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Development and standardization of scale to measure opinion of the beneficiary farmers towards working pattern of primary agriculture credit societies (PACS)

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Abstract
An attempt has been made in this paper to develop and standardize a valid and reliable scale for measuring the opinion of the beneficiary farmers towards working pattern of Primary Agriculture Credit Societies (PACS). The 'Scale Product Method' was used to develop the opinion scale. 55 statements were selected for judgment and send to a panel of 100 judges of concerned subject. The judges were requested to judge each statement critically and assign the score for each statement on five point equal appearing interval continuum. Based on the score given by the judges for each statements, the scale/ median value (S value) and quartile value (Q value) was calculated for each statements and on the basis of these values, 16 statements were finally selected for inclusion in the final format of the opinion scale.

Keywords: Median value, quartile value, PACS, scale product method

Introduction
The opinion refers to a generally held view (Ray and Mondal, 2011) [10]. It is a judgment, viewpoint or statement that is not conclusive. It may deal with subjective matters in which there is no conclusive finding, or it may deal with facts which are sought to be disputed by the logical fallacy that one is entitled to their opinions (https://en.wikipedia.org/wiki/Opinion). It is based on a belief or view. It is not based on evidence that can be checked. (http://www.bbc.co.uk/skillswise/factsheet/en06opin-l1-f-what-is-fact-and-opinion).
Credit plays an important role in the development of agriculture. The limited availability of credit and its lack have been identified as the most limiting factor in the modernization of agriculture (Goyal and Pandey, 1987) [4]. In the context of credit disbursement, Primary Agriculture Credit Societies (PACS) occupy a predominant position in the country. In the Chhattisgarh state three tier credit structure is exist thorugh which short-term, medium-term and long-term credit is distributed to farmers. In this three tier structure, State Cooperative Bank (SCBs) or Apex bank is working at the State level, District Central Cooperative Banks (DCCBs) are working at the District level and Primary Agricultural Credit Societies (PACS) are working at the village level. A PACS is organized at the grass roots level of a village or a group of small villages. It is this basic unit which deals directly with the rural (agricultural) borrowers. It involves in the disbursement of agricultural inputs (Viz., seeds, fertilizers and credit), crop procurement, crop insurance and some of these are also performed the function of public distribution system (PDS). It serves as the final link between the ultimate borrowers on the one hand and the higher financing agencies, namely the SCBS, and the RBI/NABARD on the other hand. Due to non-availability of a proper scale to measure opinion of the beneficiary farmers towards working pattern of PACS, an attempt has been made to develop an opinion scale for measuring the opinion of the beneficiary farmers towards working pattern of PACS.

Materials and Methods
The following methodology was used in the development and standardization of scale to measure opinion of the beneficiary farmers towards working pattern of Primary Agriculture Credit Societies (PACS).

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Development of the opinion scale

In the present study opinion is conceptualized as the judgment or viewpoint of the beneficiary farmers towards the working pattern of the PACS. For measuring the opinion of the beneficiary farmers towards the working pattern of the PACS, the researcher has developed the scale by adopting systematic methodology. Among the techniques available researcher has used 'Scale product method' which combines the Thurstone's technique of equal appearing interval scale (1928) for selection of items and Likert's technique of summated rating (1932) for ascertaining the response on the scale as proposed by Eysenck and Crown (1949) [2].

Statement Selection

The items of opinion scale are called as statements. In initial stage for developing the scale 68 statements reflecting the judgment or viewpoint of the beneficiary farmers regarding the working pattern of the PACS were collected from relevant literatures; discussion with experts of Agricultural Extension, Agricultural Economics, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh and the officials of State Cooperative Bank, Raipur District Central Cooperative Banks, Raipur and Primary Agricultural Credit Societies of Raipur District (Chhattisgarh).

Editing of Statements

The collected statements were examined and each statement was carefully edited according to the criteria described by Thurstone and Chave (1928) [12] and Edward (1957) [1]. After rigorous culling, total 55 statements were retained out of 68 statements. Each statement comprised minimum possible words and these were checked for their easy comprehension.

Statement Analysis

In order to judge the degree of "agreement" or "disagreement" of each statement on five point equal appearing interval continuum a panel of judges was selected. All the 55 statements were included into a schedule. The schedule was then mailed/handed over to a panel of 100 judges of the concerned subject drawn from various agricultural universities including professor, scientists, subject matter specialists of KVK, Ph.D. students and officials of SCB, Raipur and DCCB, Raipur (Chhattisgarh). They were requested to judge each statement critically with regard to measure opinion of the beneficiary farmers towards the working pattern of the PACS and give their response about inclusion of each statement on five point equal appearing interval continuum viz., strongly agree, agree, undecided, disagree and strongly disagree with the score of 5, 4, 3, 2 and 1 respectively. The judges were also requested to make necessary modifications and addition and deletion of items/statements if they desired so. Among 100 judges, only 55 judges had returned the statements after dully recording their judgments in time and the responses of these judges were considered for the analysis.

Determination of scale value and quartile value

The five points of the rating scale were assigned with a score ranking from 1 for most disagreement and 5 for most agreement. Based on the judgment of the 55 judges for each statement, the Median value or Scale value (S value) of the distribution and the Quartile (Q) value for the statement were calculated for each statement.

Formula to find out Median or S value

$$S = L + \frac{0.50 - \sum Pb}{Pw} \times i$$

Where,
S = The median or scale value of the statement
L = Lower limit of the interval in which the median falls
$\sum Pb$ = Sum of the proportion below the interval in which the median falls
Pw = Proportion within the interval in which the median falls
i = Width of the interval and is assumed to be equal to one (1)
The interquartile range was worked out for each statement by taking the difference between C_{75} (Q_3) and C_{25} (Q_1) [i.e. Q = $C_{75} - C_{25}$]. The interquartile range for each statement was worked out for determination of ambiguity involved in the statement (Edward, 1957) [1]. To determine value of Q, two other point were measured, the 75th centile and 25th centile. After that S value and Q value of each statement were used to decide whether the particular statement should be a part of opinion scale or not.

Formula to find out value of C₂₅ or (Q₁)

$$C_{25} = L + \frac{0.25 - \sum Pb}{Pw} \times i$$

Where,
C_{25} = 25th centile value of the statement
L = Lower limit of the interval in which the 25th centile falls
$\sum Pb$ = Sum of the proportion below the interval in which the 25th centile falls
Pw = Proportion within the interval in which the 25th centile falls
i = Width of the interval and is assumed to be equal to one (1)

Formula to find out value of C₇₅ or (Q₃)

$$C_{75} = L + \frac{0.75 - \sum Pb}{Pw} \times i$$

Where
C_{75} = 75th centile value of the statement
L = Lower limit of the interval in which the 75th centile falls
$\sum Pb$ = Sum of the proportion below the interval in which the 75th centile falls
Pw = Proportion within the interval in which the 75th centile falls
i = Width of the interval and is assumed to be equal to one (1)

Standardization of the opinion scale

The validity and reliability was ascertained for standardization of the scale. The validity of opinion scale was tested for content validity and the reliability of the scale was tested by split-half method. The coefficient of reliability was calculated by the Rulon's formula (Guilford, 1954) [5].

Rulon's formula

$$r_{oe} = 1 - \frac{\sigma^2 d}{\sigma^2 t}$$

$$\sigma^2 d = \frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n}$$

$$\sigma^2 t = \frac{\sum t^2 - \frac{(\sum t)^2}{n}}{n}$$

Where,

r_{oe} = Coefficient of reliability of odd and even score
$\sigma^2 d$ = Variance of differences
$\sigma^2 t$ = Variance of total score

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 to consider final value of reliability. The correction factor can be calculated by using Spearman-Brown formula (Ray and Mondal, 2011) [10].

$$r_{tt} = \frac{2r_{oe}}{1 + r_{oe}}$$

Where,

r_{tt} = Coefficient of reliability of the original test
r_{oe} = Coefficient of reliability of odd and even score

Results and Discussion

Based on the median and Q values, out of 55 statements, 16 statements were finally selected to constitute opinion scale to measure opinion of the beneficiary farmers towards the working pattern of the PACS. Here only those statements were selected whose scale (S) values were greater than quartile (Q) values. However, when a few items had the same scale values, items having lowest quartile value were selected. Such 16 statements were presented in Table 1 along with their scale value and quartile value.

Table 1: Final selected statements with their respective S values and Q values

S. No.	Statements	S value	Q value (Q₃ - Q₁)	Q₃	Q₁
1	Agricultural inputs (viz. credit, seed, fertilizer) provided by PACS play an important role in increasing the crop production	2.02	1.98	3.21	1.23
2	Zero per cent interest rate of short term loan increases its utilization among the farmers	2.05	1.76	3.06	1.30
3	Amount of short term loan should be increased every year according to exiting circumstances.	2.34	1.48	3.16	1.68
4	Inadequate amount of chemical fertilizers are provided by PACS	4.38	1.72	4.97	3.25
5	Chemical fertilizers are timely provided by PACS to their beneficiaries	2.00	1.60	2.88	1.28
6	Adequate quantity of rice seed disbursed by PACS	2.77	2.18	3.59	1.41
7	Quality of disbursed consumer goods should be improved by the PACS	2.12	1.54	3.06	1.52
8	Weighing machine used by PACS are not accurately worked	3.67	2.00	4.50	2.50
9	MSP announced by Government for rice crop is not satisfactory	2.20	2.13	3.44	1.31
10	Crop procurement procedure followed by PACS is simple	2.08	1.24	2.76	1.52
11	Amount of procured paddy should be increased by PACS	1.97	0.94	2.44	1.50
12	Bonus announced by state government on paddy is satisfactory	2.21	1.91	3.17	1.26
13	Compensation received under Pradhanmantri Phasal Bima Yojana is not satisfactory	1.93	1.08	2.44	1.36
14	PACS is an important grass root level institution which is actively involved in raising of socio-economic status of their member farmers	4.07	1.85	4.80	2.95
15	PACS play an important role in ensuring food security of their member farmers	1.83	1.18	2.39	1.21
16	Complete banking services should be undertaken by the PACS	2.37	1.80	3.53	1.73

Validity of the opinion scale

The validity of a scale is a property that ensures the constructed scale measures the variables which are suppose to measure. The validity of any measuring instrument, depends upon the fidelity with which it measures what it purports to measure (Garrett, 1979) [3]. Here the validity of the opinion scale was examined for content validity. According to Kerlinger (1973) [8], the content validity is representativeness of sampling adequacy, the content, the substance, the matter and the topics of measuring instrument. The content validity of the opinion scale was examined by determining how well the contents of the scale were selected by discussing it with specialists of agricultural extension, agricultural economics and agricultural statistics.

Reliability of the opinion scale

Reliability is the accuracy or precision of a measuring instrument (Kerlinger, 1973) [8]. A scale is reliable when it consistently produces the similar results when applied to the same sample. In the present study, a split-half method of testing reliability was used. 16 statements were divided into two equal halves with 8 odd numbered statements in one-half and 8 even numbered statements in the other-half. These were administered to 20 respondents. Each of the two sets of statements was treated as a separate scale and then these two

sub-scales were correlated. The reliability coefficient for the opinion scale was came to 0.819, which was obtained after applying correction factor.

Administration of the opinion scale

The final format of the opinion scale constitute the 16 statements. Out of the 16 selected statements, 8 statements were positive and the indicators of the favourable opinion and 4 statements were negative and the indicators of unfavourable opinion. These 16 statements were administrated to the farmers and asked to express their response on five point continuum viz., strongly agree, agree, undecided, disagree and strongly disagree with the scores of 5, 4, 3, 2 and 1 respectively for the favourable or positive statements. The scoring for negative or unfavourable statements was just reversed. The total score for each respondent was obtained by adding the weights of his/her responses made to individual opinion scale item. The possible opinion score of the individual respondent regarding the working pattern of the PACS could range from 16 to 80. Further the farmers were categorized into 3 categories viz., less favourable, favourable and more favourable by considering the total opinion score obtained by them. The final format of the opinion scale is presented in Table 2.

Category	Range
Less favourable	Up to 27 score
Favourable	Between 28 to 54 score
More favourable	Above 54 score

Table 2: Final selected statements to measure opinion of the beneficiary farmers towards the working pattern of the PACS

S.No.	Statements	SA	A	U	DA	SDA
1.	Agricultural inputs (viz. credit, seed, fertilizer) provided by PACS play an important role in increasing the crop production. (+)					
2.	Zero per cent interest rate of short term loan increases its utilization among the farmers. (+)					
3.	Amount of short term loan should be increased every year according to exiting circumstances. (+)					
4.	Inadequate amount of chemical fertilizers are provided by PACS. (-)					
5.	Chemical fertilizers are timely provided by PACS to their beneficiaries. (+)					
6.	Adequate quantity of rice seed disbursed by PACS. (+)					
7.	Quality of disbursed consumer goods should be improved by the PACS. (+)					
8.	Weighing machine used by PACS are not accurately worked. (-)					
9.	MSP announced by Government for rice crop is not satisfactory. (-)					
10.	Crop procurement procedure followed by PACS is simple. (+)					
11.	Amount of procured paddy should be increased by PACS. (+)					
12.	Bonus announced by state government on paddy is satisfactory. (+)					
13.	Compensation received under Pradhanmantri Phasal Bima Yojana is not satisfactory. (-)					
14.	PACS is an important grass root level institution which is actively involved in raising of socio-economic status of their member farmers. (+)					
15.	PACS play an important role in ensuring food security of their member farmers. (+)					
16.	Complete banking services should be undertaken by the PACS. (+)					

SA=Strongly Agree, A=Agree, U=Undecided, DA=Disagree, SDA=Strongly Disagree

Conclusion
The scale product method was used to construct the opinion scale for measuring the opinion of the beneficiary farmers towards the working pattern of the Primary Agriculture Credit Societies (PACS). The scale product method combines the Thrustone's technique of equal appearing interval sacle, for selection of items and Likert's technique of summated rating for ascertaining the response on the scale. The scale is found reliable and valid. Hence the same can be used by other investigators elsewhere in the context of measuring the opinion towards PACS or for other organizations or institutions with due modifications. The final format of the opinion scale comprise the 16 statements in which 8 statements were positive and the indicators of the favourable opinion and 4 statements were negative and the indicators of unfavourable opinion.

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