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RESEARCH ARTICLE

Development of a Scale to Measure Farmers Perception about Effectiveness of Krishi Vigyan Kendra's (KVKs)

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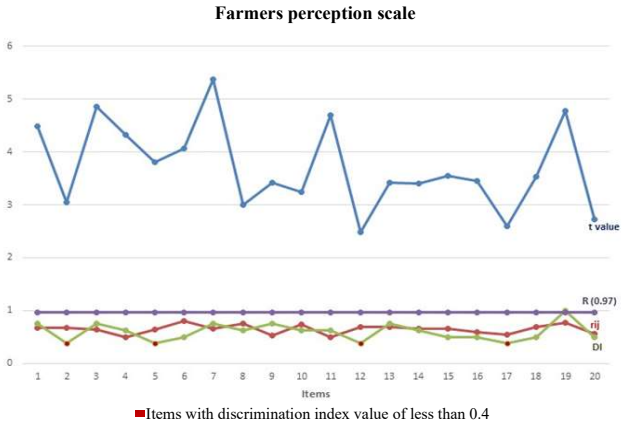
HIGHLIGHTS

- Development of a precise farmer perception scale: Ensures precision in assessing farmers' perspectives on Krishi Vigyan Kendras (KVKs).
- Scale validation through rigorous testing: Confirms the robustness of the scale by affirming the strength and direction of the linear relationship between the original variables and the principal component.
- Enhanced utility for assessing diverse impacts: The demonstrated discrimination capability enhances the scale's utility.

GRAPHICAL ABSTRACT



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ABSTRACT

Context: Acknowledging the vital role of KVKs in bridging the gap between agricultural research and practical farming applications, this study underscores the significance of comprehending farmers' perceptions. The context highlights the critical need for understanding how these extension systems impact farmers and enhance agricultural extension services. This necessitates on developing a Farmer Perception Scale to evaluate the efficacy of Krishi Vigyan Kendras in agricultural extension.

Objectives:The primary objective is the development of a highly reliable and valid Farmer Perception Scale. This scale aims to gauge the effectiveness of Krishi Vigyan Kendras in facilitating the transfer of technology and improving services in the agricultural sector.

Methods:The methodology employs a meticulous approach involving statement collection, editing, and relevancy scoring. Rigorous testing for reliability and validity is undertaken, culminating in a final scale comprising 16 statements. Item analysis, reliability testing, and validity assessments, including Principal Component Analysis (PCA), contribute to the comprehensive evaluation of the instrument.

Results and Discussion:The findings reveal a highly reliable instrument (r = 0.97) established through the split-half method. The validity, measured by PCA (rij > 0.5), confirms the strength and direction of the linear relationship between variables and the principal component, with a discrimination index of DI=0.65.

Significance:The standardized Farmer Perception Scale emerges as a strong reliable and valid tool with substantial significance. It not only measures farmer perceptions effectively but also provides valuable insights into the impact of Krishi Vigyan Kendras on farmers. These insights guide improvements in information dissemination and service delivery within the agricultural sector.

Krishi Vigyan Kendras (KVKs) are pivotal institutions in the agricultural extension landscape, addressing farmers' needs through technology evaluation, demonstrations, capacity building, and the dissemination of critical agricultural inputs. These district-level entities play a crucial role in bridging the gap between laboratory research and practical farm applications, significantly contributing to agricultural development and farmers' livelihoods (Patil *et al*., 2018; Subbaiah, 2024). Understanding farmers' perceptions of KVKs is essential, particularly concerning technology transfer activities such as knowledge dissemination, capacity building, on-farm trials, and frontline demonstrations (Ravikishore and Seema, 2017; Ranjan *et al.,* 2019; Sarnaik *et al*., 2020; Somanje *et al*., 2021; Sahoo and Rout, 2023; Saha *et al.,* 2023). Measuring these perceptions is vital for fostering group cohesion among agriculture stakeholders and ensuring the sustainable growth of KVKs (Manjusree *et al*., 2022), however there are constraints in adoption of technology (Kumar *et al*., 2005).

To address the research question, "How do farmers perceive the effectiveness of Krishi Vigyan Kendras in facilitating technology transfer and improving agricultural services?" the hypothesis set forth posits that a standardized Farmer Perception Scale can effectively measure farmers' attitudes, beliefs, and feelings towards Krishi Vigyan Kendras, providing valuable insights into the impact of these extension systems on agricultural practices. This research endeavours to construct a comprehensive farmer perception scale, encompassing diverse aspects such as attitudes, beliefs, feelings, and tendencies regarding Krishi Vigyan Kendra (KVK) services. The utilization of this scale as a valuable instrument for comparative analysis and research in agricultural extension aligns with established methodologies (Likert, 1932; Edmondson, 2005; Singh, 2019; Zala and Kalsariya, 2022). Furthermore, an essential facet of the approach involved the consideration of factors such as the quality and relevance of services, along with the sociodemographic characteristics of farmers. This consideration is crucial for gaining insights into farmers' attitudes towards public extension and advisory services, as emphasized in previous research (Martin-Collado et al., 2021; Maake and Antwi, 2022). The outcomes derived from this research are anticipated to play a pivotal role in refining the design and delivery of extension services through the developed scale with high reliability and validity, thereby fostering positive growth and development within the agricultural sector.

METHODOLOGY

The development of the perception scale, aimed at assessing farmers' views on the effectiveness of Krishi Vigyan Kendras (KVKs), followed a systematic and structured approach. Initially, a comprehensive set of 140 statements was assembled through a rigorous process that encompassed literature reviews and expert consultations. Subsequently, a stringent editing procedure was employed, adhering to the criteria set forth by Edwards (1969) and Thurstone and Chave (1929), followed by Raj and Thomas (2022), leading to the elimination of statements that were ambiguous or irrelevant. To evaluate the relevancy of the statements, experts engaged in a scoring process, where the Relevancy Score (%) was computed using the formula:

$$\text{Relevancy Score (\%)} = \left(\frac{\text{Total scores obtained on each item}}{\text{Maximum possible score}}\right) \times 100$$

Statements exceeding the 80 percent threshold were retained, resulting in a curated selection of reduced number of statements. These statements were then subjected to a thorough item analysis utilizing the t-ratio method, following the recommendations of Edwards (1957), followed by Pordhiya *et al*. (2022), Patel and Sharma (2022) and Chandran *et al*. (2023). A sample of 30 beneficiary farmers was involved in this process. The 't' value formula,

$$t = \frac{XH - XL}{\sqrt{\frac{([(\sum XH^2 - (\sum XH)^2)/N)] + [(\sum XL^2 - (\sum XL)^2/N)])}{N(N-1)}}}$$

Where,

XH= The mean score on a given statement for the high group

XL= The mean score on the same statement for the low group

$\sum XH^2$= Sum of squares of the individual score on a given statement for high group

$\sum XL^2$= Sum of squares of the individual score on a given statement for low group

$\sum XH$= Summation of scores on given statement for high group

$\sum XL$= Summation of scores on given statement for low group

N= Number of respondents in each group

The 't' value formula was instrumental in discerning the statements' ability to discriminate between high and low perception groups. Specifically, XH denoted the mean score on a given statement for the high group, XL represented the mean score on the same statement for the low group, and N signified the number of respondents in each group. As a result of this rigorous analysis, a final perception scale emerged, consisting of 20 statements.

To ensure the reliability of the measurement scale, the split-half method was employed, and the reliability coefficient was calculated using the Spearman-Brown prophecy formula.

Split half reliability, (Pearson product-moment method)

$$r^{1/2} = \frac{N\sum XY - \sum X \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

Where, X= Score of odd items

Y= Score of even items

Reliability co-efficient of the scale, (Spearman-brown prophecy formula)

$$R = \frac{2\,r^{\frac{1}{2}}}{1+r}$$

This statistical approach was chosen to assess the consistency of the scale in measuring the targeted construct. Notably, this methodology aligns with the work of Chithra and Manjunatha (2018), who applied a similar technique in developing a perception scale for extension personnel towards Agricultural Technology Management Agencies (ATMA). Furthermore, the content validity of the scale, reflecting the extent to which its content accurately represents the subject matter concerning farmers' perceptions of Krishi Vigyan Kendra (KVK) effectiveness, was rigorously ensured. This was accomplished through a combination of expert consultations, comprehensive literature reviews, and systematic ratings provided by judges with expertise in the relevant field. These measures collectively fortified the content validity of the scale, reinforcing its effectiveness in capturing and measuring the intended aspects of farmers' perceptions of KVK effectiveness.

The construct validity of the scale was determined using principal component analysis. The original variable and the principal component have been appropriately standardised by subtracting the mean and dividing by the standard deviation for each variable, as the correlation is sensitive to the scale of the variables and the correlation between an original variable and a principal component can be calculated using the correlation formula.

$$rij = \frac{Cov(X,PC)}{\sqrt{Var(X)Var(PC)}}$$

Where,

Cov(X,PC) = Covariance between the original variable X and the principal component PC

Var(X) = Variance of the original variable X

Var(PC) = Variance of the principal component PC

The discrimination index (DI) was calculated to determine the validity of the scale items, and the formula used was as follows:

Discrimination Index,

$$DI = \frac{RU - RL}{NU \text{ or } NL}$$

Where, RU- Number of respondents in the upper group who responded correctly

RL- Number of respondents in the lower group who responded correctly

NU- Number of respondents in the upper group

NL- Number of respondents in the lower group

The data collection phase involved the administration of the finalized perception scale to a targeted group of farmers, with their responses recorded on a five-point scale. Subsequent data analysis, employing robust statistical techniques, provided valuable insights into the farmers' perceptions of KVK effectiveness, with comprehensive results and discussions presented in the appropriate sections of the research paper.

RESULTS

Collection of items : The first step in the development of the perception scale was to collect statements pertaining to the perception of farmers about the effectiveness of Krishi Vigyan Kendras (KVKs). A list of 140 statements pertaining to the perceptions of farmers on the effectiveness of KVKs was collected through an extensive review of the literature and interaction with beneficiary farmers of KVKs, subject matter specialists, and other experts in the field of agriculture.

Editing of items : The statements were edited as per the criteria enunciated by Edwards (1969) and Thurstone and Chave (1929). Vague, overlapping, ambiguous, and irrelevant statements were eliminated. Statements that distinguished between the positive and negative perceptions of the farmers about the effectiveness of KVKs were collected and included in the scale. As a result, 36 statements were eliminated, and the remaining 104 statements were selected as relevant in measuring farmers perceptions about the effectiveness of KVKs. All the selected statements were sent to

40 experts in the field of agricultural extension, scientists, and subject matter specialists of KVKs for analysing the relevancy of the statements by checking the content, nature, and suitability of the statements in measuring farmers perception. Five types of responses were given as a continuum for each statement, such as 'Most Relevant', 'Relevant', 'Undecided', 'Less Relevant', and 'Least Relevant' for Judges ratings. Relevancy test was performed to assess the accepted and rejected statements by the judges, and statements with a score above 80 percent were retained, while those with a score below 80 percent were discarded. Based on the relevancy test, final set of 50 statements out of 104 were retained.

Item analysis and selection : The item analysis was done by applying the t-ratio method suggested by Edwards (1969). This was done by setting two extreme groups, i.e., high and low, on the basis of the total scores obtained by respondents against all the statements. The fifty statements selected based on relevancy test were subjected to item analysis to identify statements based on the extent to which they could differentiate the respondent with a high perception from the respondent with a low perception about the effectiveness of KVKs. For this, the selected statements were introduced to a random sample of 30 beneficiary farmers of KVKs from non-sample areas. The farmers were asked to indicate their degree of agreement or disagreement for each statement on a five-point continuum as 'strongly agree', 'agree', 'moderately agree', 'disagree', and strongly disagree, with scores of 5, 4, 3, 2, and 1, respectively in the case of positive statements and vice versa in the case of negative statements.

The scores of each respondent against each item were arranged in descending order based on the total individual scores to find out the high and low groups. The t-values were then calculated by discriminating between higher and lower group responses for each item using the t-value calculation formula (Edwards, 1969). A significant difference in the mean scores of the two criterion groups would indicate that the item has a discriminating quality. Twenty-seven percent of the respondents with the highest score were taken as the high group, and Twenty-seven percent of the respondents with the lowest score were taken as the low group. The mean scores of both the high and low groups for all fifty selected statements were worked out to calculate the discrimination value for all statements called the 't' value. Items with a 't' value above 2.35 were selected for the final scale for measuring farmers perception. The final scale consists of 20 statements, including 12 positive and 8 negative statements with a 't' value above 2.35 and significant at the 0.01 level of significance.

Standardization of scale : A standardised scale would help the researcher understand how favourable the scale item is to the desired concept or construct and how discernible the defined construct is among the respondent groups. A perception scale of farmers about the effectiveness of KVKs consists of a number of items that are essential in the measurement of the underlying construct and should be measured accurately in terms of their psychological intellect. The standardisation of the scale was done by testing its reliability and validity.

Reliability of scale : The reliability of a scale indicates its consistency in measuring the intended construct. Reliability is the degree to which a test consistently measures whatever it measures, and a measurement procedure yields consistent scores when the phenomenon being measured is not changing (Ray and Mondal, 2014). A well-constructed analytical instrument should produce accurate and identical, or at least comparable, results for the person being tested from one occasion to the next, both at present and over time. The reliability of a measuring instrument can be improved by controlling those factors that adversely impact its reliability, such as the homogeneity of the respondents and the heterogeneity of the scale items. Also, the discriminatory nature of the items on the scale improves its reliability in measuring the intended construct (Singh, 2019).

In the present study, the split-half method of testing reliability was used because of time and resource constraints. The 20 statements were divided into two halves, with 10 odd-numbered statements in one half and 10 even-numbered statements in the other. The score for each half is calculated separately using the split-half test reliability coefficient by the Pearson product-moment method, and the reliability coefficient of the whole test was estimated using the Spearman-brown prophecy formula and found to be 0.97. Thus, the scale developed was found to be highly reliable in measuring the farmers perceptions about the effectiveness of KVKs.

$$\mathbf{r}^{1/2} = \frac{30 \times 112484 - 1260 \times 1337}{\sqrt{[30 \times 109942 - (1260)^2][30 \times 121317 - (1337)^2]}} \times 0.94$$

$$\boldsymbol{R} = \frac{2 \times 0.94}{1 + 0.94} = 0.97$$

Table 1. Selected items with t values (Significant at 1 per cent level) and rij values for the final draft of perception scale of farmers about effectiveness of KVK

Statements	t value	Mean		Validity measure (rij)
		Higher (XH)	Lower (XL)	
KVKs assist farmers in bridging the gap with agricultural domain experts	4.48	4.38	2.75	0.672
KVKs disseminate only assessed and refined technologies to farmers*	3.05	3.75	2.38	0.681
Demonstrations conducted by KVKs do not showcase the worth of improved practices and technologies over conventional methods (-ve)	4.85	4.13	2.25	0.638
KVKs make it easier for farmers to communicate with scientists from different disciplines of agriculture	4.32	4.88	3.38	0.505
The capacity development programmes of KVKs are mainly intended for skill-based employment opportunities in agricultural and allied sectors*	3.81	5.00	3.88	0.649
KVKs do not concentrate on the timely dissemination of information and technology to needy farmers (-ve)	4.07	4.50	2.63	0.807
The efforts made by the KVK officials to solve the problems of the farmers are commendable	5.38	4.88	2.88	0.651
KVKs enhance the development of agriculture at district level	3.00	4.50	3.00	0.754
Farmers suggestions for further change are not being taken seriously by KVK officials (-ve)	3.42	3.88	2.38	0.533
KVK produces and supplies quality inputs such as seeds, planting materials, bio-fertilizers and pesticides, micronutrient mixtures, etc. to farmers	3.24	4.00	2.50	0.734
KVKs hardly conduct regular field visits to analyse farmers' problems at the field level(-ve)	4.70	4.88	3.13	0.503
KVK-based extension services supplement the extension activities of the state department of agriculture*	2.49	4.75	3.75	0.689
Research outcomes of agricultural universities and ICAR research institutes are effectively reaching out to farmers through KVKs	3.42	4.13	2.63	0.685
KVK officials lack adequate understanding of farming situations when dealing with farmers problems (-ve)	3.41	4.63	2.88	0.664
Farmers are able to eliminate crop losses with the timely assistance from KVKs	3.55	3.50	2.00	0.666
KVK never provides guidance to farmers in selecting suitable crops for each AEU (-ve)	3.45	3.50	2.13	0.588
Regular contact with scientists through capacity building programmes of KVK like training, OFTs, FLDs, etc., motivates farmers to adopt scientific practices*	2.59	4.75	3.88	0.538
KVKs do not consider the requirements of farmers while planning their activities; rather, they plan according to their convenience (-ve)	3.53	4.00	2.38	0.697
KVKs play an important role in developing innovations consistent with farmers needs	4.78	4.25	2.50	0.765
Farmers problems are not being resolved by KVKs because of the absence of experts from multiple disciplines (-ve)	2.73	3.63	2.38	0.564

*Items with a discrimination index value of less than 0.4

Validity of scale : This research focuses on the critical evaluation of the validity of a scale designed to measure farmer perceptions regarding the effectiveness of Krishi Vigyan Kendras (KVKs). Validity, an essential criterion in scientific instrument development, ensures accurate inferences and practical conclusions. Validity is a measure of how well the desired construct was measured and a scientific instrument for assessing farmer perceptions must have validity to infer relevant, significant, and practical conclusions from the study (Singh, 2019). Drawing from the works of Ray and Mondal (2014), this study employs a multi-faceted approach to ascertain content validity, construct validity, and discrimination index, thereby enhancing the robustness of the developed scale.

Content validity : Content validity, a pivotal aspect of instrument development (Raj and Thomas, 2022), was rigorously addressed. The area of content, coverage, and relevance of items on the scale are reflected in the assessment of content validity. The content validity of the scale was determined by verifying how effectively the content of the scale reflected the subject matter in the field of study, and the items were selected based on the coverage of the subject matter in measuring farmers

perceptions about the effectiveness of KVKs based on expert advice, relevant reviews of literature, and judges ratings. The scale's items were meticulously selected through a comprehensive process involving expert advice, literature reviews, and judge ratings. This ensured that the scale effectively represented the subject matter pertinent to farmer perceptions of KVKs.

Construct validity : Construct validity, encompassing internal consistency, stability, and dimensionality, was assessed using principal component analysis (McShane, 1986; Nunnally and Bernstein, 1994; Shiarella *et al*., 2000). The correlation coefficient values (rij) derived from this analysis (Table 1) provided insights into the strength and direction of the linear relationship between the original variables and the principal component. Items with correlation coefficients below 0.50 were judiciously eliminated, optimizing the validity of the scale.

Discrimination index (DI) : The Discrimination Index (DI) serves as a pivotal metric for evaluating the efficacy of scale items in capturing meaningful variations within the construct under investigation. Initially, the average discrimination index calculated for a set of 20 statements was found to be 0.59. It revealed strong discriminatory power. However, in pursuit of heightened precision, four items with DI values below 0.4 were judiciously identified and, despite their initial high reliability, were removed. This reduction led to a refined scale consisting of 16 statements. The subsequent DI calculation for the refined scale was found to be 0.65. It showcased a substantial increase in the average discrimination index (DI= 0.65). The elevated value of 0.65 denotes robust discriminatory power, indicating that the refined scale possesses a heightened ability to differentiate between participants or conditions. This enhanced discrimination index value is indicative of the scale's success in capturing significant variations within the measured construct. A value of 0.65 underscores the positive outcome of the scale development process, affirming that the selected items significantly contribute to the scale's effectiveness in distinguishing between different levels or groups. This rigorous analysis not only bolsters the validity of the scale items but also reinforces the scale's utility in providing nuanced insights into the nuances of farmer perceptions concerning the effectiveness of Krishi Vigyan Kendras.

DISCUSSION

The rigorous validation process affirms the robustness of the refined scale, consisting of 16 statements, which demonstrated high reliability, construct validity, and discriminatory power. This confluence of factors attests to the scale's precision in gauging farmer perceptions regarding the effectiveness of Krishi Vigyan Kendras (KVKs), establishing it as a reliable instrument for future research in this domain. The scale's comprehensive nature, evident in its reliability, construct validity, and discriminatory power, suggests its potential applicability beyond the specific context of KVKs, positioning it as a versatile instrument for measuring farmer perceptions in diverse agricultural extension programs and initiatives. In contributing to methodological rigor within the domain of KVKs, this study establishes a precedent for the scale's adaptation and utilization in various agricultural settings. Researchers and practitioners in agricultural extension services can utilize the refined scale as a benchmark for creating tailored instruments that assess the effectiveness of different agricultural supports, such as the perception scale developed by Rajeswari and Dolli (2020) and Chandhana *et al*. (2022) in measuring the effectiveness of farm advisory services and public and private extension systems, respectively.

Administration of the scale : The scale to measure farmers' perceptions of the effectiveness of KVKs underwent rigorous validation, meeting the requisite reliability and validity standards before finalization. Comprising 16 statements with a high discrimination index (8 positive, 8 negative), respondents are prompted to indicate their agreement or disagreement on a five-point continuum: "strongly agree," "agree," "moderately agree," "disagree," and "strongly disagree," corresponding to scores of 5, 4, 3, 2, and 1, respectively, for positive statements, and vice versa for negative ones. While initially designed with a focus on farmers' perceptions of KVKs, the scale's carefully validated nature allows for seamless adaptation to other agricultural extension programs. Researchers, extension agents, and policymakers can employ the scale as a template, tailoring specific statements to align with the objectives and characteristics of different agricultural initiatives. This consistent and reliable measurement tool enables stakeholders in the agricultural sector to gain insights into the effectiveness of various programs beyond KVKs. The standardized scoring system establishes a common framework for comparison, facilitating cross-program evaluations and fostering a

holistic understanding of farmer perceptions across diverse agricultural contexts.

CONCLUSION

The final scale, developed to measure farmers' perceptions of Krishi Vigyan Kendra's (KVKs) effectiveness, was carefully developed using the Likert method of attitude scale construction. Comprising sixteen items thoughtfully distributed across relevant major aspects, the scale ensures equal proportion and consistency in gauging farmers' perceptions. This developmental process provides valuable insights for researchers and extension agents, shedding light on the evolving perspectives of beneficiary farmers within Krishi Vigyan Kendras (KVKs) and guiding the identification of effective tools and mechanisms for information and service delivery. The Likert method employed in constructing the scale introduces a systematic and replicable approach applicable to the creation of instruments tailored to diverse agricultural settings. The sixteen items, designed to encompass crucial facets of farmer perceptions, establish a foundation for constructing scales relevant to a spectrum of agricultural extension services. Derived from this scale development, researchers and practitioners can customize the instrument, aiding in assessing diverse agricultural interventions' impact. This customization will let know targeted strategies for effective information and service delivery by understanding the evolving perceptions of farmers. To conclude, the scale, initially designed for assessing farmers' perceptions of KVK effectiveness, transcends its specific context to lay the groundwork for broader application in agricultural research, extension, and policy development. The flexibility of this tool enhances its utility, offering a valuable resource for the continual improvement of agricultural support systems on a global scale.

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Authors contribution:Author 1 performed the statistical analysis of the study, managed the literature searches and the wrote the first draft of the manuscript. The second author performed editing. Both authors read and approved the final manuscript.

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REFERENCES

Chandhana, B.; Kumar, G.D.S. and Sengar, R.S. (2022). Development of Scale to Measure Sunflower Farmers' Perception on Public and Private Extension Systems. *Indian J.Ext. Edu.*, **58** (3): 1-4.

Chandran, V.; Saurav, S.K. and Chakravarty, R. (2023). Development of scale to measure the attitude of farmers towards integrated farming system. *Indian Res. J. Ext. Edu.*, **23** (3): 55-59.

Chithra, Y.D., and Manjunatha, B.N. (2018). Development of a scale to measure the perception of extension personnel towards agriculture technology management agency (ATMA). *Intl. J. Agri. Sci.*, **10**(10): 6100-6103.

Edmondson, D.R. (2005). Likert scales: A history. Proceedings of the Conference on Historical Analysis and Research in Marketing, **12**: 127-133.

Edwards, A.L. (1969). Techniques of Attitude Scale Construction. New York: Vakils Feffer and Simons Prt Ltd, 1969. pp. 1-256.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psycho.,* **140**: 5-55.

Maake, M.M.S. and Antwi, M. A. (2022). Farmers perceptions of effectiveness of public agricultural extension services in South Africa: an exploratory analysis of associated factors. *Agri. and Food Security*, **11**(34): 1-15.

McShane, S.L. (1986). General Union attitude: A construct validation. *J. Labor Res.,* **7**(4): 403-417.

Manjusree, R.V.; Maiti, S.; Garai, S.; Manjunath, K.V.; Jha, S.K. and Kadian, K.S. (2022). Farmers' perception towards agromet advisory services in Kerala. *Indian Res. J. Ext. Edu.*, **22** (2): 34-37.

Martin-Collado, D.; Díaz, C.; Benito-Ruiz, G.; Ondé, D.; Rubio, A. and Byrne, T. J. (2021). Measuring farmers' attitude towards breeding tools: the livestock breeding attitude scale. *The Intl. J. Animal Biosci.,* **15**: 61-68.

Nunnally, J.C.; and Bernstein, I.H. (1994). *Psychometric theory*. New York: McGrawHill, 1994. Pp. 82-90.

Patel, S. and Sharma, O.P. (2022). Scale on attitude of young farmers towards climate smart agricultural interventions. *Indian Res. J. Ext. Edu.*, **22** (2): 181-183.

Patil, S.; Mahale, M.; Chavan, S. and Shinde, V. (2018). Impact of frontline demonstrations on oilseed crops in Konkan region of Maharashtra. *Indian Res. J. Ext. Edu.*, **18** (4): 30-36.

Pordhiya, K.I.; Singh, B.P.; Chander, M. and Goyal, J. (2022). A scale to measure attitude of farmers towards vermiculture technology. *Indian Res. J. Ext. Edu.*, **22** (2): 150-155.

Raj, N. and Thomas, A. (2022). A scale to measure risk behaviour of vegetable farmers. *J. Tropi. Agri.*, **60**(1): 113-117.

Rajeshwari, N. and Dolli, S.S. (2020). Development of a scale to measure the perception and acceptance of information technology (IT) enabled comprehensive farm advisory services by farmers. *Intl, J. Cur. Micro. and Appl.Sci.*, **9**(7): 3299-3308.

Ranjan, R.; Ansari, M.A.; Shekhar, S.; Singh, C.V.; Singh, R.K. (2019). Farmers' perspective of Krishi Vigyan Kendra (KVK) activities in Uttarakhand, India. *Indian Journals.com*, **14**(3): 529-537.

Ravikishore, M. and Seema, B. (2017). A scale to measure attitude of extension professionals towards technology dissemination system of State Department of Agriculture (SDA*). Indian Res. J. Ext. Edu.*, **17** (1): 109-112.

Ray, G. L. and Mondal, S. (2014). Research methods in social sciences and extension education. Ludhiana, India: Kalyani Publishers, 2014. pp. 256-280.

Saha, S.; Sharma, N.; Burman, R.R.; Sinha, P.K.; Joshi, P. and Ramasubramanian, V. (2023). Analysing attitude of the farmers towards IARI Pusa extension approaches. *Indian Res. J. Ext. Edu.*, **23** (1): 23-29.

Sahoo, M. and Rout, S.K. (2023). Farmers' perceptive on private extension services. *Indian Res. J. Ext. Edu.*, **23** (4): 41-45.

Sarnaik, S. D.; Bhople, P. P.; Mankar, D.M. and Tekale, V.S. (2020). Perception of farmers towards effectiveness of extension services of KVK. *Indian J. Ext. Edu.*, **56**(4): 43-48.

Kumar, Alok; Sharma, Ashok Kumar and Chauhan, Jitendra (2005). Constraints in adoption of quality seeds. *Indian Res. J. Ext. Edu.*, **5** (1): 66-68.

Shiarella, A.H.; Mccarthy, A.M. and Tucker, M.L. (2000). Development and construct validity of scores on the community service attitudes scale. *Edul. and Psycho. Measurement*, **60**(2): 286-300.

Singh, A.K. (2019). Tests, measurements and research methods in behavioural sciences. New Delhi: Bharati Bhawan Publishers & Distributors, 2019, pp. 79-103.

Somanje, A.N.; Mohan, G. and Saito, O. (2021). Evaluating farmers perception toward the effectiveness of agricultural extension services in Ghana and Zambia. *Agril. and Food Security*, **10**(53): 234-241.

Subbaiah, P.V. (2024). Impact of KVK activities on farmers preparedness for agricultural operations. *Indian Res. J. Ext. Edu.*, **24** (1):78-84.

Thurstone, L.L., and Chave, E.J. (1929). The analysement of attitude. USA: Chicago Uni.Press, pp. 39-40.

Zala, P.H. and Kalsariya, B.N. (2022). A scale to measure the attitude of farmers towards natural farming. *Indian Res. J. Ext. Edu.*, , **22** (1): 13-18.

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