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Research Article

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Role of Transparency, Traceability, Compatibility, and Relative Advantage towards Raising Blockchain Technology Adaptation in Banking Sector of Bangladesh: The Mediating Role of Perceived Value

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Abstract
Blockchain technology has emerged as a transformative innovation in the Banking sector. Despite its promise, there is a lack of understanding about its value and usefulness, which makes it difficult to get people to use blockchain technology on a broader scale. This research provides a framework and compares the effects of Perceived Transparency, Perceived Traceability, Relative Advantage, and Perceived Compatibility on Perceived Value, and explores how Perceived Value influences Intention to Adopt Blockchain Technology. The data were analyzed by Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. The results of the measurement model indicate satisfactory reliability and validity, with all indicator loadings being greater than the recommended value. The results of the structural model indicate that perceived transparency, traceability, relative advantage and perceived compatibility are significant and positively associated with perceived value. The findings also confirm that the perceived value significantly influences intention to use blockchain technology. The model has strong explanatory power, accounting for 66.6% of variance in PV and 75.1% of variance in AI. The results show that users are more likely to adopt blockchain technology if they are aware of its advantages of providing transparency in information, reliability in tracking, better advantages than current technology, and suitability for their operations. The purpose of this research is to add to the adoption of blockchain literature by proving the mediating role of perceived value, and to provide some practical guidance for organizations looking to facilitate the adoption of the blockchain in Banking sector.

Keywords: Banking Sector, Emerging Economy, Relative Advantage and Value, Structural Equation Modeling, Transparency and Traceability

1. Introduction
In recent years, technologies have been rapidly evolving, making significant changes to the global financial landscape and presenting opportunities to enhance efficiency, transparency and security in banking operations. Of these new technologies, blockchain has received a lot of interest for its ability to offer decentralized, unalterable, and transparent transaction management systems. Blockchain was first conceived as the technology behind Bitcoin, but it has since expanded into various other sectors beyond the cryptocurrency field such as financial services (i.e. cross-border payments, trade finance, identity management, and compliance with regulations) (Casino et al., 2020). The blockchain technology can revolutionize the current banking processes and build trust between financial stakeholders by providing secure peer-to-peer transactions that don't require the full reliance of a centralized intermediary.

Banking is one of the industries that has significant possibilities to benefit from blockchain technology. Conventional banking systems encounter difficulties with transaction delays, costs of operation, information security, risk of fraud and message imbalance between stakeholders. Blockchain can overcome these drawbacks by introducing distributed ledger mechanisms that enhance the transparency, traceability, and security of transactions, while minimizing the reliance on intermediaries (Garg et al., 2021). Given the many advantages of blockchain, financial institutions around the globe are turning to such solutions for greater efficiency and competitive edge in an evolving digital landscape.

Although the advantages are there, blockchain's penetration into the banking industry is still in its initial phases, especially in developing countries like Bangladesh. Bangladesh's banking sector has undergone a remarkable transformation in the digital era, with online banking, mobile financial services, and electronic payment systems playing a vital role in the sector's growth. As a result, the digital banking sector has grown in Bangladesh, but challenges such as technological readiness, regulatory uncertainty, cybersecurity, and organizational capability remain to pose a significant influence on the adoption of advanced technologies. While blockchain has the potential to enhance financial transparency, transaction security, and regulatory oversight, its adoption requires widespread understanding and confidence among banking professionals regarding its value and utility.

The previous research has pointed out a number of factors that affect the adoption of blockchain, such as compatibility, transparency, traceability, and relative advantage (Garg et al., 2021; Rahman et al., 2025). But most of the previous studies have been conducted in developed economies and empirical evidence on intention to adopt blockchain in the banking sector of Bangladesh is still scarce. Moreover, numerous studies have explored the direct links between technology characteristics and adoption intention, and few studies have investigated the underlying processes that make the link between perceived value and adoption decisions.

To fill this gap, this study proposes a conceptual model to explore the factors affecting the adoption intention of the blockchain technology in the banking sector of Bangladesh. In particular, the study investigates how perceived compatibility, perceived transparency, perceived traceability, perceived relative advantage, and perceived value are related to the adoption intention of blockchain. This research, on the other hand, combines two theories, namely the Technology Acceptance Model (Davis, 1989) and Diffusion of Innovation Theory (Rogers, 2003), to offer both theoretical and practical knowledge on the assessment of blockchain technology among banking professionals. The results will help inform policy makers, financial institutions and technology vendors of sustainable approaches for blockchain adoption in the banking industry in Bangladesh.

2. Theoretical background and hypotheses development

2.1 Theoretical background

Relative Advantage and Compatibility adopted from Diffusion of Innovation Theory (DOT), whereas, from blockchain-specific literature the variables Transparency and Traceability were adopted. Besides, Perceived Value adopted from Perceived Value Theory, similarly Adoption Intention adopted from Technology Acceptance Model (TAM).

2.2 Hypotheses Development

Perceived Compatibility and Intention to Adopt Blockchain Technology

Perceived compatibility is the degree of consistency between the innovation and the current values, technology, work processes and organizational needs (Rogers, 2003). From blockchain adoption's standpoint, compatibility denotes the level of integration blockchain technology can achieve in the

current banking systems, processes, and regulations. Technology that complements existing infrastructures is more likely to be accepted by organizational users because banking institutions are likely to have complex information systems and well-established procedures.

Blockchain technology needs to be compatible with the current banking core banking infrastructure, digital payment systems, and compliance frameworks in the banking industry. If employees believe that blockchain fits into their banking workflow, they will have a greater awareness of its value and more favorable attitudes toward its adoption. Adoptability of innovations is influenced by compatibility, as evidenced by previous research which found that people view more compatible innovations as less risky and easier to use (Rogers, 2003, Oliveira et al., 2011). Moreover, the studies regarding the blockchain adoption have indicated compatibility as a crucial determinant of blockchain-based financial application acceptance (Garg et al., 2021; Rahman et al., 2025). Hence, the objective of this study is to propose:

H_1: Perceived Compatibility has a significant and positive effect on Intention to Adopt Blockchain Technology.

Perceived Transparency and Intention to Adopt Blockchain Technology

Perceived transparency is the level of trust that users have in blockchain technology to deliver clear, transparent and trustworthy information about transactions and operations. Among the key features of blockchain, transparency is one that is crucial, since in DLT, participants who have been authorized to view the transactions will be able to have access to the same information (Casino et al., 2020).

Transparency is a key concern in the banking industry, especially with the rise in financial fraud, transaction verification, regulatory requirements, and customer trust. The blockchain-based systems can enhance transparency by minimizing information asymmetry and allowing for the real-time verification of financial activities. Bankers who believe that blockchain technology can help increase transparency are more likely to understand the benefits of blockchain for organization and have a higher intention to use it. Transparency enhancement is one of the key perceived benefits that has been identified in the previous research that has led to the adoption of blockchain in financial services (Garg et al., 2021). Based on the above, this study suggests:

H_2: Perceived Transparency has a significant and positive effect on Intention to Adopt Blockchain Technology.

Perceived Traceability and Intention to Adopt Blockchain Technology

Perceived traceability is the capability of blockchain to trace, confirm and record transaction history during the entire process. The transactions recorded in the blockchain are permanent and chronological, unlike the traditional centralized systems, which provide better monitoring, accountability and auditability (Casino et al., 2020).

Banking institutions find traceability extremely beneficial for international payments, trade finance, remittance management, anti-money laundering compliance, and fraud detection. As transactions can be traced better, it can minimize the operation risk and build trust among the banking professionals on using blockchain. Users are more likely to have positive attitudes towards blockchain adoption when they believe this can improve the transaction tracking and monitoring. The traceability feature of blockchain has been cited as a key factor in its perceived usefulness and the intention for adoption for financial use (Garg et al., 2021; Rahman et al., 2025).

H_3: Perceived Traceability has a significant and positive effect on Intention to Adopt Blockchain Technology.

Relative Advantage and Intention to Adopt Blockchain Technology

The concept of relative advantage relates to how much an innovation is seen as better than the alternatives (Rogers, 2003). The Diffusion of Innovation theory also suggests that relative advantage is one of the most important factors that determines the adoption of innovation as technology adopters are more likely to embrace innovations that perform better and are more efficient and economical.

The use of blockchain technology in banks offers a number of possible benefits such as faster transaction speeds, lower operational costs, better security, no need for middlemen and better management of data. Adopting a technology that offers a clear operational advantage is likely to be easier to accept in a developing economy (like Bangladesh) where banks are rapidly undergoing digital transformation. The studies conducted so far have verified that relative advantage has a positive effect on blockchain adoption intention, by enhancing the users' perceptions of the usefulness of the technology and their potential benefits (Garg et al., 2021; Wider et al., 2025).

Based on this, this study proposes:

H_4: Relative Advantage has a significant and positive effect on Intention to Adopt Blockchain Technology.

The Mediating Role of Perceived Value

Perceived value is the total evaluation users make of the benefits gained by using a technology versus the risks, costs and effort involved in using it. Perceived value is a crucial factor in technology adoption research because the value with which the user perceives the innovation is likely to form his or her behavioural intentions (Davis, 1989).

Technological attributes like compatibility, transparency, traceability, and relative advantage might not directly influence blockchain adoption unless users believe that these attributes will lead to valuable results. For instance, transparency and traceability are relevant when it aids in building trust, minimizing operational risks, and augmenting efficiency. Likewise, when users are aware of their role in organizational performance, compatibility and relative advantage will affect adoption. In the past, studies on blockchain adoption have highlighted the role of perceived benefit and value perception as important mechanisms between the technological features and the intention to adopt (Garg et al., 2021; Wider et al., 2025). Hence, the relationships between the characteristics of a blockchain and adoption intention are expected to be mediated in the banking sector of Bangladesh. On the basis of this argument the following hypotheses are set out:

H_5: Perceived Value mediate the relationship between Perceived Compatibility and Intention to Adopt Blockchain Technology.

H_6: Perceived Value mediate the relationship between Perceived Transparency and Intention to Adopt Blockchain Technology.

H_7: Perceived Value mediate the relationship between Perceived Traceability and Intention to Adopt Blockchain Technology.

H_8: Perceived Value mediate the relationship between Relative Advantage and Intention to Adopt Blockchain Technology.

2.3 Research framework

Based on the discussion of theories and hypotheses, in Figure 1, developed the research conceptual framework and model structure.

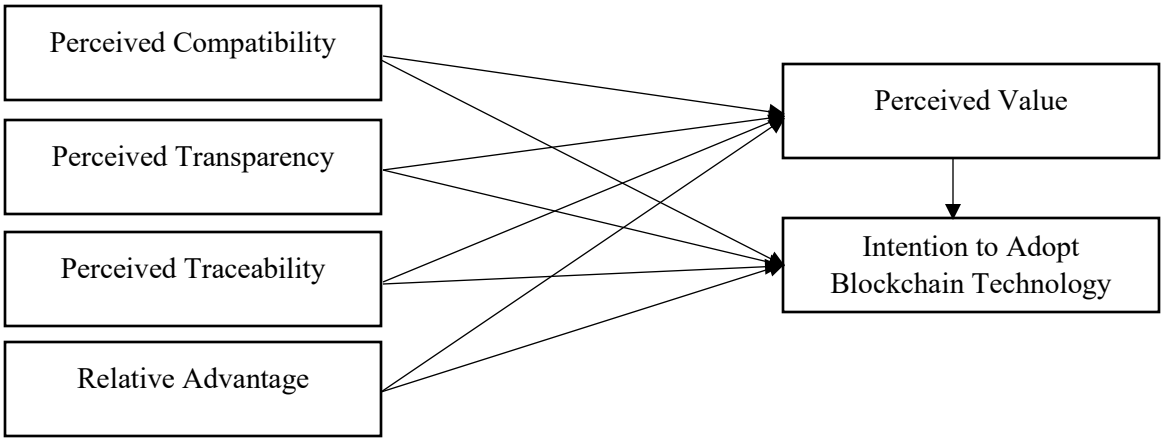


Fig. 1: Proposed research framework for model

3. Methodology

This study employs a quantitative research methodology, which necessitates a comprehensive and objective examination of the correlations between variables. Quantitative research collected numerical data to improve the validity and generalizability of findings, making statistical analysis and hypothesis testing easier (Bouteraa et al., 2023). It will be especially useful in research initiatives that include evaluating constructs, determining causal links, and recognizing patterns in large datasets (Park & Kim 2020). A quantitative technique also assures a systematic and repeatable process, which eliminates study bias and increases the validity of findings (Shafique and Khan, 2020). This method is efficient for evaluating theoretical models because it employs statistical techniques such as Structural Equation Modeling (SEM), which allows for the study of complicated relationships between latent variables. The quantitative method is most suited for this investigation since it allows for theoretical generalizations while also providing empirical evidence (Saif et al., 2022).

3.1 Research design and method

The study research approach is cross-sectional and descriptive, examining the relationship between variables at a certain point in time. When researching perceptions and actions in a real-world setting, this is one of the greatest descriptive techniques to use because the research variables may completely appreciate patterns, characteristics, and correlations without having to change the research variables. Because data is gathered methodically from a sample population in order to identify trends and relationships, the process described provides an accurate picture of the issue under discussion. For studies that aim to quantify the attitudes, behaviors, or elements that impact decision-making at a particular moment in time, the cross-sectional approach is most appropriate. It is frequently used in surveys because it allows the researcher to compare the responses of several respondents and is a practical and economical method of gathering vast amounts of data. Because it can yield statistically significant results without necessitating extensive follow-up, the descriptive cross-sectional approach is most suited to the goals of the study (Jaradat et al., 2013).

3.2 Population, sampling, data, and sample size

The target population of this study consisted of bank employees working in bank companies operating in Bangladesh. Respondents were employees who had direct experience with digital technologies and technology-enabled systems used within the banking sector, including digital

banking platforms, automated information systems, and other emerging technological solutions relevant to bank operations. This focus allowed participants to provide informed responses regarding their perceived compatibility, perceived transparency, perceived traceability, relative advantage, perceived value, and intention to adopt blockchain technology, all of which are central to understanding the blockchain technology adoption framework proposed in this study. Convenience sampling, supplemented by purposive screening, was adopted because the target population could not be drawn from a single accessible sampling frame, given the absence of a comprehensive national registry of bank employees with knowledge of and exposure to emerging technologies such as blockchain. Although less rigorous than probability-based sampling, convenience sampling remains widely used in technology-adoption research because it enables efficient access to a relevant, knowledgeable, and dispersed respondent base within practical time and resource constraints (Siddiqi et al., 2025). This approach was particularly suitable for the present study because bank employees were reached through bank companies, professional networks, and social media platforms commonly used by bank professionals across Bangladesh. Data were collected over a four-month period, from February 2026 to May 2026 using a structured, self-administered questionnaire distributed both online and in person. A total of 443 responses were initially obtained. Following careful screening for straight-lining, incomplete responses, failed attention checks, and respondents who did not meet the inclusion criterion of active employment in a bank, 53 responses were identified as unreliable or invalid and were excluded from further analysis. This screening process yielded a final sample of 390 valid responses, which were retained for subsequent structural equation modeling (Nevitt & Hancock, 2001). A sample size of 300 is considered adequate for PLS-SEM analysis involving the six latent constructs examined in this study, as it satisfies established minimum sample-size guidelines for models of comparable complexity (Hair et al., 2019). This is consistent with prior survey-based quantitative research, which similarly affirms that a sample of around 390 respondents provides sufficient statistical power for structural equation modeling (Siddiqi et al., 2025).

3.3 Measures

Table 1 shows how the measurement scales used in this investigation were presented in a table manner. The items are adjusted to meet the research aims. All objects in this study are rated on a 5-point Leikert scale.

Table 1: Measurement scales

Construct	Items	Sources
Intention to Adopt Blockchain Technology (IABT)	IABT1: I intend to use blockchain technology in my work-related activities. IABT2: I intend to use blockchain technology in bank-related activities in the future. IABT3: I expect to use blockchain technology whenever it is available in my organization. IABT4: I am willing to recommend the adoption of blockchain technology in my organization.	Venkatesh and Davis (2000)

Perceived Compatibility (PC)	PC1: Blockchain technology is compatible with my existing work practices. PC2: Blockchain technology fits well with the existing systems of my organization. PC3: Using blockchain technology is consistent with the way I prefer to perform my work. PC4: Blockchain technology is compatible with the needs and requirements of my organization.	Rogers (2003)
Perceived Transparency (PT)	PT1: Blockchain technology can improve the transparency of organizational transactions. PT2: Blockchain technology can make transaction-related information more visible and accessible. PT3: Blockchain technology can reduce information asymmetry in organizational transactions. PT4: Blockchain technology enables transparent monitoring of transactions.	Wamba et al. (2020); Hina et al. (2025); Rapezzi et al. (2025)
Perceived Traceability (PTR)	PTR1: Blockchain technology can make it easier to trace transactions. PTR2: Blockchain technology can enable the tracking of transaction histories. PTR3: Blockchain technology can improve the ability to verify transaction records. PTR4: Blockchain technology can provide reliable records that can be traced when necessary.	Shin, & Hwang, (2020); Yap et al. (2025)
Relative Advantage (RA)	RA1: Blockchain technology can provide advantages over existing technologies. RA2: Using blockchain technology can improve the efficiency of organizational operations. RA3: Blockchain technology can provide better outcomes than conventional systems. RA4: Adopting blockchain technology would provide significant benefits to my organization.	Bag et al. (2023); Chittipaka et al. (2023)
Perceived Value (PV)	PV1: The benefits of using blockchain technology can outweigh the associated costs and efforts. PV2: Using blockchain technology would provide valuable benefits to my organization. PV3: Overall, blockchain technology can offer good value for its use. PV4: Adopting blockchain technology would be worthwhile for my organization.	Yilmaz et al. (2023); Bhatnagr et al. (2025)

3.4 Analysis approach

In order to expand the theories into the studies and examine the hypothesized connections among the latent dimensions, this study used PLS-SEM with SmartPLS 4 (Version 4.1.1.6) to evaluate the IABT pros. SEM enables researchers to estimate measurement models and structural pathways with greater accuracy (Hair et al., 2019). Because the study used a structural model with multiple dependent variables, latent constructs based on multi-item indicator variables, and different stages and levels of constructs, SmithPLS software was used. Strict requirements for multivariate normality of data and sample sizes are imposed by CBSEM, which leads to skewed test statistics, unsatisfactory solutions, and challenges in model identification. Therefore, instead of using CB-SEM, we employ PLS-SEM (Podsakoff et al. 2003).

4. Results analysis and findings

To begin, this study made use of Harman's single-factor test. To use Harman's single-factor test, all indicators under consideration were represented by a single unrotated exploratory factor analysis (EFA), and CMB is considered problematic when the first factor explains more than half of the variance in the indicators (Podsakoff et al., 2003). In this illustrative analysis, Table 2 shows that the first factor accounts for 34.17% of the indicator variance. As the first factor explains less than 50% of the total variance, common method bias is not considered a substantial concern in this illustrative dataset. Kıymalıoğlu et al. (2024) used the full collinearity test to identify potential common method bias.

Table 2: Results of Harman's single factor test

Component	Initial Eigenvalues		Cumulative %	Extraction Sums of Squared Loadings		
	Total	% of Variance		Total	% of Variance	Cumulative %
1	8.20	34.17	34.17	8.20	34.17	34.17

Table 3 describes the demographic characteristics of the respondents. A total of 390 bank employees participated in the study. The majority were male (61%), aged between 30 to 39 years (42%), and held at least a bachelor's degree (49%). Most respondents had between 3 and 5 years of working experience in the bank sector (36%), and the majority reported a moderate to high level of familiarity with digital technologies and blockchain-related applications (84% combined).

Table 3: Participants' demographic characteristics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	238	61
	Female	140	36
	Prefer not to say	12	3
Age Group	Below 30 years	113	29
	30 to 39 years	164	42
	40 to 49 years	78	20
	50 years and above	35	9
Education Level	HSC or below	39	10
	Bachelor's Degree	191	49
	Master's Degree	133	34
	Others	27	7
	Below 3 years	94	24

Working Experience in the Bank Sector	3 to 5 years	140	36
	6 to 10 years	101	26
	Above 10 years	55	14
Familiarity with Digital and Blockchain Technologies	Low	62	16
	Moderate	172	44
	High	156	40

The descriptive analysis presented in Table 4 summarizes the statistical properties of the latent constructs rather than evaluating structural relationships. Specifically, the table reports the mean, standard deviation, skewness, and kurtosis values for each construct. The results indicate that the constructs demonstrate relatively similar mean values, ranging from approximately 2.92 to 3.38 on the five-point Likert scale, suggesting moderate perceptions among respondents regarding perceived transparency, perceived traceability, relative advantage, perceived compatibility, perceived value, and intention to adopt blockchain technology. The standard deviation values are below 1.0 for all constructs, reflecting reasonable dispersion and indicating that responses are not widely scattered from the mean. This suggests relatively consistent perceptions among bank employees toward the factors influencing blockchain technology adoption. Table 4 also reports the results of the normality assessment using skewness and kurtosis indicators. Following Kline's (Fornell and Larcker, 1981) recommended thresholds, skewness values should fall within ±3 and kurtosis within ±10 to assume an approximately normal distribution suitable for PLS-SEM. All skewness and kurtosis values reported in Table 5 fall comfortably within these acceptable ranges. Therefore, the data meet the normality assumption, supporting the appropriateness of the subsequent multivariate analysis using PLS-SEM.

Table 4: Descriptive statistics and results of normality test

Constructs	N	Mean	Std. Deviation	Skewness	Kurtosis	Normality Assumed
Perceived Transparency (PT)	390	3.27	0.73	−0.05	0.19	Yes
Perceived Traceability (PTR)	390	2.92	0.8	0.06	0.07	Yes
Relative Advantage (RA)	390	3.01	0.7	0.13	0.26	Yes
Perceived Compatibility (PC)	390	3.38	0.71	−0.06	0.16	Yes
Perceived Value (PV)	390	3.26	0.83	−0.01	−0.18	Yes
Intention to Adopt Blockchain Technology (IABT)	390	2.95	0.76	0.34	0.24	Yes
Valid N (listwise)	390					

Two steps are needed to complete the PLS-SEM analysis. The PLS-SEM is independent and uses ordinary least squares regression to examine the connection between measurement and structural model, according to Hair et al. (2019). SmartPLS 4 (4.1.1.6) was used in this query. To ascertain the measurement model's validity and reliability, evaluation is essential. Hair et al. (2019) suggested four points for each model construct while examining the reflective measure model.

Concept dependability, discriminant validity, convergent validity (CV), and indicator loadings (size and importance) are a few of these.

Internal consistency and convergent validity (CV) Internal consistency (IC) is determined by composite reliability (CR), whereas convergent validity is determined by average variance extracted (AVE) and outer loadings. The indicators' dependability as determined by the CR is shown in Table 6. The CR value of 0.708 is acceptable, according to Hair et al. (Hair et al., 2019); however, values lower than 1 and higher, like 0.8 or 0.9, can also be accepted. Because of their low outer loading levels, IABT2, PC3, PT5, PTR4, PV5, and RA4 were not included in the study. All of the item codes were changed using this technique. Both outer loadings and AVE are used to evaluate good IC and CV, respectively, as Table 6 shows that the CR value for each construct is more than the recommended value. Hair et al. (2019) state that item dependability is considered excellent when loading values are greater than 0.708, indicating that factors explain more than half of the variability of the indicator. Every item in Table 5 has a loading greater than 0.708. According to Ringle et al. (2020), the AVE values determine the CV. To assure CV, a number greater than 0.50 should be allowed. Table 6 shows that all of the AVE values range from 0.870 to 0.950, with a limit of 0.50. This study has so confirmed that there is no CV concern (Fig. 2).

Table 5: Test of IC and CV

	Items	***Loadings***	***Composite reliability (CR)***	***Average variance extracted (AVE)***
IABT1	IABT11	0.950	0.957	0.884
	IABT12	0.940		
	IABT13	0.929		
	IABT14	0.942		
PC	PC1	0.879	0.902	0.772
	PC2	0.873		
	PC3	0.879		
	PC4	0.884		
PT	PT1	0.882	0.908	0.782
	PT2	0.888		
	PT3	0.883		
	PT4	0.884		
PTR	PTR1	0.909	0.926	0.818
	PTR2	0.902		
	PTR3	0.904		
	PTR4	0.901		
PV	PV1	0.911	0.931	0.828
	PV2	0.907		
	PV3	0.915		
	PV4	0.907		
RA	RA1	0.871	0.897	0.763
	RA2	0.870		
	RA3	0.890		
	RA4	0.864		

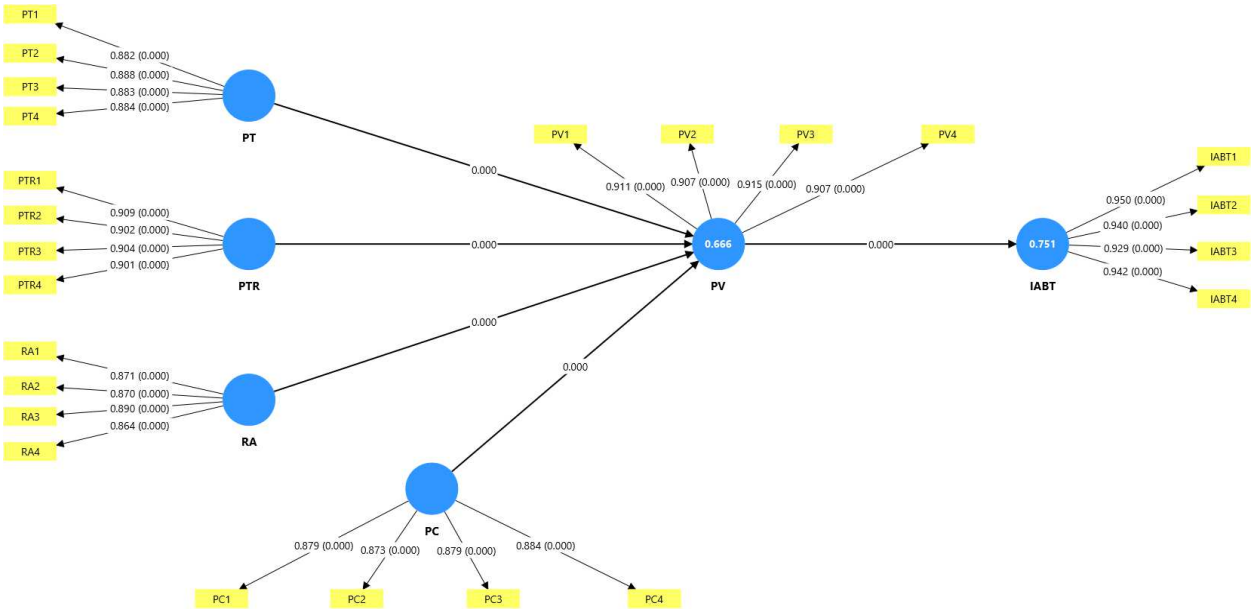


Fig. 2: Measurement Model of the Framework

The study analyzes the relationship between Perceived Transparency (PT), Perceived Traceability (PTR), Relative Advantage (RA), and Perceived Compatibility (PC) with Perceived Value (PV), which then impacts Intention to Adopt Blockchain Technology (IABT) according to the proposed framework. Results in Figure 2, the PLS-SEM analysis show that the measurement model has good reliability and validity because all the measurement model indicator loadings are above 0.70. Constructs show very good internal consistency with indicator loadings ranging from 0.871 to 0.950, indicating that the items selected for the constructs are adequate indicators of the constructs. The structural model results indicate that, the Perceived Transparency, Perceived Traceability, Relative Advantage and Perceived Compatibility have significant positive influences on Perceived Value. In all four relationships, the significance value is $p < 0.001$, which indicates that these relationships are of significant value for users' perception of the value of blockchain technology. Specifically, Perceived Transparency displays good measurement performance with the loadings of the indicators ranging from 0.882 to 0.884, indicating that the information is perceived as open and visible, which positively impacts the perceived value of blockchain. Likewise, the indicators of Perceived Traceability have high loading values between 0.904 and 0.909, which suggest that the ability of blockchain to track and verify transactions increases the confidence and perceived benefit of their users. Furthermore, the Relative Advantage construct shows good reliability, with the loading ranging from 0.864 to 0.890, indicating that users find blockchain useful because they see its benefits in comparison to existing systems, e.g., increased efficiency, security, and reliability. Additionally, the scores of the indicator items exhibit very high indicator reliability values between 0.873 and 0.884, suggesting that the more compatible the blockchain technology is with the user's practices, needs, and technological context, the greater the value they will place on it. Perceived Value has a coefficient of determination R^2 is 0.666 which suggests that the four antecedent variables together account for 66.6% of the variance in perceived value. This implies that transparency, traceability, relative advantage, compatibility are crucial factors affecting the users' assessment of blockchain technology. These factors, in combination, suggest that users consider the utility of blockchain, its security attributes, and its ability to fit into their current workflow to be the most important. Moreover, the results show that Perceived Value positively

affects Intention to Adopt Blockchain Technology ($p < 0.001$). The strong path relationship reveals that the perceived value, usefulness, and benefits of blockchain technology positively increase the willingness of users to adopt blockchain technology. The dependent variable, Intention to Adopt Blockchain Technology, has an R^2 value of 0.751, which means that Perceived Value accounts for 75.1% of the variance in the intention to adopt blockchain technology. This is a significant explanatory power, indicating that perceived value is an important mechanism explaining actual adoption willingness.

Overall, the results validate the framework presented and substantiate that the perceived value gained from transparency, traceability, relative advantage, and compatibility, are the main drivers of blockchain adoption among users. The findings suggest that organizations interested in advancing the use of blockchain technology should emphasize the advantages of using blockchain, including greater transparency, tracking capability, operational benefits, and integration with current systems. As soon as users see these benefits and have a greater level of perceived value, their desire to use the technology increases. The last step in assessing the reflective measurement model is the DV. According to Hair et al. (2019), DV is distinct from any other structural model construct. DV is calculated using the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT) (see Table 6). When the AVE of each concept's square root is greater than the other correlation coefficients of the construct, discriminant validity can be evaluated, according to Fornell and Larcker (1981). Each construct's off-diagonal square root was found to be less than its diagonal square root. Both correlations between diagonal and off-diagonal items and an estimated AVE value more than one guaranty appropriate discriminant validity (Table 6). According to this analysis, the study's measurement paradigm is convergent and satisfies the criteria for discriminant validity. Additionally, the HTMT value should be smaller than 0.9, according to Hair et al. (2019). According to Table 7, every HTMT test is within the permitted range because it is less than 0.90. Consequently, every factor is guaranteed to guaranty DV.

Table 6: Results of Fornell–Larcker *criterion*

Variables	IABT	PC	PT	PTR	PV	RA
IABT	0.940					
PC	0.748	0.879				
PT	0.759	0.657	0.884			
PTR	0.777	0.676	0.671	0.904		
PV	0.866	0.689	0.693	0.725	0.910	
RA	0.738	0.620	0.660	0.640	0.699	0.874

Table 7: Results of HTMT

Variables	IABT	PC	PT	PTR	PV	RA
IABT						
PC	0.805					
PT	0.815	0.726				
PTR	0.826	0.74	0.732			
PV	0.818	0.751	0.753	0.78		
RA	0.796	0.688	0.731	0.702	0.764	

R^2 is used to assess prediction accuracy and quantifies the influence of both endogenous and external variables. Hair et al. (2019) reported that the R^2 coefficient ranged from 0 to 1. Therefore, 0 represents the lack of an effect and 1 represents its perfection. Cohen (2013) states that an R^2 of

0.26 denotes a significant level of predictive accuracy, 0.13 a moderate level, and 0.02 a poor level. Both endogenous variables have an R^2 better than 0.26, as Table 8 demonstrates. The model's high predicted accuracy is indicated by this high degree of value Q^2 is used to assess the path model's quality. Predictive relevance (PR) is calculated using Q^2's capacity to replicate known values. PLSpredict makes advantage of Q^2's value. For $Q^2>0$, PR of the path model is acceptable (Hair et al., 2019). This happens when Q^2 is less than zero, indicating minimal predictive significance. The IABT measure and the PV's Q^2 measurements are both above zero, as Table 9 demonstrates. Consequently, PR uses the model.

Table 8: Results of coefficient of determination (R^2) and predictive relevance (Q^2)

	R-square	R-square adjusted	Q^2predict	RMSE	MAE
PV	0.666	0.663	0.658	0.588	0.473
IABT	0.751	0.750	0.737	0.516	0.403

A standardized root mean square residual (SRMR) was used to determine an approximate fit of the model in accordance with the guidelines of Henseler et al. (2016). An SRMR of less than 0.08 is considered an appropriate match, according to Henseler et al. (2014). This study was found to have the proper SRMR. The Bentler-Bonett normed fit index (NFI) was also used to assess the model's approximation fit (Henseler et al., 2016). An NFI range of 0.6 to 0.9 is suggested by Singh. The model can be considered an adequate fit since the NFI found in this investigation fell within the range and the specified threshold (Table 9).

Table 9: Results of model fitness

	Saturated model	Estimated model
SRMR	0.031	0.065
d_ULS	0.286	1.259
d_G	0.262	0.352
Chi-square	605.81	738.464
NFI	0.904	0.902

The relative significance of components in explaining other constructs in the structural framework can be clarified by conventional PLS-SEM research (Ringle et al., 2022). Additionally, they asserted that there is a strong correlation between the PLS-SEM results and the importance-performance map analysis (IPMA). The IPMA considers the performance of every variable. Performance and significance are the two dimensions that constitute the basis of evaluations. They are essential to managerial tasks. The significant influence of PV, which is centered on the IABT, is seen in Table 10. In particular, a unit's IABT performance is increasing by 0.866 along with its PV performance. The PV's share of the overall IABT is eventually determined by this augmentation. Additionally, PV is a significant aspect of positioning since it is an essential part of this construct pertaining to managerial techniques. Additionally, PTR was operating at a low level, so there is room for development.

Table 10: IPMA results full data set

Latent variable	Total effect (importance)	Index value (performance)
PC	0.178	59.383
PT	0.166	56.635
PTR	0.253	47.997

PV	0.866	56.507
RA	0.223	50.194

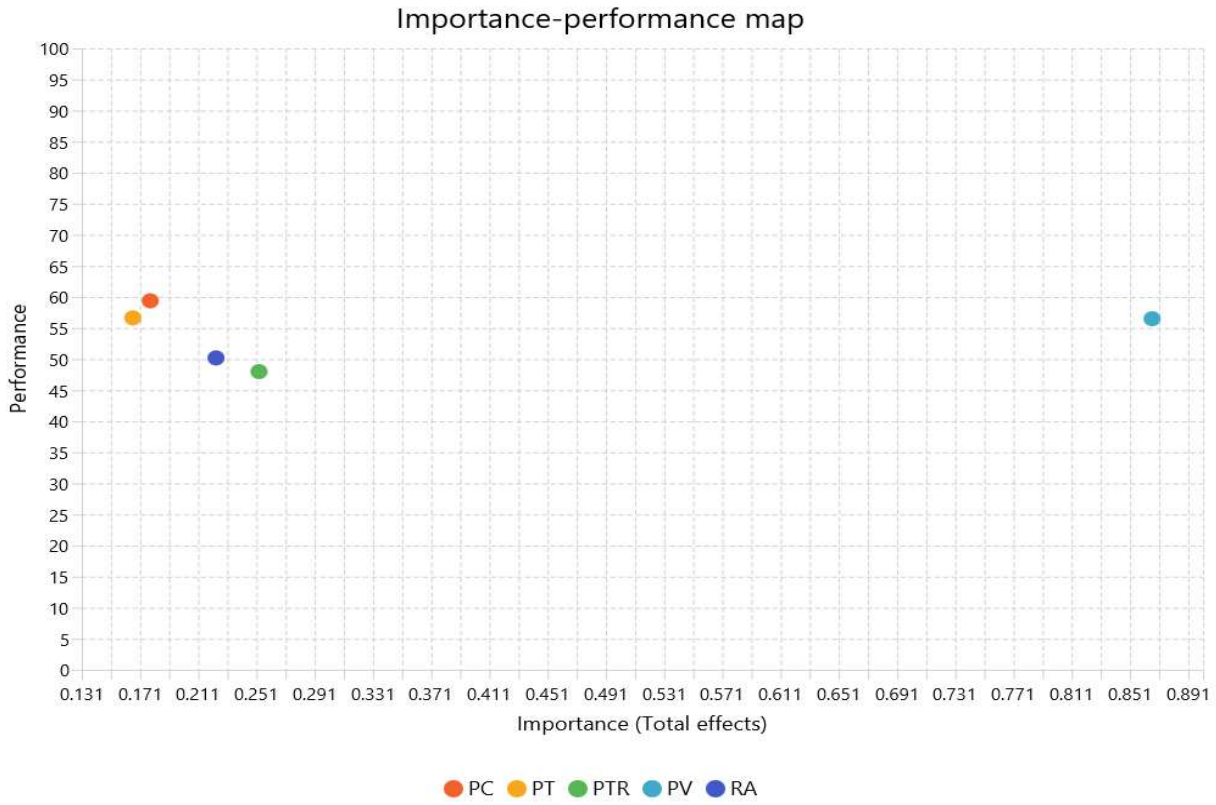


Fig. 3: Importance-performance map

Table 11: Results of path coefficient (direct effect)

Hypotheses	Path	Original sample (O)	Sample mean (M)	Standard deviation	T statistics	P values	Decision
H_1	PC → IABT	0.178	0.177	0.042	4.213	0.00	Supported
H_2	PT → IABT	0.166	0.167	0.04	4.112	0.00	Supported
H_3	PTR → IABT	0.253	0.253	0.041	6.221	0.00	Supported
H_4	RA → IABT	0.223	0.223	0.037	5.985	0.00	Supported

Table 12: Results of path coefficient (indirect effect)

Hypotheses	Path	Original sample (O)	Sample mean (M)	Standard deviation	T statistics	P values	Decision
H_5	PC → PV → IABT	0.178	0.177	0.042	4.213	0.00	Supported

H_6	PT → PV → IABT	0.166	0.167	0.04	4.112	0.00	Supported
H_7	PTR → PV → IABT	0.253	0.253	0.041	6.221	0.00	Supported
H_8	RA → PV → IABT	0.223	0.223	0.037	5.985	0.00	Supported

Bootstrapping techniques were used to analyze the construct's route value. The range of the path coefficient is +1 to -1. Stronger predictive relationships between the components will result from high absolute values. According to Hair et al. (2011), a two-tailed test is considered significant if the T-statistic is greater than 1.96 and the P-value is less than 0.05. As seen in Tables 11 and 12, all hypotheses are accepted since their t-values and p-values meet the requirements.

5. Discussions

This study examined the factors affecting blockchain technology adoption intention in the banking sector in Bangladesh and explored the mediating role between perceived value and perceived compatibility, perceived transparency and perceived traceability. The results show that it is not only technological features that spark the interest in blockchain, but it is the question of how blockchain can offer valuable operational and strategic benefits that prompt banking professionals to formulate adoption intentions. This result is consistent with the results of previous blockchain adoption studies that showed that the perceived benefits and value creation are major factors in blockchain-based financial technologies acceptance (Garg et al., 2021; Wider et al., 2025).

The strong connection between perceived compatibility and perceived value indicates that blockchain technology is more valuable when banking professionals believe that it can be used alongside the current banking system, organization, and regulations. Technology compatibility is a key element of the technology adoption process since user acceptance of innovations is based on how well they fit with current technological skills and processes (Rogers, 2003). Adopting blockchain in Bangladesh's commercial banking sector will need a form of interoperability with existing core banking systems rather than a complete replacement of existing infrastructures, which are diverse in this country. In the context of blockchain banking, Rahman et al. (2025) found organizational compatibility and technological readiness to be key factors in the decision to adopt the technology. Thus, the gradual integration of blockchain technology, compatibility of systems, and the banking applications should be considered as the top priority for the implementation in Bangladesh.

This is because of the positive correlation between perceived transparency and perceived value, which suggests transparency is one of the key enablers that affects blockchain adoption. The traditional banking systems are often based on centralized databases that require multiple parties to reconcile transactions. Blockchain technology can be used to create a decentralized and tamper-resistant ledger that enhances transparency, traceability and reliability of information among authorized participants (Casino et al., 2020). In a country like Bangladesh, where the strengthening of financial governance, managing frauds and improving trust in digital banking services is critical, blockchain-based transparency can have a significant impact on perceived organizational value. Transparency-driven security is also deemed as one of the major reasons affecting the adoption of blockchain in financial institutions, as revealed in previous studies (Rahman et al., 2025).

The results of the research show that the perceived traceability plays a significant role in perceived value, suggesting that the ability to trace and verify transaction histories makes blockchain

technology more appealing. The requirement for traceability is heightened in the case of international payments, trade finance, remittance management and regulatory compliance across banking operations. By using blockchain, records can be tracked in real-time, and the risk of unauthorized changes is minimized, which enhances the reliability of operations and risk management. Garg et al. (2021) concluded that there are many perceived advantages that blockchain offers to banking institutions, such as increased security, transparency, and process efficiency. Hence, blockchain could be beneficial for Bangladeshi banks in terms of bolstering monitoring systems, strengthening trust among customers and regulators.

The results also indicate that the relative advantage has a significant effect on perceived value and adoption intention. Relative advantage is the degree to which an innovation is better than the competing alternatives (Rogers, 2003). Blockchain can offer a number of potential benefits to banking institutions such as quicker settlement time, lower transaction costs, better fraud prevention, higher security, and more efficient information exchange. The relative advantage factor is also in line with recent empirical evidence from Bangladesh, which found that relative advantage was one of the most important factors affecting the intention to adopt blockchain among banking professionals (Wider et al., 2025). The results indicate that banks will be more inclined to adopt blockchain once the technology can prove to offer tangible benefits over traditional banking.

This study is theoretically significant because of the introduction of the mediating role of perceived value. The findings show that technological aspects like transparency, traceability, compatibility, and relative advantage mostly affect the adoption intention through enhancing users' perception of value. This is a new development of the Technology Acceptance Model (TAM) which suggests that usefulness and expected benefits ratings are high determinants of adoption (Davis, 1989). Advanced technical functionalities are only relevant during blockchain adoption when users can see how the respective functionality can enhance the performance of banking. The same mediation effect is described in the research on blockchain adoption, which describes how perceived benefits and usefulness are translated into behavioral intention because of the technological capabilities (Garg et al., 2021; Wider et al., 2025).

The findings indicated that perceived value plays a significant role in intention to adopt blockchain technology, which further suggests that value perception is critical for the acceptability of blockchain technology in the banking sector in Bangladesh. The banking community is more inclined to embrace blockchain when they see its potential in increasing efficiency, transparency, security and the quality of customer service. This result is consistent with previous research showing that the perceived values of financial institutions using blockchain are among the highest indicators to adopt blockchain (Garg et al., 2021). Moreover, the study by Wider et al. (2025) for Bangladesh showed that the intention to adopt blockchain is significantly influenced by the participants' assessment of usefulness, relative advantage and security benefits of the technology.

In terms of management, these results have significant implications for banks, policy makers and technology providers in Bangladesh. The first step in this process is for banks to talk about the practical benefits of blockchain, not just technology. Measurable benefits can be proved by applications like trade finance platforms, inter-bank settlement systems, digital identity verification, and tracking payments. Second, it is necessary to create supportive frameworks for blockchain governance, cyber security, data protection, and compliance requirements, provided by the regulatory authorities. In the banking sector, previous systematic studies have concluded that regulatory support, interoperability, and organizational readiness are key factors impacting blockchain adoption (Rahman et al., 2025).

Furthermore, to effectively adopt blockchain, investments in employee training, technological infrastructure, and organizational skills are required. While blockchain technology could provide many benefits for the banking industry, technical complexity, integration costs, and regulatory uncertainty could limit its adoption. Hence, the phased implementation of blockchain can be considered to be adopting the technology step by step, starting with limited applications that offer the most value to banks, and then working its way up to the broader use of blockchain in banking. Overall, this study has shown that the intention to adopt blockchain technology in the banking sector in Bangladesh is largely motivated by the perception of value driven by the technology's advantages. The factors of compatibility, transparency, traceability, and relative advantage affect adoption decisions because they make the users feel blockchain is more useful and more beneficial for the organization. Thus, an adoption policy with a value orientation, which prioritizes practicality and regulatory support along with technological readiness will play a pivotal role in enabling the successful integration of blockchain technology into the banking sector in Bangladesh, thereby supporting digital transformation.

6. Conclusion and Recommendations

The current study examined the role of perceived compatibility, perceived transparency, perceived traceability, and relative advantage in the intention to use blockchain technology in the banking sector of Bangladesh with the mediation of perceived value. The results show that users are not merely adopting blockchain based on the technology itself but rather for the value it brings. The findings show that compatibility with existing banking systems, transparency, transaction traceability, and relative advantages with respect to traditional technologies play significant roles in the development of perceived value, which in turn affects intentions toward the use of blockchain technology.

The study underscores that there exists huge potential of blockchain to solve multiple issues of the banking system in Bangladesh such as inefficiency in transactions, lack of transparency in information, risks of fraud, and restricted financial monitoring. By offering secure, transparent and immutable transaction records, blockchain has the potential to deliver significant value to banking institutions through operational efficiencies and enhanced trust among customers, regulators and financial stakeholders. This study confirms previous studies showing that perceived benefits and organizational value are among the key factors, which influence blockchain adoption in financial services.

The mediating effect of perceived value is also important as it shows that the expected benefits users perceive is the pathway that technological attributes affect adoption intention. That is, if banking professionals can better understand how specific blockchain capabilities can enhance banking operations and provide strategic benefits, they are more likely to support the adoption of blockchain. This discovery builds on the body of literature on technology adoption by highlighting the role of value perception in the context of blockchain acceptance in emerging financial ecosystems. The study implies that the implementation of blockchain in Bangladesh needs more than just an investment in technology on a practical front. Implementing these successfully requires establishing a conducive environment that includes regulatory policies, organizational adaptation, technology integration, and qualified staff. Hence, banks and policymakers must be strategic and value-oriented in their approach to blockchain implementation, and prioritize use cases where the technology can offer tangible benefits to the banking sector.

According to the results of this study, there are certain recommendations that can be made to facilitate the use of blockchain technology in the banking sector of Bangladesh. First, a robust and

all-encompassing regulatory framework should be formulated to govern blockchain, covering various aspects such as cybersecurity, data privacy, compliance, and operational standards, with the Bangladesh Bank's involvement as the central bank. Clear regulations would also help mitigate the uncertainty for financial institutions and spur more investment in blockchain solutions. Second, banks need to prioritize incorporating blockchain where it can offer tangible benefits, including cross-border payments, trade finance, remittance management, interbank settlements, digital identity verification, and fraud prevention. Banking institutions should focus on use cases that benefit customers, are efficient, transparent, secure, and not only a technological solution.

Moreover, banks should focus on technological interoperability and create blockchain solutions that can be compatible with the core banking system and digital platforms. The implementation of projects in phases – starting with pilot projects and limited applications can ease problems with integration and financial risks. Likewise, organizational readiness is essential for successful blockchain adoption, so banking organizations should allocate resources to employee training and capacity building initiatives to build their technical expertise on blockchain, distributed ledger technology (DLT), smart contracts, and cybersecurity. Moreover, there should be an improvement in cooperation between the commercial banks, Bangladesh Bank, fintech companies, technology providers and academic institutions to create innovative blockchain ecosystems and knowledge sharing platforms. Lastly, further studies are encouraged to examine the real-life blockchain implementation results in the banking sector of Bangladesh considering other factors like regulatory support, organizational preparedness, cost, cybersecurity risks and customer trust to get a holistic picture of sustainable blockchain adoption in the Bangladesh banking sector.

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