Research Article

Exploring The Role of Blockchain Technology and Relational Innovation In Enhancing Company Performance in MNCs: A TAM-Based Approach

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ARTICLE INFO	ABSTRACT
	Using TAM theory, the study aims to explore the impact of perceived ease of use and perceived usefulness for implementing blockchain technology in MNCs. Further, the present study also explores the contribution of blockchain technology to enhance company performance with mediating role of relational innovation. The data is collected from 402 software engineers of MNCs in Delhi and for data analysis, AMOSS 16 is used for all the constructs. The findings highlight that perceived ease of use and perceived usefulness play crucial role in implementing blockchain technology, enhancing company performance by providing secure, transparent systems, improve user experience by reducing costs. Additionally, relational innovation plays a mediating role, facilitating the sharing of information and knowledge with partners, increasing market share, and fostering open communication. It also aids in retaining partners, customers, and suppliers. The study concludes that firms must invest in collaborative networks, unremitting relational innovation practices, and ensure seamless integration of blockchain technology to maximize business performance. This approach enables companies to build robust, efficient, and competitive business models in an increasingly interconnected, technology-driven marketplace. **Keywords:** Blockchain Technology, Company Performance, Perceived Ease of Use, Perceived Usefulness and Relational Innovation.

INTRODUCTION

Digital technologies today have been changing the entire economy since the 1960s in terms of efficiency, security, and business processes. Among digital innovations, blockchain technology has emerged as a major game changer by bringing extraordinary features beyond conventional tools. Initially known for its use in trading value, such as Bitcoin, blockchain's broader potential—through smart contracts and distributed ledgers—has garnered widespread interest (Liu &Ye, 2021). With promises of enhanced security, decentralization, and trust, blockchain adoption is projected to grow rapidly, with spending expected to reach 12 billion USD by 2022 (IDC). However, despite its transformative potential, blockchain adoption has been slow, largely due to uncertainties regarding its benefits and the complexity of implementation (Hughes et al., 2019; Y. Wang et al., 2019).

Blockchain operates as Distributed Ledger Technology (DLT), ensures transparency, security, and immutability by recording transactions with cryptographic signatures. Its decentralized nature eliminates intermediaries, offering businesses a more efficient and trustworthy process. Adoption is influenced by perceived ease of use (PEOU) and perceived usefulness (PU), two key factors from the Technology Acceptance Model (TAM) (Aboalsamh et al.,2023). Previous Studies have witnessed that PEOU and PU of TAM model significantly impact the adoption of new technologies (Davis, 1989; Venkatesh et al., 2003). Previous researches (Karamchandani et al., 2020; Liu & Ye, 2021) highlights the relevance of these factors (Perceived ease of use &Perceived usefulness) in the context of blockchain, emphasizing their role in its adoption. While the benefits of blockchain such as increased transparency and efficiency are clear, understanding how PEOU and PU specifically influence blockchain adoption in organizations, especially multinational corporations (MNCs), remains an underexplored area. To fully realize blockchain's potential, organizations must consider its perceived ease of use and usefulness Further, Blockchain's impact on company performance is evident, particularly in its ability to enhance innovation and improve business processes. By enabling secure data sharing across decentralized networks, blockchain fosters better collaboration in Research and Devrelopment and strengthens supply chain relationships through increased transparency and trust (Coita et al., 2019; Casey & Wong, 2017). Following the similar grounds,the performance of the company is enhaned through

relational innovation that offers a sustainable competitive advantage and driving efficiency (Lambert & Enz, 2017). Relational innovation is defined as the process of creating new or improved relationships and collaborations that helps to add value and progress of operations of organisations (Lambert& Enz,2017). The indepth analysis of contribution of PEOU AND PU to influence the adoption of blockchain technology and its impact on performance with mediating role of relational innovation is crucial Additionally, examining the role of relational innovation as a mediator provides valuable insights into how blockchain enhances business relationships and drives company performance. Hence the present study explores the diffusion of blockchain technology in MNCs, focusing on the importance of PEOU, PU, and relational innovation in driving blockchain adoption and improving organizational performance. The objectives of the study are as follows:

i)   To evaluate the relationship of perceived usefulness for adopting blockchain technology.
ii)   To evaluate the relationship of perceived ease of use for adopting blockchain technology.
iii)   To explore the role of blockchain technology for enhancing MNCs performance.
iv)   To examine the mediating role of relational innovation between blockchain technology and company performance.

REVIEW OF LITERATURE

PERCEIVED EASE OF USE, PERCEIVED USEFULNESS AND BLOCKCHAIN TECHNOLOGY

Davis (1989) proposed the Technology Acceptance Model (TAM) in the MIS Quarterly. This model has become one of the most effective approaches for modelling technology adoption and describing how users accept and use technology. Based on the TAM, this study has adopted perceived usefulness and ease of use as factors that affect the adoption of blockchain technology in a research model (Kumar et al., 2021). The degree to which a person believes that employing a certain technology or system will enhance his job performance is termed as perceived usefulness (Davis, 1989). Further, perceived ease of use is the degree to which a person believes a certain information technology or system is simple to use. In the past literature, perceived ease of use and perceived usefulness were commonly utilized as user-perceived value, that is, the experience the consumers might have experienced while dealing with blockchain technology features (Shin et al., 2020). They found that usefulness and ease of use significantly influence the users' attitude towards the adoption of blockchain technology. If users experience that blockchain is important for the organisation and can increase their efficiency, they can expect a positive attitude towards blockchain and vice versa. On a similar ground, a study conducted by Liu et al. (2021) reveals that there is a strong relationship between perceived ease of usefulness, perceived ease of use and trust for blockchain, which explains the behaviour of users. According to them higher the users trust blockchain technology, more they will be inclined to perceive the value of this technology. Companies that employ blockchain should make it clear to their clients that because this technology is transparent and decentralized, it can ensure that all data in the application is unalterable and shared with all parties involved. Furthermore, the program's interface should be simple to use and function well so that clients can create trust in the application. So, based on the above discussions, the following hypotheses are framed:

H1: Perceived ease of use significantly impacts the adoption of blockchain technology in MNCs.

H2: Perceived usefulness significantly impacts the adoption of blockchain technology in MNCs.

BLOCKCHAIN TECHNOLOGY AND COMPANY PERFORMANCE

The literature on blockchain technology is still evolving. Blockchain, in its essence, is defined as a type of Distributed Ledger Technology (DLT) that records all the transactions using a hash, termed as an immutable cryptographic signature (Dowelani et al.,2022). The transactions are then organized into blocks, with each new block including a hash of the previous one, essentially chaining them together, which is why distributed ledgers are also known as blockchains (Hughes et al., 2019). Earlier studies (Tian et al., 2024; Juan et al., 2023) witnessed that adoption of blockchain technology enhances the company's performance. Blockchain technology helps the company by increase in cost reduction, enhanced employee performance, increase in customer base (Tian et al., 2021; Juan et al., 2023) which in turn leads to better company performance. By using Industry 4.0 disruptive technologies, many industries have enhanced their capabilities and performance (Buchi et al., 2020; Szalavetz, 2019). They claimed that the implementation of blockchain has helped increase trust (eliminating the importance of the third party) and reducing fraud transactions that ensure increased transaction auditability. Simultaneously, all individuals in the blockchain

can see the misconduct behaviour, which can minimize individual opportunism, conduct collective supervision, and prevent theft, fraud, and manipulation. Further, according to Kouhizadeh et al. (2021), the perceived benefits of blockchain technology, such as security, immutability and immaturity has induced the companies to opt such type of technology in their industry. Considering the above discussion, the following hypothesis is framed.

H3: The adoption of blockchain technology significantly impacts the company performance of MNCs.

MEDIATING THE ROLE OF RELATIONAL PERFORMANCE BETWEEN BLOCKCHAIN TECHNOLOGY AND COMPANY PERFORMANCE

 In the context of Industry 4.0, integrating various technologies and systems is crucial for driving innovation and creating value within firms. Blockchain technology, in particular, has significantly impacted by addressing issues related to security, reliability, and traceability (Duan et al., 2021). It enhances firm performance through an intermediary factor known as relational innovation (Wamba & Guthrie, 2019). According to Lefebvre et al. (2003), adopting blockchain technology strengthens relationships with both business networks and customers, fostering relational innovation. This relationship improvement has a direct positive effect on operational performance and overall firm performance through sharing of information and knowledge with our partners and open & transparent communication with partners (Wisner, 2003). Furthermore, Coita et al. (2019) argue that implementing blockchain technology transforms how businesses are organized and managed, ultimately boosting innovation. So, in light of the above discussions, the following hypothesis is framed.

H4: Relational performance mediator the relationship between blockchain technology and company performance.

The conceptual framework as follows:

Figure1. Conceptual Framework
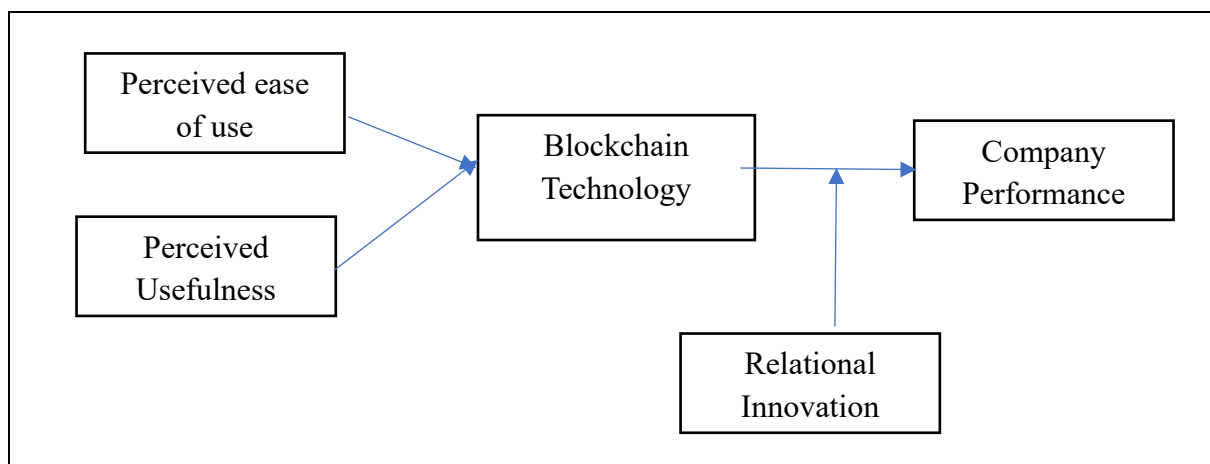
3. RESEARCH METHODOLOGY

3.1 Measures

The scales for all five constructs are adopted from previously established literature with little modification according to the context of the present study. The measurement scales for perceived ease of use and perceived usefulness are adopted from (Liu&Ye 2021; Davis1986; Venkatesh& Davis 2000). Further, the blockchain technology construct includes seven items adopted from previous studies (Tella, 2023; Wamba & Guthrie, 2019). The studies conducted by (Kale et al.2000; Kohtamaki et al. 2012) were adopted for measuring relational trust for the study. Lastly, the scales for measuring company performance were adopted from Ravichandran (2018), Ravichandran and Lertwongsatein (2005) and Buchi et al.2020 see Appendix 1. The measurement scales of all constructs were presented to 5-10 software engineers of MNCs for initial screening. Furthermore, for the data analysis, CFA are performed to explore the dimensionality of measurement scales and for mediation analysis the technique adopted by Baron and Kenny (1986) is adopted.

3.2. Sample

The data for the present study is collected from software engineers of MNCs in Delhi, India. The current research is exploratory; hence, a questionnaire technique is used to collect data. The software engineers were chosen as respondents because they are more agile, have better knowledge of blockchain technology, and are in continuous interaction with the IT sector. Further, using the snowball technique, 683 questionnaires were distributed, out of which only 402 were received back.

4. DATA ANALYSIS

4.1. MEASUREMENT MODEL ANALYSIS

CFA was done to verify the measurement characteristics of constructs: perceived ease of use, perceived usefulness, blockchain technology company performance and relational innovation. Further, the testing of hypotheses is done through SEM analysis.

4.1.1. Perceived ease of use- The standard regression weight values of all items of perceived ease of use are above 0.5, AVE is equal to 0.867 and CR is 0.975, which depicts the validity of the construct. Further, the Cronbach alpha is 0.96. This model depicts a strong fit with CMIN/DF=1.8, GFI=0.995, AGFI=.976, NFI= 0.998, CFI= 0.999, RMR= 0.003 and RMESA=0.040 refer (Table1).

4.1.2. Perceived Usefulness- Each item of Perceived Usefulness scores standard regression weights above 0.5, and the construct validity was established. In addition to it, AVE is equal to 0.809 and CR is 0.962. The Cronbach alpha is 0.97. The model of the construct fits CMIN/DF=2.260, GFI=0.998, and AGFI=.970, NFI= 0.998, CFI= 0.999, RMR= 0.003 and RMESA=0.049 refer (Table1).

4.1.3. Blockchain Technology- This construct encompasses good psychometric properties as the standard regression weight of all items is above 0.5, AVE is 0.589 and CR is 0.907. The Cronbach alpha is 0.904. The model stands fit with CMIN/DF=4.219, GFI=0.977, AGFI=.941, NFI= 0.978, CFI= 0.999, RMR= 0.003 and RMESA=0.040 refer (Table1).

4.1.4. Company Performance- CFA validated all four items of this construct: cost reduction, an increase in revenue and employee performance. The standard regression weight of all items is above 0.5, CR is 0.83, AVE is 0.554, and the construct validity is established. The Cronbach alpha value of the construct is 0.83. The model represents a strong fit with CMIN/DF=1.783, GFI=0.998, AGFI=.983, NFI= 0.998, CFI= 0.999, RMR= 0.006 and RMESA=0.039 refer (Table1).

4.1.5. Relational innovation: CFA validated all the items of the construct as value of CR is 0.839, AVE is 0.554. The Cronbach alpha is0.862 and construct validity is established. The model represents a strong fit with CMIN/DF= 1.264, GFI=0.997, AGFI=0.986, NFI= 0.997, RMR=0.006, RMESA=0.022 refer (Table 1).

4.2. Reliability and Validity

All the constructs encompass absolute reliability and validity as values for Cronbach alpha and composite reliability were within threshold limits (Table2).

Table1. Measurement model fit indices

Constructs	CMIN/DF	GFI	AGFI	NFI	CFI	RMR	RMESA
Perceived ease of use	1.8	0.995	0.976	0.998	0.999	0.003	0.040
Perceived Usefulness	2.26	0.98	0.970	0.998	0.999	0.003	0.049
Blockchain Technology	4.21	0.977	0.94	0.97	0.98	0.18	0.07
Company Performance	1.78	0.998	0.98	0.99	0.99	0.006	0.03
Relational Innovation	1.264	0.997	0.986	0.997	0.999	0.006	0.022

Table 2. SRW value, reliability and validity

Constructs	Items	SRW	Alpha	Composite Reliability	AVE
Perceived ease of use	PEU1	0.872	0.96	0.975	0.867
	PEU2	0.980			
	PEU3	0.936			
	PEU4	0.885			
	PEU5	0.953			
	PEU6	0.808			
Perceived usefulness	PU1	0.909	0.97	0.962	0.809
	PU2	0.945			
	PU3	0.922			
	PU4	0.872			
	PU5	0.933			
	PU6	0.955			
Blockchain	BC1	0.735	0.904	0.907	0.589
	BC2	0.776			
	BC3	0.745			
	BC4	0.822			
	BC5	0.827			
	BC6	0.663			
	BC7	0.763			
Company Performance	CP1	0.711	0.83	0.83	0.55
	CP2	0.836			
	CP3	0.722			
	CP4	0.794			
Relational Innovation	RN1	.700	0.862	0.839	0.510
	RN2	.729			
	RN3	.732			
	RN4	.678			
	RN5	.773			

4.2. SEM ANALYSIS

In order to test the relationship between constructs and for acceptance/rejection of hypotheses AMOS (version 16) was adopted. The detailed results of hypotheses are given as below:

4.2.1. Perceived ease of use and Blockchain Technology- The SEM results depict significant relationship between perceived ease of use and blockchain technology in context of MNCs. The beta value is 0.78 which indicates a significant and strong relationship between perceived ease of use and blockchain technology. The model stands fit with CMIN/DF=4.869, GFI=0.927, AGFI=0.864, NFI= 0.962, CFI= 0.970, RMR= 0.02 and RMESA=0.086.

4.2.2. Perceived usefulness and blockchain technology- The SEM results reveals that there is significant relationship between perceived usefulness and blockchain technology in context of MNCs. As the beta value is 0.79, specified that adoption of blockchain technology is significantly affected by perceived usefulness. Hence, hypothesis 2 stands accepted. The detailed analysis of model fit is given in Table3.

4.2.3. Blockchain Technology and Company Performance- The implementation of SEM reveals that there is significant relationship between blockchain technology and company performance. As beta value is 0.688, it specifies that adoption of blockchain technology enhances the performance of the company. Hence, hypothesis 3 stands accepted. The detailed analysis is given in Table3.

Table3. Summary of Hypotheses Testing

Constructs	B value	CMIN/DF	GFI	AGFI	NFI	CFI	RMR	RMESA
PEOU-BC	0.78	4.869	0.927	0.864	0.962	0.970	0.02	0.086
PU->BC	0.79	4.95	0.922	0.880	0.961	0.969	0.22	0.086
BC->CP	0.68	3.182	0.959	0.932	0.961	0.973	0.022	0.064

4.2.4. Mediation Analysis

The current study explores relational innovation as a mediator between blockchain technology and company performance. According to the findings, implementation of blockchain technology has a significant positive impact on relational innovation of MNCs (SRW=0.64, p<0.001) which in turn has favourable impact for improving firm performance (Table 4). In the presence of mediator (relational innovation), the bootstrapping findings showed a substantial indirect effect of blockchain technology on company performance (SRW=0.450, p<0.001). Further, evidence that relational innovation mediates the relationship between blockchain technology and firm performance may be seen in the bias-corrected confidence interval of upper limit and lower bound not including zero given in Table4. Hence, hypothesis 4 stands accepted.

Table 4. Mediation Analysis

Relationships	The main effect of the independent variable on the mediator	The main effect of a mediator on the dependent variable	Indirect effect	LL95% UL 95%
BC->RN->CP	0.680	0.731	0.49**	.353 to .486

5. DISCUSSION AND IMPLICATIONS

5.1. Theoretical Implications

For MNCs navigating the competitive environment, adopting blockchain technology is critical in improving their business performance and ensuring their sustainability and competitive edge. The robust identification and analysis of the impact of perceived ease of use, perceived usefulness and relational innovation for blockchain technology and company performance relationship, this research delineates how this advanced technology is crucial for the corporate sector (MNCs). The present study explores the research model assessing the contribution of PEOU and PU for blockchain technology-company performance linkage in the context of the mediating role of relational innovation, thus adding to the literature on blockchain technology and reinforcing tenets of TAM theory.

The findings from the study provide theoretical light and present practical implications for managers associated with MNCs. For example, MNCs can train their employees on the skills and training to effectively implement blockchain technology. Further, MNCs must enhance their focus on implementing blockchain technology and their relationships with other stakeholders to ensure better performance.

The study corroborates blockchain technology's influential role in enhancing MNCs' performance, aligning with the findings of (Juan et al.2023, Tian et al. 2024; Sonawane & Motwani 2023). The mediating role of relational innovation between blockchain and performance aligns with previous studies (Wamba & Guthrie, 2019; Fynes&Voss, 2005).

5.2. Practical Implications

This paper aims to identify the effect of perceived ease of use and perceived usefulness on implementing blockchain technology. In addition, it also reveals that blockchain technology increases company performance through the mediation of relational innovation.

To implement blockchain technology effectively, the managers of MNCs should focus on investing in user-friendly blockchain solutions and support systems and provide purposeful training to ensure that employees and other

stakeholders perceive it as easy to use. Features like task automation, data transparency and security will induce the employees to expect increased efficiency in operations, contract execution and financial transactions. The mediation of blockchain technology in businesses thereby posits a great potential to further enhance performance. Operational efficiency, transparency, and security offered by blockchain are supplemented by relational innovation through collaboration, trust, and the adoption of agility among partners. Firms, therefore, must invest in the development of collaborative networks, continuous relational innovation practices, and ensure that blockchain technology is well integrated into those networks if business performance is to be maximized. In doing so, companies can develop a robust, efficient, and competitive business model that thrives in an increasingly interconnected and technology-driven marketplace.

6. CONCLUSION

Though the present study has taken all the critical steps to maintain the objectivity and validity of the study. But still few limitations are required to be addressed in future studies. Firstly, the present study has taken perceived ease of use and perceived usefulness as facilitators for adopting blockchain technology in MNCs. Hence, the future researchers should incorporate other facilitators such as trust and TOE framework that can impact the adoption of blockchain technology (Liu &Ye 2021). Further, the study has included only relational innovation as mediator between blockchain technology and company performance. Hence, the future studies should include various other types of innovations such as process innovation, product innovation. Lastly, the MNCs of Delhi was chosen as sector for data collection. Future researchers must encompass MNCs of other metropolitan cities with the purpose of having in -depth analysis.

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APPENDIX 1

CONSTRUCTS	ITEMS
Perceived ease of use	I find blockchain technology easy to learn It is easy to interact with blockchain-based applications. I feel comfortable using blockchain technology in my daily work. Using blockchain technology does not require a lot of effort. I find the user interface of blockchain platforms intuitive. I believe that understanding blockchain technology is not difficult.
Perceived Usefulness	Blockchain technology improves the efficiency of business operations. Using blockchain technology enhances the quality of my work. Blockchain technology makes it easier to track and verify transactions. Blockchain technology improves decision-making processes in my organization. he use of blockchain technology increases the overall productivity of my firm. Blockchain technology helps in reducing costs and errors in business transactions.
Blockchain Technology	My company invests resources in blockchain-enabled projects. Business activities in our company require the use of blockchain technologies. Functional areas in my company require the use of blockchain technologies. I have sufficient knowledge and training to use blockchain technology effectively. My business environment is conducive to implementing blockchain technology. The use of blockchain technology is widely accepted in my professional network. I have access to adequate support for using blockchain technology.
Company Performance	With the implementation of blockchain technology, there is increase in cost reduction. With the help of blockchain technology, there is increase in revenue. The employee performance is increased after adopting blockchain technology. Blockchain has enabled us to expand our customer base, contributing to higher profits.
Relational innovation	Regular sharing of information and knowledge with our partners. Increase in market share. Open and transparent communication with our partners. Ability to retain partners, customers and suppliers. Improved customer satisfaction.