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Scale to measure the attitude of farmers towards district agro-met units (DAMUS) Project

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Abstract

Agriculture in India is heavily dependent on weather, with crop yields largely determined by the monsoon season. Farmers require timely and accurate weather information to make informed decisions regarding harvesting, watering, planting, and pest control. The need for such information has become even more critical due to the increased uncertainty in weather patterns caused by climate change. Weather services like the District Agro-Met Units (DAMUs) provide localized and detailed forecasts that are essential for farmers to enhance their productivity and resilience to adverse weather conditions. Given the importance of studying farmers' attitudes towards the DAMUs project, a scale has been developed to measure these attitudes. The Scale Product Method was employed, which combines Thurstone's technique of equal appearing interval scale for item selection with Likert's technique of summated rating. The development process began with identifying key aspects and collecting relevant items. This was followed by a relevancy and item analysis, and finally, checking the reliability and validity to ensure precision and consistency of the results. Initially, 47 statements were selected, and through this process, 15 statements were ultimately retained in the scale to measure the attitude of farmers towards DAMUs project. The developed scale was found to be reliable.

Keywords: Attitude, scale, farmers, weather, DAMUs

Introduction

Agriculture in India is highly reliant on the weather, and crop yields are mostly determined by the monsoon season. Farmers need quick and accurate weather information in order to make well-informed decisions about harvesting, watering, planting, and pest control. By lowering the hazards brought on by erratic weather patterns, weather services improve food security and minimize crop losses.

Farmers now need access to accurate weather forecasts even more because climate change has increased weather pattern uncertainty in recent years. Compared to generalized forecasts, weather services like DAMUs offer localized and detailed weather information that is more pertinent and helpful for farmers. Farmers that use this information to optimize their agricultural techniques will be more productive and resilient to bad weather. Overall, to help the agricultural sector, guarantee food security, and enhance farmers' lives, India urgently needs efficient weather services.

In order to improve farmers' decision-making skills and overall agricultural productivity, the District Agro-Met Units (DAMUs) project seeks to offer farmers with localized weather information and agricultural advice. Knowing how farmers feel about DAMUs is important for

evaluating the acceptability and efficacy of these efforts, as agriculture is the main source of income for many. Farmers' positive perceptions and active engagement are critical to the project's success since they have a substantial impact on the agricultural outcomes in this region. Keeping this in view, a standardized scale has been developed to measure the attitude of farmers towards DAMUs project.

Objective

To develop and standardize a scale to measure the attitude of farmers towards DAMUs project

Materials and Methods

Among available techniques for the construction of the scales, the Thurston's Equal Appearing Interval Scale (1928)^[9] and the Likert's Summated Rating Scale (1932)^[8] are quite well-known. However, both these methods suffer from the limitations, the first one in getting discriminating response and second one in the selection of items. Thus, the technique chosen to construct the attitude scale was "Scale Product Method" which combines the Thurston's technique of equal appearing interval scale for selection of the items and Likert's technique of summated rating for ascertaining the response on the scale as proposed by Eysenck and

Crown (1949) ^[3]. The procedures are followed as followed by Chauhan et al. (2022) ^[1], Yeragorla et al. (2021) ^[12], Jagadeeswari et al. (2019) ^[5] and Vinaya et al. (2018) ^[11].

Steps in construction of attitude scale

Steps in development of the attitude scale explained as below:

Item selection

The items of attitude scale refer to statements related to attitude. Primarily, large number of statements reflecting attitude towards working in rural area were collected from relevant literature and constructed through discussion with extension personnel. The statements thus selected were edited on the basis of criteria shown by Edwards (1957) ^[2] and at last, 47 statements were selected as they were found to be non-ambiguous. The selected statements are presented in Table 1.

Table 1: Selection of statements on the basis of 'S' and 'Q' value to measure attitude of farmers towards DAMUs project

Statements no.	S Value	Q Value	Consent
15	4.83	3.89	Accepted
9	4.72	5.11	Rejected
29	4.62	4.97	Rejected
24	4.38	4.99	Rejected
22	4.28	4.89	Rejected
32	4.28	4.65	Rejected
41	4.05	5.05	Rejected
46	3.95	4.02	Rejected
33	3.94	3.53	Accepted
43	3.88	4.65	Rejected
47	3.83	4.16	Rejected
40	3.75	4.03	Rejected
42	3.50	4.08	Rejected
25	2.00	1.69	Accepted
44	2.86	4.15	Rejected
38	2.83	2.77	Accepted
28	2.50	2.84	Rejected
11	2.33	4.94	Rejected
7	2.30	1.12	Accepted
10	2.00	3.35	Rejected
34	1.94	3.21	Rejected
13	1.82	1.19	Accepted
37	1.76	1.15	Accepted
12	1.73	5.18	Rejected
36	1.70	1.23	Accepted
17	1.68	1.15	Rejected
23	1.67	1.29	Rejected
5	1.66	(Q lowest) 1.06	Accepted
18	1.64	1.17	Rejected
35	1.62	1.31	Rejected
30	1.55	1.15	Rejected
4	1.55	(Q lowest) 1.12	Accepted
16	1.55	2.12	Rejected
20	1.50	1.33	Rejected
21	1.50	(Q lowest) 1.24	Accepted
31	1.50	1.28	Rejected
39	1.46	1.34	Rejected
3	1.46	1.16	Rejected
6	1.46	(Q lowest) 1.09	Accepted
14	1.46	1.20	Rejected
26	1.46	1.24	Rejected
2	1.39	(Q lowest) 1.08	Accepted
8	1.39	1.15	Rejected
27	1.39	1.28	Rejected
45	1.39	1.15	Rejected
1	1.31	0.10	Accepted
19	1.28	0.98	Accepted

Judges rating of attitude statements:

In order to judge the degree of 'very important' to 'not important' of each statement on the five point equal appearing interval continuum. The schedule was sent via

post and online through 'Google forms' to judges 142 with request to analyze the relevancy of items. Out of the total, 65 judges had responded. The investigator has found that some of the judges have responded very carelessly,

misunderstand the directions and not be aware of the judgments desired in scale construction hence, 15 schedules were eliminated. Lastly, 50 schedules were kept for the construction of scale.

Determination of scale and quartile value

The five points of the rating scale were assigned score ranking from 1 for not important and 5 for very important. The responses of 50 judges on 47 items were transferred into the master sheet.

The appropriateness and relevancy was calculated by using statistics advocated by 'Scale Product Method'. Based on judgement, the Median value of distribution and the Quartile value (Q) for the statement concerned were calculated. The following procedure was use for calculation of S and Q values.

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

Where,

S	= Median or Scale value of statement
L	= Lower limit of the interval in which the median falls
$\sum P_b$	= Sum of the proportion below the interval in which the median falls
P_w	= Proportion within the interval in which the median falls

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

Where,

C_{25}	= Median or scale value of the statement
L	= Lower limit of the interval in which the 25 th centile falls
$\sum P_b$	= Sum of the proportion below the interval in which the 25 th centile falls
P_w	= Proportion within the interval in which the 25 th centile falls
i	= Width of the interval and is assumed to be equal to 1.0 (one)

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

Where,

C_{75}	= Median or scale value of the statement
L	= Lower limit of the interval in which the 75 th centile falls
$\sum P_b$	= Sum of the proportion below the interval in which the 75 th centile falls
P_w	= Proportion within the interval in which the 75 th centile falls
i	= Width of the interval and is assumed to be equal to 1.0 (one)

The inter quartile range was worked out for determination of ambiguity involved in the statement by taking the difference between C_{75} (Q3) and C_{25} (Q1), that means $Q = C_{75} - C_{25}$ for each statement. In this manner, the inter-quartile range (Q) for each statement was worked out and presented in Table 1.

Thurstone et al. and C have (Edwards, 1957) [2] described criteria in addition to Q as a basis for rejecting statement in scales constructed by the method of the equal appearing interval. In this case statements no. 15, 33, 38, 7, 13, 37, 25,

36, 1 and 19 whose scale values were greater than Q values were selected in the first phase of selection of statement to include in the scale to measure attitude of farmers towards DAMUs project.

Accordingly when a few items had the same scale values, the items having lowest Q values were selected. As was displayed in Table 1 Here statement no. 2, 8, 27 and statement no. 45 have equal scale values of 1.39 but Q value in case of statement no 2 is 1.08, is smaller than Q value of statement no. 8, 27 and 45 which is 1.15, 1.28, and 1.15 respectively. Thus, statement no. 2 was finally selected. Similarly in case of statement no 6 with 14, 26, 3, 39 statement no 21 with 31, 20 statement no 4 with 16, 30 statement no 5 with 35, 18, 23, 17 have equal scale values, thus statements having smaller than Q value were statements no. 6, 21, 4 and 5 respectively were finally selected to include in the scale. 15 statements were finally selected to constitute to measure attitude of farmers towards DAMUs project.

Reliability of the scale

The split-half technique was used to measure the reliability of the scale. The 15 statements were divided into two equal halves as two separate sets with 8 odd numbered and 7 even numbered statements in order. These were administered to 20 respondents. Each of the two sets was treated as separate scale and scores for both the sets from the 20 respondents were obtained. The coefficient of reliability was calculated by Rulon's Formula (Guilford 1954) [4], which came to 0.76. Reliability is directly related to the length of scale when we split to odd and even number items. The reliability coefficient which has been calculated is the value of half size of the original scale. In case of finding reliability using split half method, researcher needs to apply correction factor for final value of reliability. In this scale it was found 0.86.

$$rtt = 1 - \frac{\sigma^2_d}{\sigma^2_t}$$

Where,

Rtt	= Coefficient of reliability
σ^2_d	= Variance of those differences
σ^2_t	= Variance of the total scores

The correction factor is calculated by using Spearman Brown (1910) formula

$$rtt = \frac{2roe}{1 + roe}$$

rtt= Coefficient of the reliability of the original test

roe = reliability of coefficients of odd and even score

Validity of the scale

The validity of a test depends on its accuracy in measuring what it is intended to measure (Kerlinger, 1976) [6]. The validity of this scale was assessed using content validity,

which involves evaluating how well the scale's content represents the subject matter domain under study. To ensure this, items were selected through expert discussions, literature reviews, and strict adherence to judges' ratings. As a result, it is presumed that the instrument meets the criteria for content validity.

Results and Discussion

A standardized scale for measuring attitude of farmers

towards DAMUs project was developed according to scale product method which combines the Thurston's technique of equal appearing interval scale for selection of the items and Likert's technique of summated rating. The selected 15 statements for final format of the attitude scale have been randomly arranged to avoid response bias. The final format of the scale is presented in Table 2. This scale was found to be reliable with a correlation coefficient of 0.86.

Table 2: Final scale to measure attitude of farmers towards DAMUs project

Sr. No.	Statement(s)	SA	A	UD	DA	SDA
1.	I am very confident about the accuracy of the information provided by DAMUs. (+)					
2.	I think that mere information alone cannot ensure climate security. (-)					
3.	I believe that DAMUs has positive impact on my farm production. (+)					
4.	I think that information provided through DAMUs advisory to me is specific as per my farming needs. (+)					
5.	I think that DAMUs advisory help me to change cropping pattern. (+)					
6.	Somehow I feel that traditional method of forecasting weather is best. (-)					
7.	I feel that use of DAMUs upgrade my knowledge about plant protection measure. (+)					
8.	I feel that information provided through DAMUs is not applicable. (-)					
9.	I believe that DAMUs is help to adoption of climate resilience technology. (+)					
10.	I believe that DAMUs is effective medium for Krishi Vigyan Kendra to enhance its reputation. (+)					
11.	I think that DAMUs is useful system to popularize university recommendation. (+)					
12.	I think that meeting quality requirements under small hold farming can be challenging under DAMUs. (-)					
13.	I believe that DAMUs helps me to protect against climate threat (+)					
14.	I believe man has limited control over the damage caused by natural calamities in agriculture, often dependent on the "will of God". (-)					
15.	I feel that DAMUs provide a means of surviving in extreme conditions. (+)					

SA=Strongly Agree; A=Agree; UD=Undecided; DA= Disagree; SDA=Strongly Disagree

Administration of the scale

The final format of the attitude scale includes 15 selected statements, which have been randomly arranged in Table 2 to avoid response biases. Among these, five statements (numbers 2, 6, 8, 12, and 14) indicate an unfavorable attitude, while the remaining ten statements indicate a favorable attitude. Responses to these 15 statements can be collected using a five-point continuum of agreement and disagreement: strongly agree, agree, undecided, disagree, and strongly disagree. The respective weightings are 5, 4, 3, 2, and 1 for favorable statements, and 1, 2, 3, 4, and 5 for unfavorable statements. The total attitude score for each respondent is calculated by summing the scores of all statements based on their responses, resulting in a possible score range from 15 to 75.

Conclusion

The implementation of DAMUs services is crucial for the farming community to secure their livelihood. Farmers with a positive attitude towards the DAMUs project can engage more effectively and benefit from it, making it essential to accurately measure their attitudes. To achieve this, an attitude scale was developed using the 'Scale Product Method,' which combines Thurstone's technique of equal appearing interval scale for item selection and Likert's technique of summated rating. The scale development process included identifying relevant aspects, collecting pertinent items, and conducting relevancy and item analysis. The reliability and validity of the scale were thoroughly checked to ensure precision and consistency. Initially, 47 statements were selected, and through rigorous analysis, 15 statements were ultimately retained in the scale. This

developed scale was found to be both reliable and valid. This scale can be used by other investigators in the context of Agricultural Universities or other organizations, with necessary modifications, to measure the attitudes of farmers towards the DAMUs project.

References

1. Chauhan CD, Patel JB. A scale to measure the attitude of member farmers of gram panchayat towards Pradhan Mantri Fasal Bima Yojana. *Guj J Ext Edu.* 2022;31(1):1-5.
2. Edwards AL. Techniques of attitude scale construction. Bombay: Vekils, Feffer and Simons Private Ltd.; 1957.
3. Eysenck HJ, Crown S. An experimental study in opinion attitude methodology. *Int J Attitude Res.* 1949;3:47-86.
4. Guilford JP. Psychometric methods. Bombay: Tata McGraw Hill Publishing Co.; c1954. p. 597.
5. Jagadeeswari B, Vinaya Kumar HM, Patel JB. Attitude of postgraduate students towards research. *Guj J Ext Edu.* 2019;30(1):87-89.
6. Kerlinger FN. Foundations of behavioural research. New Delhi: Surjet Publication; c1976.
7. Maheswaran, Pandya RD. Development of scale on attitude of woman faculties towards professionalism. *Guj J Ext Edu.* 2022;33(2):1-4.
8. Likert R. A technique for measurement of attitude. New York: Psychology; c1932. p. 140.
9. Thurstone LL, Chave EG. The measurement of opinion. *J Abnorm Psychol.* 1928;22:415-30.
10. Thurstone LL. The measurement of attitude. *Am J Sociol.* 1946;39:50.

11. Vinaya Kumar HM, Patel JB, Chauhan NB. Attitude of farmers towards Agricultural Produce Market Committee. *Guj J Ext Edu*. 2018;29(2):224-226.
12. Yeragorla V, Patel JB, Vinaya Kumar HM. Development of a scale to measure the attitude of extension personnel towards e-extension. *Guj J Ext Edu*. 2021;32(1):34-37.