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Development and standardization of a scale to measure impact of ATIC on its beneficiaries

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Abstract

A method used for evaluating or ordering entities based on quantitative characteristics or attributes is known as scaling. "Procedure for assigned numbers or other symbols to a property of objects in order to impart some of the characteristics of numbers to the properties in question" is the definition of scaling. The present investigation, was conducted in the region of Marathwada within 2021 and 2022, planned at developing and standardize a scale to measure the impact of Agricultural Technology Information Centres (ATIC) among the beneficiaries. The Agricultural Technology Information Center (ATIC) impact scale was developed and standardised according to the Likert (1932) summated rating method. 65 statements, expressing the impact of Agricultural technology information centre by Vasantao Nike Marathwada Krushi Vidyapeeth, Parbhani on farmers have been collected under four components. These statements were edited on the basis of criteria suggested by Thurstone (1946), Likert (1932) and Edward (1957). Total 42 statements were retained after editing and sent to 160 judges to determine the relevancy. Out of that 103 judges responded. After calculation of relevancy score, t-value calculation. Test-retest method of reliability final scale contain 30 statements to measure the impact of ATIC Scheme. The scale contain three continuum i.e. 'Strongly Agree' to "Strongly Disagree". The scoring pattern adopted was 3 to 1, in which, 3 weighs to Strongly Agree response, 2 to Partially Agree response, 1 to strongly disagree response for positive statement and negative statement, the scoring pattern was reversed.

Keywords: Scale, impact, likert, ATIC, Marathwada, reliability, validity

Introduction

Agricultural Technology Information Centre (ATIC)

The main role of agricultural extension education is to communicate the latest agricultural technology generated from state, central Agriculture Universities and research station to the farmers. Hence, research-extension-farmers (R-E-F) linkage is the essential element of agricultural extension. Indian farmers need to be well informed and well trained in the field of management therefore now the farmers are needed to replace traditional practices by using modern information technologies with the help of agricultural technology information centre.

For effective Dissemination of Latest agriculture information National Agriculture Technology Project (NATP) under the financial assistance of the World Bank was launched by Indian council of Agricultural Research (ICAR), New Delhi.

Establishment of Agricultural Technology Information Center (ATIC) under NATP has provided an efficient mechanism for information dissemination. ATIC acts as a single window system for farmers.

Objective

This research was conducted to measure Impact of ATIC, VNMKV on its beneficiary. A scale has been developed to

measure the Impact of ATIC on its beneficiaries.

Materials and Methods

The present investigation was conducted to measure the impact of ATIC among its beneficiaries. In order to measure the Impact of ATIC an impact scale was developed by adopting method of summated rating suggested by Likert (1932) [4]. The details of the steps which followed during developing and standardization of the scale are mentioned as below.

Identification of dimension

ATIC is the dimension related to impact of Agricultural Technology Information Centre on its beneficiaries, in this research which is identified on the basis of review of literature and discussion with the experts who is specialist in extension education.

Collection of items and editing

There are total 65 statements, expressing the impact of Agricultural technology information centre by Vasantao Nike Marathwada Krushi Vidyapeeth, Parbhani on its beneficiaries have been gathered from available literature, websites and in discussion with the specialists in the area of extension education and they were edited on the basis of

criteria suggested by Thurstone (1946) [3], Likert (1932) [4] and Edward (1957) [1]. Out of 65 statements, 42 statements were remained after editing. These statements were found to be non-ambiguous and non-factual.

Relevancy test

The collected 42 statements, were sent to the 160 judges which are Expert, Specialist in the disciplines of Agricultural Extension which are senior faculty members from the State and Central Agricultural Universities, Research stations and Subject Matter Specialists of the

Krishi Vigyan Kendras, Extension Scientists from the ICAR. They were requested to show their responses regarding each of the statements on a three point continuum namely, 'most relevant' 'relevant' and 'not relevant' with the score of 3, 2, and 1, respectively. Also request to give their opinion. A total of 103 judges responded to the appeal and returned the duly filled in schedules. On the basis of the responses received, the relevancy weight age, relevancy percentage and mean relevancy score for each statement were calculated through following formulae these value presented in Table 1.

Table 1: List of total statements considered for scale construction to measure the impact of agricultural technology information centre on its beneficiaries

Sr. No	Statements	Relevancy		
		RW	RP	MRS
Economic Impact				
1	ATIC helps in keeping agricultural production at a sustainable level	0.80894	80.8943	2.68919
2	ATIC helps to improve personal and socio-economic status of beneficiaries.	0.7561	75.6098	2.51351
3	Standard of living of farmers improved due to increase in annual income through benefits of ATIC programme	0.78049	78.0488	2.59459
4	Annual income of beneficiaries was increased due to implementation of ATIC programme	0.76423	76.4228	2.5454
5	Increase in income has resulted in increase in ability of rural households to purchase food grains other essential commodities education and healthcare	0.76829	76.8293	2.55405
6	Improved their per capita income and help to lead a better standard of living	0.76423	76.4228	2.54054
7	ATIC would generate new employment opportunities in rural areas	0.6166	61.666	1.85946
8	ATIC training helps to start Agro based business for rural youth	0.78455	78.4553	2.60811
9	Better seasonal crop management is possible due to the ATIC agro advisory services.	0.85366	85.3659	2.83784
10	Proper technical guidance through ATIC lessen economic burden of farmers	0.82114	82.1138	2.72973
Technological Impact				
1	Communication aids, like radio, TV, Internet, mobile phone, computer etc. helps to communicate beneficiaries regarding benefits about ATIC	0.84959	84.9593	2.82432
2	Farm mechanization is promoted due to ATIC	0.82927	82.9268	2.75675
3	ATIC helps farmers in proper insect pest and disease management.	0.83333	83.3333	2.77027
4	Weed management can be done on time with help of ATIC	0.76423	76.4228	2.54054
5	Information about livestock management helps the farmer to take care of his livestock	0.81301	81.3008	2.7027
6	Farm operations like sowing, harvesting, marketing etc can be performed well on time with the help of weather advisory services	0.84146	84.1463	2.7973
7	Timely pest and disease forecasting leads to proper crop protection measures	0.84146	84.1463	2.7973
8	ATIC helps farmers in effective annual planning of crop cultivation practices	0.94144	94.1441	2.82432
9	ATIC reduces frequency of sprays in crops	0.6433	65.3333	1.96217
10	Weather advisory delivered through ATIC can avert crop losses	0.8252	82.5203	2.74324
11	Proper input management reduces economic losses of the farmers	0.81301	81.3008	2.7027
12	Proper irrigation management reduces economic issues of the farmers	0.76423	76.4228	2.54054
13	Advanced technology provided in ATIC programme increases the productivity of crops.	0.81301	81.3008	2.7027
Marketing Impact				
1	ATIC provides information of different university products, their use and sales (seeds, nursery, implements, bio fertilizers, publications)	0.86179	86.1789	2.86486
2	Higher social involvement can be achieved by participating in the Agril. Exhibitions, Agro expositions, Agri Tour, Field Tour etc.	0.82114	82.1138	2.72973
3	The training conducted by ATIC are useful in motivating the farmers towards adoption of the improved agricultural practices.	0.84553	84.5528	2.81081
4	Training programmers of ATIC help in increasing knowledge level of farmers, farm women and rural youth.	0.84553	84.5538	2.81081
5	The technical guidance through training programme can not only improve the social but the economic status of the Beneficiaries	0.76423	76.4228	2.54054
6	ATIC Training generate self confidence among beneficiaries for better results	0.81707	81.7073	2.71622
7	ATIC helps to create Farmers Help Group for processing and marketing their produce	0.82114	82.1138	2.72973
Social Impact				
1	ATIC is a new concept in Agriculture	0.77642	77.6423	2.58108
2	ATIC help to improve the farm educational level of rural people	0.79675	79.6748	2.64865
3	Standard of living of family increased due to benefits derived by ATIC	0.6166	61.666	1.85231
4	Technology helps in creating co-operation, co-ordination among beneficiaries of ATIC	0.79268	79.2683	2.63514
5	Shifting from traditional farming to new technology farming is very difficult	0.6333	63.333	1.90243
6	The migration of beneficiaries from rural areas to urban areas have been reduced due to receiving benefit of ATIC	0.6266	62.6666	1.88105
7	For dryland agriculture in Marathwada region ATIC is boon for small, marginal beneficiaries	0.76016	76.0163	2.52703
8	The participation of beneficiaries in socio-political programmers were increased due to ATIC	0.5966	59.666	1.79234
9	Participation in social welfare through political party increased	0.6233	62.333	1.87548
10	Beneficiaries developed relations with other beneficiaries because of more social and political participation	0.6466	64.666	1.94621
11	Beneficiaries able to motivate and direct others through social and political participation about ATIC programmers	0.6533	65.333	1.96217
12	Knowledge gained through participation in ATIC and relationship build up among the community	0.6033	60.333	1.81308

RW: Relevancy weightage, RP: Relevancy Percentage, MRS: Mean Relevancy Score

I. Relevancy weightage

Following formula was used to work out the relevancy.

$$RW = \frac{MRR \times 3 + RR \times 2 + NRR \times 1}{MOS (3 \times 103 = 309)}$$

Where,

RW= Relevancy Weightage

MRR = Most Relevant Response

RR = Relevant Response

MOS = Maximum Obtainable Score

II. Relevancy percentage

Relevancy percentage of each statement was computed by using the following formula.

$$RP = \frac{OS}{MOS (3 \times 103 = 309)}$$

Where,

RP = Relevancy Percentage

OS = Obtained Score

MOS = Maximum Obtainable Score.

III. Mean relevancy score

For calculating the mean relevancy score of each item,

following formula was used.

$$MRS = \frac{MRR \times 3 + RR \times 2 + NRR \times 1}{\text{No. of judges (103)}}$$

Where,

MRS = Mean Relevancy Score

MRR = Most Relevant Response

RR = Relevant Response

NRR = Not Relevant Response

Using these three criteria, the items were screened for their relevancy. Finally, the statements having, more than 0.66 relevancy weightage, more than 66.00 per cent relevancy percentage and more than 2 mean relevancy score were considered for the inclusion in item analysis. Thus, 30 statement were retained out of 65 statements.

Calculation of ‘t’ value (item analysis)

The ‘t’ value which is a measure of the extent to which a given statement differentiates between the high and low groups of the ATIC beneficiaries for each statements was analyzed through the formula suggested by Edward (1957) [1].

After calculating the ‘t’ value for all the 32 statements, statements with greater than 1.75 and highest ‘t’ value were finally selected for the scale. The lists of statement and their ‘t’ values are expressed in Table 2.

Table 2: List of total Statements of scale with their ‘t’ values to measure the impact of of agricultural technology information centre on its beneficiaries

Sr. No	Statements	‘T’ Value
A) Economic Impact		
1	ATIC helps in keeping agricultural production at a sustainable level	1.9222
2	ATIC helps to improve personal and socio-economic status of beneficiaries.	1.8784
3	Standard of living of farmers improved due to increase in annual income through benefits of ATIC programme	1.8163
4	Annual income of beneficiaries was increased due to implementation of ATIC programme	1.575
5	Increase in income has resulted in increase in ability of rural households to purchase food grains other essential commodities education and healthcare	2.1036
6	Improved their per capita income and help to lead a better standard of living	1.5551
7	ATIC training helps to start Agro based business for rural youth	1.8500
8	Better seasonal crop management is possible due to the ATIC agro advisory services.	1.8163
9	Proper technical guidance through ATIC lessen economic burden of farmers	2.0635
B) Technological Impact		
1	Communication aids, like radio, TV, Internet, mobile phone, computer etc. helps to communicate beneficiaries regarding benefits about ATIC	1.9222
2	Farm mechanization is promoted due to ATIC	1.9393
3	ATIC helps farmers in proper insect pest and disease management.	2.0617
4	Weed management can be done on time with help of ATIC	2.0416
5	Information about livestock management helps the farmer to take care of his livestock	2.0582
6	Farm operations like sowing, harvesting, marketing etc. can be performed well on time with the help of weather advisory services	2.0230
7	Timely pest and disease forecasting leads to proper crop protection measures	1.8163
8	ATIC helps farmers in effective planning of crop cultivation practices	1.9950
9	Weather advisory delivered through ATIC can avert crop losses	1.9423
10	Proper input management reduces economic losses of the farmers	1.8230
11	Proper irrigation management reduces economic issues of the farmers	1.9950
12	Advanced technology provided in ATIC programme increases the productivity of crops.	1.8163
C) Marketing Impact		
1	ATIC provides information of different university products, their use and sales (seeds, nursery, implements, bio fertilizers, publications)	3.2334
2	Higher social involvement can be achieved by participating in the Agril. Exhibitions, Agro expositions, Agri Tour, Field Tour etc.	2.9327

3	The training conducted by ATIC are useful in motivating the farmers towards adoption of the improved agricultural practices.	2.0233
4	Training programmes of ATIC help in increasing knowledge level of farmers, farm women and rural youth.	1.9423
5	The technical guidance through training programme can not only improve the social but the economic status of the Beneficiaries	1.7995
6	ATIC Training generate self confidence among beneficiaries for better results	1.9821
7	ATIC helps to create Farmers Help Group for processing and marketing their produce	1.9222
D)	Social Impact	
1	ATIC is a new concept in Agriculture	1.75
2	ATIC help to improve the farm educational level of rural people	1.9222
3	Technology helps in creating co-operation, co-ordination among beneficiaries of ATIC	1.9222
4	For dry land agriculture in Marathwada region ATIC is boon for small, marginal beneficiaries	2.0582

These 32 statements undergo item analysis in the items based on the extent to which they can differentiate the beneficiaries with high impact than the beneficiaries with low impact of ATIC on beneficiaries in Marathwada region. From non-sample areas, 60 farmers had been selected for this. On a three-point continuum which range from "Strongly Agree" to "Strongly Disagree", those who responded were requested to state the extent to which they agreed or disagreed with each item. The chosen scoring scheme was 3 to 1, with 3 weights indicating a "Strongly Agree" response, 2 expressing a partially agree response, and 1 expressing a "Strongly Disagree". Reaction for both positive and negative statements. The scoring pattern was reversed. The respondents have been arranged in descending order according to their overall scores. Because both of these categories act as criteria groups to evaluate each of the respondents, the top 25% of respondents with their total score were considered to have in the high group and the bottom 25% as the low group. Provide criterion groups in terms of evaluating the individual statements as suggested by Edwards (1957) [1]. Thus out of 60 beneficiaries to whom the items were administered for the item analysis, 15 beneficiaries with lowest, 15 with highest scores were used as criterion groups to evaluate individual items.

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

Where,

$$\sum(X_H - \bar{X}_H)^2 = \sum X_H^2 - (X_H)^2$$

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

XH = The mean score on given statement of the high group

XL = The mean score on given statement of the low group

XH² = Sum of squares of the individual score on a given statement for high group

XL² = Sum of squares of the individual score on a given statement for low group

XH = Summation of scores on given statement for high group

XL = Summation of scores on given statement for low group
 n = Number of respondents in each group
 \sum = Summation

Reliability test-retest method

Test-retest was used to determine the scale's reliability. The final 30 statements, which define the impact of the agricultural technology information centre on beneficiaries, were presented with to a three-point continuum to a fresh group of sixty beneficiaries who which were not included in the actual sample. After 15 days interval the scale was again administered to the same respondents and thus two sets of scores were obtained. For both sets, the correlation coefficient was calculated. The impact scale was suitable for administering to extension staff due to its stable and reliable measurement, as indicated by the significant "r" value (0.742) at the 0.01 level of probability.

Content validity

The scale's content validity was tested. The content validity is the sampling or representative adequacy of the content, the matter and the topics of a measuring instrument. This method was used in the present scale to evaluate the content validity of the scale. As the content of the impact was thoroughly covered the entire field of agricultural technology information centre on beneficiaries through literature and expert opinion, it was assumed that present scale satisfied the content validity. 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 a valid measure of the impact. Thus, ensuring a fair degree of content validity.

Administration of scale

The three-point continuum, which ranges from "Strongly Agree" to "Strongly Disagree," was used for administering the scale. It measures the degree of relevancy or not relevant. Three points were allocated for an "Strongly Agree" answer, two for a Partially Agree response, and one for a strong "Strongly Disagree," response for both positive and negative statements. The scoring scheme used was three to one.

Table 3: List of total selected statements for final scale construction to measure the impact of agricultural technology information centre on its beneficiaries

Sr. No	Statements	SA	PA	SD
		3	2	1
A)	Economic Impact			
1.	ATIC helps in keeping agricultural production at a sustainable level			
2.	ATIC helps to improve personal and socio-economic status of beneficiaries.			
3.	Standard of living of farmers improved due to increase in annual income through benefits of ATIC programme			
4.	Increase in income has resulted in increase in ability of rural households to purchase food grains other essential commodities education and healthcare			
5.	ATIC training helps to start Agro based business for rural youth			
6.	Better seasonal crop management is possible due to the ATIC agro advisory services.			
7.	Proper technical guidance through ATIC lessen economic burden of farmers			
B)	Technological Impact			
1.	Communication aids, like radio, TV, Internet, mobile phone, computer etc. helps to communicate beneficiaries regarding benefits about ATIC			
2.	Farm mechanization is promoted due to ATIC			
3.	ATIC helps farmers in proper insect pest and disease management.			
4.	Weed management can be done on time with help of ATIC			
5.	Information about livestock management helps the farmer to take care of his livestock			
6.	Farm operations like sowing, harvesting, marketing etc can be performed well on time with the help of weather advisory services			
7.	Timely pest and disease forecasting leads to proper crop protection measures			
8.	ATIC helps farmers in effective annual planning of plant crop cultivation practices			
9.	Weather advisory delivered through ATIC can avert crop losses			
10.	Proper input management reduces economic losses of the farmers			
11.	Proper irrigation management reduces economic issues of the farmers			
12.	Advanced technology provided in ATIC programme increases the productivity of crops.			
C)	Marketing Impact			
1	ATIC provides information of different university products, their use and sales (seeds, nursery, implements, bio fertilizers, publications)			
2	Higher social involvement can be achieved by participating in the Agril. Exhibitions, Agro expositions, Agri Tour, Field Tour etc.			
3	The training conducted by ATIC are useful in motivating the farmers towards adoption of the improved agricultural practices.			
4	Training programmes of ATIC help in increasing knowledge level of farmers, farm women and rural youth.			
5	The technical guidance through training programme can not only improve the social but the economic status of the Beneficiaries			
6	ATIC Training generate self confidence among beneficiaries for better results			
7	ATIC helps to create Farmers Help Group for processing and marketing their produce			
D)	Social Impact			
1	ATIC is a new concept in Agriculture			
2	ATIC help to improve the farm educational level of rural people			
3	Technology helps in creating co-operation, co-ordination among beneficiaries of ATIC			
4	For dryland agriculture in Marathwada region ATIC is boon for small, marginal beneficiaries			

SA: Strongly Agree, PA: Partially Agree, SD: SD is agree

Conclusion

The Agricultural Technology Information Center helps to establish strong connections between various research stations, line departments, and users of new technology. It also provides a "Single Window Delivery System" for seed, planting material, processed products, biofertilizers, biopesticides, equipment, and literature. Therefore, policy makers are able to benefit from this scale. The validity and reliability of the scale indicates how consistently the results are attained.

Recommendation: The scale developed in the present study to assess the impact of ATIC will be useful to researchers interested in similar types of studies in the future.

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Conflict of interest

“No conflict of Interest” among researcher.

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