

A SCALE TO MEASURE PERCEPTION OF FARMERS ABOUT AGRITECH STARTUP-FARMER PRODUCER ORGANIZATION INTEGRATION FOR IMPROVED EXTENSION ADVISORY SERVICES

Machapathri Praneeth¹, Arun Kumar S.² and M. L. Sharma³

1 Ph.D scholar, Dept. of Agril. Extension, IGKV, Raipur - 492012

2 Principal scientist, Indian Institute of Rice Research, Rajendranagar, Hyderabad - 500001

3 Head and Professor, Dept. of Agril. Extension, CoA, Indira Gandhi Krishi Vishwavidyalaya, Raipur - 492012

Email : mpraneeth95@gmail.com

ABSTRACT

To measure the perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services a scale was developed with Likert's summated rating technique. A list of 45 items regarding Agri-Tech startups - Farmer Producer Organization (FPO) integration was sent to 200 experts for their relevancy using google forms and personal follow up. Based on 75 expert's ratings, the relevancy percentage (RP), Relevancy Weightage (RW) and Mean Relevancy Scores (MRS) were estimated. 37 items with RP > 70, RW > 0.70 and overall MRS > 2.31 were considered for item analysis. These items were administered to 60 farmers for item analysis and items with 't' value equal or greater than 1.75 were selected and those with 't' value below 1.75 were rejected. Out of 37 statements, 28 statements were retained on the final scale through t-test item analysis. The Cronbach's alpha value was 0.77 and Guttman split half method was 0.72 which showed high reliability. The Pearson's product moment correlation coefficient calculated 0.68. The scales demonstrated precision and consistency, as evidenced by their validity and reliability measures. The scale developed to measure perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services is deemed reliable and can be utilized by researchers in similar studies.

Keywords: likert scale, perception, FPO, agri-tech startups, integration

INTRODUCTION:

India is becoming more dominant in the global agricultural market, but the vast majority of its farmers own small or marginal holdings of land and are still forced to work in the monotonous agricultural tasks that keep them in a cycle of poverty. Micro land holdings are a problem for Indian agriculture, since they restrict the opportunities and scale available to farmers to engage in mixed farming, scope to producing multiple crops at once, or even experiment with new crop cultivation techniques. Therefore, in order to prevent small-scale farmers from being cut off from the advantages of agricultural products, they must be integrated (Vadivelu and Kiran 2013). This is because farmer collectives are seen as a crucial component in connecting smallholders with modern markets (input and output) because they offer numerous advantages for this interface (Trebbin and Hassler 2012). One such initiative that has helped and encouraged the farming community overall is the establishment of Farmer Producer Organizations (FPO) across the country during 2011–12 (Singh et al. 2018; Singh 2012).

Agricultural supply and value-chain operations can be carried out collaboratively by farmers through the formation

of organized groups through the growing paradigm of FPO (Venkatta kumar et al 2017). In order to support the adoption of technology, boost productivity, enable better access to inputs and services, and raise farmer incomes—all of which will strengthen their livelihoods centered on agriculture—farmers, particularly small farmers, are encouraged to organize into Farmers' Promotion Organizations (FPOs) at different levels throughout the states (GoI 2013a).

Despite the advantages they offer farmers, Farmer Producer Organizations (FPOs) encounter various challenges. These include difficulties in reaching out to a large number of farmers and connecting with input suppliers and output purchasers, managing their business effectively, coping with irregular input supplies, accessing timely financial support, managing water resources, and securing financing at competitive rates. These obstacles hinder FPOs from achieving their goals smoothly. There is an urgent need for a comprehensive approach to tackle the majority of these challenges. Collaborations with Agri-tech startups offer a promising solution to address these issues effectively.

One key area where Farmer Producer Organizations (FPOs) and Agri-tech companies can collaborate is in

formalizing the agricultural economy and extending the benefits of scaled-up businesses to farmers. FPOs offer the necessary legal and operational framework to enable farmers to access these benefits, while Agri-tech companies contribute technology solutions to enhance efficiency. Thus, it is important to investigate the perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services. Measurement of perception of farmers about FPO and startups integration helps in gaining valuable insights into the effectiveness of collaborative efforts and identifying areas for improvement, thus facilitating informed decision-making and fostering a more responsive and adaptive agricultural ecosystem. In this backdrop, developing and standardising a scale to measure perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services is carried out.

OBJECTIVE

To develop a scale to measure perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services.

METHODOLOGY

The measuring instrument was developed using the Summated Ratings method pioneered by Likert (1932). The ensuing sections provide a comprehensive account of the procedures undertaken, detailing the process followed in standardizing the scale for measuring perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services. A standard procedure followed as suggested by Harikrishna et al., (2021), Nedhi Rani Sharma (2023), Patel Rathod et al., (2023); Rathod et al., (2023); Shah Rathod et al., (2023); Singh Rathod et al., (2023).

RESULTS AND DISCUSSION

Item collection

As the first step in developing perception scale, a large number of statements related to Farmer Producer Organization (FPO) and Agri-Tech startups were gathered from literature, books, bulletins, articles, journals and by holding discussions with the experts. A tentative list of the 60 statements were drafted keeping in view the applicability or item suited to the area of the study:

Editing the statements

These statements were edited as per the 14

criteria enunciated by Edwards (1957). Out of 60 statements 15 statements were thus eliminated. The remaining 45 statements were included in the proforma. These statements were framed in such a way that they could express the positive or negative perception.

Experts response to raw statements

The proforma containing these statements on three continuums ranging from “most relevant” (MR), Relevant (R) and Irrelevant (IR) were mailed by email, Google docs form and also handed over personally to the judges. These judges were experts in the relevant subject matter, drawn from universities, institutes, and extension education specialists. They were requested to add or delete any statement which they deemed fit for the conclusion or deletion. Out of 200 judges only 75 experts had returned the same set of statements after duly recording their judgments and were considered for the analysis

Selection of items

The judge’s responses were systematically tabulated and analyzed to calculate the “relevancy percentage,” “relevancy weightage,” and “mean relevancy score” for each statement.

Relevancy percentage (RP)

The calculation involved adding up the scores from the “most relevant” and “relevant” categories, which were then converted into percentages.

$$RP = \frac{\text{Frequency score of most relevant and relevant}}{\text{Number of judges}} \times 100$$

Relevancy weightage (RW)

It represents the ratio of the actual score obtained by each respondent to the maximum achievable score.

$$RW = \frac{\text{Actual scores obtained for the statements}}{\text{Maximum possible scores obtainable for the statement}}$$

Mean relevancy Score: It was derived using the standard formula.

$$MRS = \frac{\text{Actual scores obtained for the statements}}{\text{Number of Judges responded}}$$

Final inclusion of statements

Based on these three criteria, the items underwent screening to assess their relevancy. The

statements having relevancy percentage of more than 70 per cent, relevancy weightage of more than 0.70 and mean relevancy score of more than 2.31 were considered for the final selection of statements. By this process 37 statements were selected in the first stage.

Item analysis

A questionnaire was prepared consisting of 37 statements and responses were collected from 60 farmers by personal interview. These farmers were selected based on the criteria that either he / she was a member of FPO or had good orientation with FPO and have knowledge about Agri-tech startups. The farmers were asked to indicate their degree of agreement on a five-point continuum namely strongly agree, agree, undecided, disagree and strongly disagree with scores of 5, 4, 3, 2 & 1 for each positive statement and 1, 2, 3, 4 and 5 for each negative statement respectively. The perception score of a respondent was obtained by summing the score of all items, thus total score obtained by each respondent was calculated. The respondents were sorted in descending order. For the purpose of item analysis, 25 per cent of the respondents with highest total score and 25 percent of respondents with lowest total score were selected. The critical ratio i.e., t-value which is a measure of the extent to which a given statement differentiates between the high and low groups of respondents for each statement is calculated by using the following formula:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\frac{\sqrt{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}}{n(n-1)}}$$

t = t value of particular statement

\bar{X}_H = The mean score on given statement of the high group

\bar{X}_L = The mean score on given statement of the low group
n = Number of respondents in each group

\sum = Summation

After computing 't' value for all the items with the help of above formula, items with 't' value equal or greater than 1.75 were selected and those with 't' value below 1.75 were rejected as the thumb rule suggested by Edwards (1957).

Standardization of the scale

A scale should accurately measure what it aims to measure and maintain consistency in its measurements. Therefore, a scale must undergo standardization before administration. The present scale developed was also standardized by testing its reliability and validity. The developed scale was further standardized by establishing its reliability and validity.

Reliability

A reliable instrument should elicit valid responses and produce consistent results when administered twice to the same respondents. Reliability is the ability of a test instrument to generate consistent results from one set of measures to another. For testing reliability, Cronbach alpha (α) and Guttman split half method was used for assessing internal consistency of the scale developed. The Cronbach alpha (α) value obtained was 0.77. For testing the reliability by Guttman split-half method the scales were split into two halves on the basis of odd and even number of items and administered to 60 farmers. The score obtained was 0.72. The Pearson's product moment correlation coefficient calculated 0.68. The reliability coefficient thus obtained indicated high internal consistency of perception scale constructed for the study.

Validity

Content validity is the representativeness or sampling adequacy of the content-substance, the matter and the topics of a measuring instrument. All the edited statements were given to 61 judges for their expert guidance in developing the scale. The scale was adjusted based on the recommendations provided by the experts. Hence, the present scale satisfied the content validity.

Administration of the scale

Finally, 28 items were selected to determine perception of farmers towards Agri-tech startups and FPO integration and arranged in such a way that positive and negative statements appear randomly to avoid biased responses. The responses had to be taken on a five-point continuum viz., strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1) with scores indicated in parenthesis for positive items and vice-versa for negative items. Each respondent's perception score must be computed by adding the scores of he or she obtained on all the items. For each respondent, the minimum and maximum scores will

range between 28 140. The higher the score, the more favorable perception, the respondent feels towards Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services.

Table 1: Items generated with Relevancy Weightage (RW), Relevancy Percentage (RP) and Mean Relevancy Score (MRS) and t-value

Sr. No.	Statements	RW	RP	MRS	t value
1	Farmers often perceive Agri-tech startups as promising entities that can revolutionize traditional farming practices through innovative technologies.	89.58	0.90	2.69	3.80
2	There is a growing sense among farmers that integration can enhance access to modern farming tools and techniques.	81.94	0.82	2.46	2.97
3	The integration is perceived positively by farmers for its potential to improve market access and information thereby ensure fairer prices for their produce.	83.33	0.83	2.50	3.78
4	Farmers see startup collaboration as a means to streamline supply chains, reduce inefficiencies, and minimize post-harvest losses.	84.03	0.84	2.52	3.92
5	There's scepticism among farmers regarding the long-term viability and commitment of startups to address their needs.	83.33	0.83	2.50	2.19
6	Farmers view the integration as a way to enhance the quality and safety standards of their produce, meeting consumer demands.	79.86	0.80	2.40	3.96
7	Many farmers believe that integration can contribute to rural development by creating new job opportunities and stimulating economic growth.	77.78	0.78	2.33	1.98
8	The integration is perceived as a strategic partnership that can unlock the untapped potential of agricultural innovation and entrepreneurship in rural communities.	81.25	0.81	2.44	2.68
9	Many farmers believe that the integration can lead to improved access to credit and financial services, enabling them to invest in their farms and businesses.	84.03	0.84	2.52	1.91
10	Farmers worry that the integration might lead to displacement of traditional farming methods and loss of indigenous knowledge.	79.86	0.80	2.40	3.03
11	This integration is viewed favourably by farmers due to its potential to improve agricultural extension services and knowledge dissemination.	80.56	0.81	2.42	2.56
12	Some farmers view the integration as a form of exploitation, where their knowledge and resources are taken advantage of for corporate gain.	82.64	0.83	2.48	3.12
13	There is a perception among farmers that the integration will lead to increased dependency on external entities for agricultural inputs and services.	85.42	0.85	2.56	3.21
14	The integration is seen as a way to foster greater transparency and traceability in the agricultural supply chain, which farmers appreciate.	84.72	0.85	2.54	2.98
15	Farmers recognize the role of startups in providing FPOs with access to digital platforms for marketing, financial transactions, and data management.	84.03	0.84	2.52	1.98
16	Many farmers believe that integrating FPOs with startups can lead to the adoption of more sustainable and environmentally friendly farming practices.	85.42	0.85	2.56	3.35
17	There is a lack of trust among farmers towards startups, with many believing they do not truly understand the needs and challenges of rural communities.	83.33	0.83	2.50	3.21
18	The integration is seen as a means to bridge the technological divide in agriculture, bringing digital tools and precision farming to the forefront.	81.25	0.81	2.44	2.88
19	The integration is seen as a way to address the needs of small-scale farmers by providing them with tailored solutions and support.	86.81	0.87	2.60	2.19
20	There is a sense among farmers that the integration with startups can open up new avenues for diversifying their income beyond traditional farming activities.	80.56	0.81	2.42	2.64
21	Many farmers believe that the integration will lead to loss of autonomy and control over their agricultural operations	84.72	0.85	2.54	1.95
22	Farmers believe that the integration can lead to improved market access, particularly for small-scale and marginalized agricultural communities.	77.78	0.78	2.33	1.99

Sr. No	Statements	RW	RP	MRS	t value
23	Farmers express scepticism about the intentions of startups, fearing they prioritize profit over the well-being of farmers.	77.08	0.77	2.31	3.21
24	Successful integration of Agri-tech startups with FPOs often hinges on effective communication, tailored training programs, and demonstrating tangible benefits to farmers.	81.94	0.82	2.46	2.17
25	The perception of farmers towards the integration varies depending on factors such as geographical location, farm size, and socio-economic background.	79.17	0.79	2.38	2.18
26	Farmers view the integration as a mechanism for promoting knowledge sharing and skills development within rural communities.	84.72	0.85	2.54	2.68
27	The perception of farmers towards Agri-tech startups is influenced by factors like reliability of technology, affordability, and the extent to which it addresses their specific needs.	79.17	0.79	2.38	2.71
28	Farmers express concern that FPO and startup integration may prioritize short-term gains over the long-term sustainability of agriculture.	78.47	0.78	2.35	2.03

CONCLUSION

A final scale with 28 statements was developed and standardized to measure the perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services. The scale's accuracy and consistency were determined using standard operating methods, and its validity and reliability were established and highly administrated to measure farmers perception levels. Researchers can use this to scale to measure the perception of farmers about Agri-Tech startups - Farmer Producer Organization (FPO) integration for improved Extension Advisory Services in similar studies.

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CONFLICT OF INTEREST

This is to declare that there is "No conflict of interest" among researchers.

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