Current Challenges Faced by Farmers in Crop Insurance New Evidence from Indian Farmers

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Agriculture is an important economic activity because it is a way of life of the Indian people. Over 66 % of the population are engaged in agriculture and its allied activities but it is beset with manifold risk factors. The principal objective of this article is to explore and define the problems that are derived from the farmers' perspectives. Hence, this paper is based on the primary data collected from the 500 farmers of 10 districts. A purposed scale is developed by using the exploratory-factor analysis method. The 8 factors obtained from the analysis contains 63.905% of the total variance and explained with Eigen-value over 1 and KMO value reported is (.803). The "Bartlett's Test of Sphericity" is another statistical test tool for determining the appropriateness of data that is determined to be 5952.713 (significant at 1%). The study has found that the lack of trust, high perceived cost, and cumbersome process of claim settlement are some of the problems faced by the farmers. Some other factors like insufficient official support, adequate assessment of compensation, absence of feedback from the farmers are hurdles identified in the crop insurance scheme. Lack of awareness about crop insurance among farmers, and "sheer profit" motive of insurance companies are the major problems in crop insurance from the farmers' perspective as well.

Keywords: Crop insurance - Trust - Awareness - High perceived cost - Insurance companies - Exploratory factor analysis

Introduction

Agriculture is the most imperative profession in India, as it is an employment provider to the greater portion of the agrarian population and it is the foremost contributor to the nation's GDP (Banerjee & Bhattacharya, 2011). About 66% of the population of India are engaged in agriculture and its allied activities (Deshmukh & Khatri, 2012). Agriculture is

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not just a job for the people here, but it is also a way of living (Rao, 2002). There is no doubt that Agriculture is *the* most important life-activity, but it is also a constantly uncertain occupation because agriculture depends on the vagaries of the monsoon. Many natural causes negatively and perilously affect it, such as drought, flood, earthquake, heavy rain, lightning, soil erosion, pests and attacks by wild animals (Nair, 2010; Rathore *et al.,* 2011). Apart from these problems, some man-made factors also affect agriculture cultivation negatively. There are many types of risks that farmers have to face, such as health risk, price risk, market risk, production risk, property risk, income risk, financial risks, etc. (Ali, 1980; Raju & Chand, 2008; Vyas & Singh, 2006). For minimizing and managing these potential and actual risks, crop insurance could be an effective mechanism (Taylor, 2016). In crop insurance, risk gets transferred to the third party who pays a particular amount by way of a fixed premium so that the burden of losses can be distributed and shared. It is a tool that insures the farmers from uncertainties of crop yield arising due to natural causes and uncertain factors which are beyond the control of the farmers. In an emergent country like India, 2/3rd of the agricultural-activity dependent population is highly and constantly vulnerable to weather uncertainties and income instability. In such a situation, agriculture insurance serves as a critical financial support for farmers by ensuring yield risk (Goodwin & Mahul, 2004; Rao, 2002; Clarke *et al.,* 2012).

Crop failure can cause financial distress and make it difficult for farmers to repay the contracted loans (Mishra, 2006). Producers face day-to-day managerial challenges in adapting to a broader collective change and are thus repeatedly faced with immediate operational decisions that can have a long-term impact on the existing production pattern or multiple side effects (Tendall *et al.,* 2015; Urruty *et al.,* 2016). Crop insurance not only pays for the nature-caused damages to farm property and products losses but also facilitates initiating farming activities after a crop cultivation pattern breakdown or bad harvest during the insured year/period (Pasaribu, 2010; Manoj *et al.,* 2003). When a loss occurs due to circumstances beyond the individual farmer's control, an indemnity will be given to him since he keeps the insurance agreement active by paying the premium (Vyas & Singh, 2006; Raju & Chand, 2008). Crop insurance cannot raise output or provide funding on its own, although it can help to improve both (Rao, 2002). Crop insurance is so necessary so that it may be considered a "rescue measure" in which case, the government also plays a crucial role (Rao, 2002). It gives a reward not only to the insured farmers but also to non-insured farmers directly and indirectly to the entire community, since insurance has spillover effects and multiplier benefits.

Crop insurance, despite being a relatively revolutionary discovery, has been identified as one of the possible techniques that provides farmers with some assistance for future re-

investment in both developing and established countries (Barnett & Mahul, 2007). India has the world's biggest agriculture insurance plan, covering 25 million insured farmers (Bhushan *et al.,* 2016). In India, two major agricultural insurance schemes are currently in operation: Pradhan Mantri Fasal Bima Yojana (PMFBY) and Restructured Weather Based Crop Insurance Scheme (RWBCIS). The government adopted these schemes as a public–private partnership venture on February 18, 2016, with significant control over the blueprint of the insurance product, amount of subsidy, and sum insured (Singh & Agrawal, 2020). Agricultural modernization can go faster with the launching and acceptance of Crop Insurance Scheme (CIS) (Raju & Chand, 2008).

2. Literature Review

Since its inception, various crop insurance schemes have been launched in India, although each scheme has its own inherent imperfections and demerits that have been identified in earlier studies. In their earlier evaluations. the IFFT (1992) has reported the farmers' perspectives in the adoption of CIS. Subsequently, Mishra (1996) has projected the importance of publicly subsidized agriculture insurance schemes. Additionally, Chatterjee *et al.* (2005) explained the relationship between purchasing power and adoption of crop insurance schemes. Consequently, Chatterjee *et al.* also opined that dissatisfaction among farmers was due to its limited area-coverage and excessive claim-payment delays. As a result of the low voluntary adoption rate, National Agriculture Insurance Scheme (NAIS) has not gained the expected widespread acceptance (Patnaik & Swain, 2017). Parallelly, government reports also recognized the ineffectiveness of crop insurance schemes in tackling, ameliorating and smoothening of the operational issues. Patnaik and Swain (2017) have reported that the adoption rate of NAIS has not been healthy because of unawareness among farmers and operational unfeasibility of the schemes. Rajeev and Nagendran (2019) have reported that due to distrust and distress among the farmers, with reference to the adoption of CIS, it may be an ineffective method of measuring claims. A comprehensive study by Kumar and Singh (2019) has recorded the farmers' stress. In continuation of this aspect, earlier (related) studies have highlighted the situation when burdened with debt, farmers have eventually committed suicide in the absence of efficient and effective agriculture insurance scheme implementation. Weather-Based Crop Insurance Scheme (WBCIS) Raju *et al.* (2016) have reported that the major problems in agriculture insurance are due to lack of statistical data, lack of trained personnel for agriculture insurance, complex land-tenure Acts, diversification of agriculture, limited sources of finance, and the perennial problems in accessing agriculture credit. Although Raju and Chand (2008) examined the effectiveness of the

NAIS program in safeguarding of all the crops for both non-loanee and loanee farmers, the major impact has been on both the area approach as well as the individual approach. subsequently, Raju *et al.* (2016) reported that WBCIS has been successful in India because it is linked to farmers' credit and is compulsorily and forcibly packaged with agriculture loans, and, the farmers needed to receive external credit to obtain crop insurance. In the same vein, Rathore *et al.* (2011) found that farmers were satisfied with crop insurance schemes except for their discontent with the delay in settlement of claims, and the present method of fixing the basic compensation rate and the inadequate payment of compensation. Further, Bhende (2012) pointed out the need for revenue insurance for Indian farmers and highlighted the various problems with crop insurance scheme. Siwach *et al.* (2017) explored the limitations of PMFBY with special reference to Haryana. Rao (2002) defined crop insurance as a supportive tool. Dandekar (1976) pointed out that agriculture insurance is significant for rural development. Agricultural insurance has been implemented in India since 1972, but each insurance scheme launched has been inconsistent, ineffective, and unable to provide adequate protection to farmers due to operational inefficiencies and deficiencies (Singh & Agrawal, 2019). Ghose *et. al.* (2021) found that farmers do value the assurance of insurance if they received timely payment for losses as and when they occur and claims are settled fast. Jha *et. al.* (2021) are of the opinion that traditional crop insurance is complex and not economically sound and also suggested that block-chain systems in crop insurance could be made effective. Carippa (2020) found that only 5% of the farmers are insured for crops and 87% are not getting claims settled after agricultural losses.

All the studies mentioned in this study, based on the secondary data, have explored the problems in crop insurance, such as delay in a claim settlement, lack of participation, lack of awareness, high premium cost, operational deficiencies, etc. The purpose of this paper is to explore and define the various problems in crop insurance programs from the farmers' perspective in the light of the literature survey. Accordingly, a purposed scale has been developed for exploring and defining the problems in crop insurance schemes.

3. Data and Methodology

In order to design the appropriate questionnaire for the study, a pre-pilot research, field observations and in-depth interviews with farmers were conducted in addition to literature research. The questionnaire was used to collect the study's primary data to avoid the statistical problem of high skewness. For the field-research survey, the questionnaire is the most prevalent and suitable method of data collection (Stone, 1978).

A 5-point Likert Scale (from "Strongly Disagree" to "Strongly Agree") was utilized in the questionnaire's design. The questions for the final questionnaire were improved using Cronbach alpha - a reliability coefficients form of pre-study assessment. The questionnaire was put to a pre-test and as a pilot study and administered to 60 farmers from the Kaithal and Kurukshetra districts in the state of Haryana and then it was modified to fine-tuned to obtain accurate responses. The modified and final questionnaire was administered to 500 farmer respondents in the 10 districts of Haryana state. A multi-stage stratified sampling method was used for selecting the sample. The number of farmers selected from each of the 10 selected districts was 50, thus arriving at 500 respondents. The exploratory-factor analysis method has been used for extracting the factors for final data analysis. This form of factor analysis is the most commonly used approach in analyzing the proposed scales, consequent to the literature review, theoretical definition approach and quantitative work to identify dimensions and components (Carpanter, 2018).

4. Analysis and Interpretation

Table 1: Characteristics of Respondents

Characteristics	Respondents (no.)	Percentage (%)
Gender		
Male	472	94.4
Female	28	5.6
Age		
18-24	7	1.4
25-34	84	16.8
35-44	142	28.4
45-54	155	31.0
55-64	79	15.8
65 and more	33	6.6
Educational Qualification		
Uneducated	155	31.0
Matric	181	36.2
12th Standard	119	23.8
Graduation	43	8.6
Post-Graduation & above	2	0.4

Land-holding Size (acre)		
Below 2.5 acre	128	25.6
2.5 – 5.0 acre	179	35.8
5.0-7.5 acre	99	19.8
7.5 -10.0 acre	61	12.2
Above 10 acres	33	6.6

(Source: Author's Calculation Based on Primary Data)

Table 1 gives a clear and complete picture of the demographic details as to the (i) gender, (ii) age, (iii) educational qualifications, and (iv) land holding pattern of the 500 respondents of the study.

[Table 1 gives the socio-demographic profile of the 500 respondents – 94.4% male and 5.6 % percent female respondents. In terms of demographic variables, the majority (31%) of the respondents were between the ages of 45 and 54, followed by those between the ages of 35 and 44. (28.4%), 16.8% of the respondents were in the 25-34 age group; 15.8% in the 55-64 age group; 6.6 % in the age group of 65 and above and only 1.7% of the respondents are from the age group of 18-24. In addition to demographic analysis, 91% of the farmers have education up to 12th standard; 31.0 % were uneducated and 36.2% have 10th standard qualification; and 8.6 % are graduates and only 0.4 % have post-graduation and above levels of education. The majority (35.8) farmers were landowners who had holdings of 2.5-5.0 acre, followed by 25.6 % who have below 2.5 acres of land, then 19.8% have 5.0- 7.5 acre then 12.2 % respondents have the 7.5-10.0 acre, and only 6.6 %t respondents have above 10 acres.]

Table 2: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.803
Bartlett's Test of Sphericity	Approx. Chi-Square	5952.713
	Df	630
	Sig.	.000

(Primary Data)

The KMO test values range from 0 to 1, with higher numbers indicating greater adequacy (Yong and Pearce, 2013). Kaiser (1974) provided the following guidelines for interpreting these values:

- .90 to 1.0 as marvelous
- .80 to .89 as meritorious
- .70 to .79 as middling
- .60 to .69 as mediocre
- .50 to .59 as miserable,
- < .50 as unacceptable.

The current practice, however, is to proceed with Exploratory Factor Analysis (EFA) when KMO test values exceed .60 (Tabachnick & Fidell, 2013; Williams *et al.,* 2010). According to Kaiser (1960), only factors with Eigen-values greater than 1.0 should be retained for interpretation. Eigen-values are the amount of information or explained variance/s captured by a given factor.

Table 2 shows that the Kaiser-Meyer-Olkin value is .803. Bartlett's Test of Sphericity is another statistical test for determining the appropriateness of data; it is determined to be 5952.713 (significant at 1%). It also indicates that the sample used for analysis was adequate, and that the factor analysis technique could be confidently conducted (Bartlett, 1954). After ensuring the scale's reliability appropriateness and adequacy of the data, exploratory factor analysis is used to extract the factors explaining the problems being faced by farmers. In addition, principal component analysis is applied. In PCA, the observed variables are standardized – i. e.: mean=0, standard deviation=1, and matrix diagonals are equal to 1. The amount of variance explained is equal to the matrix's trace (Suhr, 2005). The number of extracted components equals the number of observed variables in the analysis. The first identified principal component accounts for the majority of the variance in the data. The second identified component accounts for the second most variance in the data and is unrelated to the first principal component, and so on (Suhr, 2005; Alavi *et al.,* 2020).

Table 3: Total Variance Explained by Each Component and its Eigen-Value
Extraction Method: Principal Component Analysis. (Primary data)

Total Variance Explained									
Compo-nent	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumula tive %	Total	% of Variance	Cumula tive %	Total	% of Variance	Cumula tive %
1	5.302	21.207	21.207	5.302	21.207	21.207	2.263	9.051	9.051
2	2.163	8.651	29.858	2.163	8.651	29.858	2.197	8.789	17.840
3	1.836	7.345	37.203	1.836	7.345	37.203	2.111	8.445	26.285
4	1.560	6.241	43.444	1.560	6.241	43.444	2.108	8.434	34.719
5	1.439	5.757	49.201	1.439	5.757	49.201	1.892	7.569	42.288
6	1.298	5.192	54.393	1.298	5.192	54.393	1.815	7.258	49.547
7	1.243	4.973	59.367	1.243	4.973	59.367	1.809	7.236	56.783
8	1.135	4.538	63.905	1.135	4.538	63.905	1.781	7.122	63.905
9	.943	3.773	67.678						
10	.896	3.582	71.260						
11	.792	3.166	74.426						
12	.753	3.012	77.439						
13	.703	2.812	80.251						
14	.669	2.675	82.926						
15	.552	2.209	85.134						
16	.525	2.102	87.236						
17	.489	1.956	89.192						
18	.436	1.744	90.936						
19	.420	1.681	92.618						
20	.391	1.565	94.183						
21	.352	1.409	95.591						
22	.324	1.295	96.886						
23	.294	1.177	98.063						
24	.263	1.051	99.114						
25	.221	.886	100.000						

Extraction Method : Principal Component Analysis. (Primary data)

The Exploratory Factor Analysis (EFA) technique was used to identify the 8 factors from the above table. These eight factors explain 63.905& of the variation in data.

The following Table 4 contains the findings of the exploratory factor analysis:

Table 4: Rotation Component Matrix and Factor Loading of Each Factor

Rotated Component Matrix								
Problem Statements	**Factors Loading**							
	F1	F2	F3	F4	F5	F6	F7	F8
Lack of Trust (Cronbach Alpha = .812)								
Crop insurance companies are not trustworthy.	.842							
Private companies should not be a part of crop insurance	.830							
Public-private partnership is not beneficial to farmers in crop insurance	.740							
High Perceived Cost (Cronbach Alpha = .730)								
Purchasing crop insurance is a time-consuming process		.767						
The cost of purchasing crop insurance is high		.765						
Insurance is an additional cost for the farmers		.678						
Cumbersome Process of Claim Settlement (Cronbach Alpha = .678)								
The amount of claim is insufficient for covering the agricultural losses			.828					
The process of assessment of claim is not fair (transparent)			.826					
Amount of claim does not compensate farmers fairly			.595					
Insufficient Official Support (Cronbach Alpha = .762)								
Government does not give appropriate amount of subsidy to farmers				.787				
Government does not give enough support for the operation of insurance scheme				.734				
Government does not conduct any awareness program regarding crop insurance at the village level				.696				
Adequate Assessment of Claim Cronbach Alpha = .738)								
Behavior of insurance agents towards farmers is not satisfactory					.781			
The assessment of crop-yield losses is inadequate					.655			

The intermediaries of crop insurance do not work fairly					.621			
Delay in the payments of claims					.503			
Absence of Feedback from the Farmers (Cronbach Alpha = .635)								
Government avoids the farmers' participation in crop insurance						.798		
Government does not take any direct feedback from farmers about crop insurance						.721		
Absence of full support of the government						.652		
Lack of Awareness about Crop Insurance (Cronbach Alpha= .703)								
Adequate knowledge about crop insurance is lacking.							.798	
Lack of understanding of the basic concepts of crop insurance							.764	
Unfamiliar with the procedure for insuring crops							.677	
Motive of Crop Insurance Companies (Cronbach Alpha = .603)								
Crop insurance companies' motive is only to make profit; They do not protect the farmers' interests								.827
Crop insurance companies and/or the implementing agency do not provide adequate information about crop insurance to farmers								.761
Crop insurance companies or implementing agency in the area avoids the interest of farmers								.544
Total Variance Explained (%)	9.051	8.789	8.445	8.434	7.569	7.258	7.236	7.122
Cumulative Variance Explained	9.051	17.840	26.285	34.719	42.288	49.547	56.783	63.905
Eigen Value	5.302	2.163	1.836	1.560	1.439	1.298	1.243	1.135

Extraction Method: Principal Component Analysis

Rotation Method : Varimax with Kaiser Normalization (Primary Data)

5. Results

Table 4 gives the factor loading of every variable having a value of 0.5.

- **Factor 1** indicates lack of trust and contains three statements:
  a) Crop insurance companies are not trustworthy (.842).
  b) Private companies should not be a part of crop insurance (.830).
  c) Public-private partnership is not beneficial to farmers in crop insurance (.740).

The first factor indicates a 9.051% of total variance, and has 5.302 Eigen value. Therefore, it can be concluded that the respondents (farmers) have a lack of trust in companies that are engaged in crop insurance.

- **Factor 2** is considered to be high and contain three statements:
  a) Purchasing crop insurance is a time-consuming process (.767).
  b) The cost of purchasing crop insurance is high (.765).
  c) Insurance is an additional cost to the farmers (.678).

This factor indicated an 8.789% of the total variance, and 2.163% of Eigen-value. The loading data of this factor indicates that the purchasing of crop insurance is costly from the farmers' perceptive.

- **Factor 3** is another important factor which has an 8.445%of total variance and 1.836 Eigen-value. It contains three statements related to the cumbersome process of claim settlement, namely:
  a) The claim-amount received is insufficient to cover the agricultural losses (.828).
  b) The process of assessment of claim is not fair/transparent (.826).
  c) Amount of claim does not compensate farmers fairly (.595).

Factor 3 explored the serious problem faced by the farmers of inadequate compensation amount received from crop insurance agencies). It is reported that it is far below the expectations of the claims made and does not meet the financial burden endured. It is also revealed that the inadequate amount of claim's settlement is a major problem from the farmer's perspective as the amount does not compensate agricultural losses sufficiently and the assessment of claim-compensation is not seen to be transparent enough.

- **Factor 4** studies the insufficient official support received by farmers and contains three statements, namely:

a) Government does not give an appropriate amount of subsidy to farmers (.787).

b) The operation of the government insurance scheme does not give enough support to farmers (.734).

c) The government does not conduct any awareness program regarding crop insurance at the village level (.696).

The fourth factor has accounted for an 8.434 % of the total variance and has a 1.560 Eigen value. The score of this factor has revealed that the crop insurance schemes lack official support.

- **Factor 5** studies the adequate assessment of compensation, and has four statements, namely:

  a) Behavior of insurance agents towards farmers is not satisfactory (.781)

  b) Assessment of crop yield losses is inadequate (.655).

  c) Intermediaries of crop insurance do not work fairly (.621).

  d) Undue delay in the payments of claims' settlement (.503)

It has reported a 7.569% of variance and a 1.439 Eigen value.

- **Factor 6** revealed the absence of feedback from the farmers regarding their participation in crop insurance. This factor included three statements, namely:

  a) The government avoids the farmers' participation in crop insurance (.798).

  b) The government does not take feedback from farmers about crop insurance (.721).

  c) Absence of full support from government (.652).

This factor represents 7.258% of the total variance and the Eigen value is 1.289. The loading of these variables shows that the government is not concerned about any feedback from the farmers, but at the same time does not imply that the government has ignored the farmers enrolled in the scheme.

- **Factor 7** is related to the awareness level of farmers about crop insurance; however, the loading shows that farmers are not sufficiently aware of the crop insurance scheme, its features and the procedures of insuring. Hence, this factor is named as Lack of Awareness about Crop Insurance, and contains three statements:

a) I have no proper knowledge about the crop insurance (.798).

b) I do not understand the basic concepts of crop insurance (.764).

c) I am not familiar with the process for insuring crops (.677).

This factor has reported 7.236 of total variance and its Eigen-value is 1.243. The factor scores reveal that: (i) farmers lack awareness about crop insurance schemes; (ii) they do not know about crop insurance schemes; (iv) they do not understand the concept of crop insurance, and (iv) they are unfamiliar with the process for insuring their crops.

- **Factor 8** is framed for addressing the motive of companies engaged in insurance business. It has three statements, namely:

a) Crop insurance companies' sole motive is to make a profit and not protect to the farmers' interests (.827).

b) Crop insurance companies or implementing agencies do not provide adequate information about crop insurance to the farmers (.761).

c) Crop insurance companies or the implementing agencies do not provide adequate information about crop insurance to the farmers (.544).

Its percentage variance is 7.122 and has 1.135 as its Eigen value. The finding of this factor shows that the only motive of insurance companies is make profit and not to protect the interest of farmers.

6. Conclusion

This paper has identified the factors affecting the challenges of adoption of CIS. Data has been obtained from farmers by using the 5-point Likert scale. Subsequently, for exploration of factors, EFA technique has been employed. Statistical data from the following 8 challenging factors were explored, namely:

1. Trust,
2. High perceived cost,
3. Cumbersome process of claim settlement,
4. Insufficient official support,
5. Adequate assessment of claim,
6. Absence of feedback from farmers,

7. Lack of awareness about crop insurance,

8. Vision of crop insurance companies.

Overall, the above 8 explored variables have defined the 63% of the cumulative variance. Among the eight factors studied in detail, the 'Lack of Trust' has the highest reliability. We believe that the problems identified in this study are significant and should be resolved, in addition to making crop insurance schemes quite effective and efficient for the benefit of farmers. Because farmers' viewpoints toward crop insurance may change over time, and the effect of crop insurance may be felt or seen only gradually. the need of the hour is to develop an appropriate and energetic evaluation method that would make a significant contribution to the agricultural sector and this activity should be taken up intensely and immediately. It will assist farmers in recovering faster from perennial problem of poor agricultural production seen over the years.

7. Limitation and Scope for Future Research

Based on the missing themes in the published literature on agriculture insurance in India, specific research gaps were identified. These gaps serve as a framework for future investigations. There is a scope for future research to find out how problems have influenced the willingness of respondents to participate in crop insurance revamp. The PMFBY was primarily an effective scheme that is now unsuccessful due to implementation flaws. There is an opportunity for further research to improve the performance of PMFBY.

Abbreviations

- PMFBY - Pradhan Mantri Fasal Bima Yojana
- RWBCIS - Restructured Weather-Based Crop Insurance Scheme
- CIS - Crop Insurance Scheme
- NAIS - National Agriculture Insurance Scheme
- WBCIS - Weather-Based Crop Insurance Scheme
- EFA - Exploratory Factor Analysis

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