

# Crop Insurance as a Tool for Inclusive Growth: A Conceptual Model

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## ABSTRACT

**Purpose:** Agriculture provides food and sustenance to a major section of our population. India, being an agrarian country, nearly 48 per cent population is directly or indirectly dependent on agriculture farm activities. The share of agriculture in GDP has declined from 51.9% (1950-51) to mere 13.7% (1912-13) during a period of 62 years. Bad weather and low monsoon hit the crop yield, leads to impoverish, and indebtedness resulting to suicides mainly for small and marginal farmers. Government should adopt a holistic approach and integrate data from other department to work out loan and insurance schemes customized at individual level. The study aims to propose a working crop insurance cum loan model which will be strictly data driven using advance analytics and big data analytics.

**Design/Methodology/Approach:** The paper is conceptual in nature and uses secondary data to highlight the problem of current crop insurance model and to develop an effective crop insurance cum loan model.

**Findings:** The study find that presently, the schemes for farmers are more of government subsidies and dole out in time of calamity. The study proposes model for crop insurance, with that model we will have more data based state interventions in dealing with factors adversely affecting agriculture.

**Originality/Value:** The paper used secondary data collected from the article, journals, reports and websites. The finding proposes a working crop insurance cum loan model which will be strictly data driven using advance analytics and big data analytics.

**Paper Type:** View Point

**KEYWORDS:** Crop Insurance | Government Schemes | Inclusive Growth | Customization

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## Crop insurance in India: Introduction and History of Evolution

Historically in independent India the first insurance scheme came in 1948, but unfortunately no state implemented the proposed schemes due to paucity of funds. Then The General Insurance Division of Life Insurance Corporation (LIC) introduced an individual approach-based system for H-4 cotton in Gujarat in 1972. The crop insurance program was then transferred to the General Insurance Corporation of India (GIC), which nationalized the general insurance business in mid-1972. The scheme continued till 1978-79, but was not successful and viable as it covered very few farmers with a very high claim premium ratio of 8.34 (Mohapatra & Dhaliwal, 2014).

GIC introduced Pilot Crop Insurance Scheme (PCIS) in 1979, which continued till 1984-85. The scheme linked crop insurance with institutional credit (which meant the scheme was available to loanee farmer only) based on an area approach to providing insurance coverage against yield reduction below the threshold. In 1985 GIC introduced Comprehensive Crop Insurance Scheme (CCIS) in relation to short term loan facility and based on homogenous area approach. CCIS was a multi-agency effort where Government of India, State Government, and Banking Institutions & GIC were partners in successful implementation of the scheme. P. Mishra (1995) reported that farmers in Gujarat put pressure on village-level officials who conducted field pruning experiments to underestimate yields so that local farmers could receive compensation. It was reported that most of the claims were paid in the states of Orissa Rs.181 crores (8%), Maharashtra Rs. 213 crores (9%), Andhra Pradesh Rs.482 crores (21%) and Gujarat Rs.1086 crores (47%)

The pilot scheme on seed crop insurance (PSSCI) was implemented in Rabi 1999-2000, It is intended to provide seed breeders with an economic guarantee on seed yields and to encourage seed breeders to use newly launched hybrid/improved seed varieties. Farm Income Insurance Programme (FIIP) was launched on a pilot basis for rabi 2003-04 and kharif 2004 season targeting two important factors of a farmer's income yield and price from a single policy instrument. According to this, a farmer's production and the price risk of the crops he produces are protected by ensuring a guaranteed minimum income determined using the average yield of the last seven years and the statutory minimum price (MSP). increase. If the actual income falls below the guaranteed income, the farmer is entitled to compensation from the Agricultural Insurance Company of India (AIC) equal to the amount of the compensation.

National agricultural insurance scheme (NAIS) was introduced in Rabi 1999-2000 in all states and UTs and covered all loanee (compulsory) and non-loanee (voluntary) farmers.

In 2010-11 on pilot basis Modified National Agricultural Insurance Scheme (MNAIS) was launched during the 11th five-year Plan from Rabi crop. At the national level disaster relief funds have been established with 50% Contributions by central government and 50% by state governments to protect

insurers with premium-to-loss ratios greater than 1:5. This is due to the inability to procure adequate reinsurance at competitive prices. Weather Based Crop Insurance Scheme (WBCIS) was introduced for Rabi 2007-08 with combination of homogenous area approach and weather index. "Weather index" insurance is based on estimates variation in crop performance due to disadvantage deviations in weather conditions using statistical techniques and estimate compensation. In November 2013 Government of India launched National Crop Insurance Programme (NCIP).

The present government has launched various schemes related to agriculture and is seeing agriculture as a way to uplift the socio-economic indicators of the country. The latest being the new crop insurance scheme, the Pradhan Mantri Fasal Beema Yojna (PMFBY), which is a major policy outreach towards the farmers.

The foundation of the new scheme is to compensate the farmers for losses instead of just providing relief like in earlier schemes. The most crucial element of the scheme is that it will bring down the rate of premium to be paid by farmers to a maximum of 2% of the sum insured (2% for kharif, 1.5% for rabi). The rest will be paid by the state and the central government. Currently, farmers have to pay a premium ranging from 4 to 15 per cent to insure crops. The scheme entails immediate payment of 25% of the due compensation; the money will go directly to bank accounts of the farmers. Going beyond the conventional methods of compensation and crop cover, the scheme provides for compensation for even loss of seed plants and post-harvest damage. It will also provide assessment for localized calamities including hailstorms, unseasonal rains, landslides and inundation. Instead of relying on yield data, which is often delayed, to settle claims, it will use smartphones, remote-sensing data and even drones to assess crop damage.

## Need to Insure: Pause and Ponder

The suicide incidence of Gajendra Singh from Rajasthan during a rally at Jantar Mantar (New Delhi) had shaken the whole country and shattered the nation. However, that was not a rare or single case. National Crime Records Bureau (NCRB) reports that in the year 2014, 12360 agriculture related suicides had been reported among which 5650 were farmers and rest farm labors (Accidental Death & Suicides in India 2014, Chapter 2, NCRM). On an average 46 farmers commit suicide every day in India. Total suicides has surpassed 2,00,000 since 1997. Conditions are alarming. Over the years government has issued special packages and agriculture related schemes. However, these schemes could not outreach and control death of farmers due to crop failure resulting into Bankruptcy and indebtedness. These three accounted for 37.4% of farmer's suicidal death in the year 2014. Shortfall of yield below survival threshold also hampers working capital flow. Monsoon hit yield calls for working capital, and through traditional system, farmers are trapped in indebtedness. Thus, working capital management for small and marginal farmers is another problem to be addressed with due concern as they are most vulnerable.

Reforms in agriculture insurance over the years could not put major influence. Farmers continue to suffer and die. Currently the crop insurance covers only 23% of cropped area. The majority of farmers either does not have access to those schemes or are not aware about them. A major reform by current NDA government in crop insurance has opened up new opportunities. Moving away from plain subsidies to market oriented approach will certainly widen the reach. However, preventing fraud is an aspect to account with due attention along with reach to farmers. States that consistently report crop insurance fraud include Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. There are regions in the country where the farmers only harvest insurance claims. Political influence also played a role in accepting multiple claims for the same property, the most common form of fraud. Maharashtra officials say farmers only take out insurance during seasons when they are known to suffer heavy losses. They can do this because a Supreme Court decision made crop insurance strictly an optional part of farm loans. Also, there is a significant time lag between the final acceptance date for insurance claims and the time monsoon patterns are evaluated.

Low spread is not the only problem, cover inadequacy, Sum Insured (SI) in case of crop damage are other problems. Compared to gross value output (GVO), average sum insured (Rs. 18464) per hectare is very low for most crops as reported by Commission for Agricultural Cost and Prices (CACPC). Problem is to set SI close to GVO.

Since last two years, India has received below average monsoon and suffered damage due to unseasonal rain and HudHud. With Rs. 17600 Crore budget for PMFBY, fresh hope can be seen on farmer's faces. However, government needs to reach far-flung and remote countryside between less educated farmers not connected with TVs and Internet. The Prime Minister's initiative of talking about the scheme on the Radio "Mann ki Baat" was a step in that direction, since the reach of All India Radio is nearly 92 per cent of country's area and 99.19 per cent of the total population. Besides this there is a need to involve post offices, Block and Tehsil offices along with bank. With revised budget and revised premiums we can hope a revival. However, three major problems will remain intact: Program penetration, Fraud prevention and Customized policies to assure fair Sum Assured.

Some areas which will require special focus in the implementation of PMFBY are:

- **Awareness** – A study (Goudappa, Reddy & Chandrashekhara, 2012) on farmer's awareness and perceptions of crop insurance implemented in Northeast Karnataka revealed that more than 80 per cent of the farmers who availed the NCIS (operating since 2002-03) were not aware of who is implementing agency and who pays compensation. In addition, more than 80% of the respondent do not know the premium payment amount, final date, crop insurance method, damage assessment and compensation method developed by insurance companies.
- Another study conducted by Agricultural and Rural Development Studies Center Tamil Nadu Agricultural University, and National Centre for Agricultural Economics and Policy Research, revealed that just about 50 per cent farmers are aware about the crop insurance schemes.
- **Target the small/marginal farmers** – Currently the scheme does not distinguish between large and small farmers, since it raises the issue of identification and subjectivity. However, if appropriate data available with government is integrated and analyzed through linking Land records, Unique Identification (UID), Bank Account then the assessment can be done objectively. Based on these data government can target the small/marginal farmers as primary beneficiaries of the scheme.
- **Financial Infrastructure** – The financial structure has to be robust with minimum human intervention for faster claims settlement. Information has to be digitized plot wise – the plot of the tiller who has paid the premium has to be synchronized with bank account number, UID and mobile number.
- **Crop Assessment** – Crop assessment should be done in a transparent manner and within a specified period of time, and using high technology such as automatic weather stations (AWSs), drones, low earth orbits (Leos) and satellites. Presently this infrastructure is not available, but based on time and cost this project can be taken up for future.
- **Seamless Process** - As far as any financial dealing is concerned, Banks are the first point of contact for farmers. The bank branches can be equipped with biometric readers, eye-scanning machines to neutralize the issues in confirming the concerned farmer's thumb impression. Generally, the farmers are illiterate and instead of their signature use thumb impression, which increases the chances of any fraudulent activity manifold.
- **Kisan Mitra**- With the advent of telecom revolution mobile phone have a deep penetration in India, and off late the smart phones have made life easier for everyone. For more effective implementation of PMFBY, a project can be taken up under 'Digital India' and 'Start-up India' on line of Passport Authority of India (outsourcing to TCS). The outsourced service centers will be linked to banks, Panchayats, Block level and each center will have a Kisan Mitra. The Kisan Mitra will act as the one stop shop for any query related to government schemes being offered and monitoring the fair implementation of the schemes. Once the farmer puts in his application for the insurance scheme, required details come on the mobile phone and same is updated in the UID & land records. The farmer centric government portal mKisan should also be linked to it for achieving maximum benefit.



## Insurance Model: An Integrated Approach

The core idea of this study is to propose a data driven comprehensive and closed loop model for agriculture insurance and loan, integrating information from various government departments. Government agencies has large amount of data which if levered through some intelligent analytical techniques, social security schemes can be implemented at a level with much benefit to those who really need it while avoiding loss and misuse of resource by intermediaries. The diagram below outlines a proposed procedure for agriculture loan and insurance followed by a thorough discussion.

### a) Loan and Insurance Application: Go Together

As available in the PMFBY the request for insurance with an option of loan can be accepted, however insurance is compulsory for agriculture loanee farmers. For small and marginal farmers (below a certain threshold: a combination of land size and family size) crop insurance should be mandatory and active by default. Application should be validated through land record, identity from UID, bank detail and ration card to cross check the information provided. For this purpose integration of these government records is mandatory. Applications should be binding to crop approved by government for soil type and geographical location i.e.

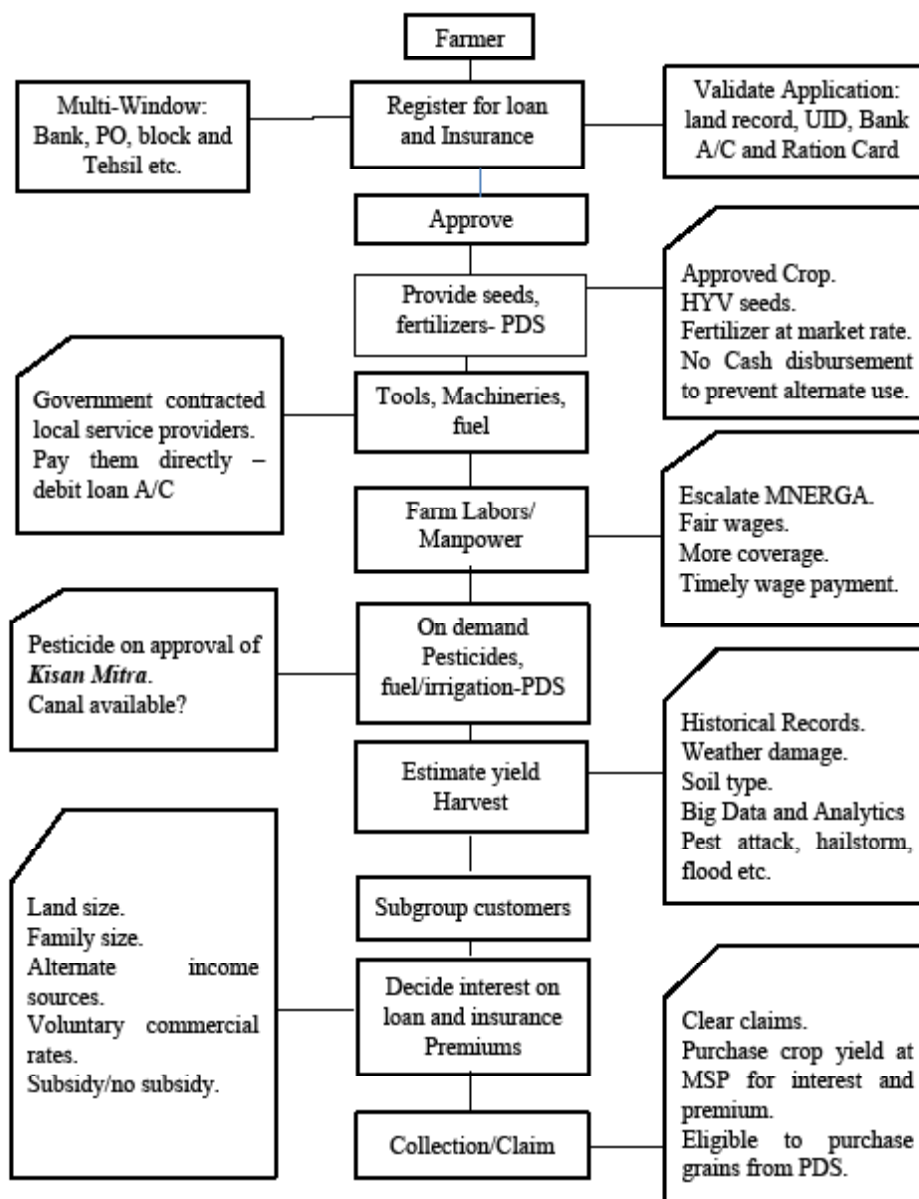


Figure 1: Integrated Crop Insurance Model

rain fall, irrigation facility and crop yield. The decision about premium and interest should not be made at this stage. Small landowners are always afraid of loan repayment (bank loan) and lend money from local "Sahu's" for working capital requirement. Others owing big lands make alternative use of loan amount, as literally they do not require it.

Through public distribution system farmer should be able to avail seeds and fertilizers. For tools and machineries required for ploughing the field and similar activities, government should have contract with local service providers and pay them directly through bank. If fuel (diesel) is required, set an upper limit (considering land area and other relevant factors), which can be bought using a token issued by bank against the loan.

### **b) Escalate MNERGA**

To fulfill labour requirement in the farm, registered MNERGA labour should be employed. This option has triple benefit. First, government would be able to employ for more number of days or cover more labors. Second, fair wage policy will be checked as in many parts of the country farm labors are paid very less than what can be called fair wage. Third, payment through bank will ensure that labors receive their wage well in time, as they do not need to wait until harvesting, as its general practice that pay wage once ripened crop is sold. Labourers have to hold many of their necessities for long, which creates a kind of unrest among society.

### **c) On demand pesticide and irrigation**

If required, request for pesticide and further machinery, labor, fuel for pest control and irrigation in case of low rain fall or others. Government should mark whether a land is irrigated by canal or not at individual basis and accordingly entertain a claim. Apart from data driven decisions, to ensure correctness of information provided and safeguard of farmers, government should appoint a KISAN MITRA at each village or village panchayat level.

### **d) Harvest: Monitor yield**

Estimation and forecasting of yield should be done at individual (household) level. We need to develop a comprehensive model similar to one used for forecasting national yield of crops, however reach at individual level by employing historical productivity data, monsoon and other relevant factors like pest attack, snow fall. Validation of this model should be done through random sampling procedures. Inform farmers about projected yield with an option to cross check in case of any controversy at lower side. Yield, along with other factors will help in deciding insurance premium and interest rate for the loan.

### **e) Segment Customers**

The profiling of farmers should be done on a holistic approach considering land size, family size, other income sources and yield, combining data of land records, UID, bank account and ration card. Based on these details the system can generate whether the yield is sufficient for the

family or not. This farmers profiling can be used further to segregate various subgroups and government can fix subsidies accordingly, which protects interest of farmers for survival.

SI close to GVO cannot be an end to the problems faced by small farmers. The yield or SI may fall short or just enough for two square meal. We cannot hope to uplift their standard of living unless we give them special treatment and considering alternate use of this section. Thus, subgrouping of farmers and differential treatment is need of time. Complex algorithms like ANN, kNN, Kohonen networks and Birch clustering techniques can be adopted to subgroup and cluster the farmers into segments.

### **f) Decide insurance premium, loan rate: Recovery**

As depicted in diagram (model), the existing policies (subsidized premiums and interest on loan) should be imposed to farmers who are vulnerable and worse affected by nature. If required, complete waiver may be called. For the farmers with surplus yield or surplus claim benefits after deducting loan charges, the insurance premium should be at commercially applicable rates with no government subsidy. For recovery of dues, the government should buy equivalent amount of yield at MSP in case of surplus yield; whereas for adverse yield, banks should deduct the charges for insurance premium and interest on loan from the claim and release the remaining amount to the farmer. Additionally, the adversely affected vulnerable farmer should be covered under Food Security Bill and should get the opportunity to procure ration from fair price shops through PDS.

## **Deploy: A Pilot Project**

Initially, government should deploy the project in some selected villages on experimental basis. The choice of villages can be from the Sansad Adarsh Gram Yojana or from the villages worst affected in terms of number of farmers committing suicide. Rather than considering the model as "Contract Agriculture", on the line of contract manufacturing, it should be considered as selective social security scheme. Analyze the feasibility of project in all perspectives-technical, economical, financial and operation before nationwide deployment. If required government can go for further data collection to improve model and its validity.

## **Conclusion**

With the proposed model for crop insurance, we will have a more data based state interventions in dealing with factors adversely affecting agriculture. Presently, the schemes are more of government subsidies and dole out in time of calamity. With a statistically backed model the scheme can be financially self-sufficient over a period of time and the funds earmarked for subsidy can be utilized for providing better facilities for agriculture like building more canals for irrigation, geo fencing of farms, drip irrigation, development of catchment areas in more flood prone farmlands, water harvesting techniques for drought prone areas. This will definitely help in improving the socio-economic indices of our farm based population and result in inclusive growth.



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### GJEIS Prevent Plagiarism in Publication

The Editorial Board had used the Ouriginal – a Swedish anti-plagiarism software tool which is a fully-automatic machine learning text-recognition system made for detecting, preventing and handling plagiarism and trusted by thousands of institutions across worldwide. Ouriginal by Turnitin is an award-winning software that helps detect and prevent plagiarism regardless of language. Combining text-matching with writing-style analysis to promote academic integrity and prevent plagiarism, Ouriginal is simple, reliable and easy to use. Ouriginal was acquired by Turnitin in 2021. As part of a larger global organization GJEIS and Turnitin better equipped to anticipate the foster an environment of academic integrity for educators and students around the globe. Ouriginal is GDPR compliant with privacy by design and an uptime of 99.9% and have trust to be the partner in academic integrity (<https://www.ouriginal.com/>) tool to check the originality and further affixed the similarity index which is {2%} in this case (See below Annexure-I). Thus, the reviewers and editors are of view to find it suitable to publish in this Volume-14, Issue-3, Jul-Sep 2022.

## Annexure 14.14

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**Reviewers  
Memorandum**

**Reviewer's Comment 1:** Paper talks about crop insurance cum loan model for the farmers in India. Author talks about different government schemes currently available for farmers. The paper focuses on areas which will require special focus in the implementation of PMFBY. The authors have done commendable work in addressing the issue of farmers and laying grounds for more extensive work on the issue.

**Reviewer's Comment 2:** The paper highlights the issues faced by farmers in India. Study proposes a data driven comprehensive and closed loop model for agriculture insurance and loan, integrating information from various government departments. The Author has very well explained crop insurance history in India.

**Reviewer's Comment 3:** Though the recommendations offered are valuable there is further room for further research and analysis. The author has provided appropriate references which can help other researchers to work on other possible determinants.



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**Editorial  
Excerpt**

The article has 2% of plagiarism which is the accepted percentage as per the norms and standards of the journal for publication. As per the editorial board's observations and blind reviewers' remarks the paper had some minor revisions which were communicated on a timely basis to the authors (Ahmad, Upadhyay and Tripathi), and accordingly, all the corrections had been incorporated as and when directed and required to do so. The comments related to this manuscript are noticeably related to the theme "**Crop Insurance as a tool for Inclusive Growth: A Conceptual Model**" both subject-wise and research-wise. Studies aim to get the root of farmer's problem in India and its solutions. After comprehensive reviews and the editorial board's remarks, the manuscript has been categorized and decided to publish under the "**View Point**" category.

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