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Drivers and Barriers to Blockchain Adoption in Pakistan

Nosheen[1], Asma Basit[2], Farah Waheed[3]

1. Assistant Professor, Department of Management Sciences, NUML, Islamabad, Pakistan.
2. Associate Professor, Department of Marketing and Business, Bahria University, Islamabad, Pakistan.
3. Senior Assistant Professor, Department of Economics, Bahria University, Islamabad, Pakistan.

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Corresponding Author:
Nosheen
Email: dr.nosheen@numl.edu.pk

Abstract: *The purpose of this research is to identify the elements that impact social media users' views about Blockchain adoption, as well as to analyze the interactions between these variables to provide a complete picture of Blockchain adoption in developing countries. This study uses the Technology Acceptance Model (TAM). The data for this study was gathered and analyzed from personnel in diverse sectors of banking, health, supply chain, and education in Pakistan. This research used the quantitative approach which enabled in depth investigation of variables and their impact on Blockchain Adoption. Smart PLS software is used to analyses the data using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method. By focusing on Blockchain Adoption, this study adds to the corpus of information on technology adoption in business operations and enhances the trust of users in technology.*

Introduction

A blockchain is allotted database this is shared most of the nodes of a laptop community. As a database, a blockchain stores statistics electronically in digital layout. Blockchains are wonderful for his or her vital function in cryptocurrency structures, along with Bitcoin, retaining a relaxed and decentralized document of transactions. The innovation with a blockchain is that it guarantees the fidelity and safety of a report of facts and generates belief without the want for a trusted 3rd celebration. Blockchain has been used in a diffusion of applications in recent years. Even though Blockchain is a rather younger era, it is already altering the digital world by way of supplying a fresh point of view on enterprise manner security, resilience, and performance. A blockchain is a decentralized ledger that isn't managed by means of central authority and is maintained through a huge variety of consumer organizations. The phrase Blockchain refers to the process of enclosing new transactions in a records block using encryption strategies and including them to the cease of an present Blockchain that carries all prior transactions (Nair et al., 2020). This era varies from preferred eventualities wherein a single man or woman is in rate of all statistics and maintains song of it (Chowdhury et al., 2018). This generation has modified the way delivery chains are managed, posing new limitations as well as new possibilities in terms of value, performance, and security. The main difference in a normal database and a blockchain

is how the data will be structured. A blockchain collects information composed in corporations, referred to as blocks that preserve the data. Blocks have a storage volume and, while crowded, are closed and connected to the previously crowded block, creating a order of facts referred to as the blockchain. All new statistics that trail that freshly additional block is accumulated right into a newly formed block so one can then additionally be introduced to the chain filled. A database usually systems its statistics into tables, while a blockchain, like its name suggests, systems its facts into blocks that are strung collectively. These facts shape integrally makes an irreparable timeline of records while applied in a decentralized nature. When a block is complete, it is set in nugget and turns into part this timeline. In each block inside the chain is given an actual time stamp while it's far introduced to the chain.

The goal of blockchain is to allow for the recording and distribution of virtual records that can no longer be changed. A blockchain serves as the inspiration for immutable ledgers, or transaction statistics that cannot be changed, deleted, or destroyed. As a result, blockchains are also known as a distributed ledger technology (DLT). Based entirely on paintings by Stuart Haber, W. Scott Stornetta, and Dave Bayer, the blockchain was popularized in 2008 from someone (or a party of people) going named Satoshi Nakamoto to run the community operation log for the Cryptocurrency bitcoin. Satoshi Nakamoto accurate individuality is ambiguous at time. Bitcoin became the first computer-generated income to overwhelm the double-spending problem without the use of a trusted authority or critical server when the blockchain was implemented. The bitcoin concept has sparked the development of alternative software and blockchains that are commonly used by cryptocurrencies. The blockchain is seen as a form of pricing control system.

The first foremost blockchain innovation was bitcoin, a virtual forex experiment. The second invention was known as blockchain, which was essentially the understanding that the underlying technology that powered bitcoin could be isolated from the exchange and used for any other type of interorganizational collaboration. The Third innovation was referred to as the “clever settlement,” embodied in a second era blockchain gadget referred to as Ethereum, constructed slight digital software at once blockchain allowed economic contraptions, like loans or bonds, to be represented, in preference to best the cash-like tokens of the bitcoin. The fourth most important innovation, the present-day slicing fringe of blockchain thinking, is referred to as “proof of stake.” Current technology blockchains are secured via “evidence of work,” in which the organization with the biggest total computing strength makes the selections. These companies are known as “miners” and perform big statistics facilities to offer this security, in change for cryptocurrency payments. The new structures eliminate these information facilities, replacing them with complicated financial gadgets, for a similar or even higher degree of safety. Proof-of-stake structures are predicted to move live later this year.

The fifth essential innovation on the horizon is mentioned as blockchain scaling. Right now, within the blockchain international, every laptop within the community methods each transaction. this is often slow. A scaled blockchain accelerates the system, without sacrificing security, by way of identifying what percentage computer systems are vital to validate each transaction and dividing up the work successfully. To manage this without compromising the mythical safety and robustness of blockchain may be a tough hassle, but not an intractable one. A scaled blockchain is predicted to be rapid sufficient to energy internet of things and cross head-to-head with the first charge middlemen (VISA and SWIFT) of the banking world.

Blockchain generation has been accompanied via a variety of buzz, which has aroused the interest of many company executives, but it has additionally raised concerns about blockchain troubles and dangers. The loss of Blockchain adoption is a trouble for ecosystems that depend on significant adoption

to feature nicely. Track-and-hint capabilities in supply chains could necessitate not simply an organization's adoption of a blockchain community, but additionally the ones of its providers. Despite this, in keeping with APQC, simply 29% of firms are experimenting with blockchain or have absolutely implemented it. The efficacy and scalability of blockchains could be confined till they are broadly used. For many future years, blockchain can be a crucial and pressing problem in logistics (Beck, R., Czepluch 2016). Because new regulations adopted by using administrators frequently result in the introduction of new feelings, attitudes, needs, and expectancies, transactions in Blockchain are still applicable, prompting endured inquiry and investigation of the issue (Wressnegger, C.; Freeman, 2017). In logistics, blockchain assists in the guarantee and safety of financial transactions (Upadhyaya, R.; Jain, 2016). The loss of confidence amongst blockchain customers is the largest roadblock to mainstream adoption. This hassle has two aspects: firms may not trust the era's protection, and they'll now not agree with different individuals in a blockchain community. The overall goal of this research is to perform a critical analysis of the link between user ease of use, trust, on technology and his/her adoption intention.

Literature Review

Blockchain may be seen of as a well-organized, gradual, solid, and digital block of cryptography connected facts (Zheng et al., 2018). Blockchain can be conceptualized as a structured, robust, immutable digital ledger comprising cryptographically linked blocks of data. Its primary distinction from other digital technologies resides in its distributed architecture, which facilitates the global transfer of cryptocurrencies without reliance on a central server (P 2 P system). Blockchain's design enables the global transmission of all cryptocurrencies without the use of a vital server. Blockchain has the potential to be beneficial in a variety of areas, including planned, organizational, financial, informational, and technical (olnes et al., 2017). Anonymity, immutability, transparency, and quick transactions are among the advantages that blockchain offers to its users (Abubakar & Al-zyoud, 2021; Hamid, et al., 2023) because the installed data is immutable (Panisi, 2017). Additionally, Blockchain offers cost reductions, enhanced record-keeping, and secure technological platforms (Puthal et al., 2018; Andoni et al., 2019). Irrespective of the sector in which it is deployed, blockchain enables substantial expense mitigation (Casino et al., 2019). Furthermore, the devolved shape lets in removing intermediaries allowing the actors to have interaction extra speedy and extra efficiently. Additionally, its decentralized structure eliminates intermediaries, thereby enabling participants to interact more swiftly and efficiently.

Among its key advantages are user anonymity, data immutability, transparency, and expedited transactions; the permanence of stored data further underscores this immutability. Moreover, blockchain delivers cost reductions, superior record-keeping, and secure technological platforms. However, despite these advantages, blockchain faces significant counterarguments, particularly regarding scalability, energy consumption, and adoption barriers in developing economies like Pakistan. Current proof-of-work mechanisms require substantial computational power, leading to high energy use and environmental concerns, while transaction speeds remain slow as every network node processes each transaction. In supply chains, infrastructure challenges such as poor logistics support and limited digital maturity hinder widespread implementation, with only 29% of firms experimenting or fully adopting it. Moreover, trust deficits—both in technology security and network participants—pose the largest roadblock to mainstream use, especially amid regulatory uncertainties.

The drivers of blockchain technology in Pakistan are multifaceted, reflecting the country's unique economic and social landscape. Key factors include the need for enhanced remittance channels, improved supply chain efficiency, transparent tax systems, and effective land administration.

Cryptocurrency and Remittances

The remittance landscape in Pakistan is currently navigating a "remittance paradox," where official inflows have experienced a sharp decline despite sustained employment rates among the migrant workforce (Rehman et al., 2025). This gap has been increasingly filled by an informal digital economy facilitated by cryptocurrency. Recent empirical benchmarks indicate that peer-to-peer (P2P) cryptocurrency networks now channel an estimated $2.1 to 2.5$ billion annually into Pakistan, positioning it as one of the nation's largest unregulated transfer corridors (Rehman et al., 2025).

This phenomenon represents the emergence of "Digital Hundi 2.0," a technological evolution of the traditional informal *hundi* or *hawala* system. Unlike traditional methods, this digital version utilizes blockchain infrastructure—primarily through the flow of stablecoins like Tether—to bypass conventional banking intermediaries (Muhammad, 2026; Rehman et al., 2025). Several key drivers underpin this shift:

- *Currency Depreciation*: The volatility and depreciation of the Pakistani Rupee act as a primary driver ($\beta = 1.225, p < 0.05$), leading users to prefer digital assets as a hedge against inflation and currency devaluation (Bibi, 2025; Rehman et al., 2025).
- *Economic Incentives:* The P2P rate premium ($\beta = 0.087, p < 0.01$) offers better exchange rates than official banking channels, providing a direct financial incentive for both senders and recipients (Rehman et al., 2025).
- *Institutional Trust Deficit*: Low trust in formal banking systems, often cited as a significant behavioral driver, encourages the adoption of decentralized alternatives that offer perceived transparency and security (Mansoor et al., 2023; Rehman et al., 2025).

While the State Bank of Pakistan maintains a cautious regulatory stance due to concerns over money laundering and volatility, the potential for blockchain-based remittance services to reduce settlement times and transaction costs remains substantial (Bibi, 2025; Christodoulou et al., 2024). Research suggests that integrating blockchain into the formal banking sector could act as a positive moderator, potentially recapturing these "invisible billions" into the formal economy if a risk-proportional licensing framework is established (S. U. Rehman et al., 2023; A. ur Rehman et al., 2025). Such a transition could enhance financial inclusion and provide a more stable digital infrastructure for the nation's economic outlook (Rehman & Khalil, 2024).

Supply Chain Efficiency

The adoption of blockchain in Pakistan's supply chain sector is primarily motivated by the need for enhanced traceability and transparency in an environment often characterized by fragmented data flows (Huzaifa, 2024; Tasnim et al., 2023). In the manufacturing and logistics sectors, blockchain integration has demonstrated significant potential to reduce operational delays through increased automation and real-time tracking of goods (Huzaifa, 2024).

Empirical evidence involving supply chain professionals in Pakistan highlights that facilitating conditions and technology readiness are the strongest predictors of organizational implementation (Khalil & Ahmed, 2024). While developing economies like Pakistan face infrastructure challenges—such as poor logistics support and limited digital maturity—blockchain's decentralized nature offers a mechanism to mitigate risks of fraud and error that are prevalent in traditional systems (Huzaifa, 2024; Tasnim et al., 2023). For Pakistani firms, the shift toward blockchain represents a move from reactive to proactive supply chain management, where smart contracts can automate cross-border settlements and ensure compliance without manual intervention (Oriekhoe et al., 2024).

Taxation and Governance

The governance sector in Pakistan, particularly tax administration, faces systemic challenges including a

low tax-to-GDP ratio and pervasive tax evasion (Rasheed et al., 2024). The proposed *PakTaxChain* initiative aims to address these issues by creating a "self-checking" tax ecosystem that combines blockchain with artificial intelligence (Goyal, 2026). This framework utilizes a permissioned blockchain (such as Corda) to ensure privacy while providing an immutable, auditable record for the Federal Board of Revenue (Naveed, 2025; Rasheed et al., 2024).

Feasibility studies on blockchain-based Value Added Tax systems in Pakistan indicate that such systems can explain up to 50% of the variance in user acceptance, driven largely by their economic viability and potential for fraud reduction (Naveed, 2025). By digitizing tax records on a distributed ledger, the government can eliminate the "register-based" manual entry system, which is highly susceptible to tampering and loss (Vistro et al., 2021). This transition not only secures public funds but also rebuilds public trust by ensuring transparency in government spending and revenue collection (Akintobi et al., 2023; Rasheed et al., 2024).

Land Administration

Land administration in Pakistan has historically been burdened by the "patwari" culture, antiquated paper systems, and frequent property disputes (Ahmad, 2024; Khalid et al., 2022). Property records are particularly vulnerable to falsification, often leading to multiple parties claiming ownership of the same asset (Aquib et al., 2020; Khalid et al., 2022).

Recent research proposes a Smart Contract approach to property transfer, which would decentralize land records and make them immutable (Zaman et al., 2022). While the Punjab government began digitizing land registry in 2017, the integration of Distributed Ledger Technology is seen as the final step to eliminate "land mafias" and ensure the enforcement of property rights (Afzal, 2019). A blockchain-based framework would provide a secure, chronological history of ownership, reducing the burden on the judiciary and enhancing investor confidence in the real estate sector (Afzal, 2019; Aquib et al., 2020).

The Technological, Organizational, and Environmental Framework

While TAM and UTAUT focus on individual behavior, the TOE framework is the primary lens for organizational and institutional adoption (Hussain et al., 2024; Tasnim et al., 2023). This model is particularly relevant for emerging financial markets where the decentralized and immutable nature of blockchain offers a potential solution to structural issues such as fraud and inefficiency (Hussain et al., 2024). The TOE framework has been widely applied to assess blockchain adoption in various organizational contexts, including supply chains and small and medium-sized enterprises (Chittipaka et al., 2022). Technological factors include the inherent security and transparency of the ledger, whereas, organisational factors such as organizational readiness and top management support are critical (Hussain et al., 2024).rganizational factors encompass firm size, managerial support, and resource availability, and environmental factors relate to competitive pressure, regulatory support, and market uncertainty (Albrecht et al., 2018; Lu et al., 2024). Environmental factors are the unique characteristics of developing countries—including infrastructure gaps and regulatory uncertainty—act as primary environmental barriers (Dondjio & Kazamias, 2025; Saif et al., 2022). In contrast, factors such as government policy, legal frameworks, and socio-cultural norms can significantly impact the successful integration of blockchain solutions within a national economic landscape (Lustenberger et al., 2021; Saed et al., 2025).

Institutional Trust and Development Frameworks

A significant theoretical contribution in the literature of the "Global South" is the role of blockchain as a mechanism to bypass institutional voids (Cunha et al., 2021). In economies characterized by a lack of

transparency and high transaction costs, blockchain is theorized as a "quantum leap" technology that allows less developed nations to bypass traditional developmental lags (Cunha et al., 2021). Many studies have taken trust as a mediator which is a multifaceted construct in these theories; it is both an enabler (trust in the technology) and a driver (distrust in existing corrupt or inefficient manual systems) (Hughes et al., 2019; Rashideh et al., 2025). However, cultural and religious factors are theorized to impact the acceptance of cryptocurrencies and blockchain-based assets (Hussain et al., 2023).

In summary, the literature indicates that a holistic approach—integrating TAM's focus on perceived ease and risk, UTAUT's emphasis on social and facilitating drivers, and TOE's analysis of the regulatory environment—is necessary to understand the complex trajectory of blockchain adoption in developing economies (Hussain et al., 2024; Tasnim et al., 2023).

Theoretical Frameworks employed to study Blockchain Technology Adoption

The theoretical framework for blockchain adoption in developing economies, specifically in the context of emerging markets like Pakistan, is primarily constructed through the integration of individual-level acceptance models and organizational-level environmental theories (Hubenova et al., 2024; Sagheer et al., 2022; Zhang et al., 2023). This section synthesizes the dominant theoretical lenses previously used to analyze this digital transition.

The Technology Acceptance Model

The Technology Acceptance Model remains a foundational theoretical lens, focusing on the individual's internal belief system. In the context of Pakistan, which is considered an emerging market for blockchain technology, adoption is currently at an "infant stage" among the general citizenry (Sagheer et al., 2022). Recent research applying TAM in Pakistan has confirmed that perceived ease of use, perceived usefulness, and perceived risk are significant determinants of behavioral intention (Sagheer et al., 2022). Furthermore, the relationship between technology awareness and the intention to adopt is moderated by government support, suggesting that individual acceptance is deeply tied to the perceived legitimacy of the technology within the national regulatory framework (Sagheer et al., 2022).

Theoretical Framing of the Study using Unified Theory of Acceptance and Use of Technology (UTAUT)

To capture a more comprehensive set of predictors, researchers frequently extend the UTAUT model. Systematic reviews of blockchain adoption in developing economies identify UTAUT, alongside TAM and Task-Technology Fit, as the most popular frameworks (Al-Sulami et al., 2024). In empirical studies targeting Pakistani operations and supply chain professionals, researchers have extended the UTAUT model to include technology readiness, technology affinity, and trust (Zhang et al., 2023).

Theoretical Framework

The proposed study model is built upon the characteristics of the Technology Acceptance Model, incorporating perceived benefits that are categorized into perceived usefulness and perceived ease of use. As a result, the model includes four latent factors to examine their impact on the willingness to use blockchain. This expanded TAM integrates external variables—such as exceptional customer service, cost reduction, efficiency, and security aspects—to provide a more comprehensive understanding of adoption intentions (Efendioğlu et al., 2023). Behavioral intention is, in turn, a critical determinant of actual adoption of new technologies like blockchain (Sagheer et al., 2022). This aligns with TAM's foundational premise, where behavioral intention is directly influenced by the interplay between perceived usefulness and perceived ease of use (Altamimi et al., 2024; Sciarelli et al., 2021) The framework further posits that individuals' attitudes toward adopting blockchain technology are primarily shaped by their perceptions of its utility and the effort required to utilize it (Hubenova et al., 2024; Kwon et al., 2020; Saha et al., 2024), perceived usefulness refers to the degree to which an

individual thinks that using a certain technology will enhance the job performance, while perceived ease of use denotes the belief that utilizing the technology will be free of effort (Hoang et al., 2023). Consequently, a technology perceived as both beneficial and straightforward to operate is more likely to elicit positive attitudes and higher adoption rates (Shahzad et al., 2024).

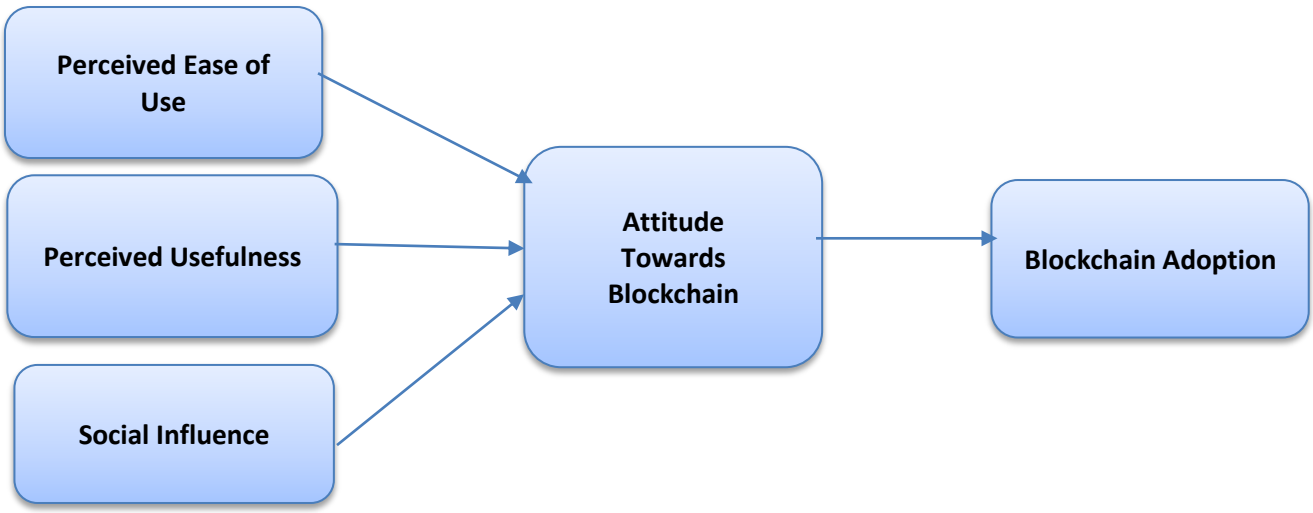

Figure 1 Theoretical Framework

The study model built on TAM characteristics combined with Perceived benefits, which were then categorized into perceived usefulness and perceived ease of use. As result, model includes four latent factors to see if they have a greater impact on the willingness to use Blockchain.

Perceived Ease of Use

Davis (1985) hooked up Perceived Ease of Use (PEU) and Perceived Utility (PU) as the two key cognitive reactions that are expecting ATT in TAM. PEU is defined as "the degree to which a person feels that adopting a given system could be free of effort" (Davis, 1989, p. 26). Users are greater willing to just accept technology that is easy to apply and calls for little attempt to apprehend (Tan and ooi, 2018). PEU has a beneficial effect on ATT's adoption of Blockchain, according to Nuryyev et al. (2020). According to proposed hypothesis:

H1: *PEOU has a positive influence on Attitude.*

Perceived Usefulness

According to TAM, Perceived Usefulness (PU) has a right of way effect on BT ((Davis et al., 1989)). The diploma on that the individual believes that the usage of selected machine might progress his or her task presentation is referred to as PU ((Davis et al., 1989), p. 26). When individuals see gadget as valuable, that accomplice it with wonderful use-performance, and they may be rewarded for doing so via receiving benefits (Pfeffer, 1982; Schein, 1980; Vroom, 1964). Several researchers have observed that Perceived Usefulness impacts the desire to embrace Block chain era (Folkinshteyn et al., 2016; Knauer et al., 2019).

According to motivation principle if an individual believes that an emotion is effective in accomplishing desired effects, he/she is greater inclined to adopt new era (Liao et al., 2007). Several researchers have located that Perceived Usefulness is a robust predictor of the ATT's willingness to undertake Block

chain generation (Kamble et al., 2018; Nuryyev et al., 2020). According to proposed hypothesis:

H2: *PU has a positive influence on Attitude.*

Social influence

Social influence impacts the utilization of digital gadgets in different cultures in various ways. Consumers are much more likely to utilize crypto currencies if a huge range of humans suggest them, (i.e. own family, friends, household or media influencers). Previous researchers have observed that SI has a favourable effect at the use of financial structures inclusive of cell banking (Savi c and Peterac, 2019) and mobile price (Farah et al., 2018; Kishore and Sequeira, 2016). The crowdfunding research confirms that SI has a significant effect on users' decisions to hire the respective technology (Moon & Hwang, 2018; Kim et al. 2018). However, studies on bitcoin popularity have yielded mixed consequences: SI is not relevant in explaining the preference to include cryptocurrencies (Arias-oliva et al. 2019). Given that one of the motives for cryptocurrency's growing recognition is its huge network.

H3: *Social Influence has a positive influence on Attitude*

Attitude

When individuals feel that their data is secure during different digital transactions, they perceive the digital system as beneficial. The high-quality affiliation between PEOU, PU, and SI, in relation to blockchain adoption are impacted by the individual's attitude.

H4: *Attitude mediates the relationship between Perceived Usefulness, Perceived Ease of Use, social influence and blockchain adoption.*

Methodology

The objective of this research is to analyze the impact of Perceived Usefulness, Perceived ease of use, social influence, and attitude on Blockchain Adoption. The study is descriptive in nature and used the survey method. Online questionnaires were used for collecting information from the survey; therefore, this is a quantitative study. The numeric data was used to quantify the results and generalize them from the sample to the population of interest.

Population and Sample Size

In this study, the researcher has specifically targeted the Employees of Banks, Supply-chain, Health, and Education Sector. The sample size is the portion of population selected for the survey as respondents. The recommended sample size according to The Cochran formula of unknown population.

$n_o = Z^2 pq / e^2$

Whereas, e= margin of error

p= estimated population response

q= p-1

Z= is calculated using Z table

Taking 95% as confidence interval value of Z from the table is 1.96, and 5% of margin error.

$= (1.96)^2 (0.85)\ (0.15) / (0.05)^2$

$= 196$

Sample size = 196

The sample size is determined according to the nature of study. This study aimed a sample size of 196 Employees of Banks, Supply-chain, Health sector, Education Sector. The questionnaire was distributed electronically among the sectors of Rawalpindi/Islamabad. Questionnaire was sent to 250 employees and only 2o6 Employees responded and only 196 were selected, and the rest were discarded as they were filled by non-relevant sector people.

Sampling Approach

There are two sampling approaches, one is “probability sampling” and other one is “non- probability sampling”. In Probability sampling, random sampling is used, and every member of the targeted population has a chance to be included in the sample. In non-probability sampling, the sample is non-random and is based on the expertise of researchers or convenience sampling. In this research, the target population which are employees of Banks, Supply-chain, Health, and Education Sector; is very large in size and we do not have any data or list available that can describe the number of employees doing job. That is why Simple random sampling technique under probability sampling is used.

Data Collection and Instrumentation

The primary data was collected through an online questionnaire made on “Google Forms” as it is convenient way of making a questionnaire and sharing with others.

Measurement of Variables

The primary information for research collected through an online questionnaire was based on “5-point Likert Scale” where “1=Strongly Agree, 2= Agree, 3=Neutral, 4= Disagree, 5= Strongly Disagree. “Section B” contained the demographic details of respondents. The responses were kept confidential. The demographic variables included Gender, Age, Qualification, Work Experience. Perceived Ease of Use, Perceived Usefulness of Blockchain Technology Adoption, and Social Influence measured using 4 items (each variable), adapted from (Davis et al., 1989) adapted by Godoe and Johansen (2012), whereas, fifth variable of Attitude was measured using 3 items (Appendix A).

Data Analysis Techniques

As this research uses questionnaire with multiple items as discussed above, for the purpose of collecting primary data, it was important to check the reliability of questions. The best measure of checking the reliability of items used for variables is Cronbach’s Alpha. The interpretation of Cronbach’s Alpha is given in Table.

Table 1. Items to measure Cronbach’s Alpha

Variables	No of items	Cronbach’s Alpha	Composite reliability
PEOU	4	0.821	0.875
PU	4	0.874	0.879
SI	4	0.798	0.861
ATT	4	0.843	0.893
BA	3	0.924	0.943

The data was evaluated in this study utilizing the "Partial lease square structural equation modelling (PLS-SEM)" method. The complexity of the model to be tested, the prediction and explanation of variation among the target variables, and the exploratory nature of the model as new variables are incorporated into the existing theory are all reasons to use this method. PLS-SEM is a two-stage data analysis technique. The first phase is the measurement model, which is used to assess the data's validity and dependability. The second step is structural model, which is used for testing of hypothesis and to check if the model is fit or not.

The expressive information was examined through “Statistical Package for the Social Sciences (SPSS) version 25” and “Partial Least Square Structural Equation Modelling (PLS-SEM)” was done with “SmartPLS software version 3.3.3”.

Data Analysis and Findings

Demographic Profile of the Respondents

The data is analyzed was based on 196 respondents. The demographic profiling show that 131 respondents were female and 54 were Male 142. 8o respondents belonged to the age group of 25-30 years and 53 respondents belonged to age group of 30-35; only 6.1% of the respondents were above the age of 45-50, (100) respondents have 2-4 years of experience and second most respondents have 4-6 year of experience located in Rawalpindi/Islamabad The detailed demographic profile is shown in the table below. Table 7 shows the age-related statistics. Many respondents (93%) were between age group of 40 and 45. The major participants at the chosen from banks, health, education & supply chain sector staff.

Table 2. Demographic Profile of Respondents

Category	Frequency	Percent
Gender		
Male	142	72.40%
Female	54	27.60%
Total	196	100.00%
Work Experience		
1-2 years	7	3.60%
2-4 years	100	51.00%
4-6 years	45	23.00%
6-8 years	16	8.20%
8-10 years	28	14.30%
Total	196	100.00%
Age		
25-30	80	40.80%
30-35	53	27.00%
35-40	31	15.80%
40-45	20	10.20%
45-50	12	6.10%
Total	**196**	**100.00%**

Measurement Model

The measurement model evaluates the constructs by showing how they have been assessed through the variables. The study used 5 main variables; 1) Perceived ease of use (PEU), 2) Perceived Usefulness (PU), 3) social influence (SI), 4) attitude (ATT), 5) Blockchain Adoption (BA) measured through 19 items.

Table 3. Reliability and Average Variance Extracted

Variables	No of items	AVE
PEOU	4	0.639
PU	4	0.652
SI	4	0.6o9
ATT	4	0.679
BA	3	0.768

Discriminant Validity (HTMT)

This measure shows that to what extent the variables are different from each other. SmartPLS shows

discriminant validity in three different criteria. When the square root of the construct's AVE exceeds the inter-item correlation, a measurement model has discriminating validity. It demonstrates that a construct's related items have greater variation than other things. First criteria is "Fornell and Lacker" and second is "Cross Loading" but they are not considered reliable. The third criteria "Hetrotrait-Monotrait ratio (HTMT)" is considered reliable for discriminant validity. "HTMT is the mean of all correlations of the indicators measuring different constructs, relative to the geometric mean of the average correlations of the indicators measuring the same construct". The values of this measure should be below 0.9o which means the variables are different from each other.

Table 4. Discriminant Validity/ Hetrotrait-Monotrait Ratio (HTMT)

	ATT	BA	PEOU	PU	SI
ATT	1				
BA	0.468	1			
PEOU	0.557	0.707	1		
PU	0.194	0.585	0.6	1	
SI	0.335	0.624	0.584	0.806	**1**

Collinearity Statistics (VIF)

Ordinary Least Square (OLS) regression is used in SMART PLS to test the relationship of the variables and to assess the collinearity. Variance Inflation Factor (VIF) is used to check multicollinearity where the values >3.3 show high collinearity. In the model adopted for study all the values are below the threshold hence, no collinearity was found among the variables of the study.

Table 5. Collinearity Assessments

	ATT	BA	PEOU	PU	SI
ATT		1.000			
BA					
PEOU	1.506				
PU	1.986				
SI	1.921				

R Square

R-square is used to know how much the variables are reliable. If the value of R-square is low its mean the certain variables are affecting the dependent variables but not being accounted.

Table 6. R -Square

	R-square	R square Adjusted
ATT	0.281	0.258
BA	0.195	0.186

F Square

F-Square depicts the change in R-Square after an exogenic variable is removed from the model. F-square is effect size (>=0.02 is small; >= 0.15 is medium;>= 0.35 is large)

Table 7. F- Square

ATT	BA	PEOU	PU	SI

ATT		0.242
BA		
PEOU	0.263	
PU	0.025	
SI	0.017	

Table 8. Hypothesis

	original Sample	Sample Mean	Standard Deviation	T-statistics	p-value
ATT->BA	0.441	0.455	0.098	4.509	0.000
PEOU->ATT	0.533	0.522	0.109	4.882	0.000
PU->ATT	0.188	0.132	0.173	1.088	0.138
SI->ATT	0.152	0.128	0.137	1.112	0.133

The summary model explains the values of all the variables which are comes after the results of processing the data.

Summary of all Hypothesis

This tables consist of all hypothesis results either the result of the hypothesis is supported or not.

Table 9. Summary of Hypothesis

Hypothesis	Significance	R2	beta	Decision
ATT->BA	0.000	0.281	0.098	Supported
PEOU->ATT	0.000	0.195	0.109	Supported
PU->ATT	0.138		0.173	Not Supported
SI->ATT	0.133		0.137	Not Supported

H1: The first hypothesis Perceived Ease of Use positively effects the individual's behavior and Attitudes of the people, the correlation between Perceived Ease of Use and Attitude is "0.522" with a significance level of "0.000, which shows a strong relationship and support our hypothesis.

H2: The second hypothesis Perceived Usefulness effects individuals / people Attitude, because correlation between Perceived Usefulness and Attitude is "0.132" with a significance level of "0.138" shows a week relationship and not support our hypothesis.

H3: The third hypothesis because Social Influence effects individuals / people Attitude, the correlation between Social Influence and Attitude is "0.128" with a significance level of "0.133" which shows a week relationship and not support our hypothesis.

H4: The Forth hypothesis Perceived Ease of Use positively effects the Attitude of individuals, and Perceived Usefulness and Social Influence have affected the people Attitude the correlation between Attitude and Blockchain Adoption is "0.455" with a significance level of "0.000", which shows a strong relationship and support our hypothesis

Discussion on Study Findings

This study aimed to analyze the impact of independent variables "Perceived Ease of Use, Perceived Usefulness, Social Influence, and Attitude" on the dependent variable which was "Blockchain Adoption". The target population for this research was Employees of Banks, Supply-chain, Health, and Education

Sector. Survey method aimed at collecting the data through questionnaires and to determine the validity of the model, empirical data was analyzed using SMART PLS path modelling. The findings of the study supported the first hypothesis Perceived Ease of Use positively effects the individuals behavior and Attitudes of the people, the correlation between Perceived Ease of Use and Attitude is "0.522" with a significance level of "0.000" which shows a strong significant relationship between both since it is near "1". And the value of r-square is "0.281. Which proves that we have a strong significant relationship, hence, hypothesis was accepted. Second hypothesis Perceived Usefulness effects individuals / people Attitude is not supported, because correlation between Perceived Usefulnessand Attitude is "0.132" with a significance level of "0.138" which shows a week relationship between both and less than "1". And the value of r-square is "0.281. Which proves that they don't have significant relationship between Perceived Usefulness and Attitude, hene, rejecting the hypothesis.

The findings of the study does not supported the third hypothesis because Social Influence effects individuals / people Attitude, the correlation between Social Influence and Attitude is "0.128" with a significance level of "0.133" which shows a week relationship between both and less than "1".". And the value of r-square is "0.281. Which proves that they have a week relationship between Social Influence and Attitude, thereby, rejecting the hypothesis. The findings of the study supported the fourth hypothesis Perceived Ease of Use positively effects the Attitude of individuals, and Perceived Usefulnessand Social Influence have affected the people Attitude the correlation between Attitude and Blockchain Adoption is "0.455" with a significance level of "0.000" which shows a strong significant relationship between both since it is near "1". And the value of r-square is "0.195. Which proves that we have a strong significant relationship, thus, hypothesis is accepted.

Theoretical Implication

The growing literature on various aspects of Blockchain shows the importance of Blockchain adoption research in research community. Current research study advances the literature on the usage of Blockchain in banks, supply chains, or education. This study examines the relationship between PEOU, PU, and SI on ATT to understand Blockchain adoption in Pakistan. The components are developed from classic adoption theories along with TAM, and they useful resource us in determining how those buildings effect the adoption system. Blockchain adoption. The statistically tested model has a strong explanatory energy, with the unbiased additives explaining 68.5% percent of the variant in behavioral purpose (R2 = 0.195), proving to be a worthwhile contribution to the modern body of research. Second, our studies contributes to the literature on Blockchain adoption by way of placing to the check a unified model that contains TAM theoretical foundation.

Managerial Implications

The discoveries of this study are similarly fascinating for specialists. The discoveries show that PEOU significantly affects ATT, and that respondents can see the convenience of Blockchain reception when contrasted with customary advances. Moreover, our discoveries recommend that PU has no perceptible impact on individuals' perspectives. PEOU was found to impact Attitude, inferring that client think about Blockchain reception as low-exertion, and that this component will help them with benefiting from Blockchain innovation in their spaces. At long last, we found that one's disposition hugely affects blockchain reception. These discoveries show that individuals consider Blockchain to be an instrument for working on specialized effectiveness, and that it can assist them with accepting that Blockchain further develops work execution. Conversely, PU and SI minorly affect ATT while ATT significantly affects Blockchain reception. Regardless of whether Blockchain Technology works on the effectiveness of an organization's cycles, it costs cash to purchase the innovation, carry out it, and train representatives.

Thus, in the beginning phases of reception, it might lessen the impression of blockchain's capacity to diminish costs. The findings point to areas where companies should focus and where they should not their resources to improve their use of blockchain, emphasizing the essential to take advantage of some of the technology's characteristics to boost adoption.

Limitations and directions for future Research

There are certain limitations to this research. This is a cross-sectional study, and we only had a limited amount of time to do it, therefore it was limited to Rawalpindi/Islamabad. We propose that it be done at a higher level of abstraction, with more variables. First, we narrowed our attention to a certain industry. Firms' behavioral intention to use Blockchain may be influenced by the business sectors in which they operate. Similarly, our research expands the TAM model with Perceived Blockchain in Pakistani firms, including large commercial and public institutions, such as the educational, health, supply chain, and financial sectors, to increase testing and importance of the results. Blockchain is a new technology for the people who adopt it in Pakistan, it's not a standalone technology it has a high level of accuracy in the data, the most important thing about this technology is the information installed in this can be deleted but cannot be edited .and it has a beneficiary in so many things. While adopting blockchain will give reduce the cost and will give more accuracy to the work and less chance of fraud and errors and it affects the performance of employees.

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