests, contaminants, degraded soil, and political risks. In addition to endangering the world's food supply, these issues also put livelihoods at risk, upend value networks, and possibly even put macroeconomic stability in jeopardy.

India's agricultural insurance schemes are essential for reducing the financial risks farmers suffer from unforeseen circumstances including crop failures, natural catastrophes, and other unfavourable circumstances. By putting into practice efficient policy interventions within this framework, the agriculture sector's resilience can be improved. The government implemented new policy interventions in this contest, including the following: Public-Private Partnerships (PPPs), Climate Resilience Initiatives, Weather Forecasting and Early Warning Systems, Research and Innovation, Promotion of Technology Adoption, Capacity Building and Awareness, Customised Insurance Products, Premium Subsidies and Support, and Risk Assessment and Data Management. India can improve the resilience and sustainability of the agriculture sector overall and bolster its agricultural insurance systems by combining these policy actions.

An important and ambitious initiative, the Pradhan Mantri Fasal Bima Yojana (PMFBY), aims to safeguard farmers' steady incomes from unpredictable agricultural conditions. Millions of small and impoverished farmers stand to gain from it, yet a number of obstacles prevent it from being successfully implemented. They include a lack of knowledge about insurance benefits among farmers, a restricted ability to access insurance providers, a reluctance to pay premiums, a delay in processing insurance claims, and a willingness on the part of state governments to share the cost of premium subsidies.

The goal of the Restructured Weather Based Crop Insurance Scheme (RWBCIS) is to shield insured farmers from potential losses brought on by unfavourable weather, hence reducing their financial burden. Despite being regarded as a cost-effective risk management tool, difficulties with meteorological data and the requirement for a modern scientific methodology have hindered its effective application.

The agriculture insurance system's evolution is dynamic and multifaceted, with the potential for progressive, regressive, or stationary traits. Its structure, functions, parts, and subsystems are governed by standards and benchmarks,

and cooperation between the federal and state governments is necessary to promote the growth of the agriculture industry. For programmes like PMFBY to be improved and protect vulnerable farming populations, as well as help formalise and finance the economy through public-private partnerships bolstered by technological advancements, it is imperative that current challenges be addressed. The outlined research paper emphasizes the necessity of comprehensive reforms in the Pradhan Mantri Fasal Bima Yojana (PMFBY), an agricultural crop insurance scheme in India. The suggested reforms aim to address existing shortcomings and enhance the scheme's responsiveness, efficiency, and equity for farmers. The proposed approach advocates for incorporating technology-driven, demand-driven, and politically unbiased elements to contribute to the success of the crop insurance scheme.

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