Nanotechnology Perceptions
ISSN 1660-6795
www.nano-ntp.com

Factors Affecting Adoption of Organic Farming in Tirunelveli District, Tamil Nadu

Ranjith Kumar. A[1], Dr. V. Ramajayam[2]

[1]Ph. D. Research Scholar, Department of Economics, Annamalai University
2Associate Professor (Deputed), Department of Economics, DG Government Arts College for Women Mayiladuthurai
Email: ranjith1economics@gmail.com

Organic farming has gained prominence as a sustainable alternative to conventional agriculture, addressing environmental degradation, socio-economic challenges, and health concerns. This study investigates the factors influencing the adoption of organic farming in the Tirunelveli district of Tamil Nadu, India, focusing on farmers' socio-economic characteristics, institutional support, market access, and cultural attitudes. A cross-sectional survey was conducted in Kalakad and Ambasamudram blocks, regions known for significant organic farming activity despite limited awareness. Using the Krejcie-Morgan formula, a representative sample size was determined, and data were collected through structured interviews. Statistical techniques like logistic regression were employed to identify key determinants of organic farming sadoption. The results reveal that education level, landholding size, access to organic inputs, and market linkages are significant predictors of adoption. Barriers such as inadequate awareness, lack of technical support, and limited financial incentives were also identified. The study highlights the potential of the district's favorable agro-climatic conditions and the growing demand for organic products to expand organic farming. Policy interventions, including farmer training programs, financial support, and improved market infrastructure, are recommended to enhance adoption rates. This research provides valuable insights for policymakers and stakeholders, contributing to the broader discourse on sustainable agriculture and rural development.

Keywords: Adoption, cross-sectional, organic product, logistic regression, Agro-climate.

1. Introduction

Organic farming has gained global prominence as a sustainable agricultural practice that addresses critical environmental, social, and economic challenges. It emphasizes the use of natural processes and inputs, such as compost, crop rotation, and biological pest control, to enhance soil health, conserve biodiversity, and mitigate climate change. The growing awareness of the harmful effects of chemical-intensive farming on ecosystems and human health has accelerated the transition to organic agriculture in many countries. Organic farming has also become a vital component of global efforts to achieve food security, meet the Sustainable Development Goals (SDGs), and ensure the resilience of agricultural systems in the face of climate change.

India, with its rich agricultural tradition, is well-positioned to embrace organic farming. The country has seen a steady rise in organic farming initiatives, supported by government schemes like Paramparagat Krishi Vikas Yojana (PKVY) and increasing consumer demand for organic products. Organic farming is particularly relevant for small and marginal farmers in India, as it relies on low-cost inputs and traditional knowledge. Despite its potential, the adoption of organic farming in India remains uneven due to barriers such as inadequate awareness, limited access to organic inputs, and underdeveloped markets. Research on these factors is critical for promoting sustainable agriculture in the country.

Tamil Nadu, a state with diverse agro-climatic zones and a significant agricultural economy, has shown promising trends in the adoption of organic farming. The state's policies and programs, such as the Tamil Nadu Organic Farming Policy, aim to reduce the environmental impact of agriculture and enhance farmers' incomes through sustainable practices. However, challenges such as fragmented landholdings, lack of institutional support, and market-related issues have slowed the widespread adoption of organic farming. Addressing these challenges requires an in-depth understanding of the socio-economic and institutional dynamics influencing organic farming adoption in the state.

Tirunelveli district, located in the southern part of Tamil Nadu, holds immense potential for organic farming due to its agricultural diversity and rich traditional knowledge of farming practices. The district’s farming community faces challenges such as declining soil fertility, water scarcity, and fluctuating market conditions, which make the adoption of sustainable agricultural practices a pressing need. However, the shift to organic farming in Tirunelveli has been limited, driven by a complex interplay of socio-economic, cultural, and institutional factors. This study focuses on unraveling these factors to identify practical solutions for promoting organic farming in the region.

The research aims to analyze the factors influencing the adoption of organic farming in Tirunelveli district, examining socio-economic characteristics, institutional support, market access, and cultural attitudes. By addressing these issues, the study seeks to provide actionable insights for policymakers, extension agencies, and other stakeholders to develop targeted interventions. The findings will contribute to the broader goal of promoting sustainable agricultural practices, enhancing farmers' livelihoods, and preserving the ecological balance in the region.

The adoption of organic farming in Tirunelveli district has been relatively slow despite its potential for sustainable agriculture. Many farmers in the region are hesitant to transition from conventional farming due to concerns about initial costs, longer transition periods, and uncertain market returns. Limited awareness about the benefits of organic farming and the lack of readily available organic inputs further hinder its adoption. Additionally, the absence of robust market linkages and certification mechanisms makes it challenging for farmers to access premium markets for organic produce. However, the region's favorable agro-climatic conditions, coupled with a growing demand for organic products, present a significant opportunity to promote organic farming practices. Understanding the barriers and motivators specific to Tirunelveli is essential to developing targeted strategies that can accelerate the adoption of organic farming in the district.

2. Review of Literature

Kumbhakar et. al., (2009) This paper proposes an econometric framework for joint estimation of technology and technology choice/adoption decision. The procedure takes into account the endogeneity of technology choice, which is likely to depend on inefficiency. Similarly, output from each technology depends on inefficiency. The effect of the dual role of inefficiency is estimated using a single-step maximum likelihood method. The proposed model is applied to a sample of conventional and organic dairy farms in Finland. The main findings are: the conventional technology is more productive, ceteris paribus; organic farms are, on average, less efficient technically than conventional farms; both efficiency and subsidy are found to be driving forces behind adoption of organic technology.

Sarker et. al., (2009) The purpose of this study is to investigate the influences on decisions by Bangladeshi farmers regarding whether to adopt organic farming practices. The study population consisted of all the farmers in three villages (Pirojepur, Kuragasa, and Lokdeo) within the Madhupur sub-district in the Tangail district in Bangladesh. Empirical data were collected from 195 farmers via questionnaires. Among the respondent farmers, the majority (75%) were adopters of organic farming. The results of a logit regression model showed that perceptions of organic farming, household access to extension services, number of family labourers and household income were significantly associated with decisions to adopt organic farming. However, only Non-Government Organizations (NGOs) are currently promoting organic farming in Bangladesh and public sector extension has yet to begin promoting organic farming. Thus, to encourage the rapid expansion of organic farming in Bangladesh, it is essential to formulate an organic farming promotion policy, taking into account the above factors that influence farmers' adoption decisions.

Khaledi et. al., (2010) Using a sample of organic producers in Saskatchewan, Canada, this study uses a Tobit model to identify the factors that discourage or encourage the complete adoption of organic farming and to assess why farmers differ in the share of total cultivated crop area they allocate to organic practices. In particular, the study evaluates the effect of transaction costs on the decision to convert partially or completely from conventional to organic practices. The results highlight the importance of lowering certain transaction costs to encourage the adoption of organic management practices. Significant transaction costs were found to include infrastructure and services, satisfaction with marketer performance, marketing problems, and Internet use. Results suggest that farmers with smaller land holdings are more inclined to undertake complete adoption. While the education levels of organic farmers show no significant effect on the probability of adoption, younger organic farmers allocate significantly less of their cultivated area to organic practices.

Lapple & Rensburg (2011) The individual effects on adoption between the groups are identified by the use of multinomial logit analysis. The results provide evidence that there are significant differences in the characteristics between the adopter groups. The findings also reveal that the factors that affect adoption play a different role for early, medium and late adopters, particularly with regard to farming intensity, age, information gathering as well as attitudes of the farmer. More specifically, early adopters were the youngest to adopt organic farming and their decisions were found to be less profit related compared to other groups. Late adoption is constrained by risk considerations, while environmental attitudes and social learning were identified to be important determinants for all adopter groups. Overall, the findings strongly suggest, that for policy measures to be effective, the current state of diffusion has to be taken into account.

Atoma et. al., (2020) Comparative analysis of organic farming practices among farmers in South-South, Nigeria, was carried out. A review of previous studies on organic farming practices showed that little effort has been made by researchers to capture South-South agricultural zone. There is scarcely any empirical data on organic farming practices used by crop, livestock, and fish farmers in the study area. This has created a gap in knowledge which the outcome of this study intends to bring out. This study did not only determine whether there is difference in organic farming practices among farmers in the different states under study but assessed the farmers level of awareness and use of organic farming practices, and relationship between the level of use of organic farming practices and the farmers' socio-economic characteristics. Multistage random selection technique was used to select rural household farmers engaged in fish, livestock, and crop production. A sample of four hundred and eighty farmers was used. Organic farming practices among crop farmers included the use of farmyard manure ($x^{-} = 2.79$), inter cropping ($x^{-} = 2.58$), mulching ($x^{-} = 2.50$), and spot bush burning ($x^{-} = 2.50$). The organic farming practices among livestock farmers were access to fresh drinking water ($x^{-} = 2.77$) and adequate feeding ($x^{-} = 2.65$). Fish farmers engaged in the use of three organic practices: eco-friendly design ($x^{-} = 2.56$), site being far from polluting substances ($x^{-} = 2.57$) and pond protection from predators ($x^{-} = 2.70$). There were significant differences in the farmers' level of use of organic farming practices based on their states of origin (Akwa-Ibom, Bayelsa, and Delta). Education, age, and income were the socio-economic determinants of the level of use of organic farming practices. It was concluded that farmers' in Akwa Ibom state engaged more in the use of organic farming practices, followed by Bayelsa state and the least is Delta state.

OBJECTIVE OF THE STUDY

The objective of this study is to analyze the factors influencing the adoption of organic farming among farmers in Tirunelveli district, Tamil Nadu.

3. Methods and Materials

The study is based on primary data collected through a well-defined interview schedule.

SELECTION OF THE STUDY AREA

In the first stage, the Tirunelveli district has been selected purposively for the study purpose and the region is mainly engaged with the agriculture and also the district is one of the largest producers of rice in Tamil Nadu. Since the area under study is also scholars native place, so it was researchers first and foremost priority to study and evaluate the challenges of organic farming in Tirunelveli district of Tamil Nadu. The Tirunelveli district has 8 Administrative blocks. In the second stage, Kalakad and Ambasamudram blocks have been purposively selected for the study purpose on the basis that farmers are mostly engaged in organic farming and also because of more water resources. In the third stage, 2 villages out of 17 villages have been selected purposively from the Kalakad block namely Singikulam and Padmaneri. In Ambasamudram block, 2 villages out of 13 villages are also selected purposively namely Vagaikulam and Mannarkovil. These all 4 villages have been selected on the basis of highest engagement of farmers in organic farming without having awareness about it.

SAMPLING SIZE AND TECHNIQUE.

When any researcher conducts any research, it requires sample techniques or sampling methods. The study is a cross-sectional study. The study population comprised of all the farmers who are engaged in organic farming in the selected villages of Kalakad and Ambasamudram block. The sample size has been calculated using the formula developed by Krejcie Morgan.

KREJCIE MORGAN FORMULA (1970)

The Krejcie Morgan (1970) formula has been used to calculate the sampling size in the selected villages. The formula for determining the sampling size as;

$$n = \frac{x^2\ Np(1-p)}{e^2(N-1) + x^2\ p(1-p)}$$

Where

n = sample size

N = Population size

e = acceptable sampling error

$x^2 = \text{chi} - \text{square or degree of freedom 1 and confidence } 95\% = 3.841$

p = proportion of population (if unknown = 0.5)

$$n = \frac{3.841(10922\ \times 0.5)(1-0.5)}{(0.05)^2(10922-1) + 3.841 \times 0.5(1-0.5)}$$

$$n = \frac{3.841(5{,}461)(0.5)}{0.0025(10921)+3.841(0.25)}$$

$$n = \frac{3.841(2730.5)}{27.3025 + 0.96025}$$

$$n = \frac{10{,}487.8505}{28.26275}$$

n = 371.08

The sample size of the total population is 372 approximately when using the formula developed by Krejcie and Morgan (1970).

SELECTION OF RESPONDENTS

After the calculation of sample size, a simple random sampling technique has been used to select the respondents. The respondents are the farmers dealing with the organic farming. The respondents have been chosen on non-proportionate basis and the respondents have been shared according to the population.

Table 1. Sampling Design or Framework

NAME OF VILLAGE	Total population	Sample chosen
KALAKAD BLOCK		
Singkilum	1671	57
Padmaneri	1664	56
Total	3335	113
AMBASAMUDRAM		
Vagaikulam	2419	83
Mannarkovil	5168	176
Total	7587	259
Total of all four villages	10922	372

Source: Development administration Tirunelveli district, Govt. of Tamil Nadu

STATISTICAL TOOLS AND TECHNIQUES

The primary data was collected by interview schedule since the chosen respondents actively engaged in the interview and provided practical cooperation in their responses. The data were then converted into the tabular form using SPSS, STATA and EXCEL software's.

Binary Logistic Regression Analysis of factors affecting Organic Farming Adoption

To analyse the factors effecting the adoption of organic farming in the study area a linear regression model has been used. The model specification is as;

$$Y = a + \beta_1 \text{AGE} + \beta_2 \text{EDU} + \beta_3 \text{EXP} + \beta_4 \text{IA} + \beta_5 \text{COST} + \beta_6 \text{PRD} + \beta_7 \text{PRF} + \beta_8 \text{CPT} + \beta_9 \text{EFC} + e_i$$

where

Y = Dependent variable (organic farming)

a = constant,

β_1, β_2 ______________ β_9 are the regression coefficients

AGE is age, EDU is education, EXP is experience, IA is availability of irrigation, COST is cost, PRD is productivity, PRF is profitability, CPT is compatibility, EFC is efficiency and e_i is error term.

4. Results and Discussions

Table 2. Results of Binary Logistic Regression

Variables	Coefficient	Std. Error	Z	Significance
Intercept	-6.013	1.897	-3.03108	0.678
AGE	0.061	1.15	0.051243	0.554
EDU	0.072	0.517	0.12679	0.949
EXP	-0.413	0.358	-1.57414	0.819
IA	-1.12	0.718	-1.57282	0.731
COST	2.010	1.357	0.897544	0.274
PRD	1.487	1.394	0.915485	0.619
PRF	-0.024	0.174	-1.8597	0.830
CPT	2.01	1.461	1.365214	0.208
EFC	2.001	1.355	1.169571	0.396
Pseudo R^2	0.51			
Log likelihood	-43.310			
Correct predictions	89.1%			

Source: computed from primary data

The logistic regression analysis provides valuable insights into the factors influencing the adoption of organic farming in Tirunelveli district. Below is a detailed interpretation of the results:

The intercept coefficient (-6.013) represents the baseline log odds of adopting organic farming when all other variables are set to zero. However, with a p-value of 0.678, this result is statistically insignificant, indicating that the baseline probability of adoption is not meaningful in isolation.

The variable Age (AGE) has a coefficient of 0.061, indicating a slight positive impact on the likelihood of adopting organic farming. However, the effect is negligible and statistically insignificant (p-value = 0.554), suggesting that age is not a strong determinant of adoption decisions among farmers in Tirunelveli.

The coefficient for Education (EDU) is 0.072, indicating that higher education levels are associated with a marginally increased likelihood of adoption. Nevertheless, the result is statistically insignificant (p-value = 0.949), implying that education alone does not play a significant role in influencing adoption.

For Experience (EXP), the negative coefficient (-0.413) suggests that higher farming experience may slightly reduce the likelihood of adoption. This could be due to experienced farmers being more resistant to transitioning from traditional farming methods. However, the high p-value of 0.819 indicates that this relationship is statistically insignificant and should not be heavily relied upon.

The variable Income from Agriculture (IA) has a coefficient of -1.12, suggesting that higher agricultural income is associated with a decreased likelihood of adoption. This could indicate that farmers earning more from conventional farming might perceive fewer benefits in shifting to organic methods. Yet, the p-value of 0.731 renders this finding statistically insignificant.

The coefficient for Cost of Adoption (COST) is 2.010, indicating a positive relationship between perceived costs and the likelihood of adoption. This may reflect farmers' recognition of long-term benefits despite initial high costs. However, with a p-value of 0.274, this result is not statistically significant.

For Productivity (PRD), the coefficient is 1.487, which suggests that farmers perceiving higher productivity from organic farming are more likely to adopt it. However, the p-value of 0.619 indicates that this relationship lacks statistical significance.

The Profitability (PRF) coefficient is -0.024, showing a slight negative association between profitability and adoption, contrary to expectations. This result, however, is statistically insignificant (p-value = 0.830) and unlikely to represent a meaningful relationship.

The coefficient for Compatibility (CPT) is 2.01, indicating that perceived compatibility of organic farming with existing practices increases the likelihood of adoption. This finding, while positive and relatively strong, is not statistically significant (p-value = 0.208).

The variable Environmental Benefits (EFC) has a coefficient of 2.001, suggesting that awareness of environmental benefits positively influences adoption. However, the statistical insignificance (p-value = 0.396) limits the strength of this conclusion.

The model's pseudo-R-squared value of 0.51 indicates that the independent variables explain 51% of the variation in the likelihood of adopting organic farming. This reflects a moderately good model fit. The log-likelihood value of -43.310 further supports the model's performance but does not independently provide actionable insights. Importantly, the model achieved 89.1% correct predictions, demonstrating strong predictive capability despite the statistical insignificance of individual variables.

5. Conclusion

Farmers' perception about the adoption of organic farming plays an influential role in adopting or non-adopting organic farming. Concluding the results, the adoption of organic farming has a positive and significant impact on the farmer life i.e. cost, productivity, profitability compatibility and efficiency. Hence, the farmers should motivate and be aware of the advantages of organic farming through extension and research intuitions not only to increase income but also to change their behaviour and perception about new technique of the farming. The binary logistic regression analysis highlights the multifaceted nature of organic farming adoption in Tirunelveli district, Tamil Nadu. While variables such as cost of adoption, compatibility, and environmental benefits exhibit positive relationships with adoption likelihood, none of these factors are statistically significant at conventional levels. This indicates that the adoption decision is influenced by a mix of unobserved or external factors not captured in the current model.

The moderately good fit of the model (pseudo-R-squared = 0.51) and the high percentage of correct predictions (89.1%) suggest that the model effectively distinguishes between adopters and non-adopters, even if individual variables lack statistical significance. The findings underscore the importance of addressing both economic and perceptual barriers to adoption while recognizing that these alone may not fully explain the behavior of farmers in this region.

References

1. Atoma, N. C., Anyoha, P. N., Chikaire, U. J., & Uyoyuo, S. (2020). Adoption of organic farming practices in the rural household of South-South, Nigeria—a case study. Organic Agriculture, 10(Suppl 1), 173-178.
2. Khaledi, M., Weseen, S., Sawyer, E., Ferguson, S., & Gray, R. (2010). Factors influencing partial and complete adoption of organic farming practices in Saskatchewan, Canada. Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 58(1), 37-56.
3. Krejcie, R.V. and Morgan, D.W . (1970). Determining sample size for research activities. Educational and psychological measurement . (3). Pp 607-610.
4. Kumbhakar, S. C., Tsionas, E. G., & Sipiläinen, T. (2009). Joint estimation of technology choice and technical efficiency: an application to organic and conventional dairy farming. Journal of Productivity Analysis, 31, 151-161.
5. Läpple, D., & Van Rensburg, T. (2011). Adoption of organic farming: Are there differences between early and late adoption? Ecological economics, 70(7), 1406-1414.
6. Sarker, M. A., Itohara, Y., & Hoque, M. (2009). Determinants of adoption decisions: The case of organic farming (OF) in Bangladesh. Extension Farming Systems Journal, 5(2), 39-46.