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Developing a Model of Factors Influencing Bank Customer Credit Evaluation Based on Blockchain Technology

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ABSTRACT

The purpose of this study was to develop a model of factors influencing bank customer credit evaluation based on blockchain technology. Accordingly, in terms of objective, this research is classified as an applied study, since in addition to contributing to scientific knowledge and theoretical understanding, it also provides practical implications for various companies and organizations, particularly banks. Considering its objective and nature, the study employed a qualitative research method. Furthermore, as the research aimed at model development, it followed an exploratory design. The qualitative phase adopted the grounded theory approach, implemented through expert interviews and three stages of coding, including open coding, axial coding, and selective coding. The findings indicated that transparency and trust functioned as causal conditions; adaptability and innovation emerged as core phenomena; security and privacy acted as intervening conditions; risk management improvement constituted the strategic responses; infrastructure and technology represented contextual conditions; and public acceptance and trust appeared as the primary outcomes of the proposed model.

Keywords: Credit Evaluation, Banking Customers, Blockchain Technology

Introduction

The rapid transformation of financial systems in the digital economy has fundamentally reshaped the mechanisms through which banks assess, monitor, and manage credit risk. Traditional credit evaluation models, largely dependent on centralized databases, historical financial statements, and conventional risk indicators, increasingly face limitations in terms of transparency, data integrity, fraud prevention, and real-time information processing. In the banking sector, credit scoring remains one of the most critical decision-making tools, directly influencing capital allocation, risk exposure, and financial stability. Empirical research has emphasized the importance of robust credit scoring frameworks tailored to real customers within national banking systems, highlighting the need for more accurate, data-driven, and dynamic assessment mechanisms (1). Similarly, the identification and prioritization of credit scoring indicators in banking institutions demonstrate that conventional models often struggle to integrate heterogeneous data sources and emerging digital footprints (2). At the same time, advanced computational approaches such as multi-objective clustering algorithms have been proposed to enhance credit risk assessment accuracy, reflecting a broader movement toward intelligent and adaptive evaluation

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systems (3). These developments underscore a critical shift from static, institution-centric models toward technology-enabled, decentralized, and trust-based credit evaluation architectures.

Blockchain technology has emerged as one of the most transformative innovations in financial services, offering decentralized ledger systems characterized by immutability, transparency, cryptographic security, and distributed consensus. Within accounting and auditing research, blockchain is increasingly recognized as a disruptive technology capable of redefining data verification, reporting, and assurance processes (4). Trend analyses reveal a significant growth in scholarly attention to blockchain-based secure accounting management, particularly in the areas of data integrity, traceability, and fraud reduction (5). Moreover, the impact of blockchain on the accounting profession extends beyond automation, encompassing structural changes in professional roles, internal controls, and trust mechanisms (6). The integration of blockchain characteristics into banking financial innovations has also been empirically examined, demonstrating positive effects on service modernization and digital transformation in banking institutions (7). From a broader professional perspective, blockchain technology significantly influences the accounting and auditing profession by enhancing transparency and reducing information asymmetry (8). These findings collectively indicate that blockchain is not merely an incremental improvement but a paradigm shift in financial information systems.

In the banking industry, blockchain's potential extends to operational efficiency, regulatory compliance, and identity verification processes. Studies have highlighted the role of blockchain in facilitating Know Your Customer (KYC) procedures, thereby reducing duplication of verification efforts and enhancing customer onboarding efficiency (9). Recent analyses further confirm that blockchain adoption contributes to operational efficiency improvements in banks, particularly by reducing transaction processing time and enhancing back-office automation (10). The application of blockchain in banking and accounting industries demonstrates its capacity to restructure transaction recording, risk monitoring, and compliance management systems (11). Furthermore, empirical investigations into electronic banking service management reveal that factors such as perceived usefulness, technological readiness, and regulatory alignment significantly influence blockchain adoption in banking institutions (12). As financial ecosystems become increasingly digitalized, integrating blockchain with artificial intelligence (AI) and business intelligence tools offers promising opportunities for strengthening cybersecurity frameworks and banking security architectures (13). Comprehensive reviews also indicate that AI, machine learning, deep learning, and blockchain collectively form the technological backbone of next-generation financial services (14). These developments create fertile ground for rethinking credit evaluation models in a blockchain-enabled banking environment.

Credit risk management innovation has become a strategic priority for banks facing volatile economic conditions and heightened regulatory scrutiny. Research emphasizes the relationship between operational decisions, labor investment efficiency, and credit ratings, highlighting the interconnectedness of managerial performance and external risk evaluation mechanisms (15). In parallel, blockchain-based credit risk management frameworks have been proposed to enhance transparency, traceability, and reliability in borrower assessment processes (16). Adaptive neuro-fuzzy and K-nearest neighbors algorithms combined with blockchain infrastructures have demonstrated potential in improving predictive accuracy within FinTech banking environments (17). Additionally, blockchain-enabled social credit systems have been conceptualized as trustworthy and safe digital communities in which transaction records and behavioral data contribute to transparent reputation mechanisms (18). These

innovations suggest that blockchain can provide an immutable, verifiable, and distributed data environment that enhances the credibility of credit scoring models while mitigating fraud and data manipulation risks.

Beyond banking, blockchain's role in supply chain mapping and sustainability initiatives illustrates its broader capacity to create transparent and traceable ecosystems (19). Conceptual frameworks for blockchain-based sustainable supply chains identify decentralization, interoperability, and data reliability as critical enablers, while also recognizing implementation barriers such as regulatory uncertainty and technological complexity (20). The logic underlying these supply chain applications—particularly transaction traceability and distributed verification—directly parallels the requirements of credit evaluation systems in banking. In the financial reporting domain, integrated frameworks combining AI and blockchain technologies have been proposed to enhance transparency and efficiency in Islamic banking contexts, further confirming blockchain's suitability for secure and accountable financial processes (21). The convergence of blockchain with advanced analytics, cybersecurity tools, and digital governance models reflects a systemic transformation in financial infrastructure, where decentralized data validation becomes central to institutional trust.

Despite the recognized advantages of blockchain technology, its effective implementation in bank customer credit evaluation requires a comprehensive understanding of the causal, contextual, and intervening factors shaping adoption and performance outcomes. Empirical research indicates that technological characteristics such as immutability, decentralization, and smart contract capability significantly influence financial innovation outcomes in banks (7). At the same time, adoption barriers—including regulatory ambiguity, organizational resistance, and infrastructure readiness—must be systematically addressed (12). The broader impact of AI and blockchain on the accounting profession underscores the necessity of integrating technical capabilities with governance mechanisms and professional standards (22). Moreover, the expansion of blockchain research in accounting and auditing suggests a growing need to conceptualize integrated models that capture strategic, operational, and technological dimensions simultaneously (4). Within this evolving landscape, the banking sector stands at the intersection of technological innovation and risk management imperatives.

Accordingly, while prior studies have examined blockchain's impact on accounting, auditing, financial innovation, supply chains, cybersecurity, and credit risk algorithms, there remains a theoretical and empirical gap regarding a comprehensive, model-based understanding of the factors influencing blockchain-based bank customer credit evaluation systems that integrates transparency, risk management, adaptability, public trust, and infrastructural readiness dimensions (1-22).

Therefore, the aim of this study is to develop and present a comprehensive model of the factors influencing bank customer credit evaluation based on blockchain technology.

Methods and Materials

Considering its objective and nature, the present study employed a qualitative research design conducted through expert interviews. The study adopted the grounded theory approach. The statistical population consisted of university professors specializing in banking studies as well as senior managers of public and private banks. In this phase, sampling was carried out using theoretical sampling. In theoretical sampling, events rather than individuals are primarily sampled; even when individuals are selected, the central objective remains the exploration of events and processes. Although no fixed rule exists regarding sample size in qualitative research, it is generally recommended that homogeneous groups include 6 to 8 units and heterogeneous groups include 12 to 20 units.

Interviews continued until theoretical saturation was achieved. In the present study, theoretical saturation occurred after interviewing 12 experts, including university professors in the field of banking and senior managers from public and private banks.

Sampling was conducted within the logic of qualitative methodology using purposive sampling. Two sampling techniques—purposive sampling and snowball sampling—were applied. In qualitative research, purposive sampling is commonly employed to obtain the richest possible data; therefore, participants were selected based on their information richness. In accordance with qualitative research principles, cases were chosen that could provide a comprehensive and meaningful representation of the phenomenon under investigation. The qualitative phase of the study was grounded in the grounded theory methodology, and data analysis was performed using MAXQDA software.

Findings and Results

Table 1 presents the primary themes, secondary themes, and main categories extracted from the interview data.

Table 1. **Open Coding, Axial Coding, and Selective Coding Results**

Open Coding (Level 2)	Open Coding (Level 1)	Axial Coding	Selective Coding
Permanent recording of transactions	Improved auditing and monitoring	Transaction traceability	Transparency and Trust
Traceability of source and destination of funds	Reduction of financial disputes		
Reduction of fraud and money laundering	Facilitation of reporting processes		
Increased confidence in information accuracy	Creation of transparent credit history		
Easy access to transaction history	Enhanced transaction security		
Elimination of credit validation intermediaries	Increased transaction speed	Decentralization of information	
Reduced dependence on centralized institutions	Creation of an open credit network		
Increased resistance to censorship	Customer empowerment		
Risk distribution among participants	Increased innovation in financial services		
Improved access to financial services	Reduced credit assessment costs		
Use of strong cryptographic algorithms	Creation of a secure transaction environment	Security and Encryption	
Protection of customers' personal information	Increased customer confidence in the system		
Prevention of unauthorized data access	Reduced legal liability of banks		
Reduced risk of hacking and data theft	Compliance with privacy regulations		
Ensuring data integrity			
Process automation	Facilitation of decision-making processes	Efficiency and Speed	Risk Management Improvement
Elimination of manual and time-consuming processes	Faster customer service delivery		
Reduction of human errors	Increased customer satisfaction		
Improved credit evaluation speed	Enhanced bank competitiveness		
Reduced operational costs	Provision of 24/7 services		
Increased employee productivity			
Elimination of costly intermediaries	Increased bank profitability	Cost Reduction	

Reduced record maintenance costs	Provision of lower-cost services to customers		
Reduced auditing costs	Attraction of new customers		
Reduced regulatory compliance costs	Increased transaction volume		
Reduced fraud-related costs	Improved resource allocation		
Ability to process large transaction volumes	Improved system performance	Scalability	
Support for a large number of customers	Reduced response time		
Adaptation to business growth	Increased system reliability		
Expansion of services to new regions	Reduced development costs		
Integration with other systems	Increased system flexibility		
System customization capability	Responsiveness to market changes	Design Flexibility	Adaptability and Innovation
Adaptation to banks' specific needs	Compliance with new regulations		
Support for various data types	Delivery of innovative services		
Integration with existing systems	Attraction of new customers		
Development of new applications	Increased competitiveness		
Automated contract execution	Creation of new business opportunities	Smart Contract Support	
Reduction of legal disputes	Facilitation of financing processes		
Increased contract transparency	Delivery of innovative financial services		
Reduced contract costs	Attraction of new investors		
Improved risk management	Increased contract efficiency		
Creation of a participant network	Increased network value	Ecosystem Development	
Attraction of developers	Attraction of new customers		
Encouragement of innovation	Creation of an active community		
Creation of collaboration opportunities	Development of industry standards		
Knowledge and experience sharing	Promotion of blockchain adoption		
Awareness of blockchain benefits	Conducting training programs	Awareness and Education	Public Acceptance and Trust
Training customers and employees	Publication of educational materials		
Addressing ambiguities and concerns	Participation in conferences and events		
Building trust in technology	Cooperation with media		
Promotion of blockchain adoption	Establishment of a credible brand		
Regulatory compliance	Cooperation in anti-money laundering efforts	Cooperation with Regulatory Institutions	
Operational transparency	Protection of customer privacy		
Building trust among regulators	Prevention of illegal activities		
Participation in regulatory development	Creation of a secure investment environment		
Regular reporting	Maintenance of financial stability		
Development of technical standards	Creation of a common language	Industry Standardization	
Establishment of security standards	Facilitation of cooperation		
Development of legal standards	Increased interoperability		
Establishment of legal frameworks	Risk reduction		

Promotion of standard adoption	Increased trust		
Secure storage of private keys	Prevention of private key theft	Private Key Management	Security and Privacy
Use of multi-signature methods	Utilization of security hardware		
Backup of private keys	User training in key management		
Recovery of private keys	Establishment of key management systems		
Access management for private keys	Enhancement of private key security		
Data encryption	Compliance with privacy regulations	Data Protection	
Use of anonymization techniques	User training on data protection		
Restricted data access	Establishment of privacy policies		
Removal of unnecessary data	Monitoring data access		
Protection of customer privacy	Enhancement of data security		
Identification of security threats	System updates	Security Threat Mitigation	
Vulnerability assessment	Staff security training		
Implementation of security measures	Development of incident response plans		
System monitoring	Penetration testing		
Response to security incidents	Enhancement of system security		
Evaluation of platform characteristics	Selection of platforms with strong support	Selection of Appropriate Blockchain Platform	Infrastructure and Technology
Consideration of banking needs	Selection of cost-efficient platforms		
Selection of highly secure platforms	Evaluation of platform history		
Selection of high-performance platforms	Assessment of developer communities		
Selection of scalable platforms	Compliance with industry standards		
Creation of blockchain nodes	System testing	Infrastructure Development	
Connection to blockchain networks	System deployment		
Application development	System monitoring		
Integration with existing systems	System maintenance		
User interface development	System upgrading		
Data collection	Data sharing	Data Management	
Data storage	Data security		
Data processing	Data quality		
Data analysis	Data integrity		
Reporting	Data privacy		

Transparency and Trust: The coding results indicate that *transparency and trust* constitute one of the most significant factors influencing blockchain-based bank customer credit evaluation. This core category emphasizes *transaction traceability* and *information decentralization*. Transaction traceability enables permanent and immutable recording of transactions, which contributes to the reduction of fraud and money laundering. Moreover, easy access to transaction histories and the ability to trace the origin and destination of funds enhance auditing and supervisory processes. Information decentralization, through the elimination of credit assessment intermediaries and reduced dependence on centralized institutions, increases resistance to censorship and distributes risk among participants.

Risk Management Improvement: This category consists of three axial categories: *security and encryption*, *efficiency and speed*, and *cost reduction*. Within the security and encryption dimension, the use of strong

cryptographic algorithms, protection of customers' personal information, and prevention of unauthorized data access ensure the security of the credit evaluation system. Efficiency and speed are enhanced through process automation, elimination of manual and time-consuming procedures, and reduction of human error, resulting in faster credit assessment and lower operational costs. Finally, cost reduction—achieved through removing costly intermediaries, lowering record maintenance expenses, and reducing fraud-related costs—contributes to increased bank profitability and the provision of lower-cost services to customers.

Adaptability and Innovation: This category comprises three axial components: *scalability*, *design flexibility*, and *smart contract support*. Scalability enables processing of large transaction volumes, supports a high number of customers, and accommodates business growth, thereby facilitating service expansion to new regions and integration with other systems. Design flexibility allows system customization, adaptation to banks' specific needs, and support for diverse data types, creating conditions for integration with existing systems and development of new applications. Smart contract support, through automated contract execution, reduction of legal disputes, and increased contractual transparency, enhances risk management and creates new business opportunities.

Public Acceptance and Trust: This category includes three axial components: *ecosystem development*, *awareness and education*, and *cooperation with regulatory institutions*. Ecosystem development, by establishing a network of participants, attracting developers, and encouraging innovation, fosters collaboration opportunities and knowledge and experience sharing. Awareness and education—through dissemination of information about blockchain benefits, training of customers and employees, and addressing uncertainties and concerns—strengthen trust in the technology and promote blockchain adoption. Cooperation with regulatory bodies, achieved through regulatory compliance, operational transparency, and trust building among supervisory institutions, provides a foundation for participation in regulatory development and the delivery of regular reports.

Security and Privacy: This category consists of three axial components: *industry standardization*, *private key management*, and *data protection*. Industry standardization contributes to the establishment of a legal framework and promotes standard adoption through the development of technical, security, and legal standards. Private key management ensures system security through secure storage of private keys, implementation of multi-signature methods, and backup procedures. Data protection, achieved through data encryption, anonymization techniques, and restricted data access, ensures customer privacy protection and compliance with privacy regulations.

Infrastructure and Technology: This category includes four axial components: *security threat mitigation*, *selection of an appropriate blockchain platform*, *infrastructure development*, and *data management*. Security threat mitigation involves identifying security threats, assessing vulnerabilities, and implementing security measures that enable system monitoring and effective response to security incidents. Selection of an appropriate blockchain platform is accomplished through evaluation of platform characteristics, consideration of banking requirements, and selection of highly secure platforms, thereby enabling high performance and scalability. Infrastructure development includes establishing blockchain nodes, connecting to blockchain networks, and developing applications, which facilitate integration with existing systems and the creation of user interfaces. Data management supports data analysis and reporting through systematic data collection, storage, and processing.

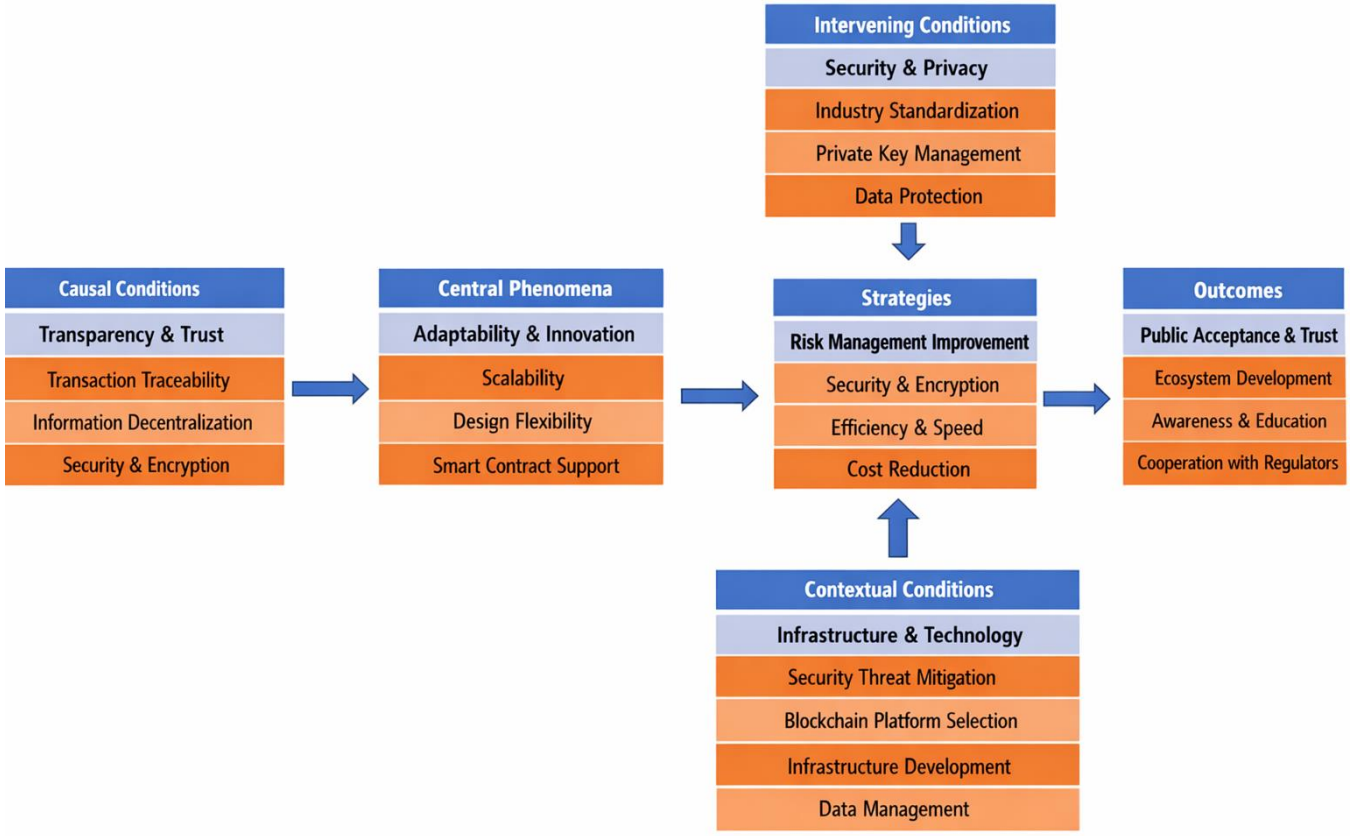

Figure 1. Paradigmatic Model of Factors Influencing Blockchain-Based Bank Customer Credit Evaluation.

Discussion and Conclusion

The findings of the present study revealed that blockchain-based bank customer credit evaluation is shaped by a multidimensional structure consisting of causal conditions, core phenomena, intervening conditions, contextual conditions, strategic responses, and outcomes. The results demonstrated that transparency and trust emerged as the primary causal drivers influencing the effectiveness of blockchain-based credit assessment systems. Transaction traceability and information decentralization played a central role in strengthening reliability within credit evaluation processes. These results are consistent with studies emphasizing that blockchain's immutable ledger and distributed verification mechanisms significantly reduce information asymmetry and enhance institutional trust in financial systems (8). The permanent recording of transactions allows banks to access verifiable financial histories, thereby minimizing manipulation risks and improving the credibility of borrower profiles. Previous research has similarly highlighted blockchain's capability to transform accounting and auditing systems through enhanced transparency and auditability (5). Moreover, the decentralization of information reduces dependency on centralized intermediaries, a finding aligned with investigations showing that blockchain reshapes traditional financial governance structures and redistributes trust among network participants (6).

The study further indicated that adaptability and innovation functioned as the central phenomenon linking technological capabilities with operational performance. Scalability, design flexibility, and smart contract support collectively enabled dynamic credit evaluation systems capable of responding to changing banking environments.

These findings reinforce the argument that blockchain adoption fosters financial innovation by enabling automated decision-making processes and adaptive service delivery models (7). Smart contracts, in particular, allow credit agreements to be executed automatically based on predefined conditions, reducing contractual disputes and administrative delays. Prior research confirms that blockchain-enabled automation enhances operational efficiency and reduces procedural complexity within banking systems (10). The ability to integrate blockchain platforms with existing banking infrastructures also supports innovation ecosystems in which financial services become more personalized and data-driven. Studies on blockchain adoption in electronic banking services similarly emphasize technological flexibility and organizational readiness as critical determinants of successful implementation (12).

Another major finding concerned the strategic dimension of risk management improvement. The results demonstrated that security and encryption, efficiency and speed, and cost reduction collectively constitute strategic responses facilitating blockchain-based credit evaluation. Enhanced cybersecurity mechanisms derived from cryptographic protocols significantly improve data integrity and reduce fraud risk. This outcome aligns with research demonstrating that blockchain integration strengthens banking cybersecurity frameworks when combined with advanced digital technologies such as artificial intelligence and business intelligence systems (13). The efficiency gains observed in the study—particularly process automation and reduction of human error—are consistent with findings indicating that blockchain and AI jointly improve financial reporting transparency and operational performance in digital banking environments (21). Additionally, the reduction of operational and compliance costs identified in this research supports earlier evidence that blockchain technologies streamline administrative procedures and eliminate redundant verification processes (9). These improvements directly influence credit evaluation efficiency by enabling faster risk assessment and real-time monitoring of borrowers' financial activities.

The results also highlighted the importance of intervening conditions, particularly security and privacy mechanisms. Industry standardization, private key management, and data protection emerged as critical elements shaping system reliability. These findings correspond with prior studies emphasizing that blockchain adoption requires standardized technical and legal frameworks to ensure interoperability and regulatory acceptance (11). The importance of privacy protection reflects broader concerns in financial technology research regarding the safeguarding of sensitive customer data while maintaining transparency. Research examining blockchain-enabled social credit systems similarly stresses the necessity of secure identity management and data protection infrastructures to sustain user trust (18). Furthermore, blockchain's cryptographic architecture addresses long-standing challenges associated with unauthorized data access and cyber threats, reinforcing its suitability for credit scoring applications within highly regulated banking environments.

Contextual conditions identified in the study underscored the foundational role of infrastructure and technology readiness. Security threat mitigation, blockchain platform selection, infrastructure development, and data management collectively formed the technological environment enabling successful implementation. These results align with comprehensive reviews demonstrating that blockchain effectiveness depends heavily on integration with complementary technologies such as artificial intelligence, machine learning, and advanced data analytics (14). The necessity of appropriate platform selection reflects findings suggesting that technological compatibility and scalability significantly influence organizational adoption outcomes (12). Moreover, blockchain's contribution to secure accounting and financial management processes highlights the importance of reliable digital infrastructure for maintaining system stability and operational continuity (4). Without adequate infrastructure investment, the transformative potential of blockchain in credit evaluation may remain unrealized.

The outcome dimension of the proposed model revealed that public acceptance and trust represent the ultimate consequences of successful blockchain implementation in credit evaluation systems. Ecosystem development, awareness and education, and cooperation with regulatory institutions were identified as essential mechanisms fostering societal and institutional trust. These findings correspond with studies emphasizing that technological adoption in banking is not solely a technical process but also a socio-institutional transformation requiring stakeholder engagement and regulatory alignment (19). Public education initiatives and collaboration with regulators help reduce uncertainty surrounding blockchain technologies and facilitate broader acceptance among customers and policymakers. Research on blockchain-based credit risk management innovation similarly confirms that transparency and collaborative governance structures enhance confidence in digital financial ecosystems (16). Additionally, the development of trusted FinTech ecosystems supported by advanced algorithms has been shown to improve predictive accuracy and strengthen stakeholder participation within banking networks (17).

From a theoretical perspective, the findings contribute to extending existing credit evaluation literature by integrating blockchain characteristics with risk management and innovation theories. Traditional credit scoring models often rely on limited financial indicators and centralized data sources, which restrict predictive accuracy and transparency (1). By contrast, blockchain-based models enable continuous monitoring of financial behavior through distributed ledgers, supporting more comprehensive risk evaluation. The incorporation of decentralized trust mechanisms also addresses weaknesses identified in conventional credit rating systems associated with managerial inefficiencies and informational gaps (15). Furthermore, the integration of blockchain within accounting and financial professions reflects broader technological shifts transforming professional roles, governance mechanisms, and financial accountability structures (22). The study therefore bridges the gap between emerging financial technologies and strategic banking management by presenting a holistic explanatory framework.

The findings also highlight the growing convergence between blockchain technology and sustainable digital transformation strategies. Research on blockchain-enabled supply chains demonstrates that transparency, traceability, and shared information environments improve coordination among stakeholders (20). Similar mechanisms operate in banking credit evaluation, where distributed data systems enhance collaboration between banks, regulators, and customers. The integration of blockchain into financial innovation ecosystems further supports organizational agility and long-term competitiveness in rapidly evolving digital economies (7). Consequently, the proposed model illustrates how technological, organizational, and institutional dimensions interact to shape successful blockchain adoption in banking credit evaluation systems.

Overall, the discussion indicates that blockchain technology provides a comprehensive infrastructure capable of transforming bank customer credit evaluation through enhanced transparency, adaptive innovation, strengthened risk management strategies, secure operational environments, and increased public trust. The alignment between the study's findings and prior empirical and conceptual research confirms that blockchain adoption represents a strategic evolution rather than a purely technological upgrade. By integrating causal, contextual, and strategic factors, the study advances understanding of how blockchain technologies can be operationalized within credit assessment frameworks to improve decision quality, efficiency, and financial stability.

One limitation of this study relates to its qualitative research design, which relied on expert interviews and theoretical sampling. Although qualitative approaches provide deep contextual insights, the findings may not be fully generalizable across all banking systems or geographic regions. Another limitation concerns the rapid evolution of blockchain technologies, meaning that technological developments occurring after data collection may influence

future applicability of the model. Additionally, organizational, regulatory, and cultural differences among banking institutions could affect implementation outcomes beyond the scope examined in this research.

Future studies may employ quantitative or mixed-method approaches to empirically validate the proposed model across larger banking populations. Comparative research examining blockchain-based credit evaluation systems in different countries or financial systems could provide further insights into contextual influences. Researchers may also explore integration between blockchain, artificial intelligence, big data analytics, and decentralized finance platforms to examine their combined impact on predictive credit assessment accuracy. Longitudinal studies investigating the long-term performance outcomes of blockchain-enabled credit scoring systems would further enrich theoretical and practical understanding.

Bank managers and policymakers should prioritize investment in digital infrastructure and cybersecurity capabilities to support blockchain adoption. Financial institutions are encouraged to develop collaborative ecosystems involving regulators, technology providers, and customers to enhance trust and institutional acceptance. Training programs aimed at improving technological literacy among employees and customers can facilitate smoother implementation processes. Finally, banks should adopt phased implementation strategies that integrate blockchain solutions with existing credit evaluation frameworks to reduce operational disruption while maximizing innovation benefits.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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