



# A Scale to Measure Attitude of Farmers towards Institutional Support Measures for Climate Change

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

Institutional support measures are formulated to induce the agriculture of the nation and also improve the livelihood of the farming community. The study aims to develop a scale to measure the attitude of farmers towards institutional support measures to mitigate the climate change for sustainable livelihood of Cauvery delta zone farmers. Hundred possible statements were prepared to assess the farmer's attitude towards climate change using the five-point continuum. Since the selected scale values should have equal appearing interval and distributed uniformly along the psychological continuum, it was necessary to form 10 compartments so as to select ten statements at one statement from each compartment. Based on the high S-value and low Q-value each statement was found and the final scale comprised of ten statements. The scale was developed using the equal appearing interval method, which comprises of 10 statements (six positive and four negative). It was found that nearly two third 63.66 per cent of the respondents had moderately

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favorable attitude towards institutional support measures followed by 19.34 per cent of respondents had less favorable attitude and only 17.00 per cent of respondents had high favourable attitude towards institutional support measures. Hence, medium to high level of favourable attitude towards the institutional support measures on climate change is giving hope for the extension professionals for improved and better implementation of suitable modification in climate change-based programmes to the farmers.

*Keywords: Attitude scale construction; equal appearing interval method; Q and S value statements; institutional support measures.*

## 1. INTRODUCTION

Climate change and variability are concerns of human being. Natural disasters such as drought, flood and cyclones are the major sources of risk in agriculture. Risks like droughts and floods have a significant impact on Indian agriculture. To deal with these unfavourable situations, farmers have created risk management systems occasionally with government assistance. It is essential to safeguard the farmers from natural disasters and guarantee their eligibility for credit for the following season. In order to achieve this, the Indian government launched numerous agricultural programmes around the nation. More than 2/3<sup>rd</sup> of the cropped acreage is vulnerable to drought in different degrees. On an average, 12 million ha of agricultural lands are damaged annually by natural calamities, adverse seasonal conditions and climatic variation in the country, grossly impacting the level of agricultural productivity and production. Tamil Nadu is heavily dependent on monsoon rain and is prone to droughts when the monsoon fails. Van koopen et al. (2017) attributed “the poor status of infrastructure and low utilization of irrigation schemes to focus on poor institutional and social factors. Deepa [1] reported that among the farm women, more than half of the respondents (53.33%) had a favourable attitude towards development programs followed by more favourable (38.34%) and less favourable (8.33%) attitude towards development programs. Marimuthu [2] observed that almost 57.14 per cent of the tribal respondents had low, followed by medium (25.72%) and high level (17.14 %) of attitude towards tribal developmental programmes”.

In order to protect their livelihoods against the effect of climate change, they depend on the various institutional support measures. Institutional support measures play a crucial role in shaping adaptation to climate change: they connect households to local resources and collective action; determine flows of external

support to different social groups, and link local populations to national interventions. The risk bearing capacity of marginal and small farmers in the country is limited. In order to avoid the risk and uncertainty in agriculture at National level and State level, various agricultural development schemes are implemented by the central and State government. With a view to bring about the development in agricultural and facilities provided to the farmer. The success of any developmental programs would mainly depend upon the people’s attitude towards it. Hence, it is necessary to study the attitude of farmers towards those institutional support programs. Based on a review of the literature and discussion with scientists and extension professionals, around 110 statements were chosen. The items were reviewed and modified using the specified informal criteria suggested by Edwards for editing the statements was used in the construction of the attitude scale. After screening, 100 items were finally selected which formed the universe of content.

## 2. MATERIALS AND METHODS

### 2.1 Description of the Study Area

The study was carried out in Thanjavur, Tiruvarur and Nagapattinam districts. Cauvery delta region is the Rice Bowl of Tamil Nadu. It also accounts for a large part of food grain production and other agricultural produce in the state which ensures the food security of the state. In recent years, severe droughts and floods are being experienced in the Cauvery Delta zone region which posing serious problems to the farmers.

### 2.2 Sampling and Procedure

The research design adopted for this study was ex-post-facto, since the institutional support Scheme was already implemented in the study areas. Purposive random sampling procedure was used for selecting the farmers in the study

area. Hundred farmers were selected from each district making the sum of 300. The measurement items were carefully selected with reference to Edwards 14 principles for the selection of items with the selected 10 statements the responses had to be recorded on a five point continuum representing strongly agree, agree, undecided, disagree and strongly disagree with scores of 5, 4, 3, 2, and 1, respectively for positive statements and vice versa for negative statements. A high attitude score indicates the more favourable attitude of farmers towards the institutional support measures and low attitude score indicates a less favourable attitude towards the institutional support measures.

### 2.3 Item Scoring and Computation of Scale Values and Q Values

The selected statements were sent to judge's opinion for item scoring of computation of scale values and Q values.

"In total, 110 statements were prepared which were organized and structured in the form of attitude items. The items were screened by following the informal criteria suggested by Edwards (1969). After the screening, 100 items were selected which formed the universe of the content. The selected item includes both positive and negative statements. The 100 statements were then subjected to judge's opinion on a five-point continuum ranging from most unfavourable to most favourable. The list of statements was sent to 75 judges who were comprised of scientists of state agricultural universities, ICAR and Krishi Vigyan Kendra. Among the 60 judges, 30 judges responded by sending their judgments" [3].

Based on the judgments, the "S" and "Q" values for each statement were calculated by applying the equal appearing scale Interval formula as suggested by Thurstone and Chave (1929). The S value obtained from the formula given below,

$$S = l + \left[ \frac{0.5 - \sum pb}{pw} \right] i$$

Where,

S—The median or scale value of the statement

l—The lower limit of the interval in which the median falls

$\sum pb$ —The sum of the proportions below the interval in which the median falls

pw—The proportion within the interval in which the median falls

i— The width of the interval and is assumed to be equal to 1.0

Thurston and Chave (1929) used "the interquartile range or Q as a measure of the variation of the distribution of judgments for proposed statements. To determine the Q value, there is a need to find two other point measures viz., the 75th centile and the 25th centile"

$$Q = C_{75} - C_{25}$$

Where Q= interquartile range

$C_{75}$  = the 75<sup>th</sup> centile

$$C_{75} = l + \left[ 0.75 - \frac{\sum pb}{pw} \right] i$$

$C_{25}$  = the 25<sup>th</sup> centile,

$$C_{25} = l + \left[ 0.25 - \frac{\sum pb}{pw} \right] i$$

## 3. RESULTS AND DISCUSSION

Based on the calculation, Individual statements with "S" and "Q" values are presented in Table 1.

### 3.1 Selection of Attitude Items

The attitude items to be included in the final attitude scale were selected based on the following criteria.

### 3.2 Item Selection

- The final attitude items were selected based on the universe of content, uniform distribution of scale values along the psychological continuum.
- Those items with high Scale values and small Q values should be selected as far as possible.
- There should be more or less equal number of statements with favourable and unfavourable attitudes as far as possible

The scale values were arranged in descending order of magnitude and the difference between the successive scale values and the cumulative total of the computed differences were worked out. Since the selected scale values should have equal appearing interval and distributed

uniformly, along the psychological continuum. It was necessary to form ten compartments to select 10 statements with one statement from each of the compartments.

For this purpose, the cumulative value (1.63) was divided by ten, which worked out to 0.163 and this formed the width of the first-class interval. The second interval was worked out by adding the value with the width of the first-class interval. Subsequently, all the ten intervals were worked out.

### 3.3 Ten Compartments

Compartment 1	0.163333
Compartment II	0.326667
Compartment III	0.49
Compartment IV	0.653333
Compartment V	0.816667
Compartment VI	0.98
Compartment VII	1.143333
Compartment VIII	1.32
Compartment IX	1.47
Compartment X	1.633333

To select the attitude items from the ten compartments, the “scale values” and the

corresponding “Q” values were considered. Based on the criteria already stated, the items having high Scale values and low Q values were selected at one item from each compartment. Thus, ten items were selected with equal appearing interval and with a uniform distribution along the psychological continuum. Final constructed attitude statements were given in Table 1.

The reliability of the scale was determined by the ‘split-half’ method. The ten selected attitude items were divided into two equal halves by odd-even method. With respondents, the two sets of statements were administered separately, which yield two sets of scores. The scores were subjected to product moment correlation test in order to find out the reliability of the half test. Hence, the half-test reliability coefficient  $r$  was 0.565 which was significant at one per cent level of probability. Further the reliability coefficient of the whole test was computed using the Spearman-Brown Prophecy formula. The whole test reliability  $r_{tt}$  was 0.626. Hence, the constructed scale is reliable as the reliable coefficient ( $rtt$ ) was  $>0.60$ .

**Table 1. Computation of equal appearing interval scale**

Statement No.	Q value	S value	Difference between successive scale values	Cumulative frequency	Equal appearing class interval	Compartments
17	2.395833	2.7				
34	2.1875	2.875	0.175		0.16	1
53	2.288889	2.928571	0.053571	0.228571	0.32	2
68	2.5625	3.166667	0.238095	0.466667	0.49	3
93	2.233766	3.25	0.083333	0.55	0.65	4
73	2.142857	3.357143	0.107143	0.657143		
87	1.25	3.416667	0.059524	0.716667	0.81	5
16	-0.06818	3.5	0.083333	0.8		
18	2.190476	3.5	0	0.8		
33	1.363636	3.590909	0.090909	0.890909		
22	2.479167	3.625	0.034091	0.925		
25	1.9	3.666667	0.041667	0.966667		
92	1.863095	3.666667	0	0.966667	0.98	6
65	1.866667	3.7	0.033333	1		
61	1.707692	3.730769	0.030769	1.030769		
36	1.065359	3.735294	0.004525	1.035294		
35	1.036932	3.75	0.014706	1.05		
30	1.704545	3.772727	0.022727	1.072727		
48	1.258929	3.785714	0.012987	1.085714		
59	1.404762	3.785714	0	1.085714		
63	1.759615	3.807692	0.021978	1.107692		
6	1.190476	3.833333	0.025641	1.133333		
57	1.458333	3.833333	0	1.133333		

Statement No.	Q value	S value	Difference between successive scale values	Cumulative frequency	Equal appearing class interval	Compartments
39	1.333333	3.833333	0	1.133333		
43	1.125	3.833333	0	1.133333		
49	1.333333	3.833333	0	1.133333	1.14	7
56	1.309524	3.857143	0.02381	1.157143		
58	1.309524	3.857143	0	1.157143		
86	1.392857	3.857143	0	1.157143		
45	1.7625	3.863636	0.006494	1.163636		
20	1.378205	3.884615	0.020979	1.184615		
24	1.461538	3.884615	0	1.184615		
47	1.378205	3.884615	0	1.184615		
78	1.378205	3.884615	0	1.184615		
89	1.586538	3.884615	0	1.184615		
41	0.888889	3.888889	0.004274	1.188889		
21	1.15	3.9	0.011111	1.2		
27	1.114286	3.9	0	1.2		
42	1.114286	3.9	0	1.2		
82	1.019608	3.911765	0.011765	1.211765		
74	1.5625	3.916667	0.004902	1.216667		
75	1.419643	3.916667	0	1.216667		
4	1.339286	3.928571	0.011905	1.228571		
15	1.03125	3.9375	0.008929	1.2375		
31	0.989583	3.9375	0	1.2375		
91	1.03125	3.9375	0	1.2375		
5	0.833333	3.944444	0.006944	1.244444		
26	0.833333	3.944444	0	1.244444		
3	1.3125	3.961538	0.017094	1.261538		
64	1.3125	3.961538	0	1.261538		
96	1.3125	3.961538	0	1.261538		
2	1.991071	3.961538	0	1.261538		
23	1.091667	3.966667	0.005128	1.266667		
12	0.9375	4	0.033333	1.3		
32	1.527778	4	0	1.3		
37	0.833333	4	0	1.3		
46	0.9375	4	0	1.3		
51	2.083333	4	0	1.3		
55	1.380952	4	0	1.3		
62	1.1625	4	0	1.3	1.32	8
19	0.882353	4.029412	0.029412	1.329412		
70	0.882353	4.029412	0	1.329412		
60	1.029167	4.033333	0.003922	1.333333		
79	1.029167	4.033333	0	1.333333		
88	1.029167	4.033333	0	1.333333		
94	0.9375	4.033333	0	1.333333		
97	1.029167	4.033333	0	1.333333		
99	1.029167	4.033333	0	1.333333		
83	1.416667	4.038462	0.005128	1.338462		
44	1.55	4.045455	0.006993	1.345455		
95	1.464286	4.045455	0	1.345455		
77	0.833333	4.055556	0.010101	1.355556		
90	0.833333	4.055556	0	1.355556		
7	0.833333	4.055556	5.56E-07	1.355556		
98	0.96875	4.0625	0.006944	1.3625		
1	1.130952	4.071429	0.008929	1.371429		

Statement No.	Q value	S value	Difference between successive scale values	Cumulative frequency	Equal appearing class interval	Compart ments
72	0.789474	4.078947	0.007519	1.378947		
38	0.915441	4.088235	0.009288	1.388235		
14	1.066667	4.1	0.011765	1.4		
52	0.868056	4.111111	0.011111	1.411111		
67	0.868056	4.111111	0	1.411111		
29	1.211538	4.115385	0.004274	1.415385		
80	1.142857	4.142857	0.027473	1.442857		
100	1.142857	4.142857	0	1.442857		
84	0.960784	4.147059	0.004202	1.447059		
66	0.7875	4.15	0.002941	1.45		
8	1.75	4.166667	0.016667	1.466667		
10	1.276515	4.166667	0	1.466667		
71	1.276515	4.166667	0	1.466667		
81	1.083333	4.166667	0	1.466667		
85	1.083333	4.166667	0	1.466667	1.47	9
28	1.13961	4.214286	0.047619	1.514286		
54	1.13961	4.214286	0	1.514286		
69	1.084848	4.233333	0.019048	1.533333		
9	1.25	4.25	0.016667	1.55		
11	1.25	4.25	0	1.55		
40	1.25	4.25	0	1.55		
76	1.25	4.25	0	1.55		
50	1.373077	4.3	0.05	1.6		
13	1.214744	4.333333	0.033333	1.633333	1.63	10

**Table 2. Final Set of attitude items selected with corresponding Scale and Q values and the nature of the statement**

Statement No	Statements	Q value	S value	Nature of statement
34	Flood control measures strengthen rural communities against extreme weather	2.1875	2.875	Favourable
53	Institutional support measures satisfy the needs of the affected farmers	2.288889	2.928571	Favourable
68	Weather information services provided by the institutions are not easily accessible by the farming community	2.5625	3.166667	Un favourable
93	Crop insurance scheme is a farmer welfare-oriented scheme	2.233766	3.25	Favourable
87	Disaster management plans facilitate farmers decision on how and when to use new innovation and climate adaptation strategies	1.25	3.416667	Favourable
92	Rehabilitation program improve the economic status of affected farming community	92	1.863095	Favourable
43	Farmers felt that agricultural input subsidy for flood affected crops was less	1.125	3.833333	Un Favourable
37	Farmers felt that climate smart agricultural technologies are not reaching to farming community	0.833333	4	Un Favourable
85	Disaster relief fund from the institution helps farmers to adopt new technologies	1.083333	4.166667	Favourable
13	Farmers feel difficulties in accessing institutional credit from the institutions	1.214744	4.333333	Un Favorable

**Table 3. Administration of the scale**

Nature of the statement	Continuum				
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Favourable	7	5	4	3	1
Unfavourable	1	3	4	5	7

**Table 4. Attitude of farmers towards institutional support measures**

S. No.	Category	Number	Per cent
1	Less favourable	58	19.34
2	Moderately favourable	191	63.66
3	High favorable	51	17.00

### 3.4 Content Validation

Content validity involves essentially the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured. It was carried out by subjecting the selected ten items to judge’s opinion. The judges were requested to indicate their presumed relevance to which the attitude items cover the different aspects of institutional support schemes. The responses were obtained on a four-point continuum of ‘most adequately covered’, ‘more adequately covered’, ‘less adequately covered and ‘least adequately covered’. Scores of 4, 3, 2 and 1 were given for the points on the continuum, respectively. Totally 30 judges were responded by sending their judgments. For the purpose of determining the scale’s content validity, a fixed mean score of 2.5 was used. If the average score of the judges’ ratings for the attitude items was greater than 2.5, the scale will be classified as true, and if not, then. The overall mean score in this instance was calculated as 2.5 and therefore the constructed attitude scale is said to be valid.

### 3.5 Administration of the Scale Value

In order to prevent biased results, the 10 attitude items chosen were distributed at random. A five-point continuum of ‘Strongly Agree’, ‘Agree’, ‘Undecided’ ‘Disagree’ and ‘Strongly Disagree’ was used as response categories. The scoring procedure adopted was given in Table 3. The score obtained for each statement was summed up to arrive the attitude score for the respondents. The responses were grouped as unfavourable, moderately favourable and highly favourable based on the cumulative frequency method.

The attitude scale developed through the Equal Appearing Interval (EAI) method leads the study to make 10 statements for measuring the attitude of the paddy crop farmers towards various institutional support measures.

### 3.6 Measuring the Attitude of Farmers towards Institutional Support Measures

Attitude of farmers towards institutional support measures were studied and data collected from the farmers was analyzed and presented in the Table 4

From the Table 3. it could be concluded that nearly two third 63.66 per cent of the respondents had a moderately favourable attitude towards institutional support measures followed by 19.34 per cent of respondents had less favourable attitude and only 17.00 per cent of respondents had high favourable attitude towards institutional support measures.

Most of the farmers from flood and drought affected area (63.66 per cent) in the Cauvery delta districts had a moderately favourable attitude towards institutional support measures on climate change.

Data from Table 3. also depicts that around 80.00 per cent of the respondents had moderate to high level of attitude towards institutional schemes for climate change. This may be due to the high level of contact between farmers and extension workers. It also shows that farmers in the study area were largely utilizing the institutional support schemes for their betterment of living.

The obtained results are in conformity with the findings of Jamanal and Natikar [4], Arifullah et al. [5], [6-11].

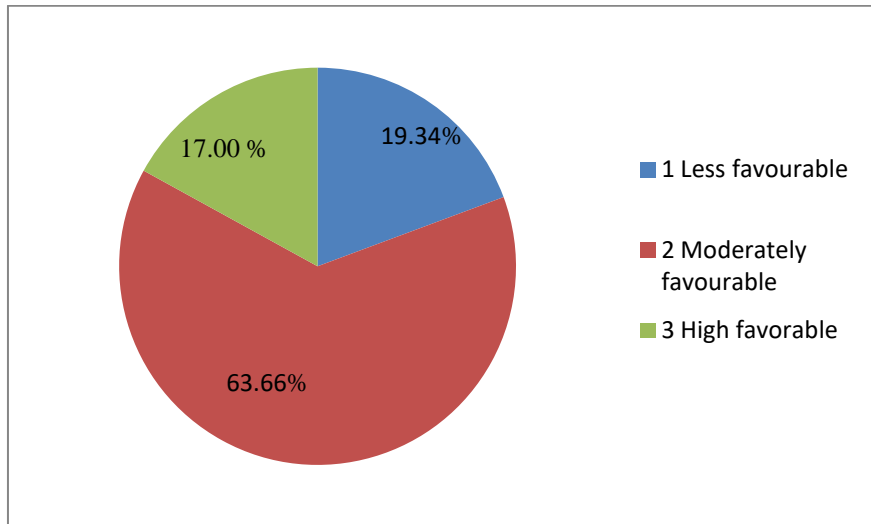


Fig. 1. Attitude of farmers towards institutional support measures

#### 4. CONCLUSION

As there is limited study and tools for measuring farmer's attitudes pertaining to institutional schemes for climate change. The scale would be highly useful to study the attitude towards institutional support measures among farmers and other agriculture stakeholders. The result indicates that the majority of the farmers are positive and interested in the institutional schemes. Hence, the medium to high level of favourable attitude towards the institutional support measures on climate change is giving hope for the extension professionals for improved and better implementation of climate change-based programmes for farmers. The study suggested that there is a need to provide location-specific and need-based information services to farmers which will help in decision making at the grass root level. It also shows that many efforts have been made by the SAUs, Ministry of Agriculture and Cooperation, Government of India to restructure the extension system of the department in order to cope with the loopholes experienced in the past.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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