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Development of Scale to Measure Sunflower Farmers' Perception on Public and Private Extension Systems

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ABSTRACT

To measure the perception of sunflower farmers on public and private extension systems, a scale was developed with Likert's summated rating technique during 2021-22. A list of 35 and 41 items regarding public and private extension systems, respectively were sent to 300 experts for their relevancy using google forms and personal follow up. Based on 45 experts' ratings, the relevancy percentage (RP), Relevancy Weightage (RW) and Mean Relevancy Scores (MRS) were estimated. Eighteen and 22 items with RP > 70, RW > 0.70 and overall MRS > 2.39 and > 2.44 were considered for item analysis regarding public and private extension systems, respectively. These items were administrated to 60 farmers. Based on t-value (≥1.75) resulting from item analysis, 13 and 17 items were finally retained in the public and private extension systems scales, respectively. The Cronbach's alpha value was 0.71 and 0.74, Guttman split half method was 0.70 and 0.74 and Spearman-Brown coefficient was found to be 0.70 and 0.75 regarding public and private extension systems, respectively which showed high reliability. The validity and reliability measures of the scales indicated the precision and consistency.

INTRODUCTION

Agricultural extension services are being provided by public and private extension systems in India. Public extension services are provided by the respective state agricultural departments and Directorate of Extension at national level. The Indian Council of Agriculture Research (ICAR) through its institutes and KVKs and the State Agricultural Universities (SAUs) through the agricultural research stations and KVKs enable frontline extension at the district level. Private extension services are mostly delivered by input marketing companies such as seeds, fertilizers, pesticides and farm machinery through their dealers and marketing staff and contact farmers.

Sunflower due to its declining trend in area and production is not being considered as a major oilseed crop and hence much emphasis was not laid in technology transfer by the agriculture department. Lack of commodity-based extension for crops such as sunflower is also a major constraint in effective technology transfer. The public extension system if any, related to sunflower is limited to distribution of subsidized inputs (on a limited scale) to progressive farmers. Small holder farmers, for whom the extension services are intended, rarely form pressure groups to pressurize for better extension services either at the state or the central level. Despite the weak and uncoordinated extension services, sunflower crop has potential to contribute substantially to the oilseed kitty. As the sunflower crop is being neglected or given limited attention by the public extension system, private sector operators are starting to provide extension services, selling inputs and purchase raw materials from the farmers. Although, private funding in extension is desirable for specific commodities, where there are buy-back arrangements, public support will be needed to ensure extension services for farmers growing other food and commercial crops in a

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sustainable and equitable way. Hence, to understand the farmers' perception of public and private extension systems, scales were developed in the present study.

METHODOLOGY

The Summated Ratings method developed by Likert (1932) was used in the development of the measuring instrument. Based on the review of literature, 45 and 60 items regarding public and private extension systems, respectively were collected and edited based on criteria suggested by Edward (1957). After editing 35 and 41 items were retained for scale construction under public and private extension systems, respectively. Mahaliyanaarachchi et al., (2006) also initially taken 41 items for the development of scale. The items were sent to 300 experts in the field of extension education through mail and personal contacts for their critical evaluation of each item. The experts were requested to give their responses on a three-point continuum viz., highly relevant, relevant, and irrelevant with scores 3, 2 and 1, respectively. Out of 300 experts, only 45 experts responded in time and their relevancy score was ascertained by adding the scores on rating scale. From this data relevancy percentage, relevancy weightage and mean relevancy scores were calculated for all the items.

Relevancy percentage was calculated by summing up the scores of most relevant and relevant categories, which were converted into percentages whereas, Relevancy weightage (RW) was obtained by the formula

$$RW = \frac{MR+R+IR}{MPS}$$

Mean Relevancy Score (MRS) was obtained by the following formula

$$MRS = \frac{MR+R+IR}{N}$$

Whereas, MR = Most Relevant (3), R = Relevant (2), IR = Irrelevant (1), MPS = Maximum possible score (45×3=135), N = Number of Judges (45)

Using these three criteria, the items were screened for their relevancy. Accordingly, items having relevancy percentage > 70, relevancy weightage > 0.70 and overall mean relevancy score > 2.39 and > 2.44 for public and private extension systems respectively, were considered for final selection. Helen & Khaleel (2009) also followed the same procedure. By this process, 18 and 22 items were isolated in the first stage, which were suitably modified and rewritten as per the comments of experts. Item analysis was carried out on 60 farmers and their responses were taken on a five-point continuum viz., strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1) with scores indicated in parenthesis for positive items and vice-versa for negative items.

The perception score of the respondent was obtained by adding up the scores of all items in the scale. Based on the total summated scores, respondents were arranged in descending order. Respondents with highest total scores (top 25%) and lowest total scores (bottom 25%) were made into two groups. The two groups provided the criterion groups in terms of which item analysis was carried out. Thus, out of 60 respondents, 15 respondents with high scores and 15 respondents with low scores were selected. The critical ratio was calculated by t-test. The 't' values were calculated by using the formula suggested by Edward (1957). Thakur et al., (2017); Kumar & Popat (2009) also followed the same procedure.

RESULTS AND DISCUSSION

Based on the t test values, items with t-value $\geq$1.75 were selected and retained in the final scale for measuring perception of farmers on public (Table 2) and private extension (Table 3) systems.

For standardization of the scale, reliability and validity were estimated. For testing reliability, Cronbach alpha (α), Guttman split-half method and Spearman-brown coefficient were used. The α values for public and private extension systems were 0.71 (Table 2) and 0.74 (Table 3), respectively. Kumar et al., (2021); Priyadarshni et al., (2021) also used α for testing reliability. For testing the reliability by Guttman split-half method the scales were split into two halves on the basis of odd and even number of items and administered to 60 farmers. Thus, two sets of scores were obtained. The scores obtained were 0.70 (Table 1) and 0.74 (Table 1) for public and private extension systems, respectively. The Pearson's product moment correlation coefficient was calculated. The value of correlation coefficient was 0.57 (Table 1) and 0.60 (Table 1) for public and private extension systems, respectively, and this was further corrected by using Spearman's Brown formula and the reliability coefficient of the whole set was obtained. The r-value for scales were 0.70 (Table 1) and 0.75 (Table 1) for public and private extension systems, respectively, which was significant

Table 1. Reliability statistics of perception scales for measuring farmers perceptions of public and private extension systems

Reliability Statistics			Public extension system	Private extension system
Cronbach's Alpha	Odd number items	α value	0.53	0.64
		N of items	7[a]	9[a]
	Even number items	α value	0.59	0.50
		N of items	6[b]	8[b]
	Total N of items		13	17
Correlation between forms			0.57	0.60
Spearman-brown coefficient	Equal Length		0.70	0.75
	Unequal Length		0.70	0.75
Guttman split-half method			0.70	0.74

a = Items with odd numbers; b = Items with even numbers

Table 2. Final scale for measuring farmers' perception of public extension system

S.No.	Public Extension System	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	α if item deleted
1.	The main objective of public extension is to create awareness about government schemes or programmes on sunflower crop	42.25	49.65	0.28	0.70
2.	Public extension assists sunflower farmers in planning and decision making of agricultural activity	42.12	47.49	0.45	0.68
3.	Public extension system provides advisory services on sunflower to farmers and solves their problems	42.23	49.98	0.29	0.70
4.	Public extension is overloaded with many programmes leading to poor dissemination of technical information on sunflower*	42.12	47.97	0.43	0.68
5.	Public extension staff conducts the programs according to situation, season and farmers needs in sunflower	41.98	50.32	0.25	0.70
6.	In public extension, regular campaigns and trainings are organized to update the knowledge level of the sunflower farmers	41.97	50.98	0.20	0.71
7.	Public extension collaborates with other departments to provide effective services to sunflower farmers	41.85	51.18	0.22	0.71
8.	Public extension caters to the requirement of small and marginal sunflower farmers*	42.00	49.42	0.32	0.70
9.	Public extension services supply timely inputs to sunflower farmers based on their needs	42.22	48.34	0.37	0.69
10.	Public extension system helps to bring socio-economic transformation of sunflower farmers in rural areas	42.33	46.80	0.44	0.68
11.	Public extension services are highly credible	42.23	49.13	0.31	0.70
12.	Only resourceful sunflower farmers can get the benefit of public extension services*	42.38	47.80	0.35	0.69
13.	Excess of political interference hinder the public extension services to reach the actual sunflower farmers*	42.12	46.51	0.41	0.68
	Overall α				0.71

*Negative items; SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

Table 3. Final scale for measuring farmers' perception of private extension system

S.No.	Public Extension System	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's α item deleted
1.	Personnel of private extension system can solve sunflower farmer's problems in time	56.37	72.74	0.24	0.73
2.	Private extension system provides demand-driven service in sunflower	56.27	72.74	0.31	0.73
3.	Private extension system provides improved technology to the sunflower farmers	56.45	69.03	0.45	0.71
4.	Private extension system charges sunflower farmers for their services	56.62	73.09	0.20	0.74
5.	Private extension personnel help sunflower farmers in processing of their produce	56.48	73.17	0.24	0.73
6.	Private extension system demonstrates the worth of new technology under local conditions in sunflower crop	56.47	70.69	0.32	0.73
7.	In private extension system, emphasis is more on documentation of success stories of sunflower farmers	56.62	71.39	0.29	0.73
8.	Private extension services on sunflower crop are very costly*	56.52	69.03	0.40	0.72
9.	Private extension system is profit motive*	56.55	73.44	0.24	0.73
10.	Private extension system ensures timely supply of required quality inputs to the sunflower farmers	56.80	69.15	0.44	0.71
11.	Private extension system increases the output quality and quantity of the products and helps to get higher income for sunflower farmers	56.45	73.40	0.22	0.73
12.	Sunflower farmer has more confidence in private extension services for increasing their yields	56.58	71.87	0.25	0.73
13.	Private extension services have personal bias towards large farmers*	56.48	67.51	0.51	0.71
14.	Only resourceful sunflower farmers can get the benefit of private extension service*	56.18	74.93	0.16	0.74
15.	Sunflower farmers are unknowingly exploited in private extension system	56.43	67.98	0.47	0.71
16.	Private extension system always recommends to use their products for sunflower crop	56.25	72.33	0.27	0.73
17.	Private extension system helps in developing better relationship between extension personnel and sunflower farmers	56.48	67.91	0.46	0.71
	Overall α				0.74

*Negative items; SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

at 0.01 % indicating high reliability of the scales. Kumar et al (2016); Shitu et al., (2018); Gupta et al., (2022); Singh et al., (2021); Rajeshwari & Dolli (2020) followed Spearman-Brown coefficient for testing the reliability. Data analysis was done with (Statistical Package for Social Sciences) (SPSS) 20. software.

Validity

Content validity was ensured while selecting perception items. Due care was exercised in selecting and wording the items to cover all the relevant aspects of public and private extension systems. Thus, ensuring a fair degree of content validity. Kumar & Ratnakar (2016); Saravanan & Gowda (1999) used content validity for testing the validity.

The final perception scales regarding public and private extension systems consisted of 13 and 17 items, respectively. Ghadei (2010) finally selected 22 items for the scale. The responses had to be taken on a five-point continuum viz., strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1) with scores indicated in parenthesis for positive items and vice-versa for negative items.

Each respondent's perception score must be computed by adding the scores of he or she obtained on all the items. For each respondent, the minimum and maximum scores will range between 13 to 65 and 17 to 85 for public and private extension systems, respectively. The higher the score, the more favourable perception, the respondent feels towards the extension systems.

CONCLUSION

Scales to measure the perceptions of sunflower farmers on public and private extension systems were developed. The precision and consistency of the scales were ascertained through standard procedures and their reliability and validity were established. Even though commodity-based extension systems do not operate in general and oilseeds perse, the scales can be employed to understand the farmers perception of public and private extension systems pertaining to sunflower crop. The scales can also be used to understand the farmers' perceptions of public and private extension systems pertaining to other crops and other areas with suitable modifications in the items.

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