The Function of the Blockchain System in Enhancing Financial Integrity and the Confidence of Society

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Abstract

Artificial Intelligence (AI) and Blockchain (BC) are combined to obtain a new way to make banking safer. The benefits of AI and BC are combined to deal with security risks like fraud, hacking, and identity theft. This builds trust and confidence in financial operations. This research examines how AI and BC work together, focusing on their combined abilities, uses, and possible benefits for the financial services industry. Combining Machine Learning (ML) and Natural Language Processing (NLP) techniques lets financial institutions look at vast amounts of data in real time, finding patterns, oddities, and malicious behavior. Companies can make the banking system safer and more open by combining Explainable AI (XAI) systems to find scams with systems that use BC to handle transactions. The record of BC ensures that transactions are secure and people are held accountable. XAI systems provide advanced analytics and predictive data that help spot and stop fraud. By combining XAI with BC-based identity systems, financial companies can make it easier to onboard new clients, improve security, and keep sensitive data safe from people who shouldn't have access to it. Intelligent contracts that XAI drives ensure promises are kept, and actions are taken. This lowers the risk of financial transaction mistakes, fraud, and disagreements. Businesses can make deals safe, clear, and unchangeable by connecting XAI-driven intelligent contract systems to BC systems. This gets rid of middlemen and lowers the cost of transactions. By joining forces with BC, XAI can follow the rules and lower risks in the banking industry. XAI-powered options for compliance with regulations, finding compliance problems, and ensuring regulatory requirements are met.

Keywords: Blockchain; Artificial Intelligence; Financial Integrity; Society.

I. INTRODUCTION

Blockchain (BC) is among the most exciting and critical new technologies (Rahman et al., 2022). The system is based on decentralization, meaning that activities and data can be stored and kept safe in a network of blocks that are all perfectly linked. Blockchain is unlike other systems because it is open, has robust security features, and is committed to keeping data integrity at the most significant level. British Columbia is very different from other places, which has brought it a lot of attention and interest in many companies and industries. It had significant effects on many different areas, but the economy was the main one that was hurt the most and for the longest

time. People who work in businesses and write code are amazed at how blockchain technology can change things.

Banks' use of Artificial Intelligence (AI) has sped up thanks to better access to data, computer power, and Machine Learning (ML) techniques (Zhai et al., 2021). Financial firms use AI to do many things, like figuring out credit risk, fraud, and price based on algorithms, helping customers, and getting the most out of their investments. The way institutions use data for making decisions has shifted since AI can look at vast amounts of separate and organized information. In the field of finance, forecasting algorithms run by AI have a lot of essential benefits. These frameworks look at how different data sets are connected in complicated ways to find trends that normal mathematical techniques miss. Recognizing small trends and links improves forecasts' accuracy and risk assessment. AI models can adapt to market changes, making them an essential tool in places where the economy is unstable.

One big problem with current AI models is that they need to be easier to understand. A lot of AI methods, especially "Deep Learning" situations, work like "black boxes," which makes it hard to explain how they make decisions in everyday language (Alvey et al., 2023). When financial experts don't give clear reasons for their statements, officials and customers are more likely to be skeptical and not trust them. Because economic decisions have significant effects and risks, everyone must know what factors affect AI-driven decisions like loan approval, investment strategies, or finding scams. Not being able to be interpreted makes it harder to use AI technology and explain actions to clients and governing bodies. When flaws in AI models aren't found, people do illegal things and may need help following the rules.

Explainable AI (XAI) tries to fix the problems with regular AI by explaining why decisions are made. However, the choices will still be changed (Saeed & Omlin, 2023). The main idea behind the XAI-BC integration is to provide AI predictions that can be understood and recorded on a public log that can't be changed (Kumar et al., 2023). Combining XAI methods with BC makes the straightforward and unchangeable recording of AI models' decision-making processes possible. This mix helps everyone involved understand the factors that affect AI predictions and makes decision-making more responsible and reliable overall. This article examines enhancing the financial processing of decisions by integrating XAI with BC. It explores the techniques and tactics XAI employs to ensure algorithms' transparency and interpretations' integrity.

II. BACKGROUND

2.1. BC

BC is a system engineered to document transactions and data inside interlinked and secure blocks. It is the basis of technology for several cryptocurrencies, such as Bitcoin. However, its uses have gone beyond digital money. BC facilitates elevated openness, safety, and data consistency. Below are essential principles that elucidate the nature of BC:

1. Decentralization: BC constitutes a distributed digital record maintained over a network of interconnected computers (nodes). No one authority governs or oversees this information. This indicates that no individual entity or party has complete jurisdiction over the BC. Decisions inside a system are often reached collaboratively by the majority of individuals.

2. Blocks: Information about transactions is aggregated into blocks at designated periods. Each block encompasses a certain quantity of transactions, and upon reaching capacity, the subsequent block starts accumulating transactions. Every block contains a reference to its predecessor, forming an interlinked sequence of blocks termed the BC.

3. Security: Data within each block is securely encrypted and permanently documented (Seth et al., 2022). This renders the data within it highly impervious to tampering or modification once captured. This safety relies on strong mathematical principles and digital keys.

4. Transparency: The complete BC is accessible and observable by all network members. Every transaction is documented, but individual identities are safeguarded using cryptographic identifiers instead of private data.

5. Smart Agreements: Smart agreements are automated programs that operate upon the fulfillment of predetermined circumstances (Kannengiesser et al., 2021). They function atop the BC and facilitate the automation of diverse contracts and operations, including settlements, product delivery, and claim processes.

6. Cryptocurrency: Numerous BCs, including Bitcoin and Ethereum, generate digital money that facilitates transactions inside the system. These cryptocurrencies are independent of central banks and conventional financial organizations.

7. Trust: BC's elevated safety and openness enhance trust in payments and corporate operations. It mitigates the dangers of fraud, data tampering, or deceit.

8. Varied Applications: Besides cryptocurrencies, BC has been utilized across other industries, including logistics, supply chain, financial services, healthcare, etc. This presents the opportunity to improve effectiveness, precision, and transparency across several businesses.

BC facilitates secure, unchanging, and accessible transactions, obviating the necessity for middlemen and fostering substantial innovation across diverse sectors. This renders it one of the most consequential scientific advancements in this century.

2.2. Public Trust

Public trust refers to the affirmative belief and assurance of people or organizations regarding a particular entity, such as a government, corporation, organization, or person. This trust relies on the anticipation that the respected entity would conduct itself honestly, fairly, and competently in customer engagements or services. Public trust encompasses the conviction that the entity will honor commitments, protect confidentiality, and act in line with established ethical norms. The following are fundamental components of the public trust concept:

1. Positive Belief: The public's confidence is that the trusted body will behave in the public's or consumers' best interests.

2. Trust in Reliability: Trust frequently encompasses the assurance that the entity will regularly and dependably fulfill its obligations and responsibilities without fail (Lohmöller et al., 2024).

3. Confidence in Honesty: Trust is predicated on the conviction that the organization would conduct itself with integrity and truthfulness, eschewing damaging or unethical activity.

4. Transparency: Honesty in activities and communication is essential for establishing and sustaining public confidence. Transparent and open dialogue cultivates trust.

5. Managing Ambiguity: Although the business might not constantly fulfill the public's demands, it is crucial to address uncertainty transparently and speak candidly regarding obstacles or limitations.

When people don't trust each other, it significantly affects business, society, and politics. Multiple good things happen when people trust each other:

1. Societal Reliability: When people trust each other more, they are more likely to work together and avoid lousy behavior or arguments. In turn, this makes society more stable.

2. Economic Growth: For economic growth to happen in a business setting, consumers and financiers must trust each other. Having more trust can make people spend and pay more.

3. Teamwork: Public trust enhances cooperation across diverse situations, including individual relationships, international trade, and warfare.

4. Government Credibility: Authorities regarded as credible are more inclined to secure public backing and assist in implementing plans and changes.

The erosion of public confidence can result in significant repercussions, such as social unrest, diminished investments, and an organization's failure to attain its objectives. Establishing and sustaining public trust is essential in several facets of life and organizations.

III. BC SYSTEM FOR FINANCIAL INTEGRITY AND CONFIDENCE OF SOCIETY

3.1. Combining BC and XAI: Enhancing Visibility and Trust in Model Translation

The integration of BC with XAI creates a powerful synergy that has the potential to transform model comprehension. This combination can encompass several fields, and the talk centers on the procedures inside XAI that can effortlessly integrate into a BC architecture, as shown in Figure 1.

- ***Data Acquisition and Preservation:*** XAI entails the acquisition and preservation of data for modeling elucidation. This dataset includes input characteristics, model projections, and corresponding explanations. Implementing BC guarantees that information is kept safe and immutable over a distributed network. Data points are time-stamped and encrypted into a block, ensuring confidentiality and transparency.

- ***Model Training and Justifications:*** ML algorithms undergo training on comprehensive datasets to provide forecasts. XAI methods look at these models and come up with explanations for particular statements. BC keeps track of the model training process, including the factors, hyperparameters, and learning data used. XAI-generated explanations are included in the BC, which lets users check the accuracy of the reasoning behind predictions.

- ***Methods of Agreement for Validity:*** For XAI validation, agreement techniques for BC are used, such as Proof of Work or Stake. Many nodes in the network can independently check created answers, making studies more reliable. Decentralized proof can make it less likely that answers will be wrong or biased, increasing trust in the program.

• ***Availability and Visibility of Stakeholders:*** The fact that BC is naturally clear fits with XAI's goal of providing information that is easy to understand. Participants can get approved access to answers to their questions through smart deals on the BC. This encourages openness so everyone can understand why AI-driven decisions were made the way they were.

• ***Immutable Audit Paths:*** Because BC is inherently immutable, records and the data that goes with them will not change over time. This ability is necessary when following the law, and being able to rely on the past is essential. Justifications made by XAI are linked to specific activities, creating an audit record of model conclusions that can't be changed.

• ***Trust and Collaborative Management:*** Adding XAI to BC can help A models feel more confident about trust. The cooperative governance system of BC networks includes a lot of different groups that make decisions about how to apply and change the model. This openness makes sure that readings take into account the various points of view of experts in the field.

• ***Ensuring Fairness and Responsibility:*** BC's autonomous proof and open operation ensure that AI decisions are fair and responsible. Discussing possible biases could lead to corrective actions, promoting equality and moral AI activities.

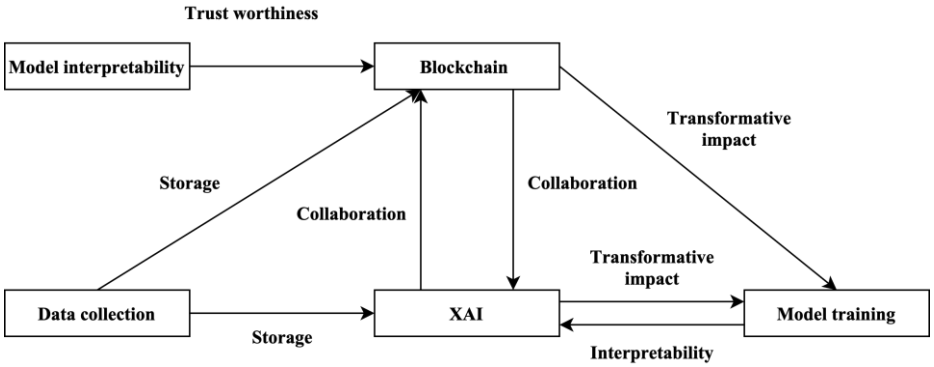

Figure 1: XAI-BC Dataflow

3.2. Merging XAI and BC has Benefits, Including Clarifying Things and Building Trust

Adding XAI to BC is a strong relationship that offers many benefits, such as changing how decisions are made, how open things are, and how much people trust each other. Bringing these two advanced areas together creates a combination that could change every industry. The study outlines the significant advantages of using XAI along with BC.

• ***Exceptional Clarity:*** XAI methods make the complicated functions of AI models more accessible so stakeholders can see why predictions are made. When XAI and BC are combined, openness is greatly improved. BC's permanent record keeps track of every step of the decision-making process and makes it possible to check and audit. This willingness to work together makes things more transparent and eliminates any chance of confusion or hidden biases.

• ***Accountable Commitment:*** When XAI and BC work together, they are accountable in a way that has never been seen before. Because BC is spread and can't be changed, model actions, explanations, and predictions will always be recorded. This responsibility framework lets people who have a stake in the decision-making process see where decisions came from, spot mistakes, and determine the factors that affected the outcome.

• ***Increased Stakeholder Confidence:*** Trust is crucial in areas like banks, healthcare, and self-driving cars, where AI-driven decisions have a significant impact. XAI builds trust by making AI models clear. Adding it to BC improves the process by making it easier to provide clear and confirmed explanations. Stakeholders rely on AI predictions and are sure they are based on thinking that can be understood and checked.

• ***Stable Data and Descriptions that Don't Change:*** The fact that BC can't be altered makes XAI's focus on exact statements even more vital. Integration ensures that XAI answers stay the same and can't be argued with over time. This ability is necessary when knowing the past very well is essential, like when following the law or regulations.

• ***Identifying and Stopping Bias:*** XAI is needed to find flaws in AI models, which promotes fairness. Combined with BC, it gives a fair record of the model's performance. This lets everyone quickly spot, discuss, and fix flaws, ensuring that decisions are made honestly and fairly.

• ***Decentralized Validation:*** The BC agreement methods can be used to check the accuracy of XAI's answers. Many BC system nodes can independently check explanations, making it less likely that wrong or dishonest answers will be given. The results are more likely to be correct because of this decentralized checking. Many different types of businesses can use the combination of XAI and BC. This combo improves many things, like banking, healthcare, manufacturing, and shipping, by rendering decision-making straightforward, accountable, and dependable.

• ***Making it Easier to Follow the Rules:*** When XAI and BC work together, industries benefit from strict regulations. Audits and conformity verifications are optimized when clarifications, forecasts, and conclusions are documented in an immutable BC record.

• ***Facilitating Cooperation:*** The collaborative governance framework of BC corresponds with XAI's objective to engage domain specialists and stakeholders in the decision-making process. This inclusive methodology guarantees that interpretations encompass diverse viewpoints, improving overall decision accuracy. The XAI-CB integration advantages are shown in Figure 2.

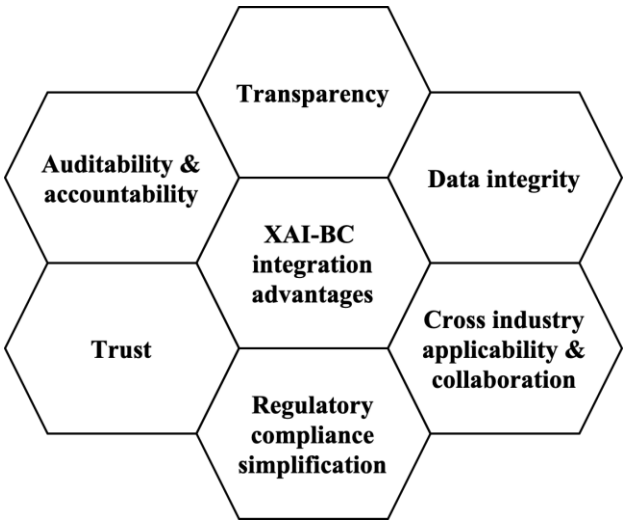

Figure 2: XAI-BC Integration Advantages

3.3. Practical Applications of XAI-BC Connectivity in Finance

Integrating XAI with BC has shown significant promise for transformation in several practical applications in the financial sector. Financial companies improve decision-making, foster equity, and establish trust among all parties by integrating the openness and verification of BC with the comprehension of XAI. This subsection provides specific instances of the intersection between XAI and BC that transform essential sectors in finance.

• ***Accurate and Reliable Credit Checks with XAI-BC Hybrid Technology:*** Conventional rating methods aren't always straightforward, so buyers don't always know what factors affect their financial standing. When XAI and BC are combined, banks can give lenders much more information and knowledge.

When a borrower applies for credit, the XAI model looks at the information provided and gives that person a credit ranking. The model's explanation, which includes the most important factors that affect the score, is written down on the BC. Lenders can get the official reason and learn about areas that can be improved to make it easier for the borrower to repay the loan. This openness builds trust and gives people the power to make intelligent choices that help them get ahead financially. Lenders can show proof of loan choices as proof that they follow the rules set by regulators. Using smart deals ensures that credit decisions are based on fair and transparent standards, promoting ethical banking.

• ***Permanent Audit Trails for AI-driven Investment Techniques:*** Combining XAI and BC is an excellent way to ensure investing strategies have permanent audit trails. When banks use AI models to make financial ideas, the reasons behind those tips are secured and written down on the BC. Investors quickly explain each investment choice, including the AI model's primary data, review, and reasoning. This much information makes investors more likely to believe you and lets them weigh investment choices based on how much risk they are willing to take and their financial goals.

The financial officials can check these financial schemes without entering the institution's internal operations immediately. Smart contracts make sure that investment rules are followed. They also give officials a record of investment choices that can be checked and protect sensitive private data.

Fraud discovery is a big problem for banks, and BC-Enhanced makes it easier to find fraud. By combining XAI and BC, scam detection models can give an apparent and unchangeable reason for actions they have recognized. The AI model shows the factors that are used to predict fraud when a transaction is thought to be possibly fake. This information is protected and saved safely in the BC.

Detectives looking into scams can look at the reasoning and learn important things about why the transaction was thought to be odd. The BC-based approach guarantees that the investigation process is open and can't be changed. This makes scam detection systems more reliable and transparent. It makes it easier for experts to share what they know, which makes stopping scams more effective.

• ***Improving Compliance with Regulations:*** Financial firms have to deal with a lot of stress when the rules for their business change. Connecting XAI to BC establishes a system that meets regulatory requirements and promotes openness and responsibility. By writing down model

reasons on the BC, financial companies help officials understand why AI comes to certain conclusions and the factors that affect those conclusions. This builds trust between the authorities and companies, which makes assessments go more smoothly and frees businesses from fulfilling their duties.

Intelligent agreements are used to make sure that AI programs follow the law. Financial companies use smart contracts to set compliance rules that ensure AI-generated decisions are legal and moral.

3.4. Obstacles and Prospective Pathways of XAI-BC Integration

• There are several limitations and issues with XAI in the banking industry despite its many advantages. It is challenging to develop understandable AI programs due to the volume and complexity of financial data. To ensure that financial professionals can use AI outputs, finding the correct balance between complicated models and ease of use is vital. Here, we'll go over the most pressing issues with XAI and BC integration in banking and some potential remedies.

• ***Issues with the Technological Implementation and Growth Potential of XAI-BC:*** Combining XAI and BC is a technologically challenging task that requires innovative approaches. Make sure XAI techniques and BC are compatible; it's crucial. BC prioritizes autonomy and historical data, whereas XAI is more concerned with understanding models. Designers need to create hybrid designs that incorporate the most significant features of both systems while preserving their characteristics if they want to bridge these two domains. The computing and storage demands of AI model arguments make it challenging to make BC systems larger. Ensuring that XAI-BC systems work well and can handle more and more complicated financial data will be necessary to get many people to use them.

• ***Concerns about Safety and Data Sharing in Distributed Records:*** Blockchain uses a centralized database that lets everyone see data. This makes people worry about the safety of private banking data. Even though BC uses encryption to protect data, the problem of making sure that only authorized people can view specific data persists. Financial institutions must balance being open and keeping information private to protect client data and explain AI models clearly. Zero-knowledge proofs and distinct privacy are two types of cryptography that protect private data and let people check on the blockchain that AI model predictions are correct.

• ***Finding a Balance from Model Efficacy and Understanding:*** AI models are often made to improve performance measures like exactness and precision, which goes against the goal of understanding. Models that are easy to understand are less performant than models that are more complicated and hard to understand. In the financial business, where accuracy and dependability are critical, finding a balance between comprehension and model effectiveness is essential. Studies and research are needed to find the right trade-offs that let banks use AI systems in a way that is clear enough while still keeping performance high.

• ***Machines and people can Talk to Each Other:*** Creating Natural Ways for XAI to Communicate: Financial experts and end users can quickly and effectively integrate XAI-BC thanks to tools that are easy to use.

One big problem in design is getting non-technical customers to understand the complex AI model requirements. For AI model results to be understandable by humans, compelling

visualization methods and application tools are needed.

Specialists in the field and interface engineers work together on cooperative, incremental design methods that create intriguing XAI interactions that make users more engaged and help them make better decisions. Figure 3 shows the study of how right and easy the model was to understand.

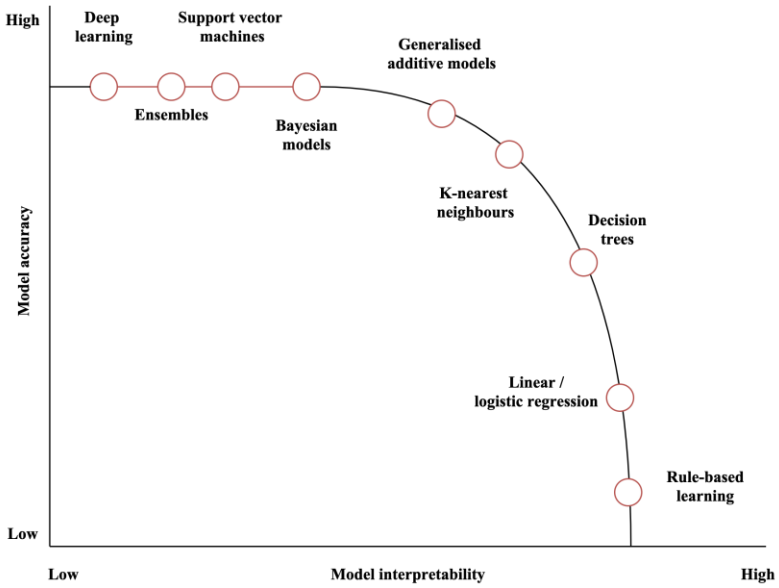

Figure 3: Model Interpretability and Accuracy Analysis

IV. CONCLUSION

XAI has become a meaningful way to deal with the difficult task of understanding AI systems used in banks. The main goal is to ensure that AI systems' reasons for their decisions are clear and easy to understand. Allowing this much openness is essential for fostering trust among parties and giving financial experts the details they need to make intelligent choices. It will significantly affect how businesses make decisions and follow the rules as XAI gets better and more people use it. Companies will be different in the future, and people will be honest, responsible, and reliable.

The problems that AI systems in banks need help understanding are well solved by XAI and BC working together. Sharing clear and accurate reasons for AI predictions on a database that can't be changed reveals essential details about the things that impact big financial decisions to people who need to know them. As a result, XAI-BC contact is used in many areas of finance, including legal compliance, credit rating, capital management, and finding scams. Like these real-life cases, XAI and BC can assist each other. Before the XAI-BC partnership in the banking sector reaches its full potential, it is essential to acknowledge that several significant issues must be resolved. Current technology makes it challenging to set up and run these systems. Problems exist with making them scalable and keeping users' data safe. This means they need to be constantly studied and grown. A good balance between understanding and model efficiency is also necessary. Therefore, we must carefully consider each choice's pros and cons to use trustworthy and simple AI models.

Any changes to XAI in BC could make AI-driven systems more open and dependable, affecting financial choices. The company began providing open, responsible, and accountable financial services starting with the merger. Overall, this change is good for everyone and society. Combining AI and BC can create a safe economic future, making people more intelligent and the system more open and straightforward. Ongoing study, teamwork, and new ideas can help with this. The banking industry could be significantly affected by researchers and businesspeople looking into how to mix XAI and blockchain. This might lead to a time when open, moral, responsible, and suitable for society's economic activities are common.

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