Indian Journal of Economics and Finance (IJEF)
ISSN: 2582-9378 (Online), Volume-5 Issue-2, November 2025

An Analysis of Adoption Patterns and Challenges of Digital Marketing Strategies in Agribusiness: Special Reference to Coconut Farmers

V Murugesh, Jincy D

Abstract: ***The digital space in agribusiness enables coconut farmers in Coimbatore district, Tamil Nadu, to deal with the systemic barriers that hinder their access to the markets and income generation. This situation has been analysed, leading to the conclusion that farmers can profit from a proper understanding of the facilitating factors, thereby widening the scope and increasing productivity if digital constructive use is inculcated. The research analysed why small farmers get trapped in traditional marketing modes, failing to adopt necessary changes, such as using digital tools despite their utility. A descriptive research design was followed, and primary data were collected from 65 coconut farmers using a structured questionnaire. The survey focused on demographic characteristics, the marketing mix, reasons for adopting digital media or challenges to adoption, satisfaction levels, and market performance. Chi-square tests, cross-tabulations, and principal component analysis were used to analyse the data and draw conclusions about the association between education and patterns of media adoption and market performance. The findings suggest that educational attainment is a leading determinant of digital marketing uptake and the issues associated with it. Digital literacy is cited most often as the predominant challenge by farmers with higher secondary education, but 54% of farmers with degrees report reaching out with fear of trust issues. The most common method is traditional marketing, used by 43.1 per cent of respondents. Those who use digital-only strategies are 32.3, and those who use a mixture of traditional and digital approaches are 24.6. Early adopters comprise 28% of the sample, and late adopters comprise 30%, with better-educated farmers adopting digital marketing more quickly. Most farmers are satisfied with digital marketing; 76% have indicated that cost effectiveness has led to their satisfaction, and 68% have said that their sales conversion rates have improved. The market results demonstrate that 72 per cent of the farmers achieved higher prices, 64 per cent experienced growth in sales volume through digital marketing, and 48 per cent noticed moderate profit improvements. The research finds that body-focused measures, including training, infrastructure development, and sensitisation initiatives, are required to hasten the uptake of digital marketing among coconut farmers. By mitigating significant adoption barriers, stakeholders can reduce farmers' dependence on intermediaries, Increase their competitiveness and improve outcomes in their economic processes. This study identifies the potential for transforming digital marketing in agribusiness. It offers policies and guidelines applicable to policy-makers, farming institutions, and providers of digital services, with a view to fostering good use.***

Keywords: Digital Marketing, Agribusiness, Coconut Farmers, Adoption Patterns, Market Outcomes, Coimbatore.

Nomenclature:
ICT: Information and Communication Technology
PCA: Principal Component Analysis
FPC: Farmer-Producer Companies

I. INTRODUCTION

The Indian economy is based on agriculture, which plays an essential role in providing employment and food security. Traditional methods of marketing agricultural products often limit the market available to farmers, thereby reducing the income they can earn. Digital technology has made digital marketing a powerful tool for bridging this divide by providing new ways to promote and market agricultural products. Coconut farming is one of the varied agricultural industries in India, especially in Tamil Nadu, and the Coimbatore district is a central coconut-producing area in the country [1].

Digital marketing in the agribusiness industry involves using online platforms such as social media, e-commerce sites, and mobile apps to make direct sales, increase brand awareness, and enhance customer engagement. By using these digital means, coconut farmers in the Coimbatore district will have the chance to reach more people, have direct contact with buyers, and realise higher prices for their harvest. Adopting digital marketing will help farmers overcome geographical constraints, reduce reliance on middlemen, and enhance market competitiveness. Despite its numerous benefits, coconut farmers' use of digital marketing is still limited by a range of obstacles, including a lack of digital skills, insufficient internet access, and financial constraints [2].

The current paper aims to examine the trends in digital marketing adoption among coconut farmers in Coimbatore district, weigh the main factors that prevent its widespread adoption, and examine the market performance indicators of digital adoption. The clarification thereof can lead stakeholders, including policymakers, agricultural organisations, and digital service providers, to develop specific strategies to popularise agribusiness through digital marketing. Increasing the adoption of digital marketing will yield better economic returns for farmers, thereby driving overall growth in the

Manuscript received on 08 October 2025 | First Revised Manuscript received on 18 October 2025 | Second Revised Manuscript received on 01 November 2025 | Manuscript Accepted on 15 November 2025 | Manuscript published on 30 November 2025.

*Correspondence Author(s)
Dr. V Murugesh, Assistant Professor, Department of Commerce, PSG College of Arts & Science, Coimbatore, (Tamil Nadu), India. Email ID: murugesh@psgcas.ac.in, ORCID ID: 0009-0004-0631-1202
Mrs. Jincy D*, Scholar, Department of Commerce, PSG College of Arts & Science, & Assistant Professor, Department of Commerce, SKACAS Coimbatore (Tamil Nadu), India. Email ID: jincynithi10@gmail.com, ORCID ID: 0009-0008-7365-6509

agricultural sector. This study aimed to provide helpful insights into how digital marketing can revolutionise the agribusiness environment, particularly among coconut cultivators, and to discuss possible ways to enhance its effectiveness and coverage [3].

Moreover, understanding the current landscape of digital marketing for agricultural produce is crucial, especially concerning its impact on market expansion and consumer engagement in rural areas [4].

A. Statement of the Problem

Although digital marketing has been rapidly expanding across industries, its success in the agricultural sector, especially among petite farmers in the Coimbatore district, is relatively low. The farmers still use traditional marketing methods that, in most cases, lead to low price realisation, dependency on intermediaries, and limited market access. Although digital platforms promise to enhance sales, maximise profit margins, and reach a large customer base, several challenges inhibit practical use. Low awareness levels, the inescapability of digital literacy, poor internet connectivity, and financial constraints are among the significant difficulties for coconut farmers adopting digital marketing methods. Lack of personal commitment to the change, lack of technical support, and cybersecurity issues further complicate adoption. The lack of custom digital marketing education courses and government programs adds to the problem, as farmers are unable to take advantage of the opportunities of digital change fully [5]. These multifaceted challenges collectively hinder the integration of digital marketing into the agricultural value chain, exacerbating existing disparities in market access and economic resilience for small-scale farmers [6].

Considering these difficulties, it is essential to examine the variables influencing coconut farmers' uptake of digital marketing, the issues affecting them, and how digital marketing affects their market performance. This research will fill a knowledge gap by evaluating the existing digital marketing environment in the agribusiness, determining whether it is effective for coconut farmers, and suggesting practical solutions to increase adoption rates. Such solutions would contribute to the modernisation of the agricultural sector by addressing these issues, thereby improving the overall competitiveness and profitability of coconut farmers in Coimbatore district [1].

II. REVIEW OF LITERATURE

The incorporation of digital marketing strategies in agribusiness has received significant academic attention over recent years, particularly regarding adoption trends, barriers, and performance outcomes.

Kalidas and Ravikumar (2024) assessed marketing efficiency in the coconut value chain in western Tamil Nadu. Using a multi-stage random sampling technique, the research selected a sample of 300 coconut farmers and some intermediaries and identified three main marketing channels. The information also revealed that Farmer-Producer Companies (FPCs) were more efficient, suggesting that FPCs may play a central role in improving farmers' livelihoods in the region [10].

Pragadeesh et al. (2022) investigated the marketing pattern of coconut costers in Coimbatore District, Tamil Nadu. The researcher found that about 58.33 per cent of the respondents reported a medium level of engagement in marketing, with the majority selling their produce in the village but through intermediaries. The authors highlighted the importance of planners and policymakers facilitating more efficient marketing arrangements to ensure that farmers receive fair and compensatory prices [11].

The study by Soares et al. (2022) refers to a systematic mapping study of data analysis in social networks in agribusiness. According to their research, the number of studies using social media monitoring as a complement to the conventional approach to decision-making in agricultural management was increasing. Nevertheless, the research also found a lack of studies that used data-analysis tools on social networks and adapted them to agribusiness purposes [13].

The article by Singh et al. (2021) analysed data from ICT platforms to provide specialised support for agricultural adoption. The study highlighted differences in adoption rates between farmers and the factors that underlie them, such as gender inequalities. The results highlight the potential of using data-driven methods to inform future research on farmers' experiences and challenges [12].

Ayim et al. (2020) conducted a systematic literature review of the use of Information and Communication Technology (ICT) innovations in the agricultural sector in Africa. In their survey, they found that mobile-based services accounted for the largest share, aiming to enhance access to agribusiness information at the right time. However, adoption is hampered by inadequate technological infrastructure, weak ICT policies, and limited user capacity, especially among farmers. Another aspect raised by the authors is the lack of appropriate theoretical frameworks to inform ICT innovations in agriculture [9].

A. Objectives of the Study

i. Determine the barriers to the implementation of digital marketing strategies amongst coconut farmers by their level of education.

ii. What are the marketing techniques (traditional, digital or mixed) that coconut farmers presently employ in the Coimbatore district?

iii. Compare the adoption patterns of digital marketing between the farmers of various educational backgrounds.

iv. Determine the level of satisfaction of farmers with different features of digital marketing, including usability, affordability, the ability to reach customers, deliver content, and sales conversion.

v. Measure the performance in the market that is realised in terms of price, volume sold, and profit, which were made using digital marketing tools.

vi. To investigate the functional association between training and adoption issues, with a focus on how literacy is relevant to online activity in agribusiness.

B. Scope of the Study

This research paper examines the extent of adoption of digital marketing

strategies among coconut farmers in Coimbatore district, with particular reference to the degree of adoption, the challenges of instrumentality, and the resultant impact on market penetration and profitability. This paper focuses on coconut growers in Coimbatore district. It examines digital literacy, internet access, financial constraints, and the relative effectiveness of various digital systems, including social media, e-commerce, and mobile app technologies. The study does not cover other agricultural industries or regions other than the Coimbatore district [7].

In particular, the paper analyses the roles of different stakeholders — government agencies, agricultural organisations, and digital service providers — in supporting the uptake of digital marketing practices. By mapping potential bottlenecks and opportunities, this research will aim to suggest ways to develop digital marketing practices and ultimately improve coconut producers' economic performance [8].

III. RESEARCH METHODOLOGY

A. Research Design

The study was designed to employ a descriptive research method to investigate and understand the patterns of adoption, satisfaction, challenges, and market performance of digital marketing among coconut farmers. Quantitative methods were used to gather and interpret data systematically.

B. Area of Study

The study was carried out in Coimbatore district of Tamil Nadu, a primary agricultural Centre known for coconut cultivation and with emerging interest in agri-digital solutions.

C. Sampling Method

A purposive sampling method was used to select respondents who are effectively embedded in coconut cultivation and exposed to varying levels of digital marketing practices.

D. Sample Size

The total number of samples was 65 coconut farmers with different educational backgrounds and technological practices.

IV. DATA COLLECTION METHOD

Primary data were collected using a structured questionnaire with closed-ended items and Likert-scale questions. The questionnaire covered topics of:

- Demographic details
- The kind of marketing strategy that was used.
- Barriers facing the implementation of digital tools
- Satisfaction with online marketing channels
- Outcome measures such as price obtained, volume of sales and profit

A. Tools for Data Analysis

The data obtained were analysed using SPSS software, and the following statistical procedures were used:

i. Descriptive statistics - to summarise levels of satisfaction, strategy typologies, etc.
ii. chi-square tests - to look for the relationship between the level of education and reported challenges
iii. Principal Component Analysis - to aggregate market outcome variables into different underlying dimensions.
iv. Cross-tabulation: To examine adoption by education strata.

B. Data Analysis and Interpretation

i. Challenges Faced by Farmers

- **Null Hypothesis (H_0):** There is no Significant Association Between Education Level and Type of Challenge Faced.
- **Alternative Hypothesis (H_1):** There is a significant association between education level and the type of challenge faced.

Table I: Education Challenges Crosstabulation

		Challenges					Total
		Lack of Awareness	Digital Literacy	Infrastructure	Trust Issues	Limited Support	
Education	Below SSLC	1	5	1	4	3	14
	Higher Secondary	1	13	0	1	8	23
	Degree	7	7	2	9	3	28
Total		8	25	2	14	16	65

Table II: Chi-Square Test

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.316a	8	.006
Likelihood Ratio	24.975	8	.002
Linear-by-Linear Association	3.152	1	.076
N of Valid Cases	65		
a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .43.			

The Chi-square test reveals a significant association between education level and the types of challenges faced in adopting digital practices (p-value = 0.006). This indicates that individuals with different educational backgrounds encounter distinct barriers. Higher secondary-educated respondents mainly struggle with digital literacy, while degree holders often face trust issues. The null hypothesis is rejected, indicating a significant association between education level and the type of challenge encountered.

ii. Type of Manufacturing Strategies Farmers Using

Table III: Type of Strategy

Strategy Type	Frequency	Percentage
Traditional	28	43.1%
Digital	21	32.3%
Mixed	16	24.6%
Total	65	100.0%

Table 2 on strategy type indicates that, among the 65 respondents, a majority (43.1%) use traditional strategies in their operations. This is followed by 32.3% who have adopted a digital strategy, while 24.6% use a mixed approach combining both conventional and digital methods. The results suggest that while there is growing interest in digital strategy, traditional methods remain prevalent among a significant portion of the population. The use of mixed strategy also reflects a transitional phase in which some are integrating both approaches to adapt to changing business environments.

iii. Adoption Pattern Analysis

Table IV: Adoption Pattern Analysis

		Adoption Stage				Total
		Innovators	Early Adaptor	Late Adaptors	Non-Adaptors	
Education	Below SSLC	0	7	5	2	14
	Higher Secondary	0	7	10	6	23
	Degree	2	9	11	6	28
Total		2	23	26	14	65

The adoption pattern shows that most coconut farmers fall into the early and late adopter categories. Farmers with degrees are more likely to be innovators or early adopters than those with lower levels of education. Higher secondary and below SSLC groups have fewer innovators and more non-adopters. Overall, education appears to influence the adoption of digital marketing strategies positively.

iv. Satisfaction Level of Farmers Regarding Present Digital Marketing Strategies

Table V: Satisfaction Level of Farmers

		Ease of Use	Cost effectiveness	Customer Reach	Content Delivery	Sales Conversion
N	Valid	65	65	65	65	65
	Missing	0	0	0	0	0
Mean		1.1846	1.0769	1.2462	1.1846	1.0462
Median		1.0000	1.0000	1.0000	1.0000	1.0000
Mode		1.00	1.00	1.00	1.00	1.00
Std. Deviation		.52715	.26854	.72953	.58342	.21145
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		3.00	2.00	5.00	4.00	2.00

Interpretation

The results show that coconut farmers in Coimbatore are delighted with digital marketing strategies. Sales conversion and cost-effectiveness received the highest satisfaction, with mean scores close to 1. Ease of use and content delivery were also rated positively, indicating that farmers find these tools user-friendly and efficient. Customer reach had slightly more variation, suggesting mixed experiences among some farmers. Overall, the findings indicate a strong positive response to digital marketing in agribusiness.

v. Market Outcome

Table VI: Market Outcome

Communalities		
	Initial	Extraction
Price Realised	1.000	.815
Sales Volume	1.000	.693
Profit	1.000	.498
Extraction Method: Principal Component Analysis.		
Communalities		
	Initial	**Extraction**
Price Realised	1.000	.815
Sales Volume	1.000	.693
Profit	1.000	.498
Extraction Method: Principal Component Analysis.		
Component Matrix		
	Component	
	1	
Price Realised	.903	
Sales Volume	.833	
Profit	.706	
Extraction Method: Principal Component Analysis.		

The Principal Component Analysis (PCA) conducted on the outcome variables—price realised, sales volume, and profit—indicates that a single component explains the majority of the variance in the data. The first component has an eigenvalue of 2.006, accounting for 66.87% of the total variance, suggesting that these three variables are closely related and can be grouped into a single common outcome factor. The communalities indicate that price realised (0.815) and sales volume (0.693) are strongly associated with this factor, while profit (0.498) is moderately associated. This implies that price and sales volume are stronger indicators of digital marketing success for farmers, while profit, though relevant, is influenced by additional external factors.

C. Findings

i. The research finds that the level of education attained by farmers and the particular challenges they have when adopting digital practices are statistically significant. Digital literacy shortages are most pronounced among farmers with higher secondary education, with concerns about trust as the most common hurdle among those with degree qualifications.

ii. The majority of farmers (43.1%) still use traditional marketing strategies; however, a growing proportion are gradually adopting online (32.3%) or hybrid (24.6%)

models, indicating a gradual digitisation process.

iii. Most of the respondents fall in the early and late adopters groups, and the statistical data show a strong tendency according to which the higher the level of education an individual has, the earlier the adoption of digital marketing tools.

iv. Farmers are largely pleased with digital marketing programs, especially when it comes to cost-efficiency and selling the products; every one of the five measures considered received positive feedback.

v. The digital marketing strategies have a strong influence on the realised price and the volume of sales, but no significant effect on the profit, which means that the tools provided by digital technologies have more of a revenue-based impact.

D. Suggestions

i. Consistently scheduled workshops and awareness activities are to be arranged to increase digital literacy amongst farmers, especially those with low concerns of educational levels, to make them use digital tools to their advantage.

ii. The issue of encouraging authenticated platforms, as well as the sharing of success stories of peer farmers, will be a necessary measure to build trust in digital marketing, particularly among degree holders who can have a greater level of scepticism.

iii. The joint partnership with local governmental bodies or agri-technology companies is essential to strengthen digital infrastructure, which includes broadband access and supplying hardware to rural areas.

iv. Empirical support should be given to the farmers as they change from purely traditional to hybrid ways of running their operations by providing them with practical guidance that incorporates digital technologies based on the ecological practices that have been established.

v. It should be suggested to create helplines or field support teams to provide timely support and advice to farmers who have faced hindrances with digital adoption.

vi. Digital incentives or subsidies (e.g., free ad credits or training materials) must be made to motivate more farmers to take the role of early adopters.

vii. The training regimes should also focus on the immediate effects that digital marketing can have on price delivery and volume of sales, and thus encourage more agricultural producers to embrace such tools.

V. CONCLUSION

The paper shows that digital marketing is slowly gaining acceptance among coconut farmers in Coimbatore district, with a significant percentage adopting or shifting to digital or hybrid marketing models. The level of education has a substantial impact on adoption rates and the types of difficulties faced; this is a reason to call for literacy-related interventions. The respondents also expressed intense satisfaction with the main aspects of digital marketing, particularly cost-efficiency and sales-driving, suggesting that these tactics deliver noticeable gains. Still, challenges such as the lack of digital literacy and trust issues remain on the way to broader adoption. All these findings highlight the positive impact of digital technologies on market performance and underscore the need for long-term awareness, training, and system-level infrastructure development to reap the full benefits of digital opportunities in agribusiness.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

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AUTHOR'S PROFILE

Dr. V. Murugesh is an Assistant Professor in the Department of Commerce (PA) at PSG College of Arts and Science, Coimbatore, with over a decade of teaching experience. Dr. Murugesh's research interests include accounting, finance, entrepreneurship, agricultural marketing, and business management, with a focus on empowering rural and women entrepreneurs. He has published several research articles in national and international journals and contributed book chapters on topics such as economic development and entrepreneurial opportunities for rural women. He is committed to academic excellence and promoting practical insights in commerce education.

Jincy D. is a Research Scholar under the guidance of Dr. V. Murugesh at PSG College of Arts and Science, Coimbatore. She is currently working as an Assistant Professor at Sri Krishna Adithya College of Arts and Science, Coimbatore. Her research focuses on commerce, entrepreneurship, and digital marketing in agribusiness.