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INVESTIGATING THE POTENTIAL OF BLOCKCHAIN TECHNOLOGY TO ENHANCE TRANSPARENCY, EFFICIENCY AND SECURITY IN CAPITAL MARKETS

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ABSTRACT
This paper explored the possibility and prospects of blockchain-based technology to increase transparency, efficiency, and security within capital market by conducting a quantitative survey cross-section across 142 professionals in capital markets. The study applied structured questionnaires and a statistical test to examine the perceptions in three main dimensions. Findings showed a high level of agreement on the transformative potential of blockchain where composite scores of efficiency (M=4.19), transparency (M=4.05), and security (M=4.04) had scores exceeding 4.0. Blockchain knowledge and organization adoption status were found to be the important variables of the positive perceptions in all dimensions by regression analysis. Yet, the most significant barrier to adoption was regulatory uncertainty (31.7%), which is in favor of the technical assessment. The results show that the problems of blockchain adoption are not so much technological but institutional and that to achieve the potential of the technology in the modernization of the capital markets infrastructure, detailed regulatory frameworks and stepwise implementation strategies are necessary.

Key words: *Blockchain technology, Capital markets, Transparency, Efficiency, Security*

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INTRODUCTION
Capital markets are the blood of the universal economy, as they help to distribute trillions of dollars in the form of capital, risk management, and economic expansion of the countries (Gupta and Arora, 2025). However, with the improvement in technology in recent decades, these markets remain based on legacy infrastructure which is defined by inefficiency, operational risks and high costs that makes them ineffective (Sanyaolu et al., 2024). Conventional clearing and settlement systems have had long-standing issues such as counterparty risk, time lag in settlement, and inefficiencies in the operations that have been in existence decades. Settlement of financial transactions especially cross-border transactions may require days or even weeks which ties up capital and expose market participants to increased credit and market risks throughout the settlement (Musayeva, et al., 2025). Among these inefficiencies, which can be captured in concrete terms are the financial services sector has to spend up to an estimated 133 billion dollars a year in clearing and settling securities post-trade In line with this was the global post-trade processing costs between 17 and 24

billion dollars a year, with an examination of the reference data, reconcilements, trade cost management and regulatory reporting (Lembhe, 2024). Besides, a small 2% worldwide failure rate would cost and lose up to $3 billion, which highlights the scale of the existing system vulnerabilities.

It is in this context of ongoing inefficiency that blockchain technology has come up as a potentially game changing concept that can dramatically change the operational framework of capital markets (Javaid, et al., 2022). Having initially been created as the base technology behind Bitcoin, blockchain is a distributed ledger system, allowing more than two parties to store and verify transactions without a central authority. The decentralization, transparency, immutability, and cryptographic security of the technology would deal with most of the underlying vulnerabilities that the financial market infrastructure would face in traditional financial markets (Kukman and Gricar, 2025). The market in the global blockchain technology is one that shows increasing confidence in the potential, with a value that is projected to reach at least 20.16 billion in 2024 and 393.42 billion by 2032, with a compound annual growth rate of 43.65 (George, et al., 2024). In the sector of financial services, namely, in the Banking, Financial Services, and Insurance sector alone, blockchain technology is projected to be in demand in 2024 by 38.7 percent, which proves that financial institutions are driving the blockchain adoption and blockchain experimentation (Lembhe, 2024). Such a steep increase in growth rate is an indicator of a radical change in the attitude of market players towards the technology-moving from the speculative interest to strategic need.

The use of blockchain in capital markets goes way beyond the digitization of the current processes; it is likely to create brand new paradigms of how the markets may work (Kan and Delina, 2025). In the primary markets, blockchain makes issuance faster, as they have common access to data and functionality to automate the processes, and in the secondary markets, they raise liquidity by fractionalizing assets and extending the trading hours by providing access to the world 24/7 (Gatla, 2022). Perhaps, most importantly, in the post-trade activities, the blockchain technology can minimize risks, allow instant settlement at the T+0 point, and simplify corporate activities with self-executable smart contracts (Sanyaolu, et al., 2024). It is estimated that with the introduction of smart contracts and automated functionality into the clearing and settlements processes, the global infrastructure would see annual cost savings of approximately $15-20 billion on the largest marketplaces such as the United States and Europe (Gupta and Arora, 2025). Industry titans have been listening to such possibilities: Larry Fink of BlackRock has opined that there will come a day when everything, stocks, bonds, etc., will be held on a single ledger and this will be a fundamental reinvention of the

financial market infrastructure (Munk, 2025). This vision is already becoming a reality in real-world use, with projects such as digital bond issues by financial institutions such as KfW and Siemens being built on blockchain, the World Bank introduced a CHF digital bond settled with wholesale central bank digital currency, and projects like Figure Technology have launched a blockchain-native marketplace that processes over 2 billion in quarterly volume (Rashid and Kausik, 2024).

The disruptive nature of blockchain in the capital market can be applied to three essential areas that constitute the basis of the efficient market functioning transparency, efficiency, and security (Frizzo-Barker, et al., 2020). In terms of transparency, the distributed and immutable ledger of blockchain makes available to all authorized participants the only source of truth, the crystal-clear access to a single source of truth, which is being challenged by data fragmentation and reconciliation difficulties in current systems (Mattila, et al., 2023). This openness goes beyond visibility to form verifiable audit trails which promote better regulatory compliance and inhibitions of fraud or manipulation possibilities. At the efficiency side, blockchain makes it possible to settle transactions almost instantly, and they could switch T+2 or T+1 settlement currently to T+0 settlement. Such acceleration liberates capital which is tied up in settlement periods, shortens the number of intermediaries needed in the transaction chains, and automates operations using smart contracts which perform specific actions upon the fulfillment of specified conditions (Kukman and Gricar, 2025). Blockchain needs to enhance security due to cryptography architecture and consensus mechanisms, which render any unauthorized changes to the records of transactions virtually impossible without detection, secure sensitive data in transactions when using advanced encryption algorithms, and distribute risk to the system across many nodes instead of keeping it centralized in databases, which is in a single point of failure (Kan and Delina, 2025).

The combined forces of technological maturity, market demand, and regulatory change have provided a hard point of adoption of blockchain in capital markets (Bai, et al., 2024). Several of the larger financial institutions have gone beyond pilot initiatives to operational projects. Regulators across major jurisdictions are creating more explicit frameworks regarding blockchain-based financial instruments (Son and Jang, 2023). Standardization work is underway to overcome interoperability issues that have impeded wider adoption. In China, the digital yuan was the largest pilot central bank digital currency in the world with the total volume of transactions amounting to $983 billion in 2024, and governments in Europe, Asia, and the Middle East initiated strategic plans to use blockchain to transform financial infrastructure (Javaid, et al., 2022). This is a worldwide trend indicating that capital markets

adoption of blockchain is not a matter of whether, but how fast and thoroughly the adoption process will be conducted.

Objectives

On the basis of a close examination of current applications and research into blockchain technology, combined with its technical characteristics, this paper aims to present:

1. an assessment of what its possible influence and its possible transformative power may mean in terms of capital markets.
2. it will also address issues of challenges posed in its implementation, regulation, and realities that surround its adoption in capital markets around the globe.

LITERATURE REVIEW

Core Principles of Blockchain

The concept of blockchain technology is a radical break in the worldwide centralized data storage systems by being a decentralized system of data management, which combines distributed ledger architecture, consensus, cryptographic security, and immutability (Guo & Yu, 2022). This distinct set of features makes it possible to generate so-called trustless environments where participants are able to perform transactions safely without the need to use centralized intermediaries. These key tenets are fundamental to evaluating the potential of blockchain that would revolutionize the capital markets infrastructure because each tenet fills structural inefficiencies within the traditional financial systems. The core of blockchain is a distributed ledger design in which copies of records of transactions are distributed amongst and synchronized across network members (Tripathi, Abdul Ahad, & Casalino, 2023). Distributed ledgers remove single points of weaknesses and allow all authorized parties to independently authenticate information unlike centralized databases under the control of one authority. Validation and updating of transactions are performed in a collectively fashion on the nodes and the methodology guarantees that no data is lost and altered. It is peer-to-peer, making it less reliant on trusted parties, and forms a common source of truth, fundamentally transforming the dynamics of operations in financial markets (Javaid, Haleem, Singh, Suman, & Khan, 2022). These mechanisms are also reliable even in the presence of malicious and unreliable actors as they resolve the Byzantine Generals Problem. Other well-known models of consensus include Proof of Work (computational effort), Proof of Stake (economic stake), and Practical Byzantine Fault Tolerance which is extensively used in permissioned systems. All mechanisms have the trade-off between security, decentralization, scalability and performance, which has an impact on the applicability of blockchain in capital

markets. (Pham, Nguyen, & Lam, 2025) The cryptography allows authorization of transactions using digital signatures with the help of the use of public-key cryptography, and cryptographic hash functions connect the links of a tamper-evident chain. (Duan, Pang, & Lin, 2023). Some of the properties of blockchain systems that come out are immutability and transparency. Verification of transactions is then possible and results in permanent and verifiable transactions enhancing record integrity and compliance with regulations. (Ibrahimy, Norta, & Normak, 2024)

Overview of Capital Markets Infrastructure

Capital markets infrastructure Capital markets infrastructure are defined as the network of institutions, systems and processes used to facilitate the issuance, trading, clearing and settlement of financial securities. It is the backbone of the contemporary financial systems as it facilitates capital allocation and provision of liquidity and risk management. (Hariyani, Hariyani, Mishra, & Sharma, 2025)There are various layers in the capital markets ecosystem. Primary markets enable the initial issue of securities to enable the government and corporations to raise capital using instruments such as equities and bonds, usually with the assistance of investment bank and underwriters. In secondary markets, the securities are traded between investors in the form of centralized exchanges, alternative trading systems and in the form of over-the-counter market. Buy-side participants are institutional investors, asset managers, pension funds, and retail investors whereas sell-side participants are broker-dealers, market makers and proprietary trading firms. (Vranakova, Babelova, & Santana, 2024)

A very important but neglected aspect of the capital markets operations is the post-trade infrastructure. After trade execution, there is the stage of clearing which includes trade booking, match, and confirmation of the transaction. (Hariyani, Hariyani, Mishra, & Sharma, 2025). Central counterparties cover counterparty risk by novating to all the sellers and all the buyers, becoming the seller of all securities to all the buyers and the buyer of all the securities to all the sellers. Settlement involves the exchange of securities in cash, normally between central securities depositories by the use of delivery-versus-payment arrangements. Fedwire Securities Service of the Federal Reserve and the Depository Trust and Clearing Corporation are institutions that are central to such processes in the United States (Zeng, Hua, Wei, Shi, & Zafar, 2023). The structure of traditional capital markets infrastructure contains a number of structural inefficiencies. The need to maintain fragmented recordkeeping with several intermediaries leads to continuous reconciliation creating high costs of operations (Agur I. ,

Bauer, Griffoli, & Tan). An increase in the settlement delays enhances liquidity requirements and counterparty risk, and cross-border transactions may encounter further legal, operational, and currency issues. Moreover, lack of real-time transparency in post-trade operations constitutes information asymmetry that prevents the effective management of risks and regulatory control. Such inefficiencies have prevailed and continue to exist to an extent because it requires path dependency and coordination costs, which is why the decentralized, transparent, and automated blockchain architecture is effectively an appealing substitute to conventional capital markets infrastructure (Kim & Rizal, 2025).

Blockchain Applications in Capital Markets

The blockchain technology has been applied in various concepts within the capital markets value chain that include primary issuance, secondary trading, and post-trade settlement. Its capability to digitize its assets, automate procedures, and facilitate near-real-time settlement of assets will place it as a potentially groundbreaking innovation. The applicability of blockchain to these phases is that it will help resolve operational inefficiencies that have been in place, but adoption will depend on the asset type, regulatory framework, and institutional bias (Sereeyatanapas & Tangsakul, 2024).

Asset tokenization and process automation helps to increase the efficiency of issuance in the primary markets using blockchain. The process of tokenization transforms the traditional securities into digital forms stored in a blockchain with ownership rights and programmable functionality embedded in smart contracts (Anwar, Khan, Kiah, & Abdullah, 2022). This strategy would enhance the mobility of collateral especially considering the gap between high volume of marketable securities and the small percentage that is actively utilized as collateral. Through the minimization of middlemen or intermediaries, blockchain decreases the length of issuance periods, costs and allows partial ownership, thus, opening up traditionally liquid assets, such as private equity, real estate and alternative investments, to a greater number of investors (Javaid, Haleem, Singh, Suman, & Khan, 2022). The tokenization of funds and securities by leading financial institutions has already been introduced, which evidences the feasibility of issuance with the use of blockchain. The applications in the secondary market are aimed toward enhanced efficiency and availability in the market. The trading platform based on blockchain technology facilitates the constant movement of assets, further settlement, and greater visibility, allowing the transactions to take place without regard to time or space limits of the traditional exchange. Security tokens can be listed on other exchanges at reduced cost, prolonged operation hour and unalterable trade history. Shared

distributed ledgers are also effective in the achievement of operational efficiency through streamlining the trade matching and boosting compliance practices like verification of knowledge on customers (Hanif, et al., 2025).

The area that could be affected most is in the post-trade operations, since the traditional clearing and settlement systems are expensive and risky (Agarwal, Wongthongtham, Khairwal, & Counting, 2023). Blockchain allows settlement (T+0), minimizing the risk of counterparty, liquidity limitations as well as extensive reconciliation. Smart contracts can also be used to automate a lifecycle event like paying dividends, giving coupons, and taking corporate decisions, which reduces the complexity of operation and the error rate (Tairu, Junior, & Akeem, 2025). The above benefits are especially high when it comes to cross-border transactions, as blockchain is capable of aligning various legal, currency, and settlement systems more easily than traditional systems. Permissioned blockchains and permission less blockchains vary in their implementation methods. Permissioned architectures are mostly preferred in institutional efforts to comply with regulatory, governance, and privacy needs, and open blockchains are more open but have scalability and compliance issues. Hybrid models are being formed based on the current controversies over the best balance between decentralization, efficiency and regulation in capital markets infrastructure (Javaid, Haleem, Singh, Suman, & Khan, 2022).

Transparency Enhancement Through Blockchain

The blockchain technology highly improves capital markets transparency by allowing immutable audit trails, real-time access to information, and verifiable records of transactions that decrease the information asymmetries that have long existed in the capital markets (Javaid, Haleem, Singh, Suman, & Khan, 2022). In contrast to conventional systems that are based on periodic reporting and fragmented databases, blockchain allows auditors and regulators to have an access to tamper-proof records at all times so that anomalies or irregularities can be found in time. Such transparency controls augment the markets visibility and at the same time provide the required confidentiality measures in permissioned access controls (Sizan, Dey, Layek, Uddin, & Huh, 2025). The role of blockchain in data integrity is impartiality. After their addition to a blockchain, it will be impossible to modify the transactions without being noticed, which guarantees that there will be proper records of their history forever. This is especially useful in capital markets where manipulation of data and unauthorized record modifications is a systemic risk. It has been indicated that a large percentage of financial leaders are worried about the accuracy of financial records, which

highlights the applicability of cryptographic protection of blockchain. Transactions are time stamped and cryptographically hashed, which is essentially changing the nature of the fraud game since it is expensive and highly detectable to manipulate the transaction (Andrew, et al., 2023).

Real-time visibility is also possible through blockchain because fragmented recordkeeping systems are substituted with a common ledger that can be viewed by all authorized parties. This unified source of truth removes latency in processing batches in the context of the old batch-processing systems and enables market participants to track transactions status, ownership transitions and settlement progress in real-time (Gulhas & Karaduman, 2025). To the regulators, the feature can aid in sustained monitoring of the market instead of retroactive monitoring, which enhances the detection of risks and reaction. The strong auditability is a logical consequence of a transparent and unalterable design of blockchain. Complete and traceable histories of transactions minimise the verification processes that are usually involved in the audit. Empirical research suggests that the use of blockchain in securities trade can save a lot of time in compliance-based processing. In addition to that, smart contracts can directly encode regulatory rules into transaction processes, which gives them a chance at continuous monitoring of compliance (Rabitti & Bassan, 2024).

Information asymmetries between market participants and investors, including the mediators and the investors themselves, are decreased by democratizing access to reliable market information, which may yield better price discovery and market fairness. Permitted blockchain schemes strike a balance between transparency and privacy demands with role-based access controls, which guarantee accountability and shield sensitive business data (Du & Shu, 2020).

Efficiency Gains From Blockchain Implementation

By increasing capital markets activities in terms of speed and efficiency of settlement, minimization of costs, automation, and leveraging fewer required intermediaries, blockchain technology has led to cumulative gains in efficiency. These benefits directly solve the long-standing bottlenecks in conventional market infrastructure wherein, multi-day settlement, manual reconciliation, and disjointed data systems impose operational friction, raise transaction costs and use up capital. The international post-trade processing on its own costs tens of billions of dollars a year, which explains the magnitude of the inefficiencies blockchain aims to address (Javaid, Haleem, Singh, Suman, & Khan, 2022). The most tangible and straightforward advantage of blockchain implementation is the settlement acceleration.

Through blockchain, settlement cycles can be minimized to nearly real-time T+0 settlement and transactions can be confirmed and recorded almost instantly, whether it is T+2 or T+1. Quick settlement reduces counterparty risk, increases capital efficiency, decreases margin requirements, and limits exposure to market risk between the execution of the trade and ultimate settlement. Should the ownership of cash and securities be registered in interoperable blockchains, delivery and payment could be finalized legally within a few seconds, a point that radically changes the use of capital (Garrido, 2023).

Cost reduction comes about as a result of the streamlining of operation and by getting rid of the redundant reconciliation processes. Conventional systems have several middlemen whose responsibility is to ensure that separate databases are kept and constantly synchronized. The architecture of blockchain is a shared ledger that offers one source of truth that is available to all authorized parties and significantly lowers verification loads and operational burdens. These efficiencies are especially high in the cross-border settlement, which may involve blockchain making coordination simpler between currencies, jurisdictions, and settlement conventions (Mahmoud & Almoghayer, 2025). Smart contracts also contribute to efficiency through automating security lifecycle events including dividend payments, coupon payment and corporate actions which minimizes human intervention and operational error. The management of collateral is enhanced through blockchain, as it allows the real-time view, automated margin calls, and optimal allocation of collateral. Although blockchain facilitates the disintermediation process where the two counterparties interact directly, in regulated markets it is unlikely that intermediaries will be completely eliminated. Rather, the middlemen will change to the more valuable governance and compliance functions. All these efficiency improvements make blockchain a potent driver of the modernization of capital markets (Noor, 2022).

Security Improvement Via Blockchain Technology

The blockchain technology can boost security in capital markets greatly by using cryptographic security, mitigating counterparty risks, avoiding fraud, and improving resiliency of the system. Primarily, traditional financial infrastructures are based in centralized databases and intermediary systems that put them at risk of cyberattacks, manipulation of data, and systems crashages. The weaknesses are directly overcome through Blockchain since the decentralized architecture spreads trust and security throughout the network (Tripathi, Abdul Ahad, & Casalino, 2023). Blockchain security is based on cryptography. With the help of public-key cryptography, it is possible to validate transactions by means of digital

signatures so that the participants do not disclose any secret keys, which provides the control of ownership and access. The cryptographic hash functions connect the transactions to an unchangeable sequence, and any attempt to modify the history is automatically noticeable. The cost of fraudulence manipulation is now economically infeasible due to the computational power of present-day hashing algorithms, which would it need a majority of the network resources to give them the ability to do so. Such cryptographic controls ensure data protection and integrity of the transactions which would otherwise be guaranteed by trusted parties (Mukherjee, Olivieri, Chaki, & CORTESI, 2025).

Counterparty risk is also minimized by blockchain by facilitating almost instant settlement using cryptographically secured delivery-versus-payment. Exposure to credit risks between trade execution and ultimate settlement is experienced by participants of the traditional settlement delays. Atomic settlement based on blockchains is such that both assets and cash transfers are made at the same time, removing the risk of default. Smart contracts also improve the automation around managing collateral including imposing a margin requirement and causing liquidation under collateral values that are below specified collateral value limits, thereby minimizing the need for human oversight (Barbalau & Allen, 2024). Blockchain transparency and immutability enhance fraud prevention. All transactions are time stamped and non-mutable audit trails are suspended that discourage manipulations. Compliance rules can be directly integrated into transaction processes through smart contracts, ensuring that it can be monitored automatically and curb the chances of misconduct. The distributed nature of blockchain enhances the resilience of systems as it eradicates the single points of failure. Nevertheless, the key to good security is good governance, good key management, and good audit of smart contracts. Even though the permissioned systems might provide a more effective form of oversight, a trade off between decentralization and the security of operations is an area of current concern in the adoption of capital markets (Abdul, 2024).

Theoretical Review

Disruptive Innovation Theory

The disruptive innovation theory presented by Christensen has become a leading concept of studying the influence of blockchain on capital markets, yet its usage is still a controversial topic. The nature of blockchain is a challenge in theory since it is the general-purpose infrastructure that may be the foundation of the sustaining and disruptive innovations rather than belonging to either of these categories (Si & Chen, 2020). Zeng et al. (2023) indicate that about one-fourth of researchers believe blockchain has disruptive potential, especially through

its potential to introduce a new level of financial transaction transparency that has the potential to radically change the balance of power. The disruptive potential of the technology in terms of removing the conventional intermediaries, and offering peer-to-peer transactions, but the sustaining nature of the technology when used by the established financial institutions to improve efficiency is evident (Lile, et al., 2025). As pointed out by George et al. (2024), blockchain has self-censored design attributes: storage cost rises exponentially with the chain, which may limit scalability. Moreover, the possibility of permission less blockchain systems is, by definition, incompatible with the current financial architecture, which implies that in case blockchain is disruptive in the real sense, it is not likely that large incumbents will succeed in the new structure by construction (Sanyaolu et al., 2024).

Network Effects Theory

The value proposition of blockchain and the process of its adoption in the capital markets can be regarded as a valuable example of how the theory of network effects can be applied (Lynberg and Deif, 2023). The practical experience proves that blockchain markets satisfy the Metcalfe Law according to which the value grows in direct proportion to the square of network users. In the specific case of Bitcoin, studies have confirmed that a 1 percent growth in working addresses is associated with 2 percent growth in market capitalization, indicating the nonlinearity of the user growth and network worth (Bakhtiar, et al., 2023). Nevertheless, blockchain network effects have opportunities and risks, which are different in comparison with the conventional platforms. It has been proposed that it takes blockchains about 650,000 active users to undergo nonlinear network effects, and only large blockchains have reached this point (Habib, et al., 2022). Beneath this level, the growth can be linear or even of negative network effect in which utility is limited due to low participation. Furthermore, network effects may be reversed within times of depreciating adoption, generating effects where a user exit causes a disproportionate loss in value that causes more user exits (Bartels & Schmitt, 2022). In the case of capital markets, such dynamics imply that effective blockchain adoption can only happen when there are critical levels of institutional participation that must be achieved within a short period of time so that they can have self-fertil growth patterns (Anwar et al., 2022).

Transaction Cost Economics and the Institutional Theory.

Institutional theory focuses on the idea that technology uptake within financial markets is so determined not only by technical efficiency but by normative pressure, mimetic behavior, and regulatory legitimacy. Studies show that isomorphic pressures are a significant factor in the

adoption of blockchains since organizations do not necessarily use blockchain for its technological benefits but to stay relevant in their field of institutions. These mimetic dynamics are exemplified by the fact that the major financial institutions up to 80 percent of the jurisdictions reviewed reported institutional digital asset initiatives specifically in the innovation-prone regulatory context. Permissioned blockchain deployment by traditional financial institutions has already been successful as it has facilitated the adoption of blockchain based on its technical benefits without necessarily compromising the existing governance framework and compliance regimes. Transaction cost economics is the complement to this view where it is possible to state that blockchain is attractive due to its potential to decrease the costs of coordination. Smart contracts save on enforcement expenses as they automatically implement pre-programmed actions, whereas distributed ledger systems save on reconciliation expenses by availing a single source of truth to all authorized parties. Nevertheless, blockchain could lead to the reduction of some of the coordination costs and an increase in the others connected with governance, dispute resolution, and adapting to changing conditions- the field where people still mediate.

Critical Perspectives

In addition to the traditional theoretical frameworks, critical academic viewpoints challenge the fact that current theories are able to sufficiently describe the implications of blockchain. According to Dowelani et al. (2023), blockchain is simply a paradigm change in moving trust that is institutionally based to an algorithmically-based model, and that new theoretical paradigms might be necessary. Kukman and Gricar (2025) also highlight the difference between the hypothetical possibilities inherent in blockchain and the difficulties of practical implementation and some see the adoption of blockchain as possibly reflecting institutional opportunism, managers might announce blockchain projects strategically to indicate innovation without necessarily making any changes. The discussion of technological determinism and social constructivism adds to the discourse in which determinists see the technical characteristics of blockchain as the sources of necessary changes (Musayeva, et al., 2025), whereas constructivists believe that the influence of blockchain relies greatly on how social actors' bargain to decide on its meaning and affixal patterns with the current systems (Ahmed, 2025). Such an integration of varied theoretical points of view offers a basis on how blockchain can be more transformative and contextually bound by its own limitations affecting its implementation in the capital markets infrastructure.

Empirical Review

Ahmed (2025) assesses the level of blockchain application within UAE banks by measuring its effect on the cost of transactions. Based on the information obtained at 17 national banks (2017-2023) and using the random forest approach, the research finds that the processing, transfer, and fraud costs are significantly reduced. In contrast to previous research that was done in perception, this study offers quantifiable results of the efficiency improvement of blockchain. Results underscore the practical utility of blockchain in promoting security, compliance and risk control, providing managers with practical knowledge and facilitating wider cross-sector research into the cost-saving uses thereof.

Haji et al. (2023) explores the financial effects of blockchain in an empirical study based on the event study approach. Using 114 observations of the U.S. firms-event (2016-2019), the analysis finds that positive abnormal returns occur in two days of the blockchain announcements, particularly when the projects focus on cost or time-saving. Smaller firms have bigger market responses, which indicates that signaling effects are relative. When the number of global observations is increased to 249, the result indicates that there are no long-term improvements in operating performance. Therefore, the shareholder value of blockchain is therefore a short-term signaling and not long-term results, hence the significance of contingent-based investment strategies.

Agarwal et al. (2023) investigated the use of blockchain in the clearing and settlement of financial markets. They employed the PRISMA methodology and the database of the Science Direct in order to systematically review literature and find themes in blockchain-based systems. Through case studies and technical insights, one can see that blockchain can help minimize inefficiencies, improve transparency, and streamline processes and that the technology has limitations to scalability and regulatory alignment. The research proposes Layer One X (L1X) as a real-world example, and shows the transformative nature of blockchain but highlights the situational and implementation issues.

Sun and Jang (2023) examined blockchain-based securities settlement in hashed timelock contracts (HTLCs). They approximate the behavior of participants and solve transaction failures due to late signatures, suggesting a premium to be paid by structurally favorable ones. This minimizes the probability of failures according to theoretical modeling and results on quantitative analysis using KRX bond settlement data indicate better results than benchmark models. Their results indicate that blockchain is capable of increasing the effectiveness of

settlement and giving regulating bodies valuable information about fintech policies without altering the current structure.

Aliyev et al. (2023) have empirically evaluated blockchain-based atomic settlements in the traditional financial markets. Simulating the settlement of securities between permission less and permissioned blockchains, they discover that permission less systems are best when it comes to the equities market and foreign exchange in the U.S. whereas the permissioned blockchains are the best in the case of corporate bonds, treasury bills, and gold. According to their estimates, they can gain efficiency in the extent of up to $17 billion in foreign exchange, as well as 12 billion every year with Nasdaq. The paper shows how blockchain can be more efficient in the market, but it will be implemented according to the nature of assets and institutional conditions.

Dowelani et al. (2023) explore the opportunities of blockchain in the clearing and settlement sector of South Africa, which is dominated by a centralized system of STRATE. Through qualitative semi-structured interviews with the identified stakeholders through purposive and snowball sampling, thematic analysis showed the high perceptions of the benefits of blockchain: faster settlement, higher automation, efficiency, transparency, auditability, and lower costs. The stakeholders focused on the removal of intermediaries and single points of failure. The paper is practically valuable, suggesting that it should be adopted in a consortium or a private network, as blockchain has a transformative ability in the monopolist financial systems.

Gaps in the Reviewed Studies

While the efficiency and cost-saving possibilities of blockchain are proven by Ahmed (2025) on UAE banks and Aliyev et al., (2023) on atomic settlements, all of them are sector-specific and short-term in scope. Agarwal et al., (2023), Sun and Jang, (2023) and Dowelani et al., (2023) focus on the securities settlement and stakeholder perception in South Africa, respectively. Nevertheless, these publications do not pay much attention to long-term effects on transparency, effectiveness, and security in capital markets. The knowledge of the long-term shareholder value, regulatory integration, and emerging market settings is limited to empirical evidence, which aids in offering a gap to be filled by thorough investigation in capital markets.

MATERIALS AND METHODS

The research design will be a quantitative and cross-sectional survey design to examine how blockchain can help improve transparency, efficiency, and security in capital markets. A quantitative method should be used due to the ability to measure perceptions and attitudes of the capital market professionals in a systematic way, resulting in the standard data, which can be analyzed objectively with statistical methods. The cross-sectional design will provide the existing views at a single time, with regards to the changing nature of the use of blockchain. The study is descriptive and correlational, as it attempts to describe the perceptions and examine the relations between organizational characteristics, professional roles, and attitudes towards the benefits of blockchain. Perceived transparency, efficiency, and improvements in security are dependent variables. Demographic and organizational aspects including professional experience, organizational scale, the level of technology adoption, and awareness of blockchain are independent variables. The variables under moderation are perceptions of regulatory environment and organizational culture to innovation. Experiments or secondary data analysis as methods of studying the topic was rejected in favor of a survey approach since blockchain adoption in capital markets is a relatively new phenomenon with limited performance data. The perception of the stakeholders is essential in forecasting the trends of adoption and surveys are also useful because they will cover a wide range of organizations and locations.

The target market will comprise capital markets practitioners directly involved in capital markets, such as trading, clearing, settlement, compliance, risk management, and the implementation of fintech. These include the employees of securities exchange, clearing houses, and brokerage companies, investment banks, FinTech's, regulators, and consultants. Participants possess at least two years of experience in the field of work in order to be informed in their responses. Non-probability sampling is used, which is a sssscombination of snowball and purposive sampling. Purposive sampling is used to guarantee that respondents can match certain criteria, whereas snowball sampling will increase coverage with the help of professional circles. The main source of finding participants in LinkedIn would be in terms of job titles, affiliations, and membership of groups. It is planned to have a sample of 120-150 respondents. It is enough in order to do multiple regression analysis having 8-10 predictors which is according to the rule of 10-15 observations per variable. The questionnaire is expected to be sent to 400-500 potential respondents since the response rate is expected to be 25-30 percent. On the one hand, non-probability sampling constrains generalizability, but

on the other hand, it guarantees knowledge and requisiteness, which is better in exploratory research.

The main one is a structured questionnaire that will be used to gauge the perceptions of a benefit of blockchain. It uses accepted scale development processes, modifying previously proven items and developing new ones when needed. The questionnaire will consist of five parts:

i. Professional and demographic data (age, experience, role, type/size of organization, location).
ii. Knowledge level (blockchain familiarity and exposure) Organizational adoption (blockchain familiarity and exposure) Information sources.
iii. Perceptions of transparency (immutable records, real-time accessibility, quality of the audit trail, less information asymmetry, regulatory oversight).
iv. Efficiency perceptions (improved speed of settlement, cost reduction, fewer intermediaries, automation of smart contracts, international processing).
v. Security perceptions (cryptographic protection, fraud prevention, reduction of counterparty risk, resiliency, data integrity).

The majority of questions are based on five-point Likert scales, which are strongly disagree, strongly agree. This scale is a compromise between variance and simplicity. Other forms are multiple choice where categorical variables come in and ranking questions where the importance of factors are involved. The questionnaire will have 35-40 questions, which need to be answered in 10-12 minutes.

Online data collection was done through a safe survey site so that anonymity and confidentiality can be ensured. The questionnaire was given to the respondents mainly using the LinkedIn platform, where capital market professionals were identified using job titles, affiliations, and group memberships. Assistance to professional associations was also sought to distribute the survey to their circles. The time frame of the collection was three weeks and the reminder messages were sent after one and two weeks on the collection period. A summary of findings was provided to the respondents as an incentive. There were quality control provisions within the process, like checking items on attention to detect inattentive responses, checking response patterns like straight-lining, checking the geographic IP addresses to make sure that the claims were in line with the professed locations. Responses that did not pass these checks or had large amounts of inconsistency were not included in the final dataset. This

methodology has been able to guarantee that the data that was obtained was credible, pertinent, and demonstrative of informed views in the capital markets sector.

The analysis of the data started with a cleaning and preparation of the raw survey data. Incomplete records with over 20 percent data gaps and those that could not complete the attention tests were dropped. Numerical coding of Likert scale responses, and the coding of categorical variables according to their statistical analysis were done accordingly. The initial calculation involved descriptive statistics to describe the characteristics and central tendencies of the respondents in reference to their perception of the potential benefits of blockchain. The frequencies, percentages, means and standard deviations gave an overview of the sample. The inferential statistical procedures were then used to deal with the research objectives. Continuous variables, including blockchain familiarity and perceived benefits, were analyzed in Pearson correlation analysis to identify the relationship among them. The significance of predictors to the perceived transparency, efficiency, and security was analyzed using multiple regression, and diagnostic tests were taken to make sure that the models have validity. Differences between groups were studied by comparative means like t-tests and ANOVA, which evaluated the differences between groups based on the organizational type, professional experience or the geographical region. Chi-square tests were used to investigate relationships between categorical variables, such as organizational size and blockchain exploration. All statistical tests were at 5 per cent level of significance and effect sizes indicated to show practical value. Data analysis was conducted with SPSS Statistics software and findings were presented in the form of tables and figures to provide clarity in presentation.

This research complied with the accepted research ethics in studies that involve human subjects. Ethical review of the research protocol was done before data collection. At the beginning of the questionnaire, informed consent was provided in which, the participants were made aware of the purpose of the study, voluntary nature of the study, and data protection measures. There were no personal identifiers gathered and data were kept safely and only aggregated results reported to provide confidentiality. The level of participation involved low risk, up to the time to fill in survey. In order to have reciprocity, interested participants were provided with a summary of findings given the contribution they made to the research.

RESULT AND DISCUSSIONS

Descriptive Statistics

Table 1: Descriptive Analysis of Socio-Demographic Characteristics

Characteristic	Category	Frequency	Percentage
Age Range	30–39 years	52	36.6
	40–49 years	48	33.8
	50–59 years	28	19.7
	18–29 years	11	7.7
	60+ years	3	2.1
Experience	Over 20 years	41	28.9
	16–20 years	32	22.5
	11–15 years	24	16.9
	6–10 years	28	19.7
	2–5 years	17	12.0
Professional Role	Technology/IT	31	21.8
	Trading/Sales	24	16.9
	Senior Management	22	15.5
	Risk Management	19	13.4
	Compliance/Regulatory	18	12.7
	Other roles	28	19.7
Organization Type	Investment Bank	33	23.2
	Fintech Company	28	19.7
	Brokerage Firm	24	16.9
	Asset Management	18	12.7
	Securities Exchange	15	10.6
	Other	24	16.9
Organization Size	Over 5,000 employees	48	33.8
	1,001–5,000	37	26.1
	251–1,000	29	20.4
	50–250	19	13.4
	Less than 50	9	6.3

Source: Author's Computation, (2026)

After data cleaning methods eliminated 18 incomplete and 3 responses that did not pass attention checks, the survey produced 142 valid responses of capital markets professionals. The demographic and professional traits of respondents are given in Table 1. The sample also displays a good professional experience where 68.3 percent of the people have a capital markets experience of more than 10 years. The types of organizations represented by the respondents were also varied but the most visible included investment banks (23.2%), fintech companies (19.7%), and brokerage firms (16.9%). The sample was well geographically represented around North America (31.7), Europe (28.2), Asia-Pacific (22.5), Middle East (11.3), and Africa (6.3).

Transparency Enhancements

Table 2: Transparency-Related Perceptions

Item	Mean	SD	Agreement (%)
Immutable record-keeping improves data integrity	4.21	0.78	81.7
Real-time data accessibility enhances visibility	4.15	0.81	79.6
Superior audit trails vs. traditional systems	4.08	0.85	76.8
Reduces information asymmetry	3.92	0.89	71.1
Improves regulatory oversight capabilities	3.98	0.87	73.2
Reduces fraud and manipulation opportunities	4.11	0.83	78.2
Balances transparency with privacy protections	3.76	0.96	64.8
Overall significant transparency potential	4.18	0.79	80.3
Composite Transparency Score	4.05	0.69	75.7

Source: Author's Computation, (2026)

The respondents were well-concurring on the possibility of blockchain in improving transparency in capital markets, with all items rating above 3.8 out of 5 point. The most rated benefit was immutable record-keeping (M=4.21, 81.7% agreement) followed by real-time data accessibility and audit trails. The lowest score was achieved in balancing transparency and privacy protection (M=3.76), which is some cause of concern. There was a high rating of overall transparency potential (M=4.18). There were substantial differences: organizations with higher transparency ratings based on blockchain adoption rated higher (M=4.19 vs. 3.78, p=.001), and Technology/IT and Compliance professionals rated higher than Trading/Sales staff. These findings indicate that familiarity with blockchain and the roles associated with data integrity and regulation positively influence more favorable perceptions of the benefits of transparency.

Efficiency Improvements

Table 3: Efficiency Improvement Perceptions

Item	Mean	SD	Agreement (%)
Reduces settlement times toward T+0	4.32	0.74	85.2
Reduces operational costs in post-trade	4.18	0.79	81.0
Reduces number of intermediaries	4.05	0.86	75.4
Smart contracts automate lifecycle events	4.24	0.77	83.1
Improves cross-border transaction efficiency	4.28	0.76	84.5
Reduces reconciliation costs	4.15	0.81	79.6
Frees up capital tied in settlement	4.06	0.84	76.1
Overall significant efficiency potential	4.26	0.75	83.8
Composite Efficiency Score	4.19	0.71	81.1

Source: Author's Computation, (2026)

The respondents gave high ratings on the efficiency potential of blockchain, with the shortest settlement time (M=4.32, 85.2) being the most favored rating, second, cross-border transaction efficiency (M=4.28), and the automation of smart contracts (M=4.24). The lowest-rated item, which is reducing intermediaries (M=4.05) was also agreed upon by 75.4% of the

respondents, indicating that operational improvements have strong support. Correlation indicated that awareness of blockchain had a positive correlation with efficiency perceptions (r=.41, p<.001), whereas more capital markets experience had a negative correlation (r= -.19, p=.024), which indicates seasoned professionals are more reserved. The chi-square results showed the difference between the organizations: brokerage companies focused on clearing and settlement (47.6%), and fintech companies focused on primary market issuance (32.1%). On the whole, the results have shown that perceptions of the efficiency benefit of blockchain are related to the familiarity and the organizational setting.

Security Enhancement in Capital Markets

Table 4: Security Enhancement Perceptions

Item	Mean	SD	Agreement (%)
Cryptographic security superior to traditional	4.14	0.82	78.9
Reduces counterparty risk	4.19	0.77	81.7
Prevents fraudulent activities	3.89	0.91	69.7
Distributed architecture improves resilience	4.08	0.84	77.5
Better data integrity than centralized systems	4.12	0.81	78.2
Protects sensitive data while maintaining transparency	3.85	0.94	67.6
Smart contracts reduce security risks	3.96	0.88	72.5
Overall significant security potential	4.11	0.80	78.9
Composite Security Score	4.04	0.73	75.6

Source: Author's Computation, (2026)

The respondents have high but a little bit reserved opinions in support of blockchain security advantage and the composite mean is 4.04 (75.6% in agreement). The most approved one was counterparty risk reduction (M=4.19, 81.7), next was cryptographic security superiority and better data integrity. Less ratings were given to fraud prevention (M=3.89) and protecting sensitive data and remaining transparent (M=3.85) which is indicative of issues over security goals and avoiding advanced fraud. The results of ANOVA indicated that there were significant differences between organizational size with larger firms (M=4.18) recording higher perception on security than their smaller counterparts (M=3.76). Uncertainty about regulations was the most mentioned adoption barrier (31.7 per cent) and security/privacy the least cited (4.9 per cent), generally reflecting favourable attitudes to the security potential of blockchain.

Correlation and Regression Analysis

Pearson correlation analysis examined relationships among the three primary benefit dimensions and between these dimensions and respondent characteristics. Table 5 presents the correlation matrix.

Table 5: Correlation Matrix of Key Variables

Variable	TP	EP	SP	BK	YE	OA
TP	1.00					
EP	0.68**	1.00				
SP	0.71**	0.65**	1.00			
BK	0.38**	0.41**	0.36**	1.00		
YE	-0.15	-0.19*	-0.12	0.08	1.00	
OA	0.42**	0.45**	0.39**	0.52**	-0.06	1.00

Source: Author's Computation, (2026): Explanatory Notes: TP is Transparency Perceptions; EP is Efficiency Perceptions; SP is Security Perception; BK is Blockchain Knowledge; YE is Years' Experience; OA is Organizational Adoption.

High positive correlations were found between the three dimensions of benefits with transparency and security having the highest positive correlation (r=.71, p<.001) then transparency and efficiency (r=.68, p<.001), and efficiency and security (r=.65, p<.001). These cross-relations indicate that perceptions regarding benefits of blockchain are uniform-respondents that have strong perceptions regarding the benefits of blockchain are likely to be having strong perceptions regarding all the other dimensions of the benefits of blockchain. Knowledge of blockchain was significantly positively correlated with all three dimensions of benefits (r=.36 to.41, all p<.001), and the same applied to organizational adoption status (r=.39 to.45, all p<.001).

Multiple regression analysis was conducted to identify predictors of perceived blockchain benefits in each dimension. Table 6 summarizes the regression results with composite scores for transparency, efficiency, and security as dependent variables, and blockchain knowledge level, years of experience, organizational size, organizational adoption status, and professional role as predictors.

Table 6: Multiple Regression Analysis Results

Predictor	Transparency β (SE)	Efficiency β (SE)	Security β (SE)
Blockchain Knowledge	0.28** (0.08)	0.31** (0.09)	0.26** (0.09)
Years Experience	-0.12 (0.07)	-0.16* (0.08)	-0.09 (0.08)
Organization Size	0.14 (0.06)	0.11 (0.07)	0.18* (0.07)
Adoption Status	0.29** (0.09)	0.32** (0.10)	0.27** (0.10)
Tech/IT Role	0.21* (0.12)	0.18 (0.13)	0.15 (0.13)
R^2	0.34	0.37	0.31
Adjusted R^2	0.32	0.35	0.28
F-statistic	13.86**	15.73**	11.94**

Source: Author's Computation, (2026):

The regression models explained significant variance in all the three dimensions of benefits transparency (34% F(5,136=13.86, p<.001), efficiency (37% F(5,136=15.73, p<.001) and security (31% F(5,136=11.94, p<.001). The level of blockchain knowledge and organizational

adoption became an important positive predictor in all three models, and organizational adoption demonstrates the most significant effects (b=.29 to.32). Experience also showed that lower efficiency perceptions were highly predicted by years of experience (b=-.16, p=.048), and higher security perceptions were highly predicted by organization size (b=.18, p=.031). Technology/IT professional role was a strong predictor of transparency perceptions only (b=.21, p=.037) but not efficiency or security perceptions.

On the question of adoption readiness (F1), 42.3% of the respondents said that their organizations were moderately to very prepared to adopt blockchain, and that 23.2% were already adopting or implementing blockchain. But 34.5% said their organizations were unprepared or partially so. In response to the question of the transformative potential of blockchain (F5), 38.7% answered that it is significant - will bring major improvements, 26.8% answered that it is revolutionary - will fundamentally transform the industry, 23.9% answered that it is moderate - will bring some benefits, and only 10.6% answered that it is minimal or uncertain. These results show that there is a significant level of confidence regarding the potential of blockchain, but transformations may be slow but gradual rather than a slam bang to most organizations.

Discussion of Findings

The results of the study indicate that there is a high level of professional agreement that blockchain can improve capital market transparency, efficiency, and security, and that its efficiency benefits are the most actively promoted ones. The means of composite scores of all three dimensions were greater than 4.0 in a 5-point scale, and this means that there will be an agreement that transcends a neutral belief to a substantive belief in the potential of blockchain to transform. Such optimism is consistent with the theoretical predictions made based on disruptive innovation theory and transaction cost economics, which propose that those in capital markets have come to realize the potential of blockchain to resolve some of the basic inefficiencies of the current infrastructure.

The especially high level of support of efficiency improvement, particularly the minimization of the settlement time and improvement of cross-border transactions, supports the empirical evidence provided by Aliyev et al. (2023) and Ahmed (2025) about cost reduction and the streamlining of operations. The strong popularity of T+0 settlement capability is indicative of the industry acknowledgment of the high capital and risk management advantages that would accrue out of near-instant settlement. Nevertheless, the correlation between the years of experience and the efficiency perceptions was negative which indicates that experienced

professionals might become more skeptical about the implementation possibility and this might be because they have prior experience with technological promises that failed to deliver on the promise or have taken longer to implement as compared to before.

The improvement of transparency results confirm the role of the blockchain in the solution of the problem of information asymmetry as reported in the literature review. The high consensus regarding the quality of the records kept and the audit trail is an indication that the professionals see blockchain as being especially useful in compliance and regulatory control roles. The reasons as to why transparency perceptions of Technology/IT and Compliance/Regulatory professionals were significantly more positive than the Trading/Sales staff include that the former are closest to data integrity and regulatory issues and therefore best understand the value of blockchain as an offering. This trend confirms the hypothesis of institutional theory that the adoption process would be influenced in part by normative forces of compliance-based organizational functions.

The security results indicate less vivid perceptions, as there is strong confidence in cryptographic security and a minimization of counterparty risk, accompanied by lower confidence in the extent to which fraud can be prevented in addition to having less confidence in the privacy balance and completeness of the fraud prevention. The reduced marks of the questions involving the trade-offs between transparency and privacy (M=3.85) represent justifiable issues in the implementation of blockchain in a setting that entails accountability and confidentiality. This observation indicates that capital markets implementation with permissioned blockchain architectures to balance such competing requirements are likely to prevail, as it is the case in contemporary industry practice in such large institutional projects.

The regression results indicate that the predictors of the positive benefit perceptions in all dimensions are the organizational blockchain adoption status and individual blockchain knowledge, which are the strongest predictors. This trend indicates that blockchain awareness creates a virtuous loop in which the awareness of the advantages of the technology leads to trust in the advantages, which subsequently creates the desire to adopt it. Nevertheless, it also brings up the issue of whether the perceptions can also be vulnerable to the confirmation bias, as organizations and individuals that have already invested in the exploration of blockchain can be more predisposed to form a more optimistic perception. The result that the regulatory uncertainty is the main adoption barrier (31.7) with the overall positive security perceptions (composite M=4.04) shows that challenges are more in areas of institutions and governance rather than in terms of technological capabilities, which supports the critical views discussed

in the theoretical framework and the focus on the significance of social and regulatory factors of establishing the final impact of blockchain.

CONCLUSION AND RECOMMENDATIONS

The implications of the findings of this study are great to the stakeholders of capital markets. The robust professional opinion about the transformative nature of blockchain in the aspects of transparency, efficiency, and security suggests an essential change in the perception of the industry of wishful thinking at the very least, towards the strategic level. The very high efficiency scores imply that the operational improvement and cost reduction are the priorities of the market participants instead of other benefits, and these implications are significant regarding the implementation strategies and the decisions on the resource allocation. The fact that blockchain knowledge and perceived benefits have a very positive correlation means that knowledge and exposure are significant facilitators of adoption. Companies that invest in blockchain literacy initiatives will probably enjoy healthier internal promotion and an easier process of implementation. On the other hand, the low correlation between professional experience and efficiency perceptions indicates that the implementation strategies should take into consideration the valid issues of experienced practitioners who know the dynamics of technological change in regulated settings.

The discovery of regulatory uncertainty as the main obstacle to overcome, even though the technical analysis showed positive results, is proof that the adoption of blockchain is more about the institutional problem than a technological one. This has far reaching implication to the policymakers who have to understand that the adoption will be enhanced better through regulatory clarity than through technological advancement alone. The significant correlations among the three dimensions of benefits show that effective implementation of blockchain must be carried out in holistic ways instead of pilot projects, since the perceived benefits of transparency, efficiency, and security are interdependent instead of independent ones.

The primary focus of policymakers should be the creation of extensive regulatory frameworks in relation to blockchain-based securities infrastructure to ensure the minimization of uncertainty in the adoption. The financial institutions need to invest in systematic blockchain education programs among the staff at all levels of seniority to develop organizational capacity and deal with skepticism. The industry organizations ought to form cross-institutional working groups whose aim is to design standardized permissioned blockchain protocols that would strike a balance between the needs of transparency and privacy. Companies must embark on incremental implementation plans that start with high impact

post-trade processes in which efficiency benefits will justify implementation expenses. These findings should be assessed by conducting future studies on the longitudinal adoption patterns and actual performance outcomes compared to perceptions to confirm them.

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