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Restructured Weather-Based Crop Insurance And Its Impact On Paddy Farmers: A Case Study From Palakkad, Kerala

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Abstract

Agriculture is one of the major economic activities in Kerala which is largely affected by Climate change. Insurance is seen as an effective tool to adapt to weather adversities. The study evaluated the present status, constraints and prospects of Restructured Weather based crop insurance for Paddy in Palakkad in the most insured blocks of Kollengode , Nenmara and Alathur. A specific analysis was made to present the claims ratio, breakeven ratio and Compound Annual Growth Rate. Despite a positive growth in enrolment (CAGR 0.13) and an increase in gross premium (CAGR 0.36), farmers continue to face significant challenges with the scheme. Delays in claim settlements (34.76), concerns over AWS reliability (47.14), and the distant location of weather stations (38.1) have made participation less appealing. Analyzing claims ratios, breakeven points, and penetration trends reveals a clear need for better coverage and a more reliable system. This paper provides an overview of the paddy cultivators' perception of crop insurance.

Keywords: Agriculture Risk ,Restructured Weather Based Crop Insurance ,Paddy,Climate Change

Introduction

Agriculture plays a pivotal role in Kerala's economy, with a significant population involved in farming. This critical economic activity faces adverse impacts due to Climate change, and farmers rely on crop insurance to protect themselves from climate-induced loss. There is a strong relationship between agricultural output and extreme weather conditions, which is evidenced by the negative growth rate in the Agriculture and allied sector caused by the onset of Cyclone Okhi (2017), the Kerala Floods (2018), and the COVID- 19 pandemic (Economics Review, Gok 2022). **Heltberg et al,2009** highlighted Climate risk insurance as an important financial mechanism to adapt to climate change In this context, crop insurance is one of farmers' most promising risk management strategies, which encourages farmers to make prudent choices to deal with climate change.

In Kerala, where growers are subject to a wide range of hazards, including climatic unpredictability, natural disasters, pest attacks and crop diseases, the scope of crop insurance is significantly greater. The Weather Based Crop Insurance (WBCI) was introduced to provide insurance against yield loss caused by weather adversities. WBCI was introduced in 2008 in Kerala. The Scheme was implemented on a pilot basis in Palakkad District for Paddy and Mango, in Idukki for pepper and in

Kasaragod for Cashew. Paddy is a significant crop in Kerala, with 7.69% of the area of paddy cultivation. Palakkad district contributes to 39% of the total paddy production in the state of Kerala. It is exposed to a lengthy and harsh summer compared to other districts due to its geographic location. A lack of water and inclement weather frequently causes crop loss. The district of Palakkad has been the most severely impacted, with an average crop loss of 8441 hectares and RS 42169 lakhs between 2019 and 2021(Agricultural Statistics Kerala 2023 n.d.)**.**

On a global scale, Weather Index Insurance (WII) has faced challenges in Research on WII for paddy farmers in Sri Lanka (Rambukwella et al. 2020)**,2020**) revealed that the participation rate was below 0.5%, highlighting structural inefficiencies in the scheme. In India, (Sinha 2004)**,2004** and (S.S.Raju and Ramesh Chand 2007)**,2008** examined crop insurance participation rates and analysed issues such as adverse selection due to uniform premium rates and delays in claim settlements. The transition from the National Agricultural Insurance Scheme (NAIS) to WBCI aimed to address these issues, yet challenges persist. (Neeta Rose 2022)**(2021)** emphasized that agricultural instability in Kerala has increased in the last decade, reinforcing the necessity for well-structured insurance policies. (Dr. R Sendil Kumar and George James n.d.)**, 2020** indicated that temperature and rainfall significantly impact yield, reinforcing the importance of targeted insurance schemes. Crop insurance is essential for mitigating agricultural risks. This study examines the current status, challenges, and future prospects of paddy crop insurance. Existing agricultural insurance schemes operate on fixed indemnity levels, failing to account for actual losses, which puts farmers at a disadvantage. This paper aims to provide an overview of objectives:

- To evaluate the effectiveness of RWBCI for paddy Cultivators
- To assess farmer's perception and satisfaction levels regarding implementation of RWBCI

Research Methodology

The present study makes use of both primary and secondary data. The details of the RWBCI Scheme from 2016 to 2023, which included the number of farmers covered, the number of farmers benefitted, the gross premium collected and claims paid, were obtained from the Agriculture Insurance Company, Thiruvananthapuram. The growth and viability of the schemes, based on the claims to premium ratio and break-even ratio, and Compound Annual Growth Rate were assessed from the secondary data. The primary data was collected from the District of Palakkad. Kollengode, Nenmara and Alathur were the three blocks with the maximum sum insured for Paddy under RWBCI. A list of farmers was collected from Krishi Bhavans of respective Panchayats. Stratified Random Sampling was employed by selecting 40 farmers from each block who had subscribed to RWBCI constituting a sample size of 120.

Methodology employed to evaluate the trend and performance of crop insurance programmes consist of claim/premium ratio, break even ratio, average penetration rate, percentage of farmers benefitted i.e., the share of farmers benefitted of the farmers covered under the scheme indicating its accomplishment, compound annual growth rate and further indicators such as farmers enrolled, sum insured, premium paid, claims sanctioned and farmers benefitted.

Claims Ratio: The claim-premium ratio, also known as the loss ratio, serves as an indicator of the financial sustainability and viability of a crop insurance scheme. It represents the amount paid out in claims to farmers for every rupee collected as a premium. A claim ratio greater than one denotes a loss, suggesting a high claim ratio. The crop insurance claims ratio should ideally be less than one.(Namdev et al. 2016; Swain 2014)

$$Claim\ Ratio = \frac{Total\ indeminities\ paid\ out}{Total\ Premium\ amount\ collected}$$

Break even Ratio: Break even Ratio compares premium collected to claims paid in a year. A negative value means that the premiums collected were greater than the amount of claims paid. On the other side, a higher indemnity paid over and above the premiums collected during the year is indicated by a positive break-even ratio.(Baliram and Babar n.d.; Varalakshmi 2014)

$$Break-even\ ratio = \frac{Total\ indemnities\ paid\ -\ Total\ premium\ collected\ in\ a\ year}{Total\ premium\ collected\ in\ a\ year}$$

Penetration rate: It is calculated to realise the level of development and reach insurance programmes. (S.S.Raju and Ramesh Chand 2007; Vijayan and Christabell P.J. (last) 2019).

$$Penetration\ rate = \frac{Number\ of\ farmers\ covered}{Total\ number\ of\ holdings}$$

Primary Data were analysed with the help of appropriate tools such as percentage and index. For measuring the attitude level of paddy farmers about RWBCIS, the Satisfaction Index was developed. For the construction of indices, the respondents were asked to rate the statements regarding features of WBCIS of paddy. The opinions of respondents were assigned to marks of 7, 5, 3, and 1 representing the most positive degree of opinion to the most negative degree of opinion.

The scores of all respondents for each variable were summed up to arrive at the total score. The total score thus obtained by each variable was then divided by the maximum possible score obtained for that variable to obtain the index of that variable. Index for a statement is calculated using the formula:

$$Index = \frac{Total\ score\ obtained\ for\ each\ statement}{Maximum\ obtainable\ score\ for\ that\ statement} x\ 100$$

Maximum obtainable score for the statement:

$$Maximum\ score\ for\ the\ opinion\ x\ Total\ number\ of\ respondents$$

$$Overall\ Index = \frac{Sum\ of\ total\ scores\ of\ all\ statements}{MxNxS} x\ 100$$

Where:

M = Maximum score

N = Number of respondents

S = Number of statements

The indices were then classified into three zones as follows for interpreting the results.

Index	Zone
Above 64.50%	High
44.51% to 64.49%	Medium
Below 44.50%	Low

Results and Findings

Table 1:Restructured Weather Based Crop Insurance Paddy Palakkad AnalysiS

Year	Number of Farmers Enrolled	Area Insured	Sum Insured(In crores)	Gross Premium (In Crores)	Claim Amount (In Crores)	No.of Claim Beneficiaries	% of farmers benefitted	Claims Ratio	Break even ratio	Penetration Ratio
2016-17	19411	15309	76.54	6.12	16.47	19365	99.76	2.69	1.69	0.30
2017-18	27204	22289	111.44	13.87	6.19	26384	96.99	0.45	-0.55	0.36
2018-19	46615	37597	142.4	19.99	22.66	45749	98.14	1.13	0.13	0.61
2019-20	73819	59886	166.26	33.87	28.85	72133	97.72	0.85	-0.15	0.97
2020-21	43915	28800	230.4	65.99	94.21	42749	97.34	1.43	0.43	0.58
2021-22	56351	32970	263.76	78.63	49.51	55757	98.95	0.63	-0.37	0.77
2022-23	46677	22347	178.78	53.63	90.37	46658	99.96	1.69	0.69	0.64
Grand Total	313992	219198	1169.58	272.1	308.26	308795	688.86	8.87	1.87	4.22

Average	44856	31314	167.0829	38.87143	44.03714	44113.57	98.40857	1.27	0.27	0.60
Cagr	0.13	0.06	0.13	0.36	0.28	0.13		-0.06	-0.12	0.11

Source: Computations based on data from AIC ,Thiruvanthapuram

Table 1 illustrates the performance of RWBCIS over the period from 2016-17 to 2022-23. The average number of farmers enrolled per year was 44,856, with the highest enrollment recorded in 2019-20 (73,819 farmers) and the lowest in 2016-17 (19,411 farmers). The enrollment trend fluctuated over the years, peaking in 2019-20 . the average area insured per year was 31,314 hectares, with the maximum area insured in 2019-20 (59,886 ha) and the minimum in 2016-17 (15,309 ha). The sum insured under the scheme also followed a fluctuating pattern, averaging ₹167.08 crores per year. The highest insured sum was recorded in 2021-22 (₹263.76 crores), while the lowest was in 2016-17 (₹76.54 crores).

The gross premium collected and claims paid over the years also showed variations. The average premium collected per year was ₹38.87 crores, while the claim amount paid averaged ₹44.04 crores. The maximum claim amount paid was in 2020-21 (₹94.21 crores), and the minimum was in 2016-17 (₹16.47 crores). The number of claim beneficiaries averaged 44,113 per year, with the highest number in 2019-20 (72,133) and the lowest in 2016-17 (19,365).

The financial viability of the scheme was assessed using the claim ratio and break-even ratio. The average claim ratio for the period stood at 1.27, indicating that, on average, claims paid exceeded premium collected. The claim ratio was highest in 2016-17 (2.69) and lowest in 2017-18 (0.45). The break-even ratio, which reflects the financial sustainability of the scheme, averaged 0.27 over the years. The highest break-even ratio was observed in 2022-23 (0.69), while the lowest was in 2021-22 (-0.37).

The penetration rate of the scheme, which indicates the proportion of farmers covered relative to total holdings, averaged 0.60 over the years. The highest penetration rate was in 2019-20 (0.97), while the lowest was in 2016-17 (0.30). The CAGR (Compound Annual Growth Rate) analysis shows a mixed trend among the indicators. The highest positive CAGR was observed for premium collected (36%), followed by claims paid (28%), while claim ratio (-6%) and break-even ratio (-12%) exhibited negative growth, indicating financial fluctuations in the scheme's sustainability.

Overall, the scheme has shown a fluctuating trend over the years, with key indicators like farmer enrolment, area insured, and sum insured witnessed growth, while financial indicators like the claim ratio and break-even ratio suggest varying levels of financial viability.

2.**Farmers Perception**

Table 2: 2.1 Factors causing yield reduction in Paddy n=120

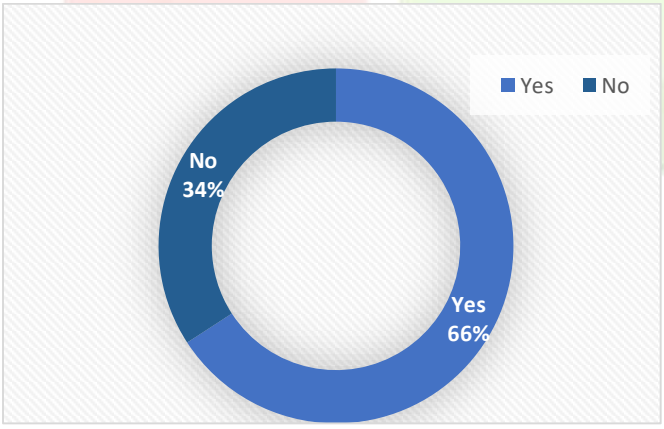
Respondents	**Drought**		**Unseasonal Rain**		**pest**		**Wild animals**		**Fertilizers**		**Labour**	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Farmers	45	37.5	34	28.33	29	24.166	4	3.33	3	2.5	5	4.16

Source:Field Survey

According to respondents, drought was considered as the major factor (37.5%) which reduces yield in paddy. Other Factors causing yield reduction were Unseasonal rain(28.33 %),Pest (24.16),Labour(4.16),Wild Animal Menace(3.33) and fertilizers(2.5).In WBCI, weather fluctuations like Drought and Unseasonal rain are covered, making it more suitable than traditional insurance. The fact that disease congenial climate related index and triggers existed as a part of weather based crop insurance farmers were unaware and demanded separate measures for pest.

2.2 Farmers' response to continuous participation

Diagram :1



Source:Field Survey

Continuous participation refers to regular season-wise enrolment for crop insurance .66% of the respondents were continuously subscribing to crop insurance while 34% were not enrolling on a continuous basis. Delays in claims settlement were one of the major constraints for continuous participation. The Farmers also emphasised the need of uniform claim settlement timing across blocks.

3. **Table 3:Satisfaction of farmers towards WBCIS in Paddy**

Statements	SA	A	N	D	SD	Max obatainable	Scores obtained	Index
Time taken for claim settlement	12	31	27	38	12	840	408	48.57
Satisfaction with Premium Subsidy	32	44	31	12	1	840	562	66.9
Affordability of Premium	7	53	7	50	3	840	438	52.14
Information from AWS is Reliable	5	34	33	44	4	840	396	47.14
Proximity of Weather Stations	5	17	15	72	11	840	320	38.1
Claims Satisfaction	0	19	12	72	17	840	292	34.76
						5040	2416	287.61

Note: "SA" indicates Strongly Agree, "A" indicates Agree, "N"-indicates Neutral "D" indicates Disagree and "SD" indicates Strongly Disagree

The **Overall Satisfaction Index is 47.94%**, indicating a moderate level of satisfaction.

Satisfaction with the premium subsidy was the highest among all factors, with 66.9% of farmers making insurance beneficial and affordable.The affordability of the premium (52.14%), indicated a medium level of satisfaction. However, concerns were raised regarding the accuracy of data from Automatic Weather Stations (AWS), with only 47.14% of farmers expressing satisfaction, reflecting doubts about the reliability of weather data used for claim assessments. Additionally, overall satisfaction with the claims process was low, with only 34.76% of farmers satisfied, indicating the need for a more transparent and efficient claim settlement system

Conclusion

Crop Insurance is seen as a catalytic tool for managing risk induced by weather adversities. Farmers face multiple risks, and covering all factors in a single scheme is not possible. The Secondary data on Area, Production of Paddy in Palakkad showed a fluctuating trend for the period of 2016-2023.The Analysis of Restructured Weather Based Crop Insurance for Paddy in Palakkad revealed a positive CAGR of 0.13 for enrolment and CAGR of gross premium was 0.36. The share of number of enrolled farmers to total holding of paddy revealed a growth of 0.11. It is noteworthy that the majority of sample farmers stated that the next generation is mainly interested in the money they will make from sold land which adds to the concerning CAGR in penetration.

Farmers had a positive perception towards premium subsidy from the government and affordability of insurance and had a negative perception on claim settlement delays (index: 34.76), AWS reliability (47.14), and weather station proximity (38.1) .Continuous participation (66%) is affected by delays in claim settlements, highlighting the need for uniform claim timelines across regions.To conclude, the Average Area insured has been decreasing over the years, the total average area insured under the scheme is currently 31314 hectares. Increasing the number of Automatic Weather Stations (currently 19) could make crop insurance more reliable and boost farmers' confidence, encouraging greater participation. Addressing these challenges is crucial to build a stronger resilience system.

Policy Implications:

- Faster claim settlements to boost farmer retention and uniform claim pay-out timelines across all blocks.
- Placement of AWS to improve data accuracy and reliability, to address concerns on insufficient weather stations.
- Awareness concerning coverage to pest attacks, as it remains a major yield-reducing factor.

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