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Scale to Measure the Utilization of Farm Implements by the Farmers

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ABSTRACT

Farm mechanization helps to enhance the overall productivity and production with the lowest cost of production. In the context of increasing commercialization of agriculture, mechanization is very important. But all the farmers may not utilize the improved farm implements at the same time and at the same rate. It is very important to know the extent of utilization of farm implements by the farmers. However, a systematic evaluative study on utilization of farm implements by the farmers unfortunately has not drawn sufficient research attention which again is due to non availability of a scale to correctly measure the farm implements utilization. Hence, an effort was made to construct and standardize a scale to correctly measure the utilization of farm implements by the farmers. The study was conducted in Newasa, Rahuri, Karjat and Pathardi tahsils of Ahmednagar district and Pandharpur, Malshiras, Karmala and Mohol tahsil of Solapur district. The method of identification of the parameters, framing and scoring of the parameters and relevancy analysis was followed in the construction of the scale along with testing of its reliability and validity. The scale developed was found to be highly reliable and valid to measure the utilization of farm implements by the farmers. Also it can be used to measure the extent of utilization of farm implements by the farmers beyond the study area with suitable modifications if required.

Key words: Relevancy, reliability, validity, utilization, farm implements, scale

INTRODUCTION

Agricultural mechanization implies the use of various power sources and improved farm tools and equipments, for reducing the drudgery of the human beings and draught animals, enhancing the cropping intensity, precision and timelines of efficiency in utilization of various crop inputs and reducing the losses at different stages of crop production.

Farm mechanization helps to enhance the overall productivity and production with the lowest cost of production. Farm mechanization can help in 15-20 per cent saving in seeds, 15-20 per cent saving in fertilizers, 5-20 per cent increase in cropping intensity, 20-30 per cent saving in time, 20-30 per cent reduction in manual labour and 10-15 per cent overall increase in farm productivity (Gautam and Kumar, 2014).

In the context of increasing commercialization of agriculture, mechanization is very important. There has been considerable increase in the use of farm machinery in Indian Agriculture as it contributed to the increase in output due to timeliness of operations and increasing precision in input application. But all the farmers may not utilize the improved farm implements at the same time and at the same rate. It is very important for the policy maker, researcher, extension functionaries, implements manufacturers and the persons who are engaged in the same to know the extent of utilization of farm implements by the farmers. However, a systematic evaluative study on utilization of farm implements by the farmers unfortunately has not drawn sufficient research attention which again is due to non availability of a scale to correctly measure the farm implements utilization. Hence, an effort was made to construct and standardize a scale to correctly measure the utilization of farm implements by the farmers. This was a part of larger Ph.D. study on 'Utilization of Farm implements by the Farmers' conducted at Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra (India) during 2012-2015 (Patil, 2015).

Objective of the Study

The main objective of the study was to construct and standardize a scale to correctly measure the extent of utilization of farm implements by the farmers.

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METHODOLOGY

In this study, the term utilization of farm implements was operationalized as the behaviour of the farmer with regard to type and number, nature of ownership, experience in using, extent and type of use, maintenance and repairs and storage of farm implements developed and recommended by the MPKV, Rahuri for performing various agricultural operations. The study was conducted in Newasa, Rahuri, Karjat and Pathardi tahsils of Ahmednagar district and Pandharpur, Malshiras, Karmala and Mohol tahsil of Solapur district.

Construction of scale for measuring the extent of utilization of farm implements

The following steps were followed for construction of the scale.

Identification of parameters

After reviewing the literature and discussion with the experts in the field of Agricultural Engineering and Extension Education, eight parameters and 33 sub-components were identified for developing the scale.

Framing and scoring of the parameters

The major parameters and their sub-components were arranged on a three point continuum viz., most relevant, relevant and not relevant to test their relevance through judges. Besides this weightages were proposed to these parameters and sub components.

Relevancy analysis

It was quite possible that all the eight parameters and 33 subcomponents identified for the purpose may not be equally relevant to measure the extent of utilization of farm implements. Therefore, those were tested for relevancy. A schedule, including these parameters and sub-components were mailed to a panel of 110 experts in the field of agricultural extension of National Agricultural Research System (NARS) such as ICAR Research Institutes, State Agricultural Universities, Agricultural Colleges, Agricultural Engineering Colleges, Krishi Vigyan Kendras and experts in the farm implement manufacturing industry. They were requested to critically evaluate the relevancy of each parameters/ sub-components against three point continuum viz., most relevant, relevant and not relevant by marking (✓) in the appropriate column.

The experts were also requested to indicate their degree of agreement to the proposed scores for the parameters and subcomponents by marking (✓) in the appropriate column. The experts were also asked to add/ modify/ delete the parameters and their sub-components, assign the new scores as per the importance and relevance. Out of 110 experts, 80 experts (72.72 per cent) responded in time. The relevancy score for each statement was worked out by adding the score on the rating scale for all 80 experts. From the data gathered, relevancy weightage, relevancy percentage and mean relevancy score were worked out for the entire eight major parameters and 33 sub-components by using following formulae.

Relevancy weightage

Relevancy weightage was obtained by summing up the score of 'most relevant', 'relevant' and 'not relevant' response for each parameter and sub-component which was divided by maximum possible score for it.

$$\text{Relevancy Weightage} = \frac{\text{Most Relevant Responses X 2 + Relevant Responses X 1 + Not Relevant Responses X 0}}{\text{160 (Maximum Possible Score: 2 × 80 = 160)}}$$

b. Relevancy percentage

Relevancy percentage was worked out by using the following formula.

$$\text{Relevancy Percentage} = \frac{\text{Most Relevant Responses X 2 + Relevant Responses X 1 + Not Relevant Responses X 0}}{\text{160 (Maximum Possible Score: 2 × 80 = 160)}} \text{ X 100}$$

c. Mean relevancy score

Mean relevancy score was obtained by summing up the score of 'most relevant', 'relevant' and 'not relevant' responses and dividing it by number of judges.

$$\text{Mean Relevancy Score} = \frac{\text{Most Relevant Responses X 2 + Relevant Responses X 1 + Not Relevant Responses X 0}}{\text{Number of judges (80)}}$$

RESULTS AND DISCUSSION

Accordingly, parameters and sub-components having relevancy percentage more than 66.66, relevancy weightage more than 0.66 and mean score of 1.31and more were considered for final scale. By this process, eight parameters and 28 sub-components were identified, suitably modified and rescored as per the comments of experts, wherever applicable (Table 1).

Table 1: Scale Values of Farm Implements and Modified Utilization Scale

Parameter (s)	Relevancy weightage	Relevancy percentage	Mean relevancy score	Final score
Type of implements				
Manually operated	0.788	78.75	1.575	1/implement
Bullock drawn	0.725	72.50	1.450	2/implement
Power tiller operated	0.844	84.38	1.688	4/implement
Tractor operated	0.925	92.50	1.850	6/implement
Self propelled	0.806	80.63	1.613	5/implement
Electricity operated	0.744	74.38	1.488	3/implement
Solar energy operated	0.594	59.38	1.188	Rejected
Any other (Pl. specify)	0.038	3.75	0.075	Rejected
Number of implements				
On hire	0.844	84.38	1.688	1/implement
Owned	0.838	83.75	1.675	2/implement
Experience in using the implements				
On hire	0.850	85.00	1.700	1/ year
Owned	0.869	86.88	1.738	2/ year
Operator of implements				
Hired labour	0.800	80.00	1.600	1
Family labour	0.838	83.75	1.675	2
Self	0.875	87.50	1.750	3
Extent of use of implements (Area and / or quantity of produce)				
Full	0.894	89.38	1.788	2
Partial	0.763	76.25	1.525	1
No use	0.588	58.75	1.175	Rejected
Care and Maintenance/ Repairs of implements				
Regularity				
Regular	0.956	95.63	1.913	1
Irregular	0.706	70.63	1.413	0
Source				
Professional	0.869	86.88	1.738	3
Self	0.750	75.00	1.500	2
Others	0.750	75.00	1.500	1
Storage of implements				
Implement shed				
Special/ Separate	0.875	87.50	1.750	2
Accommodated elsewhere	0.688	68.75	1.375	1
Implement shed				
Size of implement shed	0.863	86.25	1.725	1/100 Sq. Ft.
Type of implement shed				
Kuchha	0.725	72.50	1.450	1
Mix	0.569	56.88	1.138	Rejected
Pucca	0.813	81.25	1.625	2
Type of Utilization				
Only on own farm	0.831	83.13	1.663	2
Own farm and leasing out	0.844	84.38	1.688	3
Only for leasing out	0.719	71.88	1.438	1
Any other (Pl. specify)	0.188	18.75	0.375	Rejected

Reliability of the scale

Reliability is the ability of a scale or instrument to give consistently similar score on repeated measurement. In short, reliability refers to the precision or accuracy of the measurement or score (Kerlinger, 1964). A well defined scientific instrument should yield accurate results, both at present, as well as, over time. The consistency of scores obtained upon testing and retesting after a lapse of time is referred to as the temporal stability of a scale, whereas, consistency of scores obtained from two equivalent sets of items of scale after a single administration is referred as internal consistency of the scale. The most appropriate techniques for estimating the reliability coefficient of a scale are test-retest and split-half methods. Therefore, to test the reliability test-retest method was used for the present scale.

The scale was administrated on 30 farmers in the non-sample area and their responses were obtained. The second administration took place 30 days after first administration. This yielded two sets of score. The correlation coefficient between two sets of score was computed. The 'r' value of 0.7811 was found to be significant, thereby indicating the evidence of reliability.

Validity of the scale

According to Lindquist (1951) validity of test is the accuracy with which it measures that what is intended to measure. Kerlinger (1964) defined content validity as the representativeness or sampling adequacy of the content of the measuring instrument. In this study, content validity of the scale was established in two stages. Firstly, parameters and sub-components selected for inclusion in the scale were based on extensive review of literatures and discussion with the experts in the field of Agricultural Engineering and Extension Education. Secondly, the rating and weightage were ascertained from these experts. It was noticed that the selected items represented the universe of the contents. Thus, the scale developed for measuring the extent of farm implements utilization was found to possess adequate content validity. The final scale is given in Table 2.

Table 2 : Final scale for measuring extent of farm implement utilization

Parameter (s)	Final Score
Type of implements	
Manually operated	1/implement
Bullock drawn	2/implement
Electricity operated	3/implement
Power tiller operated	4/implement
Self propelled	5/implement
Tractor operated	6/implement
Number of implements	
On hire	1/implement
Owned	2/implement
Experience in using the implements	
On hire	1/ year
Owned	2/ year

Operator of implements	
Hired labour	1
Family labour	2
Self	3
Extent of use of implements (Area and / or quantity of produce)	
Full	2
Partial	1
Care and maintenance of implements	
Regularity	
Regular	1
Irregular	0
Source	
Professional	3
Self	2
Others	1
Storage of implements	
Implement shed	
Special/ Separate	2
Accommodated elsewhere	1
Implement shed	
Size of implement shed	1/100 Sq. Ft.
Type of implement shed	
Kuchha	1
Pucca	2
Type of Utilization	
Only on own farm	2
Own farm and leasing out	3
Only for leasing out	1

Administration of the scale

The final scale having eight parameters and 30 sub components was administered on the respondent farmers under investigation. The responses of the respondents about utilization of farm implements were collected. While calculating the extent of utilization index for each respondent, only the implements applicable to his/her farming were considered.

Further, to ascertain the relationship between utilization of farm implement and independent variables the utilization index (%) for each respondent was calculated by using the following formula.

$$\text{Utilization Index (\%)} = \frac{\text{Total obtained score}}{\text{Maximum obtainable score (Only applicable implement considered)}} \times 100$$

CONCLUSION

Identification of parameters, framing and scoring of the parameters, relevancy analysis and reliability and validity of the scale are the important statistical tests for developing and standardized the scale for utilization of farm implements. Identification of the parameters and relevancy analysis helps in selection of appropriate and closely related parameters. Thus it can be concluded that finally selected parameters are highly relevant and statistically fit for measuring the utilization of farm implements.

The reliability and validity value of the scale shows the precision and consistency of the scale. Therefore, it can be concluded that the scale is highly reliable and valid to measure the utilization of farm implements by the farmers. Further, it can be used to measure the extent of utilization of farm implements by the farmers beyond the study area with suitable modifications if required.

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