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The Challenges of Blockchain Technology Adoption in the Agro-based Industries

Ramji Nagariya
School of Business and Management,
CHRIST (Deemed to be University), Delhi-NCR, Ghaziabad, Uttar Pradesh, India.
Corresponding author: ramnagariya84@gmail.com

Subhodeep Mukherjee
Department of Operations, GITAM Institute of Management,
GITAM (Deemed to be University), Visakhapatnam, Andhra Pradesh, India.
E-mail: subhodeepmukherjee92@gmail.com

Manish Mohan Baral
Department of Operations, GITAM Institute of Management,
GITAM (Deemed to be University), Visakhapatnam, Andhra Pradesh, India.
E-mail: manishmohanbaral.31@gmail.com

Bharat Singh Patel
Thiagrajar School of Management,
Madurai, Tamilnadu, India.
E-mail: bharat.s.aero@gmail.com

Chittipaka Venkataiah
Department of Operations Management,
Indira Gandhi National Open University, Delhi, India.
E-mail: venkatchitti@gmail.com

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Abstract
Blockchain is one of the latest innovations in information technology, bringing a digital revolution to many industries by increasing transparency. But this technology needs to be explored a lot as of now. Agriculture supply chain management distributes agro-based products like vegetables, fruits, pulses, and cereals. This research is conducted to identify the agro-based industries' adoption of blockchain in their supply chain for achieving sustainability. The next step towards sustainable agriculture is primarily seen as blockchain-enabled agriculture. By making supply chains transparent, technology can follow products from the point of manufacture and prevent waste and inefficiency. A structured literature review helped determine the barriers to blockchain adoption in agro-based industries. This research is unique as no survey-based research on blockchain in the agriculture supply chain using structural equation modeling has been found. The seven proposed hypotheses support the blockchain challenges for adoption in agro-based industries. The findings of this study suggest that the blockchain can bring transparency and traceability and will remove the agro-industry inefficiencies.

Keywords- Blockchain, Agriculture supply chain, Agro-based industries, Sustainability.

1. Introduction

Blockchain is a method for keeping records inside a system. Blockchain eliminates the possibility of forgery by making the actual sequence of exchanges transparent from start to end. Moreover, no central authority helps determine the authenticity of any transaction, which also eradicates the risk of fraud that happens with

a system takeover (Zhou et al., 2020). Transaction authenticity becomes a democratic system because confirmation and the record-keeping process are decentralized (Zhou et al., 2020). Blockchain impacts supply chain practices by offering fast and much more cost-effective delivery processes, increasing product traceability, getting better partner coordination, and enabling financing (Jamwal et al., 2021). The blockchain assigns the ultimate tracking number to essential assets, lowering the temptation to take a cut. Blockchain eradicates the possibility of human error in this system. Since everything is transparent and can be automated, the prospect of a mistake here is reduced significantly.

An agriculture supply chain is an intricate framework liable for agricultural items in the markets. These days, food security can profit from innovation's straightforwardness, moderately low exchange costs, and immediate applications. The decentralized and robust use of the blockchain has been used in the worldwide financial sector, and it can be undoubtedly stated that it can be extended to the supply chain (Yadav and Singh, 2020). By and large, agri-food sectors are requesting their partner for safe and suitable quality products (Kamilaris et al., 2019). Therefore, accurate information sharing between the partners is necessary (Yadav et al., 2020). Generally, all partners associated with the food supply chain can show their customers the techniques' general nature and items. In this unique circumstance, blockchain could rearrange a moving undertaking by accommodating one-to-numerous information joining and cycle organization concerning straightforwardness, effectiveness, security, and safety among the members (Wong et al., 2020).

Food confirmation speaks to a critical issue intrinsic in the food supply chain, a cycle by which the consistency of nourishments with their mark depictions (for example, geographic location, creation technique, handling innovation, and composition) can be checked in any case, being a cheat. With developing mindfulness about supportability and purchasers' worries about the safety and security of food products, associations currently face the test of embracing reasonable measures through innovation. Blockchain is one innovation that can lead to such headways (Tian, 2017).

Consumers and firms can use blockchain to verify their product's journey, tracing it from farm to table. Furthermore, it provides information on when a product was harvested and produced and who produced it (Lohmer and Lasch, 2020). The adoption of blockchain in agro-based firms is that the blockchain provides secured platforms with tracking and tracking of goods.

Blockchain is a dispersed information base of records as encoded 'blocks', a public record, or advanced occasions executed and shared among an interested party and can be checked later on (Nakamoto, 2008). The agreement of most members confirms every exchange in the public record in the framework, and data, once embedded, can be taken out. Blockchain can track and store data related to the food items' production and expiry dates, reducing food from selling after expiry (Antonucci et al., 2019). Blockchain can track the quantity of food waste and help the circular economy. With proper tracking and tracing of food items, firms can reduce the chances of food-borne diseases. The advanced idea of these innovations could be utilized to advance fast information sharing. Considering the potential of blockchain and its need in the agro-based industry, the research is aimed to find the answers to the following research questions-
RQ1: Whether the agro-based firms are ready to adopt the blockchain in their systems?
RQ2: What problems are the agro-based firms facing in adopting blockchain?

Seven independent variables are determined from the literature review (from the Scopus database) mainly, and these variables are COM: Blockchain system complexity; INV: Huge investments; CR: Change resistance; AW: Lack of awareness among various partners; RG: Lack of proper regulatory guidelines by the government; TR: Trust issues among various partners; SI: Security issues. One dependent variable used is Blockchain Adoption barriers.

The remainder of the paper is organised as follows: section 2 covers the literature review, section 3 explains the research methods, section 4 offers the study results, section 5 provides the discussion, and section 6 delivers the research conclusion.

2. Literature Review

2.1 Blockchain in Agriculture Supply Chain and Sustainability

The blockchain framework in the agriculture supply chain could be utilized for recognizability, water management, agro-food assembling, and data security (Mukherjee et al., 2021c). In a full review on the use of blockchain research in farming, the researchers demonstrated that blockchain acceptance is a naïve phase and organised current blockchain-based research under 4 measurements, including recognizability, engineering, data framework, and other random applications (Ghode et al., 2020).

Although blockchain technology has enormous potential, a lack of regulations prevents its widespread adoption. Government can regulate and frame the rules for using blockchain technology in firms. Nonetheless, this will help the government collect taxes or limit distributed ledgers to stop criminal activities (Jamwal et al., 2022). The blockchain technology market is also suffering due to uncertain regulations and a common standard framework for adopting blockchain by firms (Mukherjee et al., 2022a). Further, Tian (2017) connected the traceability system in the agriculture supply chain utilizing blockchain and IoT. These difficulties include government guidelines, routineness vulnerability, lack of training, etc. Different difficulties for blockchain reception include the absence of a talented labor force, absence of government guidelines, the capacity limit of the framework, throughput and inactivity, versatility, security concerns, significant expense, and so forth (Rocha et al., 2021).

The acute effects of blockchain technology on operations management with an emphasis on the supply chain management decision-making procedures from the standpoint of sustainable performance (di Vaio and Varriale, 2020). The main problems with an agri-food supply chain include a lack of industrialization, inadequate management, inaccurate information, and ineffective supply networks (Tura et al., 2019). Supply chains for sustainable agriculture may be made possible by using internet of things, and blockchain (Kamble et al., 2020a). To achieve sustainability through a carbon taxation policy, we suggest the blockchain solution for various production allocation challenges within a multi-echelon supply chain (Manupati et al., 2020). Biswas and Gupta (2019) created a framework for investigating the challenges to blockchain acceptance and successful implementation in various industries and services. A robust trading system to encourage a sustainable ecology for exchanging electrical energy between prosumers and users of smart homes (Park et al., 2018).

Due to globalization, outsourcing, and offshoring, manufacturers have encountered numerous obstacles and difficulties when attempting to integrate sustainable practices throughout the supply chain. The issues of sustainability could potentially be solved by blockchain technology (Khanfar et al., 2021). As blockchain technology gains popularity, it is critical to outline its contributions to some areas, including promoting sustainability. Jamwal et al. (2021) attempted to build a framework for sustainability practices for the Micro, Small and Medium Enterprises sectors. Lim et al. (2021) stressed that interest in using blockchain technology to operate supply chains is rising.

Fernando et al. (2021) studied the drivers of blockchain technology acceptance and carbon performance, using technology, organization, environment theory as a foundation for building a technology adoption framework. Blockchain guarantees that the data is stored and updated securely, impenetrable and irreversible. Although still in its infancy, blockchain research is advancing quickly in various disciplines, making it crucial to understand blockchain development and application's ethical and sustainability

implications. In addition to promoting economic growth, the circular economy strongly emphasizes improving sustainability and social responsibility. The Table 1 shows the summary of previous studies that focused on blockchain application in agriculture.

Table 1. Summary of the literature review.

Author	The objective of the study
(Biswas and Gupta, 2019)	Developed a framework for investigating the challenges to blockchain acceptance and successful implementation in various industries and services
(Lezoche et al., 2020)	This research the future of blockchain in the agriculture sector.
(Kamilaris et al., 2019)	Examines the impact of blockchain in agriculture and the food supply chain.
(Yadav et al., 2020)	Developed a model and identified the critical factors for the adoption of blockchain in a sustainable supply chain
(Kamble et al., 2020a)	This research highlighted the articles related to sustainable performance in the agriculture supply chain.
(Kamble et al., 2020b)	The enablers of blockchain adoption in the agriculture supply chain are identified in this study, and their linkages are established.
(Ronaghi, 2021)	According to the research, the three most crucial blockchain dimensions are smart contracts, the Internet of Things, and transaction records. Additionally, the digital papers used to investigate the supply chain are in good shape.
(Demestichas et al., 2020)	It provides a summary of how blockchain technology are being used to enable traceability in the agri-food industry.
(Niknejad et al., 2021)	Identified the research trends in the area of food and agriculture sector.

2.2 Barriers of the Blockchain Adoption in Agriculture Supply Chain

2.2.1 Lack of Proper Regulatory Guidelines by the Government (RG)

There are a lot of regulatory issues with blockchain adoption in many countries, and many are not ready for its adoption (Jabbar et al., 2021). Blockchain still needs to be developed, and research needs to be done. The government needs to give proper guidelines for technology adoption, which will help the industries smoothly adopt blockchain in agro-based industries. Without government support, many sectors will fail to adopt blockchain (Frizzo-Barker et al., 2020). Therefore, the first hypothesis is proposed as-

H1: The government's lack of proper regulatory guidelines influences blockchain adoption barriers.

2.2.2 Security Issues (SI)

Security issues play an essential role and are challenging for the blockchain provider. Industries fear that shared data can be hacked or lost. Top management can fully believe in blockchain and its related technology (Ar et al., 2020). There is a concern that the competitors can use data sharing in the agro-industries to gain insights (Kouhizadeh et al., 2021). Agro industries are very concerned about transferred data and information security.

H2: Security issues influence blockchain adoption barriers.

2.2.3 Lack of Awareness Among Various Partners (AW)

Many stakeholders involved in the agriculture supply chain operations are not educated or aware of the latest innovation (Behnke and Janssen, 2020). So, this creates a problem among various partners in adopting blockchain in agro-industries. Due to a lack of awareness about the latest technologies, late adoption of innovative technologies is found in the industries. Employees need to have a piece of proper knowledge and skills about blockchain (Fosso Wamba et al., 2020). Organizations need to look after blockchain training and skill development for their employees. Therefore, the third hypothesis is proposed as-

H3: Lack of awareness among various partners influences blockchain adoption barriers.

2.2.4 Blockchain System Complexity (COM)

Blockchain involves lots of coding and technical knowledge, which the employees must know about the companies (Orji et al., 2020). Understanding the complexity of blockchain is very difficult as blockchain adoption requires employee experience and expertise (Duan et al., 2020). Due to the complex algorithm and computation techniques, it may become problematic for the employees. Therefore, the hypothesis is posited as-

H4: Blockchain system complexity influences blockchain adoption barriers.

2.2.5 Change Resistance (CR)

Whenever the latest technology is adopted, there would be a CR among its employees and stakeholders. The same scenario applies to blockchain adoption on an agro-based supply chain (Bag et al., 2020). Sometimes, employees are against adopting the latest technology because they fear losing their job. Some companies do job cuts after the adoption of the latest innovative technology.

H5: Change resistance influences blockchain adoption barriers.

2.2.6 Trust Issues Among Various Partners (TR)

Agro industries must create trust among their partners before adopting the latest technology for the agriculture supply chain (Niknejad et al., 2021). The adoption of blockchain will require sharing data from various stakeholders and supply chain partners. But some partners may feel unsafe sharing the data among themselves. There is an issue of data loss and data hacking by the revival companies (Bumblauskas et al., 2020).

H6: Trust issues among various partners influence blockchain adoption barriers.

2.2.7 Huge Investments (INV)

Blockchain adoption requires huge monetary investments, including employee training (Erol et al., 2020). Infrastructure must be developed for the adoption process (Paliwal et al., 2020). There is also uncertainty about the firm's profitability after implementing blockchain in its systems. Big firms can still adopt innovative technology as they can easily take risks. But it has become difficult for smaller firms to take such a risk (Kamble et al., 2020b).

H7: Huge investments influence blockchain adoption barriers.

The definitions of the barriers used in this study and their sources are mentioned in Table 2.

Table 2. Definition of the barriers.

Sl.No.	Barriers	Definition	Reference
1	Lack of proper regulatory guidelines by the government (RG)	There are numerous regulatory issues with blockchain adoption in many nations. BLOCKCHAIN still needs to be implemented, and an investigation must be conducted.	(Feng et al., 2020)
2	Security issues (SI)	SI is complex and vital for the blockchain vendor to organize. Companies are worried that the data they share will be managed to hack, or lost.	(Esmaeilian et al., 2020; Yadav & Singh, 2020)
3	Lack of awareness among various partners (AW)	Many relevant stakeholders in agriculture supply chain operations are not very well aware of the newest advances. Consequently, various partners are experiencing troubles having adopted blockchain in agro-industries.	(Yadav et al., 2020)
4	Blockchain system complexity (COM)	blockchain requires a great deal of source code and tech expertise, which had to be present in employees. It is tough to decipher the complexities of blockchain.	(Kamble et al., 2019)
5	Change resistance (CR)	There is a CR among its staff members and stakeholders when new technology is applied. The same situation exists in the case of blockchain adoption in an agro-based supply chain.	(Lezoche et al., 2020)

Table 2 continued…

6	Trust issues among various partners (TR)	Before implementing innovation in the agriculture supply chain, agro sectors should create trust among their partner organizations.	(Bag et al., 2020; Mirabelli and Solina, 2020)
7	Huge investments (INV)	Blockchain adoption requires substantial cash investment opportunities, including staff training. Adoption necessitates infrastructure development.	(Esmaeilian et al., 2020)

3. Research Methodology

The related research papers were searched in the most extensive database Scopus. The articles were selected carefully, and the barriers to adopting blockchain technology in agro-based companies were identified. The questionnaire was developed to collect the responses from the plant managers, directors, and agro-based IT managers (Mukherjee and Chittipaka, 2021). The agro-based companies were searched on the internet, and details of these companies' manufactured products were identified. If the organization was manufacturing agro-based products, then the organization was selected as a suitable sample. Three hundred fifty-six agro-based industries were identified; a simple random sampling method was used.

Further, the respondents were identified by determining the agro-based companies and visiting the website containing the contact details of the managers, directors, and IT managers. Approximately contact details of 1500 working professionals were collected. The reason for selecting more than one potential respondent from one company was to increase the response rate. The respondents were contacted by email and telephone. The respondents were further requested to suggest likely working professionals in the agriculture supply chain. The questionnaires were sent out to the target respondents, but only 294 returned usable questionnaires. The current research utilized an empirical paradigm using a cross-sectional design and quantitative analysis.

Table 3. Demographics of the respondents.

Characteristics	Percentage %
Industry type	
Small Industry	31
Medium Industry	48
Large Industry	21
The job role of the respondents	
Head of the factory	30
Manager in the IT department	46
Director of the factory	24

4. Data Analysis

4.1 Reliability and Validity

The Cronbach's alpha values of the elements should be above the value of 0.70 (Nunnally, 1994). As shown in Table 3, the importance of Cronbach's alpha for all the components is above 0.70 (Kant Pal et al., 2021). Composite reliability (CR), called construct reliability, measures the scale items' internal consistency (Mukherjee et al., 2022b; Mukherjee et al., 2021b). Table 3 shows the importance of CR and Cronbach's alpha (α).

4.2 Exploratory Factor Analysis (EFA)

SPSS 20.0 software was used to calculate exploratory factor analysis (Baral et al., 2022). Exploratory factor analysis helps in grouping the items or the indicators into meaningful factors (Mukherjee et al., 2021a; Pal et al., 2022).

The Rotated Component Matrix is required for interpreting the analysis results (Watkins, 2018). As a result, this is the goal of rotation (Kline, 2012). Table 4 shows the factor loadings and reliability of the items.

Table 4. Values of cronbach's alpha (α), composite reliability, factor loadings.

Barriers	Items	Cronbach's alpha (α)	Composite reliability	Factor loadings
Blockchain system complexity	COM1	0.882	0.909	0.873
	COM2			0.904
	COM3			0.853
Huge investments	INV1	0.848	0.891	0.816
	INV2			0.908
	INV3			0.839
Change resistance	CR1	0.839	0.895	0.817
	CR2			0.951
	CR3			0.808
Lack of awareness among various partners	AW1	0.753	0.861	0.740
	AW2			0.862
	AW3			0.855
Lack of proper regulatory guidelines by the government	RG1	0.743	0.853	0.854
	RG2			0.776
	RG3			0.803
Trust issues among various partners	TR1	0.771	0.852	0.820
	TR2			0.863
	TR3			0.748
Security issues	SI1	0.731	0.845	0.827
	SI2			0.864
	SI3			0.712

4.3 Construct Validity (CV)

CV is the extent to which a test quantifies the idea or development it is designed to quantify. In order to estimate the link between assessments collected from a few scales, CV is frequently performed (Mukherjee et al., 2022d). The Table 5 shows the construct validity.

Table 5. Construct correlation and AVE.

		Variance Extracted Between Factors						
Variables	AVE	Blockchain system complexity	Huge investments	Change resistance	Lack of awareness among various partners	Lack of proper regulatory guidelines by the government	Trust issues among various partners	Security issues
Blockchain system complexity	0.876	1						
Huge investments	0.854	0.749	1					
Change resistance	0.859	0.753	0.734	1				
Lack of awareness among various partners	0.819	0.719	0.700	0.704	1			
Lack of proper regulatory guidelines by the government	0.811	0.713	0.694	0.698	0.665	1		
Trust issues among various partners	0.81	0.712	0.693	0.697	0.664	0.657	1	
Security issues	0.801	0.705	0.686	0.69	0.656	0.65	0.649	1

4.4 Structural Equation Modeling (SEM)

SEM is carried out to test the hypothesis as this method helps identify the relationships between the variables that cannot be observed directly. Confirmatory factors analysis was carried out to test the suitability of the measurement model. Path analysis was carried out for hypothesis testing. CMIN/Df =

1.727; RMSEA is 0.050; CFI is 0.940; TLI is 0.927; GFI is 0.912; AGFI is 0.966; NFI is 0.970, and IFI is 0.941. Table 6 represents the values of the path analysis for the model. Figure 1 shows the structural model.

Table 6. Path analysis result for the model.

Hypotheses	Estimate	SE.	CR.	P	Hypothesis
Blockchain adoption barriers <--- Blockchain system complexity	0.184	0.066	2.79	***	Supported
Blockchain adoption barriers <--- Huge investments	0.420	0.075	5.60	***	Supported
Blockchain adoption barriers <--- Change resistance	0.170	0.068	2.50	***	Supported
Blockchain adoption barriers <--- Lack of awareness among various partners	0.790	0.102	7.75	***	Supported
Blockchain adoption barriers <--- Lack of proper regulatory guidelines by the government	0.630	0.081	7.78	***	Supported
Blockchain adoption barriers <--- Trust issues among various partners	0.860	0.119	7.23	0.004	Supported
Blockchain adoption barriers <--- Security issues	0.340	0.074	4.59	0.003	Supported

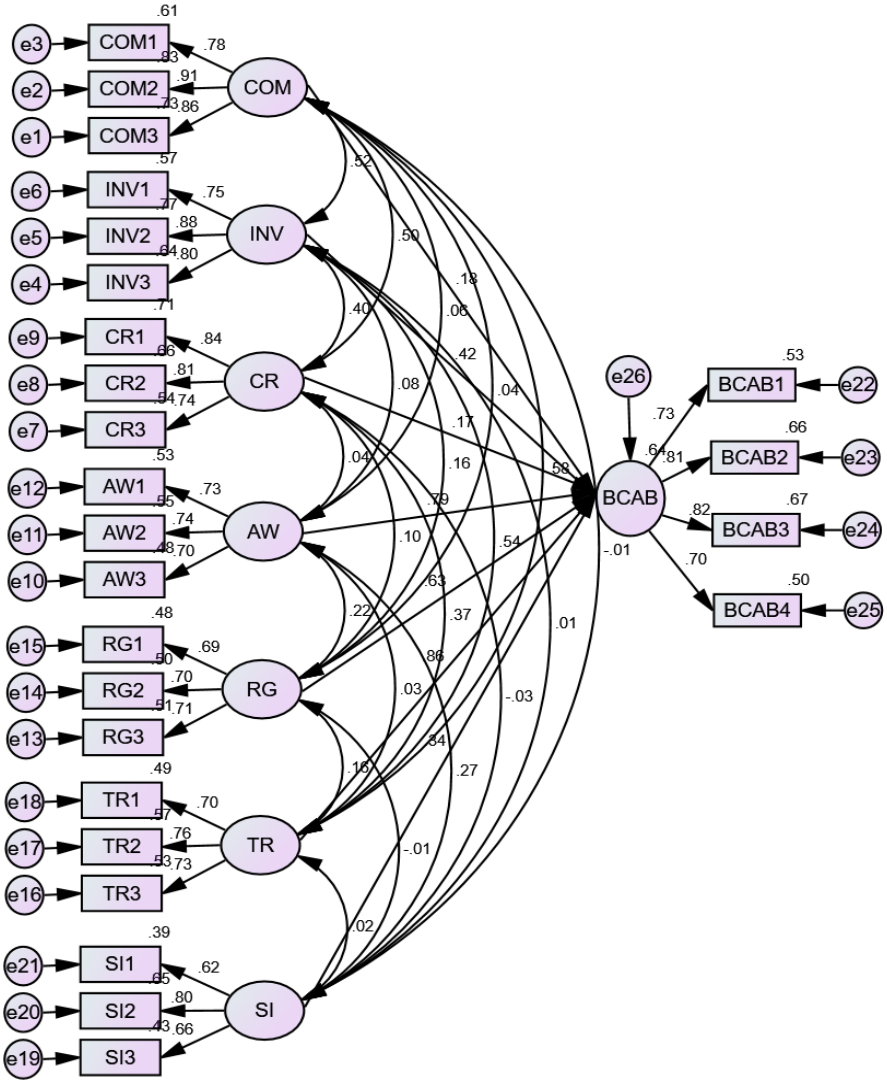

Figure 1. Final structural model.

5. Discussion

The agriculture supply chain faces many challenges like food waste, lack of proper communication and commitment to adopting the latest innovations due to poor IT infrastructure. This research was conducted by identifying the barriers to blockchain from the literature review. Target populations were mainly planted managers, owners and IT managers working in agro companies. The hypothesis was accepted that the complexities involved in the blockchain are barriers to blockchain adoption. Blockchain is the latest innovation in IT, and many areas still need to be explored, so the use of blockchain is very complex for industries to understand and adopt (Yadav and Singh, 2020). Firms must understand the importance of blockchain adoption and its benefits in tracing and tracking products (Niknejad et al., 2021). Blockchain service providers need to make the adoption process lesser complex.

Blockchain adoption requires vast investments in the infrastructure and upgrading the employees' skills. There is a lack of experienced employees in blockchain as the technology is new, so the companies will need to train their employees. Infrastructure development for adopting blockchain is very much required (Kamble et al., 2020b). Still, the agro companies in India are already at a loss for many reasons, so it's become next to impossible to invest a significant amount in technology adoption (Clohessy et al., 2020). But with the support of the government, such things can become possible. Therefore, help from the government in the form of subsidiaries and terms of support, infrastructure, encouragement, and policies are very much required.

The resistance to change to adopt the latest technologies like blockchain as the different stakeholders are involved in the agriculture supply chain (Demestichas et al., 2020). The hypothesis was also accepted. Employees fear that if the newest technology is adopted, there will be a chance of employment reduction in their companies. Employees also don't want to come out of their comfort zone of the working style in which they are habituated. The result of the hypothesis depicts a lack of knowledge about the benefits of adopting the latest technology of blockchain to improve the current operations. Blockchain service providers need to create awareness for blockchain adoption in the firms as many organizations are not having the proper knowledge about blockchain and its advantages. The government must also create awareness among the firms and encourage blockchain adoption (Corallo et al., 2020). The government's seminars, workshops, and policies can create awareness and clear doubts regarding data theft and transparency. They can pass the benefits of blockchain to organizations. Blockchains require external systems to access reliable data from the outside world to function (Yuan et al., 2020).

The hypothesis related to the lack of proper regulatory guidelines by the government was supported, indicating a need for appropriate procedures from the government. However, the government has allowed blockchain adoption in some industries, but it still needs detail (Pournader et al., 2020). Proper rules and regulations need to be framed by the governments to increase blockchain adoption among firms (Pappa et al., 2018). Top management also needs to properly understand the rules and regulations framed by the government so that the adoption process becomes easier (Galvez et al., 2018).

Trust issues among various partners as the agriculture supply chain involves many stakeholders, from the farmers to the retailers and the customers. So, the agro companies must develop trust to adopt blockchain in the agriculture supply chain. Many firms cannot trust the blockchain platform for sharing data. Firms have a negative image of blockchain, and stakeholders lack understanding (Corallo et al., 2018). Because data may be read by anybody in the network, the openness of a blockchain-based platform could be a significant limitation. This implies that anyone may also have access to private information, for example, trade secrets. One of the undeniable characteristics of this technology is its authenticity and transparency, which are well known. Significantly, it is feasible for a stakeholder to lie. In the event of fraud detection,

blockchain technology would enable the cheater to be uniquely recognized (Creydt and Fischer, 2019). Food safety refers to handling, storing, and hygienically prepared food to avoid spreading disease to the general populace. In light of expanding global goods flows, ensuring food safety and quality has become more challenging.

This hypothesis depicts the organizations' perception of data security in blockchain. The security of the data stored in the platform is a serious question that the firms are asking. Firms need to have a hacking-free secure medium, and data shared or stored remains inaccessible to the competitors (Rocha et al., 2021). Firms fear that their competitors can use data sharing in the market, leading to a loss of market share (Mukherjee et al., 2022a). Food exchange in the supply chain must be trustworthy if there is to be food integrity. Each actor should provide complete information regarding the product's provenance (Chang et al., 2020). Even agricultural robotic swarm operations could benefit from using blockchain to increase security, autonomy, and flexibility.

5.1 Recommendation to Managers and Policymakers

The research helps identify the substantial blockades to blockchain acceptance in the agro-based supply chain. Blockchain adoption will enable the managers to identify the source of origin to source consumption. The managers can create awareness among the employees, provide the necessary training for smooth execution, and convince the employees of the technological changes in the organization. The top management can discuss the benefits of blockchain adoption with the various stakeholders and convince them to the blockchain adoption in the agriculture supply chain. The managers can rely on the information of blockchain as the data can be tracked. If the effort to insert misleading information were attempted, it would notify each block, and thus the false information can be traced. The government can support, encourage, incentivize and build the necessary infrastructure for blockchain adoption in the agriculture supply chain.

5.2 Theoretical Contribution

The problems highlighted in the works for implementing blockchain in the agriculture supply chain to achieve sustainability were identified in this study. In numerous areas, this study adds to the body of literature. The research's initial theoretical contribution was the identification of those obstacles and the validation of those findings using survey-based analysis in the agro-based businesses. The sustainability of implementing blockchain in the agriculture supply chain is the second contribution to the literature. The final contribution to the literature is that this research determined that a major impediment to blockchain adoption in Indian agro-based firms is the absence of government regulatory norms. This research's identification of security concerns for blockchain use in the agriculture supply chain represents the fourth contribution to the literature. The fact that this research found no awareness of blockchain use in the agriculture supply chain represents the fifth contribution to the literature. The research's identification of the challenges associated with using blockchain in the agricultural supply chain is the sixth contribution to the body of literature.

6. Conclusion

The research identified seven critical factors utilizing literature review, and statistical methods were used to validate the results and findings. The seven identified factors were blockchain system complexity, huge investments, change resistance, lack of awareness among various partners, lack of proper regulatory guidelines by the government, trust issues among multiple partners, and security issues. Hence, there is no statistical evidence to reject this hypothesis. All the components significantly contributed to the dependent variable blockchain adoption barriers. This research is also unique because no prior study has validated

these components identified in the literature review. Hence, this current research will provide a base for researching the future from a different nation, state, or sector perspective.

6.1 Future Research

This research is based on Indian agro-based industries, and the study is cross-sectional. Future research can compare these results by doing similar research after some interval. Also, specific sector research can be done using the survey method.

Conflict of Interest

The authors confirm that there is no conflict of interest to declare for this publication.

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