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Behavioural change scale development towards organic farming transition by farmers

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Abstract
The present study was attempted to know the behavioral change of farmers towards organic farming transition. Due to non-availability of a proper scale to measure the behavioural change of farmers towards organic farming, it was thought necessary to construct a scale for the purpose. The method suggested by Likert (1932) and Edwards (1969) in developing summated rating scale was followed in the construction of behavioural change scale of farmers towards organic farming. The behavioral change scale developed was administered to 180 transition farmers of Mandya and Mysore district. The results revealed that majority (41.11%) of the respondents shown moderate extent of behavioural change, 33.89 per cent shown greater extent and 25.00 per cent had shown lower extent of behavioural change towards organic farming. The scale developed was found to be reliable and valid, hence it can be used by the researchers to measure the behavioural change of farmers.

Keywords: Behavioural change, organic farming, Relevancy, item analysis, reliability, validity

Introduction
Organic farming is often seen as a strong indicator for a changing behaviour in agriculture, advocating environmental protection, small scale farming, intensification and diversified agriculture. Furthermore the government uses organic farming as one aspect to reach the country's environmental targets. An organic farmer behavior (OFB) framework will provide the passion to accelerate wilderness organic farming within the smallholder farmer community, which is a fundamental area in global farmland agriculture. Understanding the critical social and cultural 'triggers' that influence farmers' behaviour is important for fostering change at farm level through extension practice and also for gauging farmers' reactions to policy instruments/programmes. As a result, the conceptual framework could be applied to explore and develop land use policies that encourage farmers to diminish conventional farming and to adopt organic farming.

The present study was formulated with the following specific objectives
1. To develop a scale to measure the farmers' behavioural change in transitional period towards organic farming
2. To know the farmers' behavioural change in transitional period towards organic farming by farmers.
3. To know the profile characteristics of farmers transition towards organic farming

Methodology
Behavioural change is operationalised as the mindset of the farmers in the process of transition towards organic farming influenced by their knowledge, attitude, social influence and control factors.
The method suggested by Likert (1932) [5] and Edwards (1969) [3] in developing summated rating scale was followed in the construction of Behavioural change scale.

Procedure followed for development of scale
1. Identification of Dimensions: The first step in the construction of Behavioural change scale was to identification of dimensions pertaining to Behavioural change. Three major dimensions related to Behavioural change were identified based on review of literature and discussion with experts in the field of extension education. Those are:
a. Knowledge
b. Attitude – i. Environment aspect ii. Economic aspect iii. Health aspect
c. Social influence

d. Control factors – i. Self-confidence ii. Management skills- a. Planning b. Production and c. Marketing skills

2. Collection of items/statements: A large number of draft statements on each dimension of behavioural change were collected based on review of literature, discussion with concerned specialists. (Table 1)

3. Editing of items: The statements for measuring the behavioural change of farmers towards organic farming were edited as per the 14th criteria enunciated by Edwards (1969) [3] and Thurstone and Chave (1929) [9]. These statements were carefully edited, revised and restructured to avoid ambiguity and duplication as a result 94 statements were included for further analysis and scale development.

4. **Relevancy test**

The selected 94 statements with appropriate instruction were sent to 120 judges who are experts in agricultural extension field. They were asked to critically evaluate the relevance of each statement *viz* Most Relevant (MR), Relevant (R), Somewhat Relevant (SWR), Least Relevant (LR) and Not Relevant (NR) with the score of 5, 4, 3, 2, 1, respectively. The judges were also requested to make necessary modifications and additions or deletion of statements, if they desire so. A total of 56 judges returned the questionnaires duly completed were considered for further processing. From the data gathered, 'relevancy percentage" 'relevancy weightage 'and "mean relevancy score" were worked out for all the 94 statements. Using these criteria individual statements were screened for relevancies using the following formulae

$$\text{Relevancy percentage (RP)} = \frac{\text{MR X 5+R x 4+SWR x 3+Lx2+NR x 1}}{\text{Maximum possible score (56x5=280)}} \text{X 100}$$

$$\text{Relevancy weightage (RW)} = \frac{\text{MR X 5+R x 4+SWR x 3+Lx2+NR x 1}}{\text{Maximum possible score (56x5=280)}}$$

$$\text{Mean relevancy score (MRS)} = \frac{\text{MR X 5+R x 4+SWR x 3+Lx2+NR x 1}}{\text{Number of judges responded (56)}}$$

Accordingly statements having relevancy percentage of equal and more than 80.00 per cent, relevancy weightage of equal and more than 0.80 and mean relevancy score of equal and more than 4.00 were considered for the inclusion in item analysis. Thus, 64 statements were retained out of 94 statements and these statements were considered for further processing and suitably modified as per the comments of experts wherever applicable. (Table 2)

4. Item Analysis: To delineate the statements based on the extent to which they can differentiate the statements about behavioral change scale, item analysis was carried on the statements selected in the first stage. Thirty farmers were selected from non-sample area and the respondents were asked to indicate their responses with each statement on a five point continuum ranging from "strongly agree" to "strongly disagree". The scoring pattern adopted was 5 to 1, in which 5 score to 'Strongly Agree', 4 to 'Agree', 3 score to 'Undecided' response, 2 to 'Disagree' and 1 to 'Strongly disagree' response for the positive statement, in case of negative statement scoring pattern was reversed.

Based upon the total scores, the respondents were arranged in descending order. The top 25 per cent of the respondents with their total scores were considered as high group and the bottom 25 per cent as low group. These two groups provide criterion groups in terms of evaluating the individual statements suggested by Edwards (1969) [3]. 't' value was calculated for each of the statement by using the following formula:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\Sigma X^2_H - \frac{(\Sigma X_H)^2}{n} \times \Sigma X^2_L - \frac{(\Sigma X_L)^2}{n}}{n(n-1)}}}$$

Where

X_H = The mean score on given statement of the high group

X_L = The mean score on given statement of the low group

$\sum x^2_H$ = Sum of squares of the individual score on a given statement for high group

$\sum x^2_L$ = Sum of squares of the individual score on a given statement for low group

n = Number of respondents in each group

$\sum$ = Summation

t = The extent to which a given statement differentiate between the high and low group.

After computing the't' value for all the 64 statements, statements with highest 't' value equal to or greater than 2.145 were finally selected and included in the Behavioural change scale. Where all the 64 statements were significant.

Reliability of the scale developed: Split half method developed by Brown prophecy was employed to study the reliability of the tool. The reliability coefficient (rII) of the tool was found to be 0.8349, which is higher than the standard of 0.70, indicating the constructed behavioural change scale was highly reliable and dependable in its measurement. (Table 3)

Validity of the scale: The data were subjected to statistical validity, which was found to be 0.9137, for behavioural change scale, which is higher than the standard of 0.70. Hence, the validity co-efficient was found to be high and it seemed reasonable to accept the scale as a valid measure of the behavioural change. (Table 3)

Administering the scale: The final scale consist of 64 statements including negative statements. The response will be collected on a five point continuum, namely, 'Strongly Agree', 'Agree', 'Undecided', 'Disagree' and 'Strongly disagree' with assigned score of 5, 4, 3, 2, and 1, respectively for positive statements and reverse scoring for negative statements.

Table 1: Exclusion of statements at assorted steps of behavioural change scale construction

Steps in behavioural change scale construction	No. of statements	
	Statements considered	Statements retained
Collection of items	139	115
Editing of items	115	94
Relevancy analysis	94	65
Item analysis	65	65
Reliability and validity	65	65

Table 2: Scale statements with their relevancy percentage and relevancy weightage and mean relevancy score to measure the behavioural change of farmers towards organic farming

A. Knowledge about organic farming

Sl.no.	Items/ statements	RP	RW	MRS	t-value
1	Organic farming is a step back to farming of the past	82.14286	0.821429	4.107143	3.004717
2	Circulation of nutrients between crop and cow	82.85714	0.828571	4.142857	2.276635
3	Kitchen wastes, plant wastes and animal wastes can be used in preparation of compost	81.78571	0.817857	4.089286	3.326675
4	Crop rotation control weeds, pest, disease and improves soil fertility	80.35714	0.803571	4.017857	2.224471
5	Applying FYM, vermicompost and incorporation of green manures improves soil fertility and water holding capacity	82.14286	0.821429	4.107143	2.694101
6	Pheromone trap methods control pests effectively	84.64286	0.846429	4.232143	3.928536
7	mono cropping system decrease pest and diseases incidence	80.71429	0.807143	4.035714	4.294036
8	More use of chemical fertilizers improves soil fertility	83.92857	0.839286	4.196429	4.791446
9	Chemical pesticides are most suitable for pest control	85.35714	0.853571	4.267857	3.605426
10	Chemical Fertilizers are necessary to supply nutrients to the plants	82.85714	0.828571	4.142857	4.345091
11	Mulching control weeds and conserve water in soil	82.14286	0.821429	4.107143	2.694101

B. Attitude towards organic farming

Sl.no.	Items/ statements	RP	RW	MRS	t-value
	i. Environmental aspects				
1	OF is efficient in mitigating climate change effects	84.28571	0.842857	4.214286	3.418525
2	The use of chemical inputs are harmful for the environment, health of the people and animals	82.85714	0.828571	4.142857	3.443323
3	Willing to give up a part of my profit for environmental conservation	81.78571	0.817857	4.089286	4.841276
4	Healthy environment and sustainable development in agriculture is possible through organic farming	82.14286	0.821429	4.107143	3.09098
5	OF reduces environmental degradation and there is greater biodiversity	83.21429	0.832143	4.160714	2.818506
6	Conventional farming pollute soil, water and natural resources surrounding farm	85.35714	0.853571	4.267857	2.370799
	ii. Economic aspect				
1	Organic farming assure the future of a farm	85.71429	0.857143	4.285714	2.948714
2	In transition period the production cost is high and yields are too low	81.42857	0.814286	4.071429	3.835979
3	As more demand and buyers Organic produce can be sold easily	82.14286	0.821429	4.107143	5.242775
4	Consumers would be willing to pay higher prices for organic products	82.85714	0.828571	4.142857	3.370495
5	Conversion allow to access economic support	83.57143	0.835714	4.178571	4.791446
6	Inputs in conventional agriculture are more expensive	84.28571	0.842857	4.214286	3.910586
7	Organic price premiums compensate for high production costs	86.07143	0.860714	4.303571	2.72172
8	Organic farming requires high certification and inspection cost	82.85714	0.828571	4.142857	3.302101
	iii. Health aspect				
1	Organic farming reduces farmers exposure to health hazards	84.28571	0.842857	4.214286	3.210983
2	Organic farming ensures food and nutritional security of farm family.	83.57143	0.835714	4.178571	4.015813
3	Use of pesticides and chemical fertilizer decreases soil health as well as food quality	85.71429	0.857143	4.285714	2.988372
4	Shelf life of organic produce is longer and tastes better	80.35714	0.803571	4.017857	3.916269

C. Social Influence

Sl.no.	Items/ statements	RP	RW	MRS	t-value
1	Family support is more important in making decision to convert to organic farming	82.85714	0.828571	4.142857	2.59724
2	Neighbors appreciate for new practices in agriculture	72.85714	0.728571	3.642857	3.920133
3	Consumer preferences are important for growers	85.35714	0.853571	4.267857	3.941292
4	Advice from experts and progressive farmers is important in transition towards organic farming	81.07143	0.810714	4.053571	4.791446
5	Information about farming in print and mass media are trustworthy	81.78571	0.817857	4.089286	2.118375
6	Organic farming brings more prestige and respect in society	84.28571	0.842857	4.214286	3.941292
7	The organic association membership increases the exchange of information about products and marketing	80.35714	0.803571	4.017857	3.728499
8	Input suppliers more recommends for use of pesticides and herbicides	86.78571	0.867857	4.339286	3.740302
9	Government programmes encourages for organic farming through incentives	85.71429	0.857143	4.285714	4.514792

D. Control Factors

Sl. No.	Statements	RP	RW	MRS	t-value
	i. Self confidence				
1	I have a fear of failing in organic farming	85.35714	0.853571	4.267857	4.841276
2	I can face a difficult situation exist in organic farming without worry	84.28571	0.842857	4.214286	3.941292
3	I am hesitate about taking decisions in organic farming	83.92857	0.839286	4.196429	3.986078
4	I am confident that I could deal efficiently with unexpected events	84.28571	0.842857	4.214286	3.554328
5	I can adjust readily to new situation	83.92857	0.839286	4.196429	4.015813
6	I am usually discouraged when the opinion of others differ from my own	84.28571	0.842857	4.214286	3.910586
7	I have enough faith in my ability	85.35714	0.853571	4.267857	3.794568
8	I always try hard to manage and solve difficult problems	81.07143	0.810714	4.053571	7.418993
	ii. Management skill				

	a. Planning				
1	Forecasting various operations to be performed in organic production	85.35714	0.853571	4.267857	3.941292
2	Estimation of organic inputs required for crop production	86.42857	0.864286	4.321429	3.910586
3	Preparation of calendar of operations in organic farming	85.71429	0.857143	4.285714	3.210983
4	Estimating financial requirements for organic farming	84.64286	0.846429	4.232143	4.209373
5	Planning of diversification of crops and not depend on only one crop	83.92857	0.839286	4.196429	3.910586
6	consult an agricultural expert for the crop planning in transition towards organic farming	82.85714	0.828571	4.142857	4.3805
	b. Production				
1	Timely and judicious irrigation of a crop	85.71429	0.857143	4.285714	3.941292
2	Use large quantity of organic mannures	86.07143	0.860714	4.303571	4.416789
3	Crop rotation with cereals and pulses to balance the nutrient requirement of crops and soil fertility improvement	83.21429	0.832143	4.160714	4.276775
4	Production with using organic fertilizer and bio-pesticides	81.78571	0.817857	4.089286	4.76087
5	Having suitable farm condition	86.42857	0.864286	4.321429	3.554328
6	Having sufficient time to carry out the work	83.92857	0.839286	4.196429	2.948714
7	Timely management of weeds	86.42857	0.864286	4.321429	4.3805
	c. Marketing skill				
1	Produce crops and commodities that give the producer more control over the price received at the farm gate	86.42857	0.864286	4.321429	4.046224
2	Maintaining crop quality and variety to meet local consumer demand	86.78571	0.867857	4.339286	2.568994
3	Searching for local market for the organic produce	86.42857	0.864286	4.321429	4.841276
4	Direct contact with groups of organic consumers	83.21429	0.832143	4.160714	3.418525
5	Market news is much important for farmers to know when to sell his produce to the market	85.71429	0.857143	4.285714	3.941292
6	Value addition of the produce for better marketing	87.14286	0.871429	4.357143	4.722141

Table 3: Reliability and Validity of the behavioural change scale construction

Particulars		**Values**
Reliability	Split –half(r1/2)	0.7165
	Whole –test (rII)	0.8349
validity	Statistical validity	0.9137

Behavioural change of farmers towards organic farming

A good number (41.11%) of the farmers had shown moderate extent of behavioral change, 33.89 per cent had greater extent and 25.00 per cent had lower extent of behavioural change towards organic farming. (Table 4)

The moderate to greater extent of behavioural change towards organic farming in both the situation may be due to the institutional influence in terms of subsidies for construction of vermicompost pit, bio-digester as well as technical information through training and situational influence like effect of climate change in terms of erratic rainfall in both the situation, shortage of irrigation water for the crops, increased input cost, as well as environment and health concern more so present day consumer preference for organic products and market demand made them to change their behavioral beliefs towards organic farming.

Table 4: Overall Behavioural change of farmers towards organic farming

Sl. No.	**Category**	**Total (n=180)**		
		No.	**%**	
1.	Lower extent (<264.62)	45	25.00	Mean = 269.8 SD=10.34
2.	Moderate extent (264.62-274.97)	74	41.11	
3.	Greater extent >274.97	61	33.89	
Total		180	100.00	

Profile characteristics of organic transition farmers

1. **Age:** Age is an important factor as it decides the adulthood of an individual to take the decisions for achieving the needs. As age increases, it enhances the knowledge and skill. Data presented in the Table 5 reveals that 54.45 percent were found in middle ages group followed by young (38.33%) and old (7.22%) aged group. It confirms that more number of organic transition farmers were in the middle aged group. As they were enthusiastic and have more work efficiency and risk bearer and innovators more interested to transit towards organic farming. The similar findings were also reported by Ananthnag (2011) and Chandrakala and Kanchana Devi (2010) [2].

Table 5: Profile characteristics of organic transition farmers

Sl. No.	**Characters**	**Category**	**n=180**	
			No.	**%**
1.	Age (years)	Young (< 35)	69	38.33
		Middle (35-50)	98	54.45
		Old (>50 years)	13	7.22
2.	Education	Up to primary	30	16.67
		Middle	37	20.56
		High school	58	32.22
		PUC & above	55	30.55
3.	Land holding	Marginal farmers	13	7.22
		Small farmers	90	50.00

		Big farmers	77	42.78
4.	Organic transition land	<2.5 acre	40	22.22
		2.5-5.00 acre	91	50.56
		>5 acre	49	27.22
5.	Farming experience Mean=15.74 SD= 8.14	Low	47	34.11
		Medium	91	75.00
		High	42	30.89
6.	Livestock possession Mean=3.98 SD= 2.16	Low	50	27.78
		Medium	91	50.55
		High	39	21.67

2. Education: It is observed that 32.22 per cent had high school education whereas 30.55 per cent had PUC and above education, 20.56 per cent had middle and16.67 percent had studied up to primary. Thus it could be seen that the organic transition farmers were educated. The present findings are supported with the findings of Patidar and Patidar (2015) [6] and **C**handrakala and Kanchana Devi (2016) [2]

3. Land holding

Half (50.00%) of the respondents were small farmers followed by big (42.78%) and 7.22 per cent of them were marginal farmers. The land holdings of the present study revealed that the large extent of transition from conventional to organic farming can be seen with small and big farmers as they can sustain with the transition loss from the organic farming.

4. Organic transition land

It is noticed that half of (50.56%) the respondent's converted 2.5 to 5.0 acres of land into organic whereas 27.22 per cent of them converted more than 5 acres and 22.22 per cent of them converted less than 2.5 acres of land into organic farming. The farmers were fed up with intensified use of fertilizers and chemicals and also with the excess cost of fertilizers and chemicals and high cost of cultivation leading them to transits their land towards organic farming.

5. Farming experience

It was found that great majority (75.00%) of the respondents had medium farming experience, whereas 34.00 per cent were had high farming experience and 30.89 per cent had low farming experience. It has been concluded that the farmers had medium to low farming experience where majority of the farmers were middle and young aged farmers and educated they want changes in their farming in terms of low intensive and sustainable farming make them to transit towards organic farming. The findings of the study were in line with the Singh and George (2012) [8] and Preethi (2015) [7].

6. Livestock possession

The results revealed that half of the (50.55%) respondents had medium livestock possession followed by low (27.78%) and high (21.67%) livestock possession.

To improve the organic farming practices in the field livestock rearing is necessary, which are directly or indirectly may be concerned with the quantum of organic matter availability. It is observed that in both dry and irrigated situation farmers had given equal importance for subsidiary enterprises as they were the source for organic manure as well as additional income. The results were in line with the findings of Ginnoccaro and Berbel (2012) [4].

Conclusion

The developed scale found to be valid to measure the behavioural change of farmers towards organic farming and also found that the farmers were more interested to transit towards organic farming as they experienced the ill effects of intensive farming in terms of reduction in soil and environment health, high cost of fertilizers and pesticides made them to change their behaviour towards adoption of organic farming.

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