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Integrating Adopter Categories into Adoption Trends among Coconut Growers in Coimbatore District, Tamil Nadu

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ABSTRACT

Coconut, a versatile tropical fruit, holds significant importance globally, with India being a major contributor to its cultivation. In recent years, innovative practices in coconut cultivation have gained momentum by enhancing yield, quality, and resilience. However, the adoption of coconut production technologies among small-scale farmers remained slow. Therefore this research study aimed to shed light on the dynamic adoption behaviour of coconut growers' in the Coimbatore district of Tamil Nadu, India. The study comprised of 120 farmers, who were selected through proportionate random sampling from two villages in the Coimbatore district. Based on the adoption of the latest technology available in coconut production, coconut grower's adoption level was measured using percentage analysis. Findings revealed that the largest adopter category was innovators. The deviation was attributed to the uniqueness of the recommended varieties and coconut tonic adoption, regional cultural influences, and targeted awareness campaigns. The study highlights the importance of tailored awareness campaigns and incentives aimed at promoting innovation adoption among farmers to enhance production. With enhanced adoption of these practices, the coconut farming sector in the Coimbatore district and beyond can experience improved productivity, economic growth, and sustainable development.

INTRODUCTION

Coconut, the versatile tropical fruit, has been an integral part of agriculture and daily life in many regions around the world for centuries. Renowned for its numerous uses, coconut cultivation plays a significant role in India and on a global level (Shanthini & Ramane, 2018). From its delicious flesh and refreshing water to its oil, fibre, and husk, every part of the coconut finds various applications, making it a valuable commodity with a wide range of economic and cultural significance (Zainol et al., 2023).

On a global level, coconut cultivation has gained prominence due to its versatile applications and increasing demand. Countries in Southeast Asia, such as Indonesia, the Philippines, and Thailand, are significant contributors to the global coconut market (Abeysekara et al., 2020). These countries, alongside India, collectively account for a substantial portion of the world's coconut production. In India, coconut cultivation is deeply ingrained in the agricultural landscape and has been an essential component of the country's agricultural heritage for millennia (Nayar, 2017). The southern states of Kerala, Tamil Nadu, Karnataka, and Andhra Pradesh are among the top coconut-producing regions, but it is grown in various other states as well, reflecting its widespread cultivation across the nation (Naveena et al., 2014; Kapil et al., 2021).

In recent years, the coconut industry has witnessed a surge of interest in innovative practices, such as the use of coconut tonics and the cultivation of diverse coconut varieties, aimed at enhancing yield, quality, and resilience (Chowdappa et al., 2016). Despite the fact adoption of technology in agriculture is fundamental to cultivating farm productivity, a countless literature

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showed that adoption levels of externally supported technologies remain low and adoption behaviour remained slow among small farm holders in developing countries (Dadi et al., 2004; Deressa et al., 2009; Johnson et al., 2016; Greenhalgh et al., 2019; Amare & Darr, 2020). Therefore the study aimed to analyse the adoption dynamics of coconut growers' of Coimbatore district of Tamil Nadu and seeks to empower stakeholders within the coconut industry which includes farmers, researchers, policymakers, and private sector players, to make informed decisions that can foster progress and sustainability in the state and nation.

METHODOLOGY

The research study was conducted in the Coimbatore district of Tamil Nadu. Coimbatore district was purposively selected for the study considering more area under coconut cultivation (Directorate of Economics and Statistics, Tamil Nadu, 2011-12). Coimbatore district comprises of twelve blocks, of which Thondamuthur block was purposively selected for the study, as it is one of the block consisting of highest number of coconut growers in Coimbatore District (Jayalakshmi & Selvi, 2018). Thondamuthur block comprises of ten panchayat villages, of which Naraipuram and Thennamanallur village were purposively selected as majority of the farmers in selected villages were coconut growers. Narasipuram village has a total of 450 coconut farmers and Thennamanallur village has 140 coconut growers, thereby using proportionate random sampling techniquea total of 120 farmers was considered for the study.

The adoption behaviour of coconut growers of selected farmers were measured as per the recommended coconut production technologies (Table 1) by Tamil Nadu Agricultural University (TNAU), Coimbatore. Among all the recommended technologies, adoption of improved variety and use coconut tonic for coconut production, which were introduced on 2006 and 2004 respectively, was taken into consideration for adoption categorization among the coconut growers for enhancing coconut production and productivity in the Coimbatore district of Tamil Nadu. Therefore to ensure accurate measurement of adopter's categories with various recommended coconut production technology, simple percentage analysis was carried out. This method offered smooth knowledge of study by simplifying the analysis process. In terms of farmers adopting improved variety (ALR1) from 2006 were considered to be innovators, farmers adopting in the year 2007 was considered as early adopters, 2008 as early majority, 2009 as late majority and laggards were the farmers who adopted in 2011 i.e. 7 years after the introduction of technology. Similarly for the adoption of coconut tonic for coconut crop production, farmers adopting coconut tonic in the year 2004 was categorized as innovators, adoption in the year 2005 were early adopters, 2006 as early majority and adoption of coconut tonic technology in the year 2007 and 2008 were categorised as late majority and laggards respectively.

RESULTS

Adoption of coconut production technologies

The adoption behaviour of coconut growers was measured with respect to recommended coconut production technologies suggested by TNAU, Coimbatore. From Table 1 it was observed that 75 per cent of the coconut growers adopted the recommended seedling selection practice. More than two-fifth of the coconut growers (44.20%) have adopted the recommended pit size of 3' x 3' x 3' feet for planting coconut seedlings. Most of the coconut growers (80.00%) have adopted the recommended spacing of 7.5 x 7.5 meters between coconut palms. Cent per cent of the coconut growers were following the recommended seedling rate of 175 palms per hectare (ha) and recommended irrigation method. The study showed that 44.20 per cent of the coconut growers have adopted the recommended planting season, which falls in June - July and December – January. 44.20 per cent of coconut growers have adopted intercropping, bringing economic advantage to the farmers (Onima et al., 2017). Nearly half of the coconut growers (45.00%) have adopted the intercultural operations mainly involve ploughing, and the preferred time for ploughing is during June to July and December to January and more than half of the coconut growers and 50.80 per cent of coconut growers have adopted mulching as a recommended technology for their coconut plantations. Most of the coconut growers (80.00%) have adopted the recommended level of FYM/ Green leaf manure for the palm. More than two-third of the coconut growers (69.20%) have adopted the manures and fertilizers on time and over two-third of the farmers (69.20%) adopted the recommended varieties of tall, dwarf and hybrid, mainly they are adopting ALR1 variety. It was observed that 44.20 per cent of the coconut growers, adopted the basin method with a 1.8-meter radius for application of fertilizers and cent per cent of coconut growers have adopted the TNAU coconut tonic at the specified rate of 200 ml per palm in 6 months interval. One-fifth of the coconut growers (20.00%) adopted application of bio-fertilizers viz., Azospirillum, Phosphobacteria, Azophos, and VAM.

Table 1. Adoption of coconut production technologies

Recommended production technologies	Adoption (%)
Crop improvement technology	
ALR1 (Improved Variety)	69.20
Crop production technologies	
Seedling selection (9-12 months)	75.00
Pit size (3' x 3' x 3' feet)	44.20
Spacing (7.5 x 7.5 m)	80.00
Seedling rate (175 palms/ha)	100.00
Planting season (June - July, Dec – Jan)	44.20
Irrigation (Basin, Drip)	100.00
Intercropping (Banana, Cocoa, pepper and vanilla)	44.20
Intercultural Operations : Jun-Jul, Dec-Jan, Chemical Weed management	45.00
Mulching	50.80
Manures and fertilizers	
FYM/ Green leaf manure	80.00
NPK	55.00
Application time (June-July, Dec-Jan)	69.20
Application method (Basin : 1.8 m radius)	44.20
TNAU Coconut tonic (@200ml/palm/ 6 month)	100.00
Bio-fertilizer (*Azospirillum*, Phosphobacteria, *Azophos* and VAM / 6 months)	20.00

*****one respondents may practice multiple practices at a time

Adopter categorization based on rate of adoption

Adopter categorization was done based on the rate of adoption of variety and coconut tonic among the coconut growers of Coimbatore district i.e. the relative speed of adopting the innovation by members of a social system in specified period of time. In this study it was determined on the basis of the time taken by the growers in adopting the preferred variety (Table 2) and coconut tonic (Table 3) after they got released. The time was measured from the year of technology introduction by TNAU i.e. improved variety (ALR1) in 2006 and coconut tonic in 2004.

Table 2. Adopter categorization based on year of adoption of recommended variety (ALR1)

Adopter Categories	Year	Per cent
Innovators	2006	64.17
Early adopters	2007	8.33
Early majority	2008	8.33
Late majority	2009	9.17
Laggards	2011	10.00

The variety ALR1 was developed in the year of 2002 from coconut research station, Aliyarnagar, Coimbatore, Tamil Nadu (https://tnau.ac.in/site/crs-aliyarnagar/). However, the distribution of ALR1 started from the year 2006 (Coconut Research Station, Aliyarnagar). Therefore, 2006 was considered for the categorization of respondents for the study. From the results of the Table 2, it could be found that majority (64.17%) of respondents belonged to innovator category followed by early adopter and early majority of 8.33 per cent respectively, late majority (9.17%) and laggards (10.00%). Results showed that percentage of adopter categories deviates from Roger's adopter categories model in ideal condition. The results are in conformity with the findings obtained by Yadav et al., (2017), Mahajan et al., (2020) and Kumar et al., (2020).

From the results of the Table 3, it can be found that nearly half of coconut growers (47.50%) belonged to innovator category followed by early adopter (23.33%) and early majority of 15.00 per cent, late majority (8.33%) and laggards (5.83%). Results showed that percentage of adopter categories deviate from Roger's adopter categories model in ideal condition. The results are in conformity with the findings obtained by Mahajan et al., (2020).

Table 3. Distribution of Respondents Based on Rate of Adoption of Coconut Tonic Application (n=120)

Adopter Categories	Year	Percent
Innovators	2004	47.50
Early adopters	2005	23.33
Early majority	2006	15.00
Late majority	2007	8.33
Laggards	2008	5.83

Adoption behaviour of coconut growers

The study results showed that coconut growers were actively seeking ways to improve their crop yield, enhance sustainability, and adopt modern agricultural practices to optimize coconut cultivation. The farmers have well awareness on the recommended level of organic manure, they are likely to enhance the soil fertility, promote healthy growth, and potentially increase the productivity of their coconut palms. The irrigation technique involved creating basins around the coconut trees and most commonly favoured by a substantial portion of the coconut growers. This may be due to frequent exposure of coconut growers to mass media, trainings and extension participation availed from the Coconut Development Board, Pollachi and Coconut Research Station, Aliyarnagar are the main reason for adopting recommended crop production technologies (Balan et al., 2019). With this the study also revealed that the knowledge level of farmers positively enhances the adoption behaviour of coconut growers with increase of their cosmopolite nature. Related findings by Kumari et al., (2022) also revealed that cosmopolite nature of farmers had positive association with technology adoption.

The study results also inclined that coconut growers adopting ALR 1 because of good nut yielding and the farmers easily get the coconut palms from the Coconut Research Station (CRS), Aliyarnagar. The study also revealed that annuals crops like groundnut, bhendi, turmeric, tapioca, sweet potato, sirukizhangu, and elephant foot yam were preferred by the majority of the coconut growers. Banana, a biennial crop, is also being adopted by coconut farmers for intercropping purposes. Perennial crops such as cocoa, pepper, and vanilla are being integrated into coconut plantations, indicating long-term planning and sustainable agricultural practices.

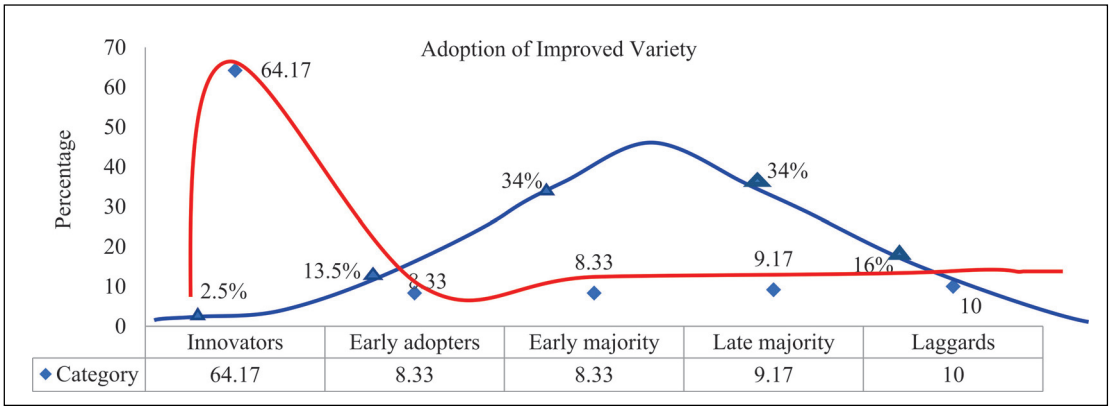

Figure 1. Adopter curve derived from the study vs. Normal Rogers adopter curve (--Adopter Categories Curve of Coconut Growers of Coimbatore District, -- Rogers Adopter Categories Curve)

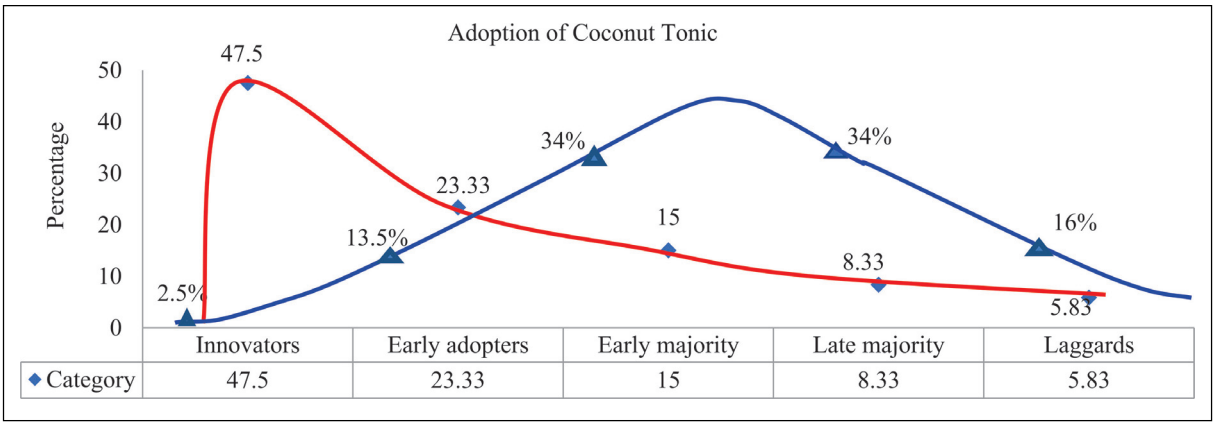

Figure 2. Adopter curve derived from the study vs. Normal Rogers adopter curve (-- Adopter Categories Curve of Coconut Growers of Coimbatore District, -- Rogers Adopter Categories Curve)

Integration of adopter categories into adoption trends of coconut growers

Innovators are the first group of people who adopt a new technology or innovation. They are characterized by their willingness to take risks and try out new things. The study results indicate that majority of the initial adoption of improved variety (ALR1) occurred from the year 2006. Early adopters are the second group to embrace a new technology. They closely follow the innovators and are seen as opinion leaders within their social circles, indicating a small but increasing interest in the innovation among the general population. The early majority represents the pragmatic and deliberate adopters who wait for the innovation to become more established before embracing it. Adopters belonging to early majority in the year 2008 showeda steady growth in the acceptance of the innovation. From the year 2009, the adopters were categorised as late majority. The late majority were sceptics who adopted the technology only after majority of the farmers had already accepted it, showing a further increase in adoption as the innovation became more popular. Farmers who adopted ALR1by 2011 were categorised as laggards, indicating that they are the last to adopt a new technology. From Figure 1, it can be observed that there was an increase in innovators, deviating from the normal Rogers's adoption curve. This increase can be attributed to the awareness of improved varieties from the CRS, Aliyarnagar. The high personal attitude of farmers to improve the farm production was found to be the main driving force and it may be because of their participation in training programmes and adoption of recommended variety (Slathia et al., 2013; Kaur et al., 2021). The observed deviation from ideal Roger's adopter categories (Figure 1) may be because of the diffusion pathways and adoption pattern of recommended variety vary from other varieties. The adoption of recommended variety may also be affected by regional or community-specific cultural and environmental factors. These elements could influence adopters' attitudes, values, and behaviour (Helen & Shammugasundaram, 2010). It is also one of the possible reasons for deviation from ideal adopter categories.

The first group of farmers who quickly embraced the use of coconut tonic in the year it was introduced i.e. 2004 are categorised as innovators. They are characterized by their willingness to take risks and try out innovative solutions. The early adopters are the second group of farmers who adopt coconut tonic from the year 2005 after the innovators. They are open to new ideas and are considered opinion leaders within their communities. Early Majority are the third group of farmers who adopted coconut tonic after a more substantial proportion of the population has already done so. They adopted use of coconut tonic cautiously, preferring to see positive results in others before adopting it themselves and finally integrated in their production technology in the year 2006. The late majority are the fourth group of farmers who adopted coconut tonic only after the majority of the population has already done so. They are more risk-averse and take a considerable amount of time to embrace innovations. In Coimbatore district, among the coconut growers laggards are the last group of farmers to adopt coconut tonic. They are resistant to change and are often the most conservative in adopting new practices. From Figure 2, it can be observed that there is an increase in innovators, deviating from the normal curve. This increase can be attributed to the awareness of coconut tonic from TNAU, Coimbatore and the increased participation in training programmes, which are the main driving force behind the adoption of coconut tonic among innovators. Similarly, the early adopter category also experienced growth beyond the typical distribution of Rogers' normal curve. This can be attributed to the various governmental incentives offered, such as subsidies, training programmes and which have enticed people to adopt coconut tonic technology promptly. Possible reasons for deviation from ideal adopter categories may be because of the diffusion pathways and adoption pattern of coconut tonic. So, the adopter categories of coconut tonic deviate from the Roger's adopter categories and may be affected by regional or community-specific cultural and environmental factors (Singh et al., 2021). These elements could influence adopters' attitudes, values, and behaviour.

Overall, the adopters categorization based on adoption of coconut technology shows a progressive pattern of adoption, with a higher percentage of farmers falling into the innovators and early adopter categories compared to the later ones (early majority, late majority, and laggards). This suggested that adoption of varieties and coconut tonic application has gained traction among farmers in Coimbatore district, with a substantial portion of the population being open to adopting the innovation. Understanding of these adoption patterns can help to tailor strategies to target different

farmer segments or adopter categories effectively and promote the adoption among the late majority and laggards and make them to move forward.

CONCLUSION

The research findings on adopter categorization showed that majority of farmers fell into the innovator category with a gradual decrease in adoption rates among early adopters, early majority, late majority, and laggards. This deviation from the ideal adopter categories model can be attributed to uniqueness of the recommended varieties and coconut tonic, regional cultural and environmental influences, and awareness-building efforts through training programs and governmental incentives. Focus on conducting targeted awareness campaigns that highlight the benefits and potential advantages of adopting the recommended coconut varieties and coconut tonic. These campaigns should be tailored to different farmer segments to address specific concerns and preferences, thereby increasing their willingness to try out new innovations. This will promote efficient and widespread adoption of recommended varieties and technologies, aiming to improved productivity, economic growth, and sustainable development in the coconut farming sector in the Coimbatore district and beyond.

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