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Development of Scale to Measure Attitude of farmers towards IARI-Voluntary Organizations Partnership Extension Model: a Methodological Approach

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ABSTRACT

Farmers' attitude towards any agricultural development program is a critical input to policy makers in evaluating the proposed program and it will also help them in designing future innovative model. A scale was constructed to measure the attitude of the farmers towards IARI-Voluntary Organizations Partnership Extension Model based on Likert's summative rating technique of scale construction. The scale consisted of final 21 statements including 16 positive and 5 negative statements. Reliability of the scale was calculated by using split half method and reliability coefficient was 0.82. Validity of the scale was tested by experts' judgement. The reliability and validity of the scale indicates its consistency and precision of the results. This scale can be used to measure the attitude of farmers in similar situation beyond the study area with suitable modifications.

Keywords: Approach, Development, Extension, Farmers, Measure attitude, Methodological, Organizations, Partnership

INTRODUCTION

The ICAR- Indian Agricultural Research Institute (IARI) popularly known as Pusa Institute is India's premier national institute for agricultural research, education and extension. The green revolution that brought smiles to millions of Indian faces bloomed from the fields of IARI. The seeds of green revolution in India during 1960s and 1970s were produced and transferred to farmers from the fields of the institute. The institute has given credit for developing innovative extension model of technology transfer to the farmers since its establishment in 1905. IARI-voluntary organizations partnership extension model is one of such example. The model has been designed, tested and validated and being implemented at several location of country since 2009.

IARI has started an innovative outreach programme in 2009 with collaboration of 31 reputed voluntary organizations (VOs) of country, which are actively

engaged in agricultural sector for transfer of technology to the farmers. The aim of this model is quick and easy dissemination of IARI technology in remote areas of country with the help of voluntary organizations (VOs) for the benefit of farmer's community. During Rabi 2015-16, a total of 572 demonstrations on 8 crops were conducted in partnership with Voluntary Organizations (IARI-annual report– 2016). The intensity in terms of number of demonstrations and crops is increasing since 2009. Adoption behaviour for a particular technology is mainly affected by the attitude held by farmers towards it. Attitude has been defined as the degree of positive or negative effects associated with some psychological object (Thurstone, 1929). Thurstone defined "psychological object" as any symbol, phrase, slogan, idea, person or institution towards which people can differ with respect to positive or negative affect. The object for the present study has been conceptualized as IARI-voluntary organizations partnership extension model. The success or failure of any agricultural

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development program to a great extent depends on the attitude of its clientele towards the planned program. By measuring the attitude of farmers towards IARI-voluntary organizations partnership extension model, it will provide input to the policy makers for desirable change in existing system. But many circumstances exist in which researcher is not able to find an adequate scale to measure an important concept. In this type of situation it is essential to develop a new scale which serves purpose of study. Keeping in view all the aforesaid circumstance, an attempt has been made to develop a scale which measures the attitude of farmers towards IARI-voluntary organizations partnership extension model.

MATERIALS AND METHODS

Attitude is an organised predisposition to think, feel, perceive and behave towards a cognitive object. In the present study attitude was operationalized as the degree of positive or negative feeling of farmers towards IARI-voluntary organizations partnership extension model. There are several techniques exist for developing attitude scale but in present study Likert method of summated rating (1932) was followed for construction attitude scale as it offers opportunities to select statements based on their discriminating power. Besides all these, this method is moderately simple and saves time. The method provides unique opportunities of item analysis and selecting items based upon their discriminating power as well as being appropriate. The methodological procedures for Likert's summated rating scale construction are as follows:-

Defining the construct: a construct is a concept with added meaning, deliberately and consciously invented or adopted for a special scientific purpose (Kerlinger, 1973). The construct is a proposed attribute of a person that often cannot be measured directly, but can be assessed using a number of indicators or manifest variables. In the present study construct was attitude of farmers towards IARI-voluntary organizations partnership extension model.

Identification and operationalization of dimensions under the construct: Major dimensions identified under this construct were technology related factors, climate related factors, capacity building factors, linkage factors and other related factors.

Collection and development of items: Items are the statements representing each dimension of construct under study. Items related to the attitude of the farmers towards IARI-voluntary organizations partnership extension model were collected and developed based on review of literature, consultation with the experts from Agricultural Extension Division and Centre for Agricultural Technology Assessment and Transfer and also based on the field experience of researcher. A tentative list of 75 statements consisting 45 positive and 30 negative statements were drafted keeping in view the applicability of statements suited to the area of study.

Editing of items The statements collected were cautiously edited by following the 14 informal criteria suggested by Edwards (1957). Maximum care was taken in editing of statements so that it could measure what is intended. As a result of this, a total of 60 statements were taken out of 75 statements.

RESULTS AND DISCUSSION

Relevancy test of items: Finally the 60 statements on a three point continuum *viz.*, Most relevant, Relevant and Not relevant with the score of 3, 2 and 1, respectively and reverse for the negative statements were sent by Google form survey, post and also handed over personally to the total of 60 judges. The judges comprise the experts from ICAR institutions, Agricultural Extension Division, and scientist of Centre for Agricultural Technology Assessment and Transfer. The judges were also requested to make necessary modifications and addition or deletion of items if they desired so. A total of 40 responses were obtained in time out of 70. The Relevancy Weightage (RW) and Mean Relevancy Score (MRS) were worked out for all the selected indicators individually by using the following formula;

$$\text{Relevancy weightage} = \frac{(\text{Most relevant} \times 3) + (\text{Relevant} \times 2) + (\text{Not relevant}) \times 1}{\text{Maximum possible score}}$$

$$\text{Mean relevancy score} = \frac{(\text{Most relevant} \times 3) + (\text{Relevant} \times 2) + (\text{Not relevant}) \times 1}{\text{Number of judges}}$$

Finally the statements having relevancy weightage of more than 0.80 and mean relevancy score of 2.48 or more than 2.48 were selected for item analysis .As a result, a total of 30 statements selected for the item analysis.

Item analysis: Item analysis is a critical step for the construction of valid and reliable scale by using Likert’s technique of attitude measurement. The purpose of an item analysis is to find those items that form an internally consistent scale and to eliminate those items that do not (Spector, 1992). The item analysis provides information about how well each individual item relates to the other items in the analysis. The 30 items selected through judges opinion were administered to a random sample of 40 farmers from non-sample area. The items are rated on five point continuum ranging from ‘strongly agree’, ‘agree’, ‘undecided’, ‘disagree’ and ‘strongly disagree’ with score of 5, 4, 3, 2 and 1 respectively for positive statements and vice-versa for negative statements. The total score for each individual judge was computed by summing up the scores over all items.

Computation of ‘t’ value: For computation of t value, the 30 items selected through judges opinion were administered to a random sample of 40 farmers from non-sample area. On the basis of total individual score, the judges were arranged in descending order. Upper and lower 25 per cent of the judges i.e. 10 of non-sample area farmers with the highest total score and 10 of non-sample area farmers with the lowest total score were selected. These two groups used as criterion groups to evaluate the individual statements. The critical ratio that is the t value is a measure of the extent to which a given statement differentiates between the high and low groups of respondents for each statement was calculated by using the formula given by Edwards (1957).

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

Where, $\sum(X_H - \bar{X}_H)^2 = \sum(X_H)^2 - \frac{(\sum X_H)^2}{n}$ and

$$\sum(X_L - \bar{X}_L)^2 = \sum(X_L)^2 - \frac{(\sum X_L)^2}{n}$$

\bar{X}_H = Mean score of given statement in high group

\bar{X}_L = Mean score of given statement in low group

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

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

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

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

$$\bar{X}_L = \frac{\sum X_L}{n_L} = \frac{39}{10} = 3.9 \quad \bar{X}_H = \frac{\sum X_H}{n_H} = \frac{48}{10} = 4.8$$

$$\sum(X_H - \bar{X}_H)^2 = \sum(X_H)^2 - \frac{(\sum X_H)^2}{n} = 232 - \frac{(48)^2}{10} = 1.6$$

$$\sum(X_L - \bar{X}_L)^2 = \sum(X_L)^2 - \frac{(\sum X_L)^2}{n} = 153 - \frac{(39)^2}{10} = 0.9$$

$$t = \frac{4.8 - 3.9}{\sqrt{\frac{1.6 + 0.9}{10(10-1)}}} = \frac{0.9}{0.1666} = 5.40$$

Final selection of item: Critical ratio (‘t’- value) of each statement was calculated for the final selection of items. Items or statements were selected on the basis ‘t’

Table 1: Calculation of sample ‘t’ value for evaluating the difference in the mean response to an attitude statement by a high group and a low group

Sample statement	Response category	Low group				High group			
		x	f	fx	fx ²	x	f	fx	fx ²
Model helped to increase awareness of farmers about quality seeds and improved varieties.	Strongly agree	5	0	0	0	5	8	40	200
	Agree	4	9	36	144	4	2	8	32
	Undecided	3	1	3	9	3	0	0	0
	Disagree	3	0	0	0	3	0	0	0
	Strongly disagree	1	0	0	0	1	0	0	0
	Σ		10	39	153	Σ	10	48	232
			n_L	$\sum X_L$	$\sum X_L^2$		n_H	$\sum X_H$	$\sum X_H^2$

Where, X = Score assigned to the response category; f = Frequency

Table 2: List of attitude statements towards IARI-Voluntary Organizations Partnership Extension Model with their respective 't' value

S.No.	Statements	't' value
1	Model helped to increase awareness of farmers about quality seeds and improved varieties.	5.40
2	Model has enhanced the linkage of farmers with research institute and other development agencies.	4.62
3	The model helps in quick and easy dissemination of quality seeds of newly developed varieties.	3.81
4	The model has improved farmers participation and interest in extension programme.	4.33
5	Model helped in increasing the production and productivity of crops by supplying quality seeds of improved varieties to the farmers.	4.04
6	It is better to remain away from this model due to poor availability of improved quality seed *	4.20
7	The model has helped in reduction in cost of cultivation in farming.	2.58
8	Staff are not concerned about feedback and response of farmers*	2.86
9	I think, model is partial towards rich/ progressive farmers.*	3.16
10	Participatory Workshop organized by model helps in resource management at farm level.	3.53
11	Farmers are interested in model and wish to further strengthen it.	2.97
12	Model is actively engaging in developing technologies which helps in drudgery reduction in agriculture.	2.30
13	The model is an innovative approach in disseminating technology and services to farmers.	3.65
14	Models helps in diffusion of climate resilient technologies which helps the farmers to cope up with the climatic variability	2.06
15	Preparing and delivering client-oriented messages by the model helps in managing pest and disease problems at the farmer's field.	3.08
16	Model has given emphasis on supply of seed and neglects other aspects of package of practice.*	3.59
17	Technology supplied through this model are economically viable and ecologically sound thus enhances the overall sustainability of farm.	2.55
18	Training provided by staff to farmers is not based on needs and interest of farmers.*	4.33
19	The demonstration conducted by model has done little in motivating the farmers.*	2.44
20	Model is participatory in its approach.	3.20
21	Model helps in diffusion of good agricultural practices among beneficiaries' farmers.	2.28
22	I feel this model can be replaced with other better mechanism	0.37
23	Scaling up of model helps in effective outreach of technology to the farmers.	1.28
24	Model has provided opportunity to integrate local knowledge into durable and adaptive management tools.	0.56
25	Model helped in providing need and demand-based knowledge and skills to farm households.	0.23
26	I feel proud to be beneficiary of this model.	1.63
27	The model has helped in increasing my farming source of income.	0.14
28	The model helps us to know about modern agricultural package of practices.	1.14
29	The model facilitates farmer's interaction with IARI Scientists or Extension workers/ SMS.	0.90
30	Model provided the platform to farmers to interact with their beneficiary fellow farmers.	0.57

*Shows negative statement

value equal to or, greater than 1.75 as this 't' value significantly differentiating between high and low groups of items. Therefore, 21 statements including 15 positive and 6 negative statements were retained in the final scale for measuring the attitude of farmers towards IARI-voluntary organizations partnership extension model as shown in Table 3.

Standardisation of the scale: For standardisation of the present scale reliability and validity was ascertained using split half method and content validity, respectively.

Reliability of scale: Reliability of the testing instrument is the ability to give consistent, stable and accurate measurement score in repeated testing with same

Table 3: Standardized scale to measure the attitude of farmers towards IARI-Voluntary Organizations Partnership Extension Model

S.No.	Statements	't' value
1	Model helped to increase awareness of farmers about quality seeds and improved varieties.	5.40
2	Model has enhanced the linkage of farmers with research institute and other development agencies.	4.62
3	The model helps in quick and easy dissemination of quality seeds of newly developed varieties.	3.81
4	The model has improved farmers participation and interest in extension programme.	4.33
5	Model helped in increasing the production and productivity of crops by supplying quality seeds of improved varieties to the farmers.	4.04
6	It is better to remain away from this model due to poor availability of improved quality seed *	4.20
7	The model has helped in reduction in cost of cultivation in farming.	2.58
8	Staff are not concerned about feedback and response of farmers*	2.86
9	I think, model is partial towards rich/ progressive farmers.*	3.16
10	Participatory Workshop organized by model helps in resource management at farm level.	3.53
11	Farmers are interested in model and wish to further strengthen it.	2.97
12	Model is actively engaging in developing technologies which helps in drudgery reduction in agriculture.	2.30
13	The model is an innovative approach in disseminating technology and services to farmers.	3.65
14	Models helps in diffusion of climate resilient technologies which helps the farmers to cope up with the climatic variability	2.06
15	Preparing and delivering client-oriented messages by the model helps in managing pest and disease problems at the farmer's field.	3.08
16	Model has given emphasis on supply of seed and neglects other aspects of package of practice.*	3.59
17	Technology supplied through this model are economically viable and ecologically sound thus enhances the overall sustainability of farm.	2.55
18	Training provided by staff to farmers is not based on needs and interest of farmers.*	4.33
19	The demonstration conducted by model has done little in motivating the farmers.*	2.44
20	Model is participatory in its approach.	3.20
21	Model helps in diffusion of good agricultural practices among beneficiaries' farmers.	2.28

*Shows negative statement

instrument. It helps to assess the homogeneity of items in scale. The scale was administered to a new group of 40 farmers of non sample area.

Reliability of the present scale was calculated by using split half method in which a scale is divided into two halves based on even and odd number of statements. The Pearson product moment correlation between odd and even scores was 0.70. This coefficient indicates split half reliability of scale. To adjust the split half reliability in to full test reliability, Spearman- Brown (1910) prophecy formula was used which is as follows;

$$R = \frac{2r}{1+r} = \frac{2 \times 0.70}{(1+0.70)} = 0.82$$

Where, R= Reliability coefficient of the whole scale

r = Estimated correlation between two halves (Pearson r)

The whole test reliability was found to be 0.82 and found to be significant at 1 per cent level of significance. Split half method is a popular method of assessing reliability of a test primarily for the advantage of single administration of the test and use of one sample. The main limitation of

Split half method has been that it does not provide the same information as the correlation between two forms given at different times (Cronbach, 1946). A solution to the problem is provided by Cronbach's alpha which is interpreted by many researchers as the average of all possible split-half correlations (Cortina, 1993). Cronbach's alpha also assumes that average covariance among non- parallel items is equal to the average covariance among all parallel items. Thus in present study standardised Cronbach's alpha also used to get more stability and accuracy with the following formula:

$${}^a\text{standardized} = \frac{Kr}{[1 + (K - 1)r]}$$

Where, K = Number of items in scale

r = Mean of the K (K-1)/2 non-redundant correlation coefficients

The value of Cronbach's alpha calculated and found to be 0.882 which means scale is consistent in measurement.

Validity of scale: Validity means ability of any instrument to measure what one intended to measure. The developed scale was tested for content validity. According to Kerlinger (1987) content validity of scale is the representative or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument. The content validity of the scale was determined through a group of experts. Since the items selected were from the universe of content, it was ensured that items covered the various aspects of attitude of the farmers towards IARI-voluntary organizations partnership extension model.

The content validity method was applied to test whether the developed scale could discriminate between the individuals who have favourable attitude towards IARI-voluntary organizations partnership extension model and those who do not. The pilot testing exposed that the scale could differentiate the individuals having favourable attitude from that of unfavourable attitude towards model. As the scale value difference for almost all the statements included had a very high discriminating value, it seemed reasonable to accept the scale as valid measure of the attitude. Thus it ensured a fair degree of validity.

Administration of the scale: The final scale which would measure the attitude of farmers towards IARI-voluntary organizations partnership extension model consisted of 21 statements. The scale can be administered on a five point continuums viz., strongly agree, agree, undecided, disagree and strongly disagree with a score of 5,4,3,2 and 1, respectively for positive statements and reverse scoring for negative statements. Therefore, the overall possible attitude score of the individual respondent towards IARI-voluntary organizations

partnership extension model could range from 21-105. The high score of scale will represent the favourable attitude of farmers towards model.

CONCLUSION

Attitude is a multifaceted component of personality, beliefs, values, behaviours, and motivations. It play vital role in providing internal cognitions or beliefs and thoughts about people and objects and help us to behave in a particular way toward an object or person. The reliability and validity value of the scale show the precision and consistency of the results. The attitude of farmers towards IARI-voluntary organizations partnership extension model will also help the policy makers in designing future innovative extension model. Further, this scale can be used to measure the attitude of farmers in similar situation beyond the study area with suitable modifications.

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