Contributing and Influencing Factors on Organic Agriculture Practices by Farmers in Tamil Nadu, India- An Analysis

Sivaraj Paramasivam ^{1 & 3}, Philip Henry ¹, Venkata Pirabu Jagadeesan ²

¹ Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University,

Coimbatore- 641 003. Tamil Nadu, INDIA sivarajtnau@gmail.com

² Directorate of Planning and Monitoring, Tamil Nadu Agricultural University, Coimbatore- 641 003.

Tamil Nadu, INDIA jvenkatapirabu@gmail.com

³ Present address: Department of Agricultural Extension, Amrita School of Agricultural Sciences,

Amrita Vishwa Vidyapeetham, Coimbatore- 642 109. Tamil Nadu, INDIA p_sivaraj@cb.amrita.edu

ABSTRACT: The goal of this study is to find factors that influence the adoption of organic farming. The study's objective necessitates the selection of an organic agricultural district. The study was conducted in Tamil Nadu's western region on purpose with 180 farmers. The most effective elements found in the current study to determine the factors affecting the adoption of organic farming in Tamil Nadu are Organic farm perception potential (Prime factor) with Eigenvalue 3.854. Since, organic farming experience (X5), scientific approach (X12), animal ownership (X13), perceptions of organic manure utilization (X15), and perceptions of organic farming profitability (X16). With the highest factor loading of the above-mentioned factors of 0.689, 0.602, 0.206, 0.591, and 0.613, it has a stronger influence on the amount of adoption of organic farming practices in Tamil Nadu's Western zone. As a result, farmers should be motivated and educated about the benefits of organic farming through extension and research institutes, not only to improve income but also to modify their behaviour and perceptions about new agricultural techniques.

KEYWORDS: Organic farming, factor analysis, perception, farmers, experiences

1. INTRODUCTION

Organic farming is a technique of agriculture that maintains the environment, food quality, animal health, natural resources on a long-term basis, and is beneficial to social welfare. These goals help to strengthen the market and compensate for externality internalization [1]. Organic agriculture is one of the finest strategies for ensuring environmental sustainability. In general, these methods are quite safe for human health since they maintain soil fertility and ecological

sustainability. Natural biodiversity and locally adapted enhanced ecological processes or cycles are more important than genetically modified resources and synthetic inputs [2]. Farmers' decisions to transition to organic farming were influenced by their health and environmental consciousness [3]. For farmers, the economic component of agriculture is critical, the ecological aspect is critical, and the social aspect of agriculture is very minor [4]. Farmers' socioeconomic features, enterprise characteristics, information sources, farmer association participation, and attitudes are all factors influencing their adoption of organic farming [5]. Farmers' acceptance of organic farming was influenced by economic and environmental reasons [6]. Five major elements influence the adoption of organic farming. Economic, social, marketing, tillage, and government policy were identified as these factors. The majority of the farmers began organic production shortly after hearing about the concept of organic farming and had been in the organic farming business for at least five years [7]. Organic farming is adopted more quickly by farmers that prefer to take chances, care about the environment, and want to generate jobs in their enterprises [8]. Farmers have a positive attitude toward organic farming and plan to move to organic farming over the next five years, according to fresh vegetable and fruit producers. A sizable percentage of farmers believe that switching to organic farming has had no discernible impact on their income [9]. Farmers' acceptance of organic farming was aided by communication with agricultural extension services [10].

Nearly 43.7 million hectares of land in 172 nations have been certified as organic, accounting for about 1% of each country's total agricultural acreage. Oceania (17.3 million hectares), Europe (11.5 million ha), and Latin America (6.6 million ha) have the most organic farming land, followed by Asia (3.4 million ha), North America (3 million ha), and Africa (1.2 M ha). Asia is home to over 36.00 percent of the world's organic growers, followed by Africa (29.00 percent) and Europe (29.00 percent) (17.00 percent). India (650000 producers), Uganda (189610 producers), and Mexico are the countries with the most producers (169703 producers). In developing countries and emerging markets, around a quarter of the world's agricultural land (11.7 million ha) and more than 80% (1.7 million) of the producers are located. According to available data, India ranked 9th in the world's organic agricultural landscape and first in terms of an overall number of producers in 2018 [11]. The National Programme for Organic Production has been implemented by the Indian government (NPOP). The national programme includes an accreditation mechanism for Certification Bodies, organic production standards, and organic

agricultural marketing. In India, there are 3.56 million hectares under organic certification (registered under the National Programme for Organic Production) (2017-18). This contains 1.78 million hectares (50%) of cultivable land and another 1.78 million hectares (50%) for wild harvesting. Madhya Pradesh has the greatest area covered by the organic certification, followed by Rajasthan, Maharashtra, and Uttar Pradesh. Sikkim made the incredible achievement of converting its whole cultivable land (more than 76000 acres) to organic certification in 2016. Sikkim has become India's first 100 percent organic state. Organic farming and goods are becoming increasingly popular in Tamil Nadu.

According to the Tamil Nadu organic certification department, over 10,000 acres of land were certified as organic in 2019, and this number is continuously increasing. Tamil Nadu has a lot of potential because the variety of crops grown there is fairly diverse, including millets and legumes, which only require marginal growing conditions and are well matched to organic growing packages. Many studies conducted in organic agricultural tracts suggest that the sector has numerous challenges, including a lack of governmental efforts, a lack of knowledge, and a lack of marketing facilities, but no comprehensive study has been conducted in the region. Although it is gratifying that Tamil Nadu has attained food self-sufficiency in such a short period of time in the country, her traditional agro-system has suffered a significant setback, mainly to the indiscriminate use of chemical fertilizers, insects, fungicides, and herbicides. As a result, soil fertility has been eroded, water supplies have been contaminated, and food grain has been contaminated chemically. Organic farming can provide high-quality food without compromising the health of the soil or the environment. It is necessary to determine the reasons for adoption and non-adoption. However, there is mixed evidence on the acceptance and impact of organic farming, and there is few research on the subject in Tamil Nadu. As a result, the current research focuses on determining the factors that influence farmers' adoption of organic agricultural practices.

2. METHODOLOGY

The research study used an ex-post facto research strategy. The research was carried out in the Tamil Nadu districts of Coimbatore, Erode, and Tirupur. These districts were chosen with care to ensure that the maximum number of respondents in the category of individual certified organic producers were included. The simple random sampling technique was used to choose a sample of

180 farmers. A well-structured and pre-tested interview schedule was used to interview the respondents in person. The data were analyzed using factor analysis. This strategy was chosen since it requires no prior knowledge of functional relationships and is a well-known data reduction method. Factor analysis is a technique for condensing a large number of variables into a small number of key elements.

Table 1. Selected Blocks and Respondents from Tamil Nadu's Coimbatore, Erode, and Tiruppur districts

S. No.	Name of the Districts	Name of the Blocks	Number of selected certified organic farmers	Total number of certified organic farmers from selected districts
1.	Coimbatore	Anamalai	20	60
		Pollachi (N)	20	
		Thondamuthur	20	
2.	Erode	Erode	20	60
		Gobichettipalayam	20	
		Sathyamangalam	20	
3.	Tirupur	Tiruppur	20	60
		Palladam	20	
		Udumalpet	20	
Total				180

3. RESULTS AND DISCUSSION

This strategy was chosen since it requires no prior knowledge of functional relationships and is a well-known data reduction method. Factor analysis is a technique for condensing a large number of variables into a small number of key elements.

Test Adequacy of Sample for Factor Analysis

The Kaiser-Meyer-Olkin is a scale that ranges from 0 to 1 for sample adequacy. Closer values to 1 are preferable, and 0.6 is recommended as the minimum. The Bartlett's Test of Sphericity is a

null hypothesis test that looks for an identity matrix in a correlation matrix. Taking this into account, these tests give a minimum criterion for moving further with Factor Analysis.

Table 2. Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

KMO and Bartlett's Test		
1. Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.619
2. Bartlett's Test of Sphericity	Approx. Chi-Square	890.772
	Degrees of freedom (df)	153.000
	Significance	0.000

Normally, $0 < \text{KMO} < 1$

If, $\text{KMO} > 0.5$, the sample was adequate.

Here, $\text{KMO} = 0.619$, indicating that the sample is adequate and that the Factor Analysis can proceed.

Bartlett's Test of Sphericity

Alfa = 0.05, assuming a 95% level of significance. The Factor Analysis is legitimate because the p-value (Sig.) is.000 0.05. The suitability of Factor Analysis was tested using the Kaiser-Meyer Olkin (KMO) and Bartlett's Test measures of sample adequacy. With 153 degrees of freedom, the approximate Chi-square is 890.772, which is significant at the 0.05 level. In addition, the KMO statistic of 0.619 is fairly large (greater than 0.50). As a result, Factor Analysis was chosen as an appropriate technique for further data analysis.

Eigenvalues of Extent of Adoption of organic farming practices

The numbers of the variables employed in the Factor Analysis are the first components. Not all of the 18 variables, however, will be kept. Only the six parameters will be recovered in this study by merging the relevant variables. The variances of the factors are the Eigenvalues. The Eigenvalue is found in the total column. The first factor is always responsible for the most variance and, as a result, has the highest Eigenvalues. The next factor will account for as much of the remaining variance as possible, and so on until the last factor.

Table 3. Eigenvalues of the Extent of Adoption of Organic Farming Practices

Factor number	Eigenvalue	Cumulative variation (%)
I	3.854	21.412
II	2.538	14.097
III	1.345	7.471
IV	1.231	6.839
V	1.108	6.157
VI	1.032	5.735

The percentage of variance represents the percent of total variance accounted for by each element, as well as the overall percentage of variance accounted for by the current and previous factors combined. The top six factors account for 61.65% of the variance in this study.

Rotated factor (Varimax) Matrix of Indicators

The findings of the factor analysis revealed that six factors explained the most variation in the adoption of organic agricultural practices in the research region (61.65%). The grouping of indicators is classified and shown below based on factor loading.

The correlation of the variables with each of the retrieved elements is shown in the matrix (Table 4). Typically, each variable is heavily loaded in one component and lightly loaded in the others. To choose which variables are included in each component, the variable with the highest value in each row is chosen to be a part of that factor. The values in each row have been highlighted to group the 18 variables into six basic elements.

Factor 1 accounts for 21.41 percent of the variance, Factor 2 for 14.09 percent of the variance, Factor 3 for 7.48 percent of the variance, Factor 4 for 6.84 percent of the variance, Factor 5 for 6.18 percent of the variance, and Factor 6 for 5.74 percent of the variance after rotation. All six factors together account for 61.65% of the variation in the extent to which organic agricultural practices are used in the research area.

Table 4. Rotated Component Matrix

S. No.	Component Matrix ^a	Component					
		1	2	3	4	5	6
1.	Extent of adoption of organic farming practices	.813	.006	.088	-.067	-.171	.012
2.	Age	.099	.618	-.201	.063	.257	.123
3.	Educational status	.198	-.612	.212	.222	-.249	-.194
4.	Annual income	.674	-.110	-.021	-.068	.166	-.420
5.	Farm size	.656	.088	.323	-.277	.005	-.326
6.	Farming experience in organic farming	.375	.689	-.095	-.114	.197	.038
7.	Cropping pattern	.588	.208	.498	-.166	.082	.025
8.	Irrigation source	.200	.057	.611	.006	-.096	.483
9.	Training undergone in organic farming	.446	.298	-.393	-.066	-.182	-.103
10.	Mass media exposure	.643	-.387	-.213	.068	-.029	-.013
11.	Extension agency contact	.614	-.270	-.359	-.093	-.094	.079
12.	Risk orientation	.241	-.346	.191	.066	.602	.224
13.	Scientific orientation	.206	-.677	-.084	.004	.251	.084
14.	Livestock possession	.438	.314	-.109	-.257	-.176	.309
15.	Perception on eco friendly conservation practices	.360	.268	.032	.591	.111	-.180
16.	Perception on use of organic manures	.039	.405	.244	.613	-.143	-.200
17.	Perception on profitability of organic farming	.454	-.064	-.260	.429	.265	.321
18.	Perception on environmental degradation	.335	-.109	-.064	.232	-.517	.341
Extraction Method: Principal Component Analysis.							
a. 6 components extracted.							

Rotated Factor (Varimax) Matrix of each Indicator and its Grouping

The indicators were grouped into components using factor analysis (with varimax rotation) based on the commonality found. In this portion of Table 5, six major indicators were taken into account.

Table 5. Factor-wise indicators with Grouping of the Indicator

Factor number	Variables included	Grouping of the indicator
I	Farming experience in organic farming (X_5), Scientific orientation (X_{12}), livestock possession (X_{13}), perception on use of organic manures (X_{15}) and perception on profitability of organic farming (X_{16})	Organic farm perception potential
II	Perception on eco-friendly conservation practices (X_{14}) and perception on environmental degradation (X_{17})	Eco-friendly potential
III	Educational status (X_2), training undergone in organic farming (X_8), mass media exposure (X_9) and extension agency contact (X_{10})	Pro-activeness potential
IV	Risk orientation (X_{11})	Pro - Autonomy behaviour potential
V	Farm size (X_4), cropping pattern (X_6) and irrigation source (X_7)	Farm resource potential
VI	Age (X_1) and annual income (X_3)	Personal potential

Factor 1

The first component, which explained 21.41 percent of the variation in the level of adoption of organic agricultural practices, was recognized as the 'Prime factor' among the total variation of 61.65 percent. Table 4 shows that Factor 1 includes the comprehensive variables of organic farming experience (X_5), scientific attitude (X_{12}), livestock ownership (X_{13}), perception of organic manure use (X_{15}), and perception of organic farming profitability (X_{16}). With the highest factor loading of the above-mentioned factors of 0.689, 0.602, 0.206, 0.591, and 0.613, it has a stronger influence on the amount of adoption of organic farming practices in Tamil Nadu's Western zone. These elements are referred to as the 'Organic farm perception potential' aspect of the level of adoption of organic farming techniques since they largely deal with the adoption of organic farming practices.

Factor 2

The second factor accounted for 14.09 percent of the variance. As a result, factors 1 and 2 together accounted for 35.50 percent of the difference in the adoption of organic farming practices. Factor 2 covers the comprehensive variables of perspective on eco-friendly conservation practices (X14) and perception on environmental degradation (X15), as shown in Table 4. (X17). With the second greatest factor loading of the above-mentioned factors of 0.438 and 0.341 respectively, it has a stronger influence on the level of adoption of organic farming practices in Tamil Nadu's Western zone. The amount to which organic agricultural practices are adopted is referred to as the 'Eco-friendly potential' factor.

Factor 3

The third factor accounted for 61.65% of the variation. As a result, factors 1, 2, and 3 combined accounted for 42.97 percent of the difference in the adoption of organic farming practices. Factor 3 is further deduced from Table 4 to contain the complete variables of educational status (X2), training undergone in organic farming (X8), mass media exposure (X9), and extension agency contact (X10). With factor loadings of 0.222, 0.446, 0.643, and 0.614, it influences the level of adoption of organic farming practices. It is referred to as the 'Pro-activeness potential' aspect of the degree to which organic agricultural methods are adopted.

Factor 4

The fourth component accounted for 6.83 percent of the variance. As a result, factors 1, 2, 3, and 4 combined accounted for 49.08 percent of the difference in the adoption of organic farming practices. It may also be deduced from Table 4 that factor 4 contains the entire risk orientation variables (X11). With factor loadings of 0.602, it determines the amount to which organic farming methods are used. It's been dubbed the "pro-autonomy behaviour potential" element in determining the extent to which organic farming practices are adopted.

Factor 5

The fifth component accounted for 6.15 percent of the variance. As a result, factors 1, 2, 3, 4, and 5 combined accounted for 55.95 percent of the difference in the adoption of organic farming practices. Factor 5 covers the comprehensive variables of farm size (X4), cropping pattern (X6), and irrigation source, as shown in Table 4. (X7). It has factor loadings of 0.656, 0.588, and

0.611, which determine the amount to which organic farming methods are used. The amount to which organic farming practices are used is referred to as the 'Farm resource potential' factor.

Factor 6

The sixth component accounted for 5.73 percent of the variance. As a result, factors 1, 2, 3, 4, 5, and 6 combined accounted for 61.65% of the difference in the adoption of organic farming practices. It can be deduced from Table 4 that factor 6 contains the comprehensive variables of age (X1) and annual income (Y1) (X3). It has factor loadings of 0.618 and 0.674, which determine the amount to which organic farming methods are used. It was dubbed the 'Personal Potential' factor in determining the extent to which organic farming practices were adopted.

4. CONCLUSION

Organic farming has exploded in popularity in recent years. Organic farming proponents tout the system's environmental and nutritional advantages. It can also contribute to rural development by creating more jobs and strengthening ties to the local economy, reuniting consumers with producers and driving positive economic multipliers. Based on the findings, it can be inferred that the majority of farmers have implemented organic farming to a moderate to low extent. Farming expertise in organic farming (X5), scientific orientation (X12), animal ownership (X13), perception of organic manure use (X15), and perception of organic farming profitability (X16) were identified as the "Prime factor" with organic farming adoption. As a result, the government and policymakers must play a critical role in changing farmers' perceptions of organic farming as a profitable and environmentally beneficial practice.

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