



Development of Scale to Measure Perceived Impact of Grape Beneficiary Farmers towards Restructured Weather Based Crop Insurance Scheme

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

For the progress of our nation, our farmers need to be progressed. Driven by the motivation Restructured Weather Based Crop Insurance scheme (RWBCIS) has been introduced in India. As agriculture is effected by disasters and consequences are beyond our control, it is very essential to take precautionary measures to mitigate from unforeseen events. Crop insurance assists in stabilization of crop production and reduces the negative impact on lives of the farmers. Grapes are susceptible to changes in weather and cause losses to the farmers. An attempt is made to develop a scale to measure perceived impact of Grape beneficiary farmers towards Restructured Weather Based Crop Insurance Scheme. With the help of Likert's Summated Rating technique perceived impact scale was constructed. The process started with selecting 39 statements after calculating

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Relevancy percentage, Relevancy weightage and Mean Relevancy score. Later for item analysis step, 30 farmers from non-sample area were selected and the test was administered having 39 statements on five point continuum. After computing t value, 29 statements were retained. The Reliability and validity of the scale was computed for precision and accuracy. The scale developed was found reliable and valid. Hence, the scale was finalized and administered to 75 Grape beneficiary farmers of RWBCIS farmers in the sample area ie. Nashik district of Maharashtra state. The overall perceived impact of beneficiary farmers towards Restructured Weather Based Crop Insurance Scheme was low. Hence it can be inferred that the farmers perceived that there is low impact of the scheme on their lives. Therefore co-ordination between the concerned authorities and regular auditing of the insurance companies is required for the scheme to run efficiently.

Keywords: Crop Insurance; RWBCIS; grape beneficiaries; perceived impact.

1. INTRODUCTION

Due to rising temperatures, it is predicted that agricultural crop output in Asia would decrease by up to 5 to 30% by the 2050s. This decrease in agricultural crop yield will cause food insecurity, which will become the most pressing issue facing humans in the future [1]. Agriculture is becoming more commercialised, which is increasing the amount of loss from unfavourable circumstances [2]. Since agricultural production and productivity are highly dependent on weather conditions, any weather aberrations cause atmospheric and other forms of stresses and in turn, will increase the vulnerability of these farmers to economic losses [3]. Crop insurance assists in stabilization of crop production and reduces the negative impact on lives of the farmers. Also new instruments are risky, hence insurance helps the farmers to try out new technologies Agricultural Insurance is one of the mechanisms to stabilize and protect the farm economy [4]. Mexico, Japan, Australia, the United States, and Brazil are where crop insurance first developed and was put into practise. The design and administration of agricultural insurance programmes can learn from these experiences and those of other nations about the function of crop insurance as a public risk management strategy [5].

In view of challenges in implementation of NAIS, MNAIS & WBCIS (previous crop insurance schemes), specially delay in settlement of claims, low risk coverage in terms of reduced sum insured due to capping in MNAIS & WBCIS, huge difference of farmer premium in neighbouring districts, low transparency in calculation and settlement of claims, fragmented information with different stakeholders, the Government of India reviewed the erstwhile Crop Insurance schemes [6] and came up with two most relevant systems in the recent past, i.e. Pradhan Mantri Fasal Bima Yojna

(PMFBY) and Restructured Weather based Crop Insurance Scheme (RWBCIS) based on restructured weather. The farmers' share of premium rates is capped at 1.5% for rabi and 2% for kharif, 5% for horticultural crops of sum insured as per the RWBCIS operational guidelines. Grape is one such fruit crop which is affected extremely by the weather affecting the vines and the fruits. RWBCIS mitigate the hardship of the insured farmers against the likelihood of financial loss on account of crop loss resulting from adverse weather conditions using weather parameters as "proxy for crop yields in compensating the cultivators for deemed crop. (Revamped operational guidelines RWBCIS). Climate plays a crucial role in the growth of grapevines. The amounts of rainfall per year, day and night temperatures, and severity of winter snowfall, are all important factors to consider. High air temperatures (usually greater than 38°C) and bright sunshine cause sunburn damage on exposed fruits. In grapes, higher temperatures may advance the ripening of berries and alter the berry composition in both table and wine grapes, thereby affecting the quality of the produce [7].

There are many critics questioning the administration and implementation of the scheme. In order to find how the beneficiaries are perceiving the impact of the scheme on different aspects of their life, we can analyze the functioning of the RWBCIS. Since the scheme was launched in the 2016, there is no research attention on perceived impact of beneficiary on RWBCIS. Hence the present study is conducted with the objective of developing a scale to measure the perceived impact of beneficiary farmers on RWBCIS.

2. METHODOLOGY

For the present study Grape beneficiary farmers of RWBCIS are taken in sampling frame. The study was conducted in Nasik district of

Maharashtra. Three tehsils Niphad, Sinnar and Dindori were purposively selected based on the maximum number of Grape beneficiary farmers. From each tehsil three villages were selected. Hence, total nine villages were selected. Total 75 beneficiary farmers were the respondents selected by proportionate random sampling method. The interview schedule was drafted so as to collect the information in line with the objectives of the study. Frequency and percentage was used to analyse the data.

3. RESULTS AND DISCUSSION

For systematic and accurate measurement of perceived impact of RWBCIS on its Grape beneficiaries the scale was constructed by following the Likert method of summated ratings suggested by Edwards [8].

3.1 Item Collection and Editing

Items related to perceived impact of RWBCIS on its beneficiaries were collected from the various sources such as literatures, extension personnel's, scientists from agricultural universities and experts from KVK's. The content of perceived impact was composed of 50 statements for grape farmers. This statements were prepared under six sub heads namely, Coping against unforeseen events, Net income, Credit worthiness, Crop diversification, Adopting innovative and modern agricultural practices and General perceived impact. The statements collected were cautiously edited by following the 14 informal criteria suggested by Edwards [9].

3.2 Relevancy

All statements were sent to 100 judges comprising of faculties experts in the field of Agricultural Extension, Agricultural Economics. The judges were selected randomly from Agricultural Universities, KVK and Research stations. Experienced judges then evaluated these statments to assess their relevancy. For this purpose, judges were requested to indicate appropriateness (relevancy) of each statement for inclusion in the scale. The responses were obtained on three point continuum viz., most relevant, relevant and least relevant with weightage of 3, 2 and 1 respectively. Out of 100 judges, responses from 50 judges were received. The relevancy score for each item/statement was found out by adding the scores on the rating scale for all the 50 judges. From the data gathered, relevancy percentage, relevancy

weightage and mean relevancy score were worked out for all the 50 statements of grape.

The Relevancy Weightage (RW) and Mean Relevancy Score (MRS) were worked out for all the selected indicators individually by using the following formula.

3.3 Relevancy Percentage

$$\text{Relevancy (\%)} = \frac{MRR \times 3 + RR \times 2 + LRR \times 1}{\text{Maximum possible score (i.e. } 60 \times 3)} \times 100$$

3.4 Relevancy Weightage

$$\text{Relevancy weightage} = \frac{MRR \times 3 + RR \times 2 + LRR \times 1}{\text{Maximum possible score (i.e. } 60 \times 3)}$$

3.5 Mean Relevancy Score

The mean relevancy score was obtained by the standard formula

$$\text{Mean relevancy score (MRS)} = \frac{MRR \times 3 + RR \times 2 + LRR \times 1}{\text{Number of judges (i.e. } 60)}$$

Where,

MRR = Most relevant response

RR = Relevant response

LRR = Least relevant response

These three criteria were used to evaluate the items' relevance. Items with a relevancy percentage greater than 75%, a relevancy weight greater than 0.75, and a mean relevancy score greater than 2 were therefore taken into consideration for the final decision. Finally, a relevancy test resulted in the selection of 39 perceived impact statements.

3.6 Item Analysis

A random sample of 30 farmers from non-sample region were given the 39 statements of perceived impact for Grape beneficiary items chosen by judges' view. The statements are assessed on a five point scale from "strongly agree," "agree," "undecided," "disagree," and "strongly disagree," with scores of 5, 4, 3, 2, and 1 for each statement that is positive and vice versa for statements that are negative. The sum of the scores for all elements was used to calculate each respondent's overall score.

3.7 Computation of 't' Values

The critical ratio (also known as the "t" value") of each statement was determined for the final item

Table 1. List of selected statement for final scale construction with their respective t values (Grape growers)

S. No.	Statements	t value
I.	Coping against unforeseen events	
a.	Adverse weather events	
1.	With the help of RWBCIS, I am able to cope up with the losses occurred by Excessive rainfall	2.04
2.	With the insurance amount provided by RWBCIS, I am able to cope losses caused by unseasonal rainfall	2.24
3.	With the help of claim amount received under RWBCIS, I could cope up with yield loss due to cyclones	2.44
4.	With the help of insurance amount, I am able to manage the damaged caused by cold waves	3.0
5.	I was not able to cope up with the losses caused by hailstorms as financial assistance was not provided under RWBCIS	1.86
b.	Others	
6.	I could not cope up with crop losses at individual farm level, due to lack of insurance coverage	2.33
7.	I could cope up with crop losses due to localized calamities in the farm as there was financial assistance provided under RWBCIS	2.37
II.	Net Income	
8.	With the empowerment gained under RWBCIS, I am Exporting grapes which increased the net income from the grape farm	2.30
9.	With the self-reliance developed by availing financial assistance, I am able to sell grapes in other than domestic market to increase net income	2.21
10.	Cost of cultivation reduced, increased net income	2.24
III.	Credit worthiness	
11.	With the help of RWBCIS, I am able to repay the loans even during the period of crop failure	2.30
12.	Enrolling under RWBCIS made it easier to get crop loans from formal institutes	2.49
IV.	Crop Diversification	
13.	With the help of insurance coverage, I am able to cultivate other crops in the farm during crop failure	2.60
14.	Due to diversification of crops , employment in the farm is generated through out the year	3.85
V.	Adoption of innovative and modern agricultural practices	
15.	Testing of EC and pH of soil in the field	3.03
16.	Installation of automatic water pump controller and moisture sensors in orchard	1.82
17.	Producing residue free grape produce for export	1.98
18.	Analyzing petiole of grape vine before irrigation	2.46
19.	Spraying plant protection chemicals in the orchard according to demand of the crop	1.90
VI.	General Perceived impact	
20.	With the motivation gained due to financial assistance, I took up new enterprise	2.10
21.	There is no change in standard of living after availing crop insurance	2.09
22.	Increase in employment on the grape farm reduced migration to the cities for other work	2.76

S. No.	Statements	t value
23	With the help of financial assistance, I am able to bring more land under cultivation	2.02
24	Due to RWBCIS insurance losses was minimized and savings used for purchase of vehicle /Tractor	3.79
25	After opting RWBCIS my savings are increased	1.96
26	I was able to meet the expenses of cost of cultivation with the insurance amount	2.19

Table 2. Overall perceived impact of beneficiaries on RWBCIS

Sr. No.	Categories	Beneficiary(n=75)	
		F	%
1.	Low(Up to 53)	24	32.00
2.	Medium(54 to 77)	41	54.66
3.	High(78 and above)	10	13.33
	Total	75	100
Mean = 65.1		SD=12.16	

selection. Items or statements were chosen based on the 't' value being greater than or equal to 1.75 since it significantly distinguished between the high and low groups of items. Therefore, 26 statements were kept in the final scale that was used to assess how beneficiary farmers in Grape evaluated the effects of RWBCIS.

3.8 Testing Reliability

For testing the reliability the scale was administered to a new group of 30 farmers of non-sample area. By using split half test, the scale was divided into two halves on the basis of odd even number of items in SPSS Statistical tool. In Grape farmers the correlation between the two sets of odd even item is 0.69. It is corrected by Spearman-Brown coefficient, where the r value is 0.82. Which indicates that perceived impact scales for Grape beneficiaries on RWBCIS are reliable.

3.9 Validity of Scale

A team of experts was used to determine the scale's content validity. Since the objects chosen came from the entire content world, it was made sure that they covered all of the different ways in which RWBCIS had an impact.

3.10 Administration of the Scale

The final scale, which would assess how the RWBCIS affected the beneficiaries, included a total of 26 statements. Strongly agree, agree, undecided, disagree, and strongly disagree are all possible responses on the five-point scale, with the corresponding scores being 5,4,3,2, and 1, respectively.

3.11 Overall Perceived Impact of Beneficiaries on RWBCIS

The total score of each beneficiary respondent was considered for calculating the overall perceived impact of beneficiary farmers. Table 2 revealed that, majority of the farmers are under the category of low and medium level of impact (86.66%).

This indicates that farmers perceived that impact of RWBCIS on them is low. Adhikari et al. [10] in their study perceived impact of farmers' producer organization (FPOs) on sustainable economic development. Maximum respondents are under the category of medium level of impact. Further,

Sonali [11] study found that MGNREGA scheme has significantly impacted the income generation and consumption expenditure of the households. There is a significant hike in the agriculture and livestock income. Kumaravel et al. [12] in their research revealed tribal farmers perceived that their income had increased substantially through the Tribal sub Plan project. The above research is contradicting with the current study, the reason of low perceived impact might be improper implementation and administration of the scheme. The RWBCIS is not penetrating deep to address the actual problem of assessing crop loss and giving appropriate compensation.

4. CONCLUSION

The scale developed to study the perceived impact of Grape beneficiary farmers towards RWBCIS was found reliable and valid hence it can be used by the researchers to measure the perceived impact of Crop insurance scheme with slight modifications. Majority of the farmers are under the category of low and medium level of impact (86.66%). This indicates that farmers perceived that impact of RWBCIS on them is low. Even though the farmers are informed of the scheme, there is no favorable attitude of grape growers towards the scheme. This is because when there is actual crop loss, compensation paid by the insurance companies is very less or sometimes nil. This leads to lack of trust of farmers towards them. Also, during the crop loss assessment stage there must be co-ordination between the insurance agents, agriculture officials and farmers to assess the crop loss in appropriate manner. Hence Credibility should be maintained from the side of Insurance companies. Auditing the insurance companies at regular intervals is need of the hour.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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