

A SCALE TO MEASURE UTILITY PERCEPTION OF THE FARMERS TOWARDS INTEGRATED FARMING SYSTEM

P. N. Radadiya¹, J. K. Patel² and S. A. Sipai³

1 Ph. D. Student, Department of Agricultural Extension and Communication, BACA, AAU, Anand - 388 110

2 Director, Extension Education Institute, AAU, Anand – 388110

3 Associate Professor, DoEE, AAU, Anand - 388110

Email id: pnradadiya19@gmail.com

ABSTRACT

In India, the farmers with small or marginal landholdings encounter significant obstacles including minimal earnings, reduced yield levels, restricted exposure to modern technologies and substantial risks in production. By combining crop farming with complementary agricultural components such as livestock, poultry, apiculture, floriculture, fisheries and horticulture, the Integrated Farming System (IFS) provides a comprehensive solution aimed at improving income stability, boosting overall productivity and promoting sustainable agricultural practices. To scientifically measure the utility perception of farmers towards IFS, a scale was developed using the Scale Product Method, which integrates the strengths of both Thurstone's Equal-Appearing Interval Method and Likert's Summated Rating Technique. An initial pool of 38 statements was generated through a literature review and expert consultation. After refinement, 28 non-ambiguous statements were rated by 50 judges on a five-point continuum. Based on the median (S value) and interquartile range (Q value) 20 statements comprising 13 positive and 7 negative statements were selected for the final scale. The reliability of the scale was assessed using the split-half method and Rulon's formula, resulting in a high reliability coefficient of 0.814 indicating that it is reliable and valid.

Keywords: *integrated farming system, utility perception, scale product method, reliability, validity*

INTRODUCTION

In India, marginal and small farmers face several issues such as low yield, poor income, limited technology use and resource inefficiency. Integrated Farming System (IFS) provide a holistic solution by integrating crops with poultry, fisheries, livestock, fruits, vegetables, floriculture and beekeeping. This diversification improves land use, boosts income and reduces the risk of crop failure (Gamit and Vinaya, 2024; Vinaya et al., 2016; Vinaya and Shivamurthy, 2021). IFS promotes the recycling of farm resources such as manure, reduces input costs and enhances soil fertility and water conservation. Endorsed by the Ministry of Agriculture and Farmers' Welfare, IFS contributes to environmental sustainability and offers a practical model for addressing the gaps left by the Doubling Farmers' Income initiative (Anonymous, 2017).

Developing a scale to measure the utility perception of farmers towards the Integrated Farming System (IFS) is essential for generating accurate and meaningful insights in research. Since utility perception is inherently subjective and can vary greatly among individuals, a well-constructed scale allows for the systematic and quantifiable assessment

of how farmers perceive the benefits of IFS in their specific contexts. This not only adds objectivity to the study but also enables comparisons across different demographic and socioeconomic groups. Furthermore, by capturing the specific components of IFS that farmers find most useful such as income diversification, sustainability and risk minimization, the scale can guide policymakers, extension personnel and researchers in designing more targeted and effective interventions. It also facilitates in-depth understanding of how perception influences adoption behaviour, helping to explain why some farmers readily adopt IFS while others do not. Moreover, developing such a scale fills an existing methodological gap in agricultural research, especially in regions where standardized tools are lacking. Ultimately, the scale enhances the credibility and relevance of the research findings, offering a farmer-centric perspective that supports the development of sustainable and acceptable farming models.

OBJECTIVE

To construct a scale to measure utility perception of the farmers towards integrated farming system

METHODOLOGY

Utility perception refers to the subjective evaluation or assessment of the usefulness, satisfaction or value that individuals attribute towards Integrated Farming System. In the present study, a scale was developed to scientifically assess the utility perception of farmers towards Integrated Farming System. Among the various available techniques for scale construction, Thurstone's equal appearing interval method (1928) and Likert's summated rating method (1932) are widely recognized. However, both approaches have certain drawbacks - Thurstone's method often lacks response discrimination, while Likert's method faces challenges in accurate item selection. Therefore, the Scale Product Method proposed by Eysenck and Crown (1949) was selected for this study. This method integrates the strengths of both Thurstone's and Likert's techniques. To ensure the development of a reliable and valid scale, a systematic process was adopted following the methodologies used in previous studies (Chauhan *et al.*, 2017, Kumar *et al.*, 2022, Patel *et al.*, 2023, Sherin *et al.*, 2023 and Chaudhary *et al.*, 2023; Singh *et al.*, 2025; Parvadiya *et al.*, 2025). The construction process included key steps such as item selection, evaluation by judges, calculation of scale and quartile values, testing for reliability and validity and final categorization, respectively. Adequate precautions were taken to ensure an unbiased response from the judges.

RESULTS AND DISCUSSION

Item collection

The initial phase of constructing the utility perception scale involved selecting relevant statements or items. A total of 38 statements reflecting farmers' utility perceptions of Integrated Farming System were gathered through a literature review and consultations with experts, advisors, and extension professionals. These statements were refined based on the criteria proposed by Thurstone and Chave (1928), Likert (1932) and Edwards (1957), ultimately narrowing the list down to 28 clear and unambiguous items.

Judges' rating of utility perception statements

To evaluate these statements, a group of 50 judges who are extension educationist from the different agricultural universities, and other institutions were selected. Each judge was asked to rate the statements using a five-point equal appearing interval scale, ranging from 'Strongly Agree' to 'Strongly Disagree.' The judges were contacted individually and given detailed guidance on how to complete the rating process.

Assessment of scale value (S value) and quartile value (Q value)

Based on the response provided by the 50 judges for each statement, the median score (S value) and quartile value (Q value) were computed individually for each statement. The difference between the first quartile (C_{25} or Q_1) and third quartile (C_{75} or Q_3), calculated as $Q = C_{75} - C_{25}$, was then used to calculate the interquartile range, for each item in the questionnaire.

The median (50th centile) was obtained by the following formula,

$$C_{50/S} = L + \frac{0.50 - \sum P_b}{P_w} \times i$$

Where,

S/C_{50} = Scale value

L = The lower bound of the range where the median is located

$\sum P_b$ = The sum of the proportion below the interval in which median falls

P_w = The percentage of the interval where the median is located

i = The width of the interval, which is assumed to be equal to 1.0 (one).

The 25th centile was obtained by the following formula,

$$C_{25} = L + \frac{0.25 - \sum P_b}{P_w} \times i$$

Where,

C_{25} = The median or scale value of the statement

L = The lower bound of the range where the 25th centile is located

$\sum P_b$ = The sum of the proportion below the interval in which 25th centile falls

P_w = The percentage of the interval where the 25th centile is located

i = The width of the interval, which is assumed to be equal to 1.0 (one).

The 75th centile was obtained by the following formula,

$$C_{75} = L + \frac{0.75 - \sum P_b}{P_w} \times i$$

Where,

- C_{75} = The median or scale value of the statement
- L = The lower bound of the range where the 75th centile is located
- $\sum P_b$ = The sum of the proportion below the interval in which 75th centile falls
- P_w = The percentage of the interval where the 75th centile is located
- i = The width of the interval, which is assumed to be equal to 1.0 (one).

Then interquartile range would be given by taking difference between C_{75} and C_{25} ,

$$Q = C_{75} - C_{25}$$

The selection of final statements for scale to measure utility perception

The statements for the utility perception scale were selected based on the level of agreement or disagreement among the judges. Only those statements with median (S) values higher than their respective interquartile range (Q) values were included in the study. Following these criteria, 20 statements were finalized for the utility perception scale.

Reliability of the scale

A scale is reliable when it consistently produces the same results (extent of consistent results) when applied to the same sample. In the present study, due to the limited time and resources available to the researcher, only the split-half method of testing reliability was used.

The 20 statements were divided into two equal halves, with 10 odd-numbered statements in one half and 10 even-numbered in the other and were administered on 20 respondents. Each of the two sets of statements was treated as a separate scale and these two subscales were correlated. The coefficient of reliability was calculated using Rulon’s formula (Guilford, 1954), which came 0.814 with a correction factor. Thus, the developed scale was found to be highly reliable.

$$rtt = 1 - \frac{\sigma^2 d}{\sigma^2 t}$$

Where,

- rtt = Co-efficient of reliability
- $\sigma^2 d$ = Variance of these differences
- $\sigma^2 t$ = Variance of total scores

Correction factor

Validity of the scale

A scale is said to be valid when it measures what it is supposed to. In the present study, the validity of the scale was tested using the following method. In addition, based on the ratings of 50 judges, the relevance of the items was determined. This ensured the high content validity of the utility perception scale.

Administering the scale for measurement of utility perception

The final utility perception scale was administered on the sample of 120 farmers. They were asked to express their reactions in terms of their agreement or disagreement with each item by selecting one of five response categories. Positive statements were scored as 5, 4, 3, 2, and 1 for strongly agree, agree, undecided, disagree and strongly disagree respectively, whereas the scoring system was reversed for negative statements.

Table 1 : Final statements for a scale to measure the utility perception of the farmers towards Integrated farming System (n = 120)

Sr. No.	Statements	Scale Value (S)	Interquartile Value (Q)
1	Initial investment is beyond the reach of farmers in execution of IFS. (-)	02.571	01.683
2	Special type of strategies is part and partial for implementing IFS model. (-)	02.182	01.803
3	IFS model means increase income of the farmer by all means. (+)	01.650	01.207
4	IFS model is for best use of available resources of farmers. (+)	01.543	01.066
5	Implementation of IFS model is gambling. (-)	03.289	01.641
6	IFS model helps to conserve natural resources. (+)	01.850	01.281
7	Adoption of IFS is helping farmers to reduce risk involved in farming. (+)	01.818	01.136

Sr. No.	Statements	Scale Value (S)	Interquartile Value (Q)
8	Implementation of IFS model is very difficult for small and marginal farmers. (-)	03.167	01.667
9	IFS is ATM for the Farmers. (+)	01.750	01.250
10	IFS model provides opportunities to generate employment among the rural people. (+)	01.740	01.082
11	Through implementation of IFS model socio-economic culture of farmers can be sustained. (+)	01.948	00.926
12	Farmers under IFS programme are more subsidy oriented rather than development oriented. (+)	02.000	00.962
13	IFS model is not possible in Indian condition due to majority of land is fragmented. (-)	03.045	02.034
14	IFS plays vital role to deliver more sustainable agriculture. (+)	01.870	01.000
15	Implementation of IFS helps to sustain bio-diversity. (+)	01.846	01.046
16	IFS model support sustainable rural development. (+)	01.780	01.086
17	Critical planning is necessary evil for implementing IFS model. (-)	02.395	01.766
18	IFS model reduces environmental hazards through efficient nutrient cycling. (+)	01.738	01.208
19	IFS concept is not compatible with the values and beliefs of the society. (-)	03.100	02.083
20	Adoption of complimentary enterprises as a whole increase the input use efficiency. (+)	01.700	01.230

CONCLUSION

The utility perception scale was developed using the scale product method, beginning with an initial pool of 38 statements. Following an expert review and specific selection criteria, the number was narrowed down to 28 statements. Subsequently, using the S and Q values for further refinement, 20 statements were finalized, comprising 13 positive and 7 negative items. The scale demonstrated a high level of reliability, with a reliability coefficient of 0.814, indicating strong internal consistency and suitability for diverse applications. These results confirm the effectiveness of the scale in assessing farmers' utility perception, making it a valuable tool for researchers aiming to evaluate similar systems in future studies with the required modifications.

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CONFLICT OF INTEREST

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

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