Scale To Measure the Attitude of Perennial Crop Farmers towards Climate Change in Tamil Nadu

Abstract

The degree of positive or negative affect associated with a psychological object is referred to as attitude. Any symbol, phrase, slogan, person, institution, idea or ideal toward which people could differ in terms of positive or negative influence can be used as a psychological object. Attitude scale provides a quantitative assessment of attitudes, views, or values by summarizing numerical scores assigned by researchers to people's replies to sets of statements investigating different aspects of a central subject. The objective of this research was to construct and standardize the same. A scale measuring the attitude of perennial crop farmers towards climate change in Tamil Nadu is developed. One hundred possible statements were prepared to assess the perennial crop farmers attitude towards climate change using the five-point continuum. The S-value and Q-value of each statement were found. The scale was developed using the equal appearing interval method, which comprises of 10 statements (four positive and six negative).

Keywords: Attitude, Climate change, Perennial crops, Q and S value, Statements

Introduction

Climate change is one of our time's most pressing issues, putting significant strain on our communities and the environment. Climate change is occurring, and it is mostly the result of human activities. Its effects are already being noticed and will increase in the next decades unless we take action. (Olufemi Adedeji *et al*., 2014) Perennial crops are those that require a number of growth cycles before producing fruit, and are therefore more permanent. Perennial crops are long-term income producers for farmers. They are a valuable source of raw materials for industries and agro-allied businesses. Many annual agricultural systems may be converted to perennials, making agriculture significantly more sustainable. They are particularly susceptible to climate due to their year-round exposure to changing climatic conditions (Winkler *et al.,*2013)

Climate change refers to abnormal changes in the climate and the consequences of these changes in other regions of the world. Where a disaster is a sudden, devastating event that severely interrupts a community's or society's capacity to operate and produces human, material, economic, or environmental losses that exceed the community's or society's ability

to manage using its own resources. Perennial crops are expected to be highly exposed to climate change because of their long economic life span and the ineffectiveness to easily switch crops due to high upfront capital costs. Area under perennial crops is decreasing every year due to climate change like high temperature, drought, low rainfall, storms and cyclones like Thane, Gaja, etc. Many perennial crop growers have been impacted by random calamities and unexpected weather change. This might cause severe damage and it has a huge impact on their living and economic circumstances. The most widely cultivated perennial crops like coconut, mango, arecanut and cashewnut were selected. Attitude scale is designed to assess people's attitudes about a relatively simple and unidimensional idea by employing a series of statements that differ in how they communicate a positive or negative view about the core concept. The objective of the study executed the selection of districts based on maximum area under perennial crop cultivation. The districts therefore selected were Coimbatore, Dharmapuri, Krishnagiri, Salem, Thanjavur, Pudukkottai, Ariyalur and Cuddalore. Hence the research paper aims to develop a scale to measure the attitude of perennial crop farmers towards climate change. Based on a review of the literature and discussions with scientists and extension professionals, around 110 statements were chosen. The items were reviewed and modified using the specified informal criteria suggested by (Edwards 1969) 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.

Materials and Method

The selected statements were sent to judges opinion for item scoring of computation of scale values and Q values

Item scoring and computation of Scale values and Q values

According to (Thurstone and Chave 1929) the list of selected statements was then subjected to judge's opinion on a five-point continuum ranging from most unfavourable to most favourable. The statements were sent to 60 judges, they were scientists from the various agricultural universities in the country. Out of 60 judges, 30 judges responded by sending their judgements. The Scale values and Q values for 100 statements were calculated using the formula proposed 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

∑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

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

Where,

Q – Interquartile range

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

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

Results and Discussion

The results obtained is presented in the following sub-headings

Calculated Scale (S) and Interquartile range (Q) value:

The scale value and Q value for the individual item were calculated and presented in Table 1.

Table -1. Computation of equal appearing intervals

S.No.	Statement No	Q value	S value	Difference between successive scale values	Cumulative value of the differences	Equal appearing class intervals	Compartments
1	54	-1.24	1.83	0.06			
2	3	1.70	1.90	0	0		
3	51	2.91	1.90	0.02	0.02		
4	19	-0.6	1.92	0.01	0.04		
5	13	0.93	1.94	0.05	0.1		
6	76	1.31	1.99	3.75	0.1		
7	14	2.71	2	0	0.1		

8	52	3.56	2	0	0.1		
9	71	0.51	2	0.16	0.26		
10	**33**	**0.15**	**2.16**	**0**	**0.26**	**0.426**	**I**
11	57	1.04	2.16	0.16	0.43		
12	69	2.54	2.33	0.16	0.6		
13	15	1.37	2.5	0	0.6		
14	18	4.18	2.5	0	0.6		
15	25	1.17	2.5	6.06	0.6		
16	44	3.44	2.50	0	0.6		
17	77	1.25	2.50	0.14	0.74		
18	9	1.33	2.64	0	0.74		
19	**16**	**0.71**	**2.64**	**0.02**	**0.76**	**0.852**	**II**
20	58	1.91	2.66	0.11	0.88		
21	98	2.00	2.78	0.04	0.93		
22	10	0.37	2.83	0	0.93		
23	32	0.71	2.83	0.09	1.02		
24	24	1.00	2.92	0	1.02		
25	26	1.87	2.92	0	1.02		
26	68	2.80	2.92	0.07	1.1		
27	28	3.06	3	0	1.1		
28	30	2.5	3	0	1.1		
29	42	2.5	3	0	1.1		
30	63	1.00	3	0	1.1		
31	64	2.85	3	0	1.1		
32	80	0.93	3	0	1.1		
33	84	4.03	3	0.09	1.2		
34	29	0.62	3.09	0	1.2		
35	60	2.08	3.09	0	1.2		
36	61	3.08	3.09	0	1.2		
37	81	2.31	3.09	0	1.26		
38	82	2.87	3.09	0	1.2		
39	4	3.08	3.16	0	1.26		

40	87	3.80	3.16	0	1.26		
41	**100**	**3.00**	**3.16**	**0.00**	**1.26**	**1.278**	**III**
42	46	2.41	3.16	0.08	1.34		
43	7	2.15	3.24	7.5	1.35		
44	43	2.5	3.25	0	1.35		
45	45	1.43	3.25	0.04	1.4		
46	38	5.14	3.29	0	1.4		
47	86	2.34	3.29	0.05	1.45		
48	85	2.80	3.35	0.14	1.59		
49	5	2.06	3.49	0	1.59		
50	6	1.66	3.49	0	1.59		
51	11	3.04	3.49	0	1.59		
52	12	3.57	3.49	0	1.59		
53	17	0.01	3.49	0	1.59		
54	41	1.93	3.49	0	1.59		
55	55	3.56	3.49	0	1.59		
56	70	4.35	3.49	0	1.59		
57	74	2.42	3.49	0	1.59		
58	75	2.85	3.49	6.06	1.6		
59	2	2.55	3.5	0	1.6		
60	**8**	**0.85**	**3.5**	**0**	**1.6**	**1.704**	**IV**
61	22	1.43	3.5	0	1.6		
62	88	3.16	3.5	4.28	1.6		
63	39	2.94	3.50	0.166	1.76		
64	96	1.51	3.66	0	1.76		
65	99	5.44	3.66	0	1.76		
66	50	5.81	3.66	0.03	1.8		
67	23	1.87	3.69	0.05	1.85		
68	59	4.59	3.75	0.08	1.93		
69	40	5.29	3.83	5.06	1.93		
70	34	1.33	3.83	0	1.93		
71	56	3.33	3.83	0	1.93		

72	90	2.56	3.83	0.06	1.99		
73	62	3.70	3.89	0	1.99		
74	91	2.81	3.89	0	1.99		
75	48	2.09	3.89	0.02	2.02		
76	73	1.33	3.92	0	2.02		
77	95	2.43	3.92	0.07	2.1		
78	20	4.56	4.00	0	2.1		
79	**27**	**2.56**	**4.00**	**0**	**2.1**	**2.13**	**V**
80	89	1.85	4.00	0.16	2.26		
81	21	2.51	4.16	0.08	2.35		
82	65	0.41	4.25	7.5	2.35		
83	37	1.73	4.25	0	2.35		
84	47	1.68	4.25	0	2.35		
85	79	3.19	4.25	0	2.35		
86	92	2.33	4.25	0	2.35		
87	**31**	**1.20**	**4.25**	**0**	**2.35**	**2.556**	**VI**
88	49	3.02	4.25	0	2.35		
89	53	2.04	4.25	0.24	2.59		
90	36	1.82	4.49	6.06	2.6		
91	66	-3.88	4.5	7.5	2.6		
92	1	2.77	4.50	0.24	2.85		
93	78	-3.20	4.75	0.083	2.93		
94	**72**	**2.88**	**4.83**	**0.00**	**2.93**	**2.982**	**VII**
95	97	1.43	4.83	0.16	3.1		
96	**83**	**0.75**	**5**	**0.25**	**3.35**	**3.408**	**VIII**
97	**67**	**1.35**	**5.25**	**0.48**	**3.83**	**3.834**	**IX**
98	93	1.45	5.73	0.1	3.93		
99	**35**	**-0.11**	**5.83**	**0.33**	**4.26**	**4.26**	**X**
100	94	-3.70	6.16	=6.16	-1.9		

Selection of attitude items

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

- The statements selected should represent the universe of content with respect to perennial crop farmers. The scale values of the selected attitude items should have equal appearing interval i.e., distributed uniformly along the psychological continuum.
- Those items with high Scale values and smaller 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 attitude items were chosen using an objective technique that took into account the above-mentioned criteria. Statements with a high scale value and lesser 'Q' values are distributed consistently along the psychological continuum. Scale values were arranged in descending order of magnitude and the difference between each scale value was calculated, as well as the cumulative of the computed differences. Because of the time limitations associated with perennial crop farmers, ten statements were decided to make constitute the attitude scale. 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. The basis for forming the compartments was that each compartment should be equally spaced in the continuum. [Table-1] the final cumulative value (4.26) was divided by ten, which worked out to 0.426 and this formed the width of the first-class interval. The second-class interval (0.852) was worked out by adding the value with the width of the first-class interval. Subsequently, all ten intervals were worked out (Presented in Table 2)

Table-2. Calculation of class intervals

S.No	Compartments	Interval values
1.	I	0.426
2.	II	0.852
3.	III	1.278
4.	IV	1.704
5.	V	2.13

6.	VI	2.556
7.	VII	2.982
8.	VIII	3.408
9.	IX	3.834
10.	X	4.26

To select the attitude items from each ten compartments of the scale values and corresponding Q values were considered. Based on the criteria already stated, 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 are given in Table 3.

Table-3. Final Set of attitude items selected with corresponding Scale and Q values and the nature of the statement

Items	Statements	S value	Q value	Nature of statement
33	Climate change becomes a widely recognized and unavoidable global challenge for perennial crop farmers.	2.16	0.15	Unfavourable
16	Climate change is reason for the change in temperature, drought, rainfall pattern, soil infertility, heat waves and other environmental effects	2.64	0.71	Favourable
100	Climate change influences the productivity and production of perennial crop	3.16	3.00	Favourable
8	Impact of natural disaster is colossal which affects the social life of perennial crop farmers.	3.5	0.85	Unfavourable
27	Area specific disaster management policies need to be developed for perennial crops.	4.00	2.56	Favourable
31	Occupational diversification should be created to minimize the effect of disaster.	4.25	1.20	Favourable
72	Climate change produce unusual rainfall which affects perennial crop.	4.83	2.88	Unfavourable

83	Reduction of income due to crop failure had a delay on repayment of loan.	5.00	0.75	Unfavourable
67	Disaster causes heavy economic loss for the perennial crop farmers.	5.25	1.35	Unfavourable
35	Perennial crop farmers are facing migration due to drought.	5.83	-0.11	Unfavourable

Reliability of the scale

The reliability of the scale was attained by 'Split-half' method. The split-half method is observed by many as the best method for measuring reliability (Garrett, 1973). The ten selected attitude items were divided into two equal halves by odd-even method (Singh, 2008). With the perennial crop 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. The half-test reliability coefficient r was 0.567, 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 0.65. According to (Singh 2008), when the mean scores of the two groups are of a narrow range, a reliability coefficient of 0.50-0.60 would suffice. Hence, the constructed scale is reliable as the reliability coefficient value is greater than 0.60.

Content validity of the test

Content validity involves essentially the systematic examination of the test content to determine whether it covers a representative sample of the behaviour domain to be measured (Anastasi 1968). The judge's opinion was used for content validation of the selected 10 attitude statements. They were requested to indicate the extent to which each attitude item covered the domains of the psychological object of ‘perennial crop farmers’ or judge each item for its presumed relevance to the property being measured. 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 responded by sending their judgments. The mean score 2.5 was fixed as the basis for deciding the content validity of the scale. If the overall mean score of the attitude items as rated by the judges was above 2.5 the scale will be declared as valid and if not otherwise. In the present case, the overall mean score was worked out as 3.25 and therefore the constructed attitude scale is said to be valid.

Administration of the scale

The 10 attitude items selected were arranged randomly in order to avoid biased responses. A five-point continuum of 'Strongly Agree', 'Agree', 'Undecided' 'Disagree' and 'Strongly Disagree' was used as response categories. The scoring procedure adopted is given in table 4.

Table-4. 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

The final attitude statements selected was administered to obtain responses of perennial crop farmers. The score obtained for each statement was summed up to arrive at the attitude score for the respondents. The responses were grouped as unfavourable, moderately favourable and highly favourable based on the cumulative frequency method.

Conclusion

The attitude scale developed through Equal Appearing Interval (EAI) method lead the study to make 10 statements for measuring the attitude of the perennial crop farmers towards climate change. As there are limited study and tools for measuring farmer's attitude pertaining to perennial crops, the present study will aid researchers in their research by adopting the scale developed.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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