

RESEARCH ARTICLE

# Awareness and Adoption of Blockchain Technology Among the Members of Kazhani Farmer Producer Company in Erode District of Tamil Nadu

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## ABSTRACT

Blockchain technology (BCT) application in agriculture can bring a win-win situation in agriculture which aids in the security of transactions and information in both forward and backward linkages in the agricultural supply chain. Furthermore, blockchain platform benefits producers by enhancing their reputation and increasing farm profit. The present study is an endeavor to explore the benefits of blockchain technology adoption among members of Kazhani Farmer Producer Company (KFPC) in Erode district of Tamil Nadu. Based on a simple random sampling method, primary data were collected from 120 members (BCT adopters) of Kazhani FPC. Percentage analysis was used to analyze the demographic characteristic features of sample respondents. The results showed that respondents were satisfied with technology adoption and they gain higher prices for their produce through blockchain technology adoption, earned price satisfaction, gained new knowledge, and had an opportunity to connect with a new network for marketing their farm produce.

Received: 01 June 2023

Revised: 19 June 2023

Revised: 27 June 2023

Accepted: 30 June 2023

**Keywords:** *Blockchain technology; Awareness; Adoption; Agriculture; Benefits*

## INTRODUCTION

Blockchain is a distributed network that enables network participants to write, read and verify transactions recorded in a database that cannot be modified or deleted. Blockchain encompasses a history of data or blocks. Each block is connected to the next block. For each transaction, a new block is created. After a transaction, a new block is added to an irreversible chain to block the transaction. Blocks in a blockchain cannot be modified or deleted and are validated using governance rules (Bakre *et al.*, 2017) and (Wang *et al.*, 2019). Blockchain-based traceability is the ability to follow a product from its origin until consumption. It aids in proving that the supply chain is open and honest by employing traceable documentation works. Sunny and Pillai (2020) revealed that blockchain-based traceability includes both tracing and tracking. Tracing means finding the origin of an item from upstream information, while tracking offers monitoring the downstream movement of the product across the supply chain network. Borrero J. D. (2019) reported that the blockchain-enabled traceability model benefited by tracking the products from

origin to consumption in the grapevine supply chain. Building confidence in the final consumers regarding the products origin is possible because all the data and transactions in the supply chain are recorded in the blockchain and managed by smart contracts. Tharatipyakul *et al.*, (2022) revealed that blockchain-based traceability framework could improve food supply chains by enabling transparency, potentially reducing risks in agro-food supply chains.

The main objective of the study is to analyze the benefits of blockchain technology adoption. A few Indian companies have launched pilot BCT project in agricultural supply chain, but there are little research about its achievements and hence it is difficult for supply chain stakeholders to understand how blockchain technology could be used in their business. Hence, the present study is an attempt to examine the benefits of blockchain technology adoption among the members of KFPC in the selected study area.

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## MATERIAL AND METHODS

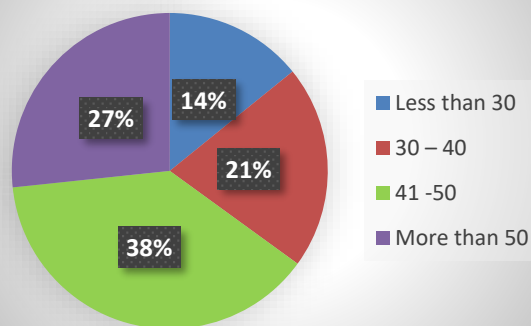
The selected study area is Erode district of Tamil Nadu, in which FPC farmers engaged in the process of blockchain technology adoption. Kazhani Farmer Producer Company (KFPC), located in Erode district focuses on banana exports, Smart Internet of Things based agriculture, blockchain-based traceability, and rural agricultural development. Kazhani FPC connects with Madurai agribusiness incubation forum (MABIF) to pilot the blockchain-based traceability system in red banana supply chain to create a digital identity for the product. The list of Kazhani FPC members involved in blockchain technology adoption in red banana cultivation was obtained from the Kazhani FPC. The primary data were collected in the month of October to December 2022 from six villages namely kallipatti, kanakkampalayam, perumugai, erangattur, athani and kodayampalayam of the Gopichettipalayam block in Erode district. Based on the simple random sampling method, the data were collected from 120 members of KFPC who adopted blockchain technology in red banana cultivation. The information regarding the demographic characteristics of sample blockchain technology adopters were collected through personal interview. Percentage analysis was used to represent the demographic characteristics of blockchain technology adopters.

## RESULTS AND DISCUSSION

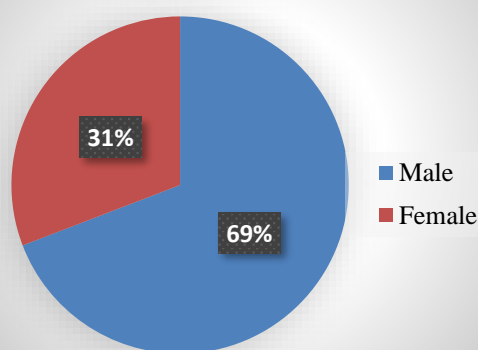
### Demographic characteristics of blockchain technology adopters

The demographic characteristics of sample respondents were analyzed and presented in the figure 1 to 4. It could be inferred that 38 per cent of them were in the age group of 41- 50 years, followed by 27 per cent in the age group of above 50 years and 69 per cent were male respondents and 31 per cent were female. Majority of them had higher secondary level education, followed by 26 per cent of respondents were graduates. The respondents (43 per cent) had a farming experience of more than 20 years and 38 per cent had farming experience between 10 to 20 years, followed by 19 per cent with less than 10 years of experience.

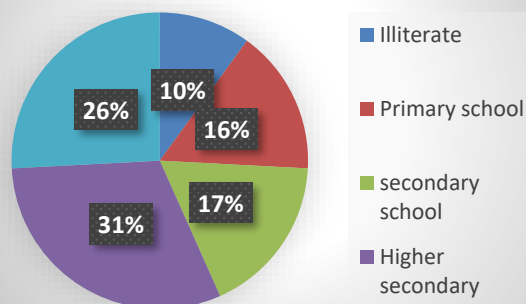
**Figure 1: Age of BCT Adopters**



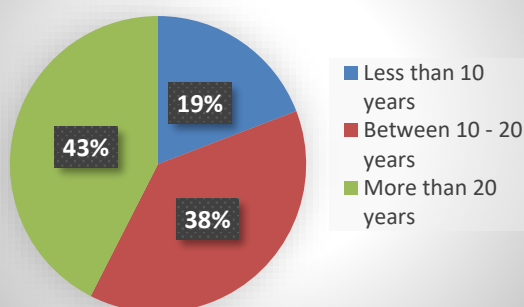
**Figure 2: Gender of BCT adopters**



**Figure 3: Educational status of BCT Adopters**

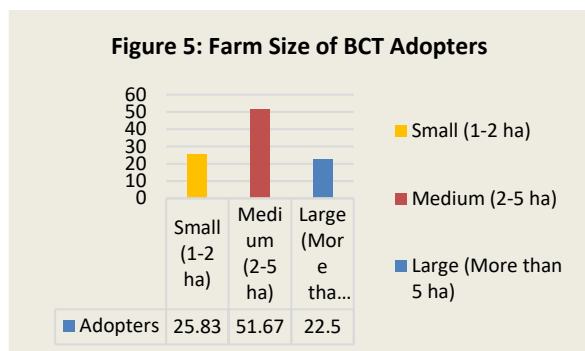


**Figure 4: Farming experience of BCT Adopters**





Farm size of sample farmers would influence farmer's decision on cropping pattern, type and quantity of inputs used. The details of land holdings of the farmers were collected and the results are presented in the figure 5. About 51.67 per cent of blockchain technology adopters were medium farmers, holding two to five ha of land and 25.83 per cent of them were small farmers with one to two ha of land holdings. Only 22.50 per cent of adopters were large farmers with more than 5 ha of land holdings. It could be concluded that, most of the sample farmers in the study area were small and marginal farmers.



**Membership of blockchain technology adopters**

Membership of blockchain technology adopters explains the extent of participation and involvement of farmers in FPC activities. The details about the membership of the sample farmers (in years) are given in the table1. It could be observed that about 43.33 per cent of sample farmers have been a member of the Kazhani FPC for the past 2 to 5 years and 30.83 per cent of sample farmers have more than 5 years of membership and only 25.83 per cent of blockchain technology adopters have been a member from less than 2 years. Thus, higher years of membership builds confident and trust on the Kazhani FPC and leads to the adoption of innovative technologies in the farms of sample respondents.

**Table 1. Membership of sample farmers**

S.No	Membership (Years)	No of the sample farmers	Percentage
1	Less than 2 years	31	25.83
2	2 – 5 years	52	43.33
3	More than 5 years	37	30.83
	Total	120	100

**Awareness about Blockchain Technology**

The details regarding the knowledge and awareness obtained by sample respondents about the blockchain technology and its adoption in farming are presented in the table 2. Among the blockchain technology adopters 57.50 per cent of them obtained knowledge and awareness from the Kazhani FPC staff members via awareness and training program, 24.17 per cent of adopters got aware about the technology through friends and relatives and remaining 18.33 per cent of blockchain technology adopters got an awareness from their fellow farmers. Thus, it can be concluded that, the sample respondents were aware about the blockchain technology and showed interest in adoption of technology in red banana production, which was a pilot project of Kazhani FPC.

**Table 2. Awareness about Blockchain Technology**

S.No	Introduced by	No of respondents	Percentage
1	Kazhani FPC Staffs	69	57.50
2	Fellow farmers	22	18.33
3	Friends and relatives	29	24.17
	Total	120	100

**Reason for adopting blockchain technology**

With a support from Kazhani FPC, sample farmers had adopted blockchain technology in red banana production. The information regarding the reason for farmers interest in blockchain technology adoption were gathered and presented in the table3.

The table3 depicts that, 28.33 per cent of sample farmers had adopted blockchain technology in order to get better market price for their produce through traceability. Further, Kazhani FPC suggested its members to adopt blockchain technology in red banana production. Due to the trust developed on Kazhani FPC, 18.33 per cent of sample famers adopted the blockchain technology, 17.50 per cent of sample farmers had adopted the technology to learn and know about its usefulness, followed by 15.83 per cent of sample farmers had self-interest to try new technologies in their farms. Remaining 10.83 per cent and 9.17 per cent of sample farmers adopted the technology due to the reasons such as



low cost for its adoption and risk free in nature. Thus, sample farmers had different reason for blockchain technology adoption in farming.

**Table 3. Reason for adopting blockchain technology**

S. No	Particulars	No of respondents	Percentage to total
1	Trust built on KFPC suggestion	22	18.33
2	Better market price	34	28.33
3	Low cost for adoption	13	10.83
4	To learn technology usefulness	21	17.50
5	Risk free nature	11	9.17
6	Self-interest to try new technologies in farm	19	15.83
	Total	120	100

**Trainings programmes attended**

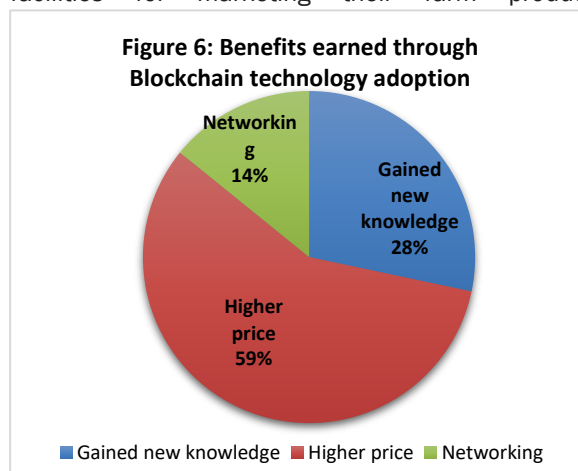
Training is the process through which awareness, knowledge, and ideas are inculcated, and fostered in an individual for adopting blockchain technology. Kazhani Farmer Producer Company and Madurai Agribusiness Incubation Forum (MABIF) organized the training programme, tracex technologies (blockchain software providers) conducted the training programme to Kazhani FPC members on blockchain technology adoption. The details regarding the training programmes attended by the sample farmers for blockchain technology adoption were gathered and are presented in the table4. Kazhani FPC conducted one awareness programme about the blockchain technology and its benefits to its members. In addition to that, MABIF and tracex technologies together conducted a training programme on how to implement and use the food sign mobile application for blockchain information update. The sample farmers participated and learned the implementation and usage process. Food sign is the mobile application used by the sample farmers to update field information on red banana production for traceability purposes.

**Table 4. Training programmes attended for blockchain technology adoption**

S.No	Training particulars			No of sample farmers attended	Percentage to total
	Organizers	Purpose of trainings	No of trainings		
	Kazhani FPC	Blockchain technology awareness	1	97	80.83
	MABIF &Tracex	BCT Implementation &mobile app usage	2	82	68.33

**Technological benefits earned by blockchain technology adopters**

The figure 6 explains about the technological benefits earned by the blockchain technology adopters. It can be concluded that, 58 per cent of respondents revealed that they gained higher price for their produce through blockchain technology adoption and earned price satisfaction, followed by 28 per cent gained new knowledge about the technology and remaining 14 per cent of sample farmers revealed that they had an opportunity to connect with new network and obtained networking facilities for marketing their farm produce.



## CONCLUSION

The study shows that most of blockchain technology adopters were in the age group of 41-50 years and most of them were male respondents. Majority of them were educated with higher secondary level education and graduates. The respondents had a farming experience of more than 20 years. Further, it could be concluded that most of the sample farmers in the study area were small and marginal farmers. Membership in Kazhani FPC builds confidence and trust and leads to the adoption of innovative technologies in the farms of sample respondents. The sample respondents were aware of blockchain technology and showed interest in the adoption of technology in red banana production. The results showed that respondents were satisfied with technology adoption and they gained higher prices for their produce through blockchain technology adoption and earned price satisfaction, gained new knowledge, and had an opportunity to connect with a new network for marketing their farm produce. The results concluded that blockchain technology adoption in the agricultural supply chain benefits the producers in the form of increased efficiency, greater traceability, and enhanced profitability when compared to the existing system.

### Acknowledgment

The authors acknowledge facilities provided by Department of Agricultural and Rural Management to carry out the research work.

### Ethics statement

No specific permits were required for the described field studies because no animal subjects were involved in this research

### Originality and plagiarism

Authors ensure that only original research works were written and submitted and that any work or words borrowed from others were properly cited.

### Consent for publication

All the authors agreed to publish the content.

### Competing interests

There were no conflicts of interest in the publication of this content

### Data availability

All the data of this manuscript are included in the MS. No separate external data source is required. If anything is required from the MS,

certainly, this will be extended by communicating with the corresponding author through the corresponding official mail: snandhini225@gmail.com.

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