



AGRICULTURAL TECHNOLOGY DEVELOPMENT AND SHIFT IN THE SOCIO-ECONOMIC TRANSFORMATION OF AGRARIAN ECONOMIES WITH SPECIAL REFERENCE TO PALAKKAD

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Abstract

This study investigates the role of agricultural technology development in driving socio-economic transformation in agrarian economies, with a specific focus on Palakkad district in Kerala, India. Using a structured questionnaire, data were collected from a sample of 320 farmers and analyzed using SPSS software. The study employed regression analysis to examine the relationship between the adoption of agricultural technologies and various socio-economic indicators such as income, employment, productivity, and standard of living. Results indicate a significant positive impact of modern agricultural tools, scientific practices, and technology-based interventions on farmers' socio-economic conditions. The findings underscore the importance of enhancing technological awareness, accessibility, and training for rural farmers to foster sustainable agricultural growth and economic upliftment. The study provides actionable insights for policymakers and stakeholders aiming to modernize agriculture and reduce rural poverty through technology adoption.

Key words: *Agricultural Technology, Socio-Economic Transformation, Sustainable, Policy Makers.*

Introduction

The agriculture rich diversity in Palakkad is indivisible in the agrarian nature of Kerala State. It has been witnessing a massive change in the organization and technology of production. The output of green revolution is remarkable in agricultural sector. Now we can see that many of the studies which is characterized the cost and consequences of green revolution. There has been a declining trend in agriculture production and area and the farmers also withdraw active participation in farming. There has been a paradigm shift in organization and technology of production .

The interference of the growth of technology is one of the most important factor that determine the socio economic condition in agriculture. Technological progress in agriculture cannot be fully explained in terms of economic and physical input-output factor. In order to catching the analysis of agricultural technology in the context of rice cultivation in Palakkad , it is easily trace back to three major phases in the technological development and they are traditional, green revolution era and post green revolution. Each stage has their own distinguishing characteristics.

Palakkad has gone through the first two phases and the final stage it has been facing new challenges and to overcome them. The specific objectives of the study are to identify the factors that determining agriculture technological development, to understand the socio-economic changes and to analyze the implementation of Government policies.

Review of Literature

1. Adoption of Agricultural Technology

Adoption of agricultural technology has been widely recognized as a critical driver of productivity and efficiency in farming. According to Rogers (2003), technology adoption follows a diffusion process influenced by farmers' socio-economic status, awareness, perceived benefits, and access to resources. Studies by Feder et al. (1985) emphasize that access to extension services, credit facilities, and training significantly increases the likelihood of technology adoption. In the Indian context, agricultural technology adoption has improved crop yields, reduced labor dependency, and enhanced farm income (BIRTHAL et al., 2015), particularly when supported by government schemes and institutional support.

2. Use of Modern Agricultural Tools and Methods

The use of modern tools and scientific methods in agriculture has transformed traditional farming practices, leading to increased efficiency and cost-effectiveness. According to Pingali (2007), mechanization and precision farming reduce manual labor, save time, and enhance productivity. Tools like tractors, harvesters, and drip irrigation systems not only boost output but also ensure sustainability by conserving resources. Research by Singh et al. (2020) found that farmers using modern tools experienced reduced input costs and improved profitability, highlighting the importance of mechanization in smallholder farming systems.

3. Technology-Based Agricultural Practices

Technology-based agricultural practices, including mobile apps, remote sensing, and IoT devices, have become increasingly essential in precision agriculture. These technologies enable real-time decision-making related to weather forecasting, pest control, and market access. According to Mittal & Mehar (2016), mobile-based information services have significantly improved farmers' decision-making capabilities in rural India. Studies show that technology integration in farming operations can lead to higher yields, better risk management, and improved market linkage, especially for small and marginal farmers (Patil et al., 2019).

4. Agricultural Technology Development

Agricultural technology development focuses on research, innovation, and the dissemination of new techniques and equipment tailored to local needs. Public and private institutions play a key role in generating technology through R&D. According to Alston et al. (2000), investment in agricultural research leads to long-term productivity growth and rural development. In India, organizations like ICAR and state agricultural universities have contributed significantly to technology development, promoting innovations such as high-yielding varieties, bio-fertilizers, and climate-resilient crops (Joshi et al., 2014).

5. Socio-Economic Development

Socio-economic development in rural areas is closely linked to advancements in agriculture. The adoption of improved agricultural technologies contributes to increased farm income, better living standards, and employment generation. Datt and Ravallion (1998) suggest that agricultural growth is a powerful tool for poverty reduction. Empirical studies by Fan et al. (2000) have shown that investment in agricultural infrastructure and technology leads to substantial improvements in rural livelihoods. In the context of India, modernization of agriculture has helped reduce rural poverty and empowered farming communities economically and socially.

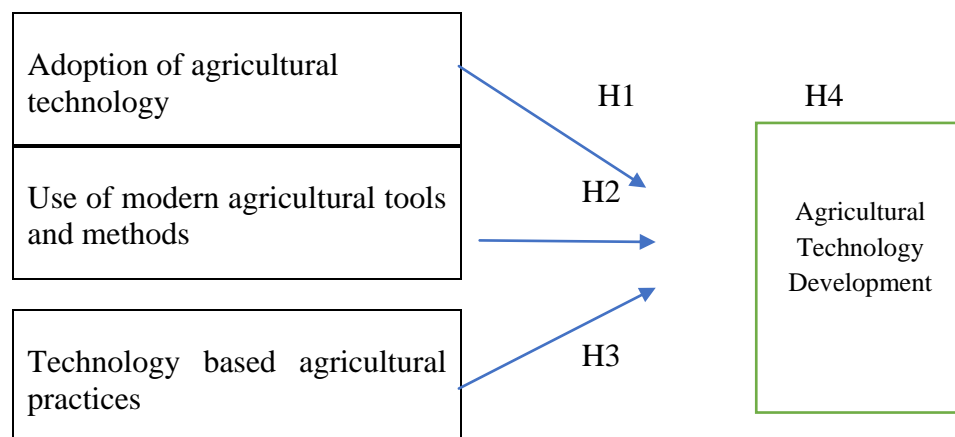


Figure 1 : Research Model

Hypothesis

H1 : Higher adoption of agricultural technology in Palakkad leads to a significant increase in Socio-Economic Transformation.

H2: Use of modern agricultural tools and methods reduces rural to urban transformation

H3: Technology based agricultural practices positively influence agrarian socio-economic transformation.

H4: Farmers adopting advanced technological systems experience greater socio-economic improvement.

Research Design

This study adopts a quantitative research design to examine the factors influencing socio economic condition in agriculture. A structured questionnaire was developed with likert point scale with five points to measure the farmers' perceptions. The research model combined with the variables like Adoption of agricultural technology, Use of modern agricultural tools and methods, Agricultural Technology Development, Socio economic development and Technology based agricultural practices.

All the data were collected from farmers from Palakkad district. The regression analysis was conducted using SPSS . The outcome of the research provide a keen look into the Agricultural Technology Development and Shift in the Socio-Economic Transformation of Agrarian Economies.

Sample Design

A convenience sampling method were used to identify the response from the respondents. The sample collected from farmers from Palakkad district . A total of 320 responses were collected for the analysis. The likert scale questionnaire were rated the opinion of the respondents. This convenience sampling technique ensured the collection of relevant data from appropriate respondents.

Results and Discussion

Demographic profile of the farmers

Table 1. Framers 'Profile

Personal Profile of the Farmers	Frequency	Percentage
Age		
18 – 29	59	18.4
30 – 39	79	24.6

40-49	93	29.06
50-59	80	25
60 and above	9	2.8
Educational Qualification		
Below High School	152	47.5
Diploma	114	35.6
Undergraduate	45	14.06
Postgraduate	9	2.8
Monthly Income		
Below 20000	98	30.6
20000-40000	126	39.3
40000-60000	65	20.3
Above 60000	31	9.6

Reliability Analysis

The demographic data shows that the highest percentage of farmers (47.5%) have an educational qualification below high school, while the lowest percentage (2.8%) hold a postgraduate degree. In terms of age, the 40–49 age group is the most represented (29.06%), whereas the least represented age group is 60 and above (2.8%). Regarding income, 39.3% of farmers earn between ₹20,000–₹40,000, the highest among the income brackets, while only 9.6% earn above ₹60,000, the lowest.

Table 2. Reliability Results

Constructs	Measurement Item	Cronbach's Alpha
Adoption of agricultural technology	Year of adoption of technology for the past five years	0.920
	Frequency of using newly introduced agricultural technology	
	Feel confident in using agricultural technologies	
	Has the agricultural technology improved the farm productivity	
Use of modern agricultural tools and methods	Regular use of modern farming tools	0.729
	Application of scientific methods in agricultural practices	
	Modern agriculture save time and labor in farming activities	
	Use of modern tools and methods	

	reduces your farming costs	
Agricultural technology development	Aware of recent agricultural technology developments	0.731
	Do you believe that agricultural research institutions contributed to technology development.	
	Participated in any training programs related to new agricultural technology	
	Agricultural technology development is keeping pace with the needs of farmers	
Technology based agricultural practices	Use of mobile applications or online platforms for weather updates and market prices.	0.742
	Are you practicing drip irrigation or other water saving technologies.	
	Use of technology for crop disease detection or pest control management	
	Technology based agricultural practices increased crop yield	
Socio-economic development	Agricultural technology adoption increased house hold income	0.724
	Standard of living has improved due to better farming technologies.	
	Agricultural modernization provided more employment opportunities	
	Technology-driven agriculture has reduced rural poverty	

Cronbach's (α), $0.7 \leq \alpha < 0.9$

Reliability Analysis

The reliability analysis, measured using Cronbach's Alpha, indicates that all constructs in the study demonstrate acceptable to excellent internal consistency. The construct "Adoption of agricultural technology" shows the highest reliability with a Cronbach's Alpha of 0.920, indicating excellent consistency among its items. All other constructs — "Use of modern agricultural tools and methods" ($\alpha = 0.729$), "Agricultural technology development" ($\alpha = 0.731$), "Technology-based agricultural practices"

($\alpha = 0.742$), and "Socio-economic development" ($\alpha = 0.724$) — fall within the acceptable range of $0.7 \leq \alpha < 0.9$, confirming good internal consistency.

Regression Results

Hypothesis	Beta Coefficient (β)	R ²	F-value	t-value	Hypothesis Supported
H1	0.68	0.59	45.76	6.76	Yes
H2	-0.41	0.38	28.23	-5.31	Yes
H3	0.52	0.44	33.18	5.76	Yes
H4	0.63	0.53	39.65	6.28	Yes

Conclusion

The study concludes that agricultural technology development has a significant positive impact on the socio-economic transformation of farmers in Palakkad. The adoption of modern tools, scientific methods, and technology-based practices has led to increased income, productivity, and improved living standards. Enhancing farmers' access to technology, along with proper training and awareness, is crucial for sustainable agricultural development and poverty reduction. These findings offer valuable direction for policymakers and stakeholders to promote inclusive growth through the modernization of agriculture.

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