

**RESEARCH ARTICLE :**

Construction and validation of a scale to study the farmers' knowledge of innovative techniques

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07.03.2015;

Revised :

21.03.2015;

Accepted :

07.04.2015

SUMMARY : In this research paper the construction and validation of a scale to measure the knowledge for the adopters and non adopters of Uttar Pradesh Diversified Agricultural Support Project (UPDASP) was developed and designed. The scale filled the need expressed due to investigation as a research instrument that has sound psychometric properties. Change in technological development can be observed in terms of knowledge gained by individual. It was believed that unless one has knowledge of the kind of the programme being implemented, it will not make one look for the programme, as to develop the required attitude for that. Therefore, gaining knowledge that related to personal profile of the respondent was one of the pre requisite for the subsequent development. It was a challenge to develop a scale to measure existing knowledge of respondents about Uttar Pradesh Diversified Support Project (UPDASP). Covering all aspect of these challenges a study was conducted in western Uttar Pradesh. An interview schedule was used to collect data from a sample of 200 farmers. Out of 200 farmers 100 were adopters or beneficiaries and other 100 were non-adopters or non beneficiaries of Uttar Pradesh Diversified Support Project (UPDASP). For development of knowledge scale fourteen open ended question were made to ask the respondents with taking proper care covering all aspect of Uttar Pradesh Diversified Agricultural Support Project. To gain relevancy of the questions the item difficulty and item discrimination test was processed with a mathematical formula. After completing the process only ten questions were found to be retained and rest four were discarded. Retained question were used in developing scale of knowledge after passing reliability and validity test with the help of split half technique, Karl Pearson formula and "t" test of statistical importance.

KEY WORDS:

Respondents,
Knowledge scale,
Item difficulty, Item
discrimination,
Reliability test,
Validity test

How to cite this article : Bhadauria, Jitendra Singh (2015). Construction and validation of a scale to study the farmer's knowledge of innovative techniques. *Agric. Update*, **10**(2): 134-138.

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BACKGROUND AND OBJECTIVES

The research was carried out in selected blocks of Baghpat district Uttar Pradesh for collecting related information through direct interview. The detailed method and procedures adopted for the study in the terms of locale of research, sampling technique and variables

taken in this study, development of scales, measurement of variables, data collection and statistical analysis. Knowledge was very important variables in the study. Extension teaching was carried out with a purpose of bringing about desirable changes in the knowledge of its clients. That knowledge was mostly related to the subject matter of Uttar

Pradesh Diversified Support Project (UPDASP) and one of the most important objectives of the Uttar Pradesh Diversified Support Project (UPDASP) was to impart knowledge in the area of diversification and intensification and empowerment of farmers and thereby help them to increase their production effectively for becoming them self reliant. Therefore, it was necessary to construct a reliable and valid scale to measure the knowledge of farmers regarding Uttar Pradesh Diversified Support Project (UPDASP).

RESOURCES AND METHODS

District 'Baghat' in western Uttar Pradesh was selected purposively to investigate different aspects of Uttar Pradesh Diversified Agricultural Support Project (UPDASP). Two blocks namely Baghat and Pilana were selected by using simple random method of sampling. Ten villages were selected from each block using simple random method of sampling. Thus, a total of twenty villages were selected for this study. Lists of villagers were obtained from the Village Development Officer (VDO) for the selection of respondents. These lists of villagers divided into two parts, adopters and non-adopters. Five adopters and five non-adopters were selected randomly from each village, total ten respondents from each village were selected. Thus, only one hundred adopters and one hundred non-adopters were selected for the study.

Construction of scale to measure knowledge level selection of items made by developing fourteen open ended questions for measuring the knowledge of

diversifiers (Adopters) and non diversifiers (non adopters) regarding Uttar Pradesh Diversified Agricultural Support Project (UPDASP). The questions were made with utmost care that was based only on that much knowledge which the farmers were expected to have. Also care was taken to see that the sentences were kept simple, easily understandable and carrying only one idea. In case of answering the question, the correct answer was given a score of '1' and false answer with '0'. Thus, a total score was obtained for every respondent and for every item. These score were then subjected to item analysis comprising of item difficulty and item discrimination. If an item was found to discriminate negatively means usually revised or discarded and items selected having difficulty level 20 to 80 means was retained, whereas rest items were discarded.

OBSERVATIONS AND ANALYSIS

Knowledge of an individual is direct related to the profile in the society and also effect the adoption of any technology. So this part was devoted to describe difficulty level of knowledge of adopters (diversifiers) and non adopters (non-diversifiers). The difficulty level of the test item provides some was doing its job. Since the major purpose of achievement was to provide a basis for evaluation. It was necessary that the test discrimination between two group of farmers who have learned much about advantages of being in the scheme and those who have not learned so much. A measure of difficulty level for a test item may be obtained on a basis of obtained

Table 1 : Showing items with their item difficulty and item discrimination for knowledge scale

Sr. No.	Items	Item difficulty	Item discrimination
1.	When UPDASP was launched	0.15	0.15
2.	Meaning of UPDASP	0.24	0.20
3.	UPDASP is behaviourly/broadly related to an employment programme	0.53	0.15
4.	UPDASP is related to technology improvement programme	0.60	0.18
5.	UPDASP is project for all round development of the farmers	0.36	0.14
6.	UPDASP is financed by World Bank	0.16	0.40
7.	UPDASP increase per capita income of the farmers	0.39	0.17
8.	UPDASP improve standard of living of the farmers	0.53	0.33
9.	UPDASP provide facility of roads	0.61	0.21
10.	UPDASP provide the facilities of Pashu Paith, veterinary service etc.	0.36	0.28
11.	UPDASP ensure the availability of finance to the farmers	0.15	0.05
12.	How many crops comes under this project.	0.12	0.02
13.	UPDASP is an innovation	0.78	0.10
14.	Adoption of UPDASP regulated through S.H.G.	0.70	0.26

data for the highly and lower groups (Table 1). For testing the higher and lower group, the score papers for all the respondents were arranged in descending order of total scores. Then 25 per cent from the top and 25 per cent from the bottom were selected as high and low groups. So there were 50 in the higher group and 50 in the lower group. The difficulty index was computed by dividing the respondents passing the item in lower group and high group by the total number of high and low group. It could be represented by the following formula :

$$\text{Item difficulty} = \frac{a + b}{n_1 + n_2}$$

where

a = Number of respondents passing in the high group.

b = Number of respondents passing in the low group.

n_1 = Total number of respondent in the high group.

n_2 = Total number of respondent in low group.

The smallest possible value of the index was zero and the largest value was one. Thus, larger the value, the easier the item.

Item discrimination was a measure of discriminatory power may also be obtained on the basis of the high and low group. The discrimination index may be computed by counting the wrong answer to the item was the low group (W_L), subtracting the number of wrong answer in the high group (W_H) and divided by the number of respondents in the high or low group. The discrimination index was formulated as :

$$\text{Discrimination index} = \frac{W_L - W_H}{N}$$

where,

W_L – Wrong answer to the item in low group.

W_H – Wrong answer to the item in the high group.

If an item was found to discriminate negatively it was usually revised or discarded. However, a negative discrimination index may be the result of an error in the scoring key for the test. The cutting an arbitrarily chosen were 80 and 20 for high and low respective scores according to the difficulty level.

According to above table items selected having difficulty level 20 to 80. These items would be retained,

Table 2 : Showing the items discarded with the item difficulty discrimination

Sr. No.	Items	Difficulty level	Discrimination
1.	When UPDASP was launched	0.15	0.15
2.	UPDASP is financed by World Bank	0.16	0.40
3.	UPDASP ensure the availability of finance to the farmers	0.15	0.50
4.	How many crops comes under this project	0.12	0.20

Table 3 : Showing the retained items with their item difficulty and item discrimination

Sr. No.	Items	Item difficulty	Item discrimination
1.	Meaning of UPDASP	0.24	0.20
2.	UPDASP is broadly related to an employment programme	0.53	0.15
3.	UPDASP is related to technology improvement programme	0.60	0.18
4.	UPDASP is project for all round development of the farmers	0.36	0.14
5.	UPDASP increase per capita income of the farmers	0.39	0.17
6.	UPDASP improve standard of living of the farmers	0.53	0.33
7.	UPDASP provide facility of roads	0.61	0.21
8.	UPDASP provide the facilities of Pashu Paith, veterinary service etc.	0.36	0.28
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Table 4 : Showing total score, mean score, variance, standard deviation and calculated value for knowledge scale

Sr. No.	Particulars	Adopters	Non adopters
1.	Total score	685	375
2.	Mean score	6.85	3.75
3.	Variance	1.74	1.77
4.	Standard deviation (S.D.)	1.16	1.34
5.	Calculated value of "t"	17.22	–

whereas rest items would be discarded. Table 2 showed the discarded items. Table 3 shows the retained items for the study.

Based on Item difficulty and item discrimination only ten items were retained in the scale for further study. To test the reliability of the knowledge scale “split half” technique was used. Sentences in each score paper were splitted into two halves on the basis of odd and even number of statement and their total score was added. Thus, there were two sets of scores. One of odd statements and another of even statements. The Karl Pearson formula was used for obtaining correlation coefficient between two sets. From correlation co-efficient of two sets (Reliability of half test), reliability co-efficient of whole test was then estimated by Spearman Brown formula :

$$r_{1.1} = \frac{2r_{1.2}}{1+r_{1.2}}$$

where

X = Odd statement (Variables)

Y = Even statement (Variables)

$r_{1.2}$ = Reliability co-efficient of half test (Correlation Co-efficient)

$r_{1.1}$ = Reliability co-efficient of whole test.

Reliability co-efficient of whole test was found 0.63 that less than 1. Thus, it was concluded that scale was reliable for use. The validity of the scale was calculated by comparing the score of adopters and non adopters. “t” test was used and then value of “t” test was compared with table value 1.75.

The calculated value of “t” was found 17.22 and that was more than tabulated value of “t” (1.75). Hence, there was difference in significant way (Table 4). Thus, the scale was valid for measuring knowledge level about Uttar Pradesh Diversified Support Project (UPDASP) regarding rural development.

Conclusion :

The study revealed that the scale of measuring knowledge was developed on the basis of reliability co-efficient of whole test that was found 0.63 and that was less than 1.00. Thus, it was concluded that scale was reliable for use. In same way study also observed that scale was valid on the basis of statistical test “t” presented calculated value of 17.22 and that was more than table value of 1.75. Thus, the scale was valid for measuring knowledge level about Uttar Pradesh Diversified Support

Project (UPDASP) regarding rural development by adopting diversification and intensification in agriculture.

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