



**The Impact of Blockchain Technology on Financial
Performance in Saudi Banks: A Case Study of Al Rajhi
Bank**



Abstract

This study examines the impact of blockchain technology on financial performance of Al Rajhi Bank's in Saudi Arabia's. With the increasing use of new technologies in the banking sector, blockchain provides an opportunity to enhance security, efficiency, and transparency in financial transactions. The study aims to fill gaps in existing literature on the specific implications of blockchain in Arab banking, i.e., Islamic financial institutions. It was descriptive–analytical in nature, and through a semi–structured interview, primary data were gathered from 10 Al Rajhi Bank employees. Blockchain technology is revealed by the study to significantly improve the operational efficiency of the bank by accelerating transactions and reducing costs. In addition, it improves transparency and eliminates fraud, which results in establishing trust among customers for banking infrastructure. The research findings are consistent with Saudi Vision 2030, whose vision is to improve digital transformation in the financial sector through the emphasis of adopting new technologies in order to remain competitive. The research presents robust empirical evidence of blockchain application in Islamic banking and presents parameters for successful application, employee training, customer training, and cross–industry collaboration. It also requires cooperation with regulatory bodies to create an enabling environment for the use of blockchain technology. In this way, Al Rajhi Bank can harness the potential of blockchain technology, increase operational efficiency, and achieve leadership in the evolving financial landscape. Finally, the study forms the basis for further research on blockchain technology in the banking sector and offers practical approaches to using the technology to achieve better financial performance and services.

1. Introduction:

Today, the world is witnessing a rapid and continuous transformation of electronic technologies through the assistance of information technology and digital innovation, which is transforming many sectors. Blockchain technology is among the innovations, which is one of the most important resources no less valuable than human and material resources (Abdulhakeem et al., 2021). This decentralized technology can be an effective tool for automating the verification of data to ensure its accuracy and preserving data integrity. Blockchain can revolutionize many industries, such as accounting and auditing, by preventing tampering with information, decreasing manipulation of information, and enhancing financial transaction transparency (Ali et al., 2020).

Interestingly, the financial sector, particularly banking, has been revolutionized by blockchain technology, making it the most controversial and researched financial technology to date. Blockchain technology is revolutionizing the banking sector by enhancing the security, efficiency, and transparency of monetary transactions. As per Chang et al. (2020), this technology has been established to improve the infrastructure of financial services, making the quality of banking services delivered to customers better. Its effect extends to numerous banking activities, such as local and cross-border fund transfers, international trade, financing services, and other critical financial transactions (Chen et al., 2020). By decentralizing financial activities, blockchain reduces intermediaries, thus making transactions faster and less expensive. Empirical research also maintains the advantages of blockchain implementation in the banking industry. Bin Younes et al. (2021) note that the use of blockchain in financial transactions significantly minimizes the cost of transactions while ensuring transparency and security. Similarly, Balnour & Dawaba (2022) emphasize the role of blockchain technology for Islamic banking, highlighting its role in improving trust, credibility, and efficiency. The study suggests blockchain adoption allows Islamic banks to diminish their reliance on employees, enhance processes, and execute quicker monetary transactions without the need for intermediaries. The technology aligns with the worldwide trend towards the digitalization of financial services. For Saudi Arabia, financial technologies such as blockchain directly impact the performance of banks through enhancing financial activities, regulatory compliance, and financial security. Saudi Vision 2030 is a significant supporter of adopting innovative financial technologies to spur economic growth and improve the banking

sector (Al-Matari et al., 2023). However, with the increasing global interest in blockchain technology, still much is lacking in Arab studies on its complete implications. Most of the studies conducted so far in the Arab world talk about general subjects on blockchain technology but not substantial research on its regulatory aspects, implementation models, and specific impacts on financial openness and fraud mitigation in the banking industry. As such, further research is necessary in a bid to bridge this gap, i.e., in unraveling how the adoption of blockchain can optimize Saudi Arabian and, by proxy, Arab banking effectiveness.

2. The study problem:

In light of current developments and modern technology, banks face many challenges in terms of the banking services they provide to customers compared to other local and international banks. They also face strong competition with financial institutions that provide many cross-border banking services. Therefore, there was a need to adopt modern technologies that will contribute to accelerating the financial services provided and thus improving the financial performance of these banks Ibrahim, (2020). Perhaps the most important of these technologies is what is known as blockchain technology, as many studies, including Nadir (2020) and Al-Shater's study (2019), confirmed that the application of blockchain technology is more secure and effective, and it is necessary to quickly benefit from the advantages it provides to the financial industry community. It also contributes to increasing the efficiency of operations in Islamic financial institutions. On this basis, the study came to answer the following main question: **What is the impact of blockchain technology on the financial performance of Al Rajhi Bank in the Kingdom of Saudi Arabia?**

3. Study questions^[4]:

The following sub-questions branch out from the main question:

1. What is the impact of applying Blockchain technology in completing financial transactions at Al Rajhi Bank with transparency and security?
2. What is the impact of applying Blockchain technology in reducing the costs of financial transactions at Al Rajhi Bank?
3. What is the impact of applying Blockchain technology on the speed, accuracy and completion of financial transactions at Al Rajhi Bank?

4. What is the impact of applying Blockchain technology in reducing fraud and cybercrime at Al Rajhi Bank?

4. Research Objectives

Main Objective:

- To explore the impact of blockchain technology on financial performance, applied to Al Rajhi Bank.

Specific Objectives:

- To investigate how blockchain technology could enhance the security and efficiency of Al Rajhi Bank's financial transactions.
- To look into how implementing blockchain reduces operating costs and increases profitability.
- Analyze the effects of blockchain technology on the transparency, fraud prevention, and regulatory compliance of banking operations.
- To investigate how blockchain-based financial services impact the trust and pleasure of Al Rajhi Bank clients.
- To identify the challenges and limitations related to blockchain technology implementation in Saudi institutions, with a focus on Al Rajhi Bank.

5. Importance of the study:

A. Scientific^[3] importance:

- Enriches the theoretical knowledge of blockchain technology and its contribution to financial performance in the banking industry.
- Contributes to the current literature through empirical evidence of the effects of blockchain technology on banking efficiency, cost savings, and security.
- Adds to the knowledge regarding the use of financial technologies in Islamic banking in Saudi Arabia.
- Aids academic research through the provision of a case study framework, with the concentration being on Al Rajhi Bank as a premier regional financial institution.
- Offers insights into the economic and regulatory implications of blockchain adoption in banking operations.

B. Practical importance

- Enhancing the financial performance and operational efficiency of banking institutions, including Al Rajhi Bank.
- Helping decision-makers evaluate the pros and cons of using blockchain technology to ensure secure and open financial transactions.
- Supporting the Saudi Vision 2030 initiative by promoting digital transformation and innovation in the financial sector.
- Providing recommendations to financial institutions regarding how they can leverage blockchain technology to reduce expenses and improve service delivery.
- Assisting regulatory bodies in developing policies and guidelines to facilitate the safe and effective implementation of blockchain technology in the banking sector.

6. Study Boundaries

Geographical Boundaries: The study takes place in the Kingdom of Saudi Arabia, and Al Rajhi Bank is particularly studied as a case study. Even though it discusses global implementations of blockchain, its general observation is carried out on Saudi banks.

Thematic Boundaries: The study examines blockchain technology and its impact on the financial performance of banks. It primarily assesses the impact of blockchain on transparency, security, cost savings, speed, and fraud protection in banking activities. The study focuses on Islamic banking since Al Rajhi Bank is Sharia-compliant in terms of financial concepts.

Time boundaries: The study was conducted between 2024 and 2025, with more recent literature and data collected. Contextual references can be used to examine previous literature, highlighting new and existing applications of blockchain technology.

Conceptual boundaries: The study is limited to the adoption of blockchain technology in the banking sector and does not cover multiple fields such as supply chain, healthcare, and government. The study explores theoretical approaches, empirical descriptions, and practical implications of blockchain technology in the financial sector. The study does not focus on cryptocurrencies, but rather on blockchain as a technology platform for banking services.

7. Theoretical Framework

Block Chain actually appeared in the world with the creation of the cryptocurrency bitcoin by Satoshi Nakamoto. Bitcoin was the first application of this

technology in the world. As an important technology underlying the digital industrial revolution that has dramatically changed the profile of the global economy. (Khawatira, 2022). Today Blockchain can be used in several sectors including finance, politics, health, etc, used in the field of finance, this innovative technology could facilitate the process of financial and banking operations. In addition, this technology lowers the costs relating to financial transactions and reduces the time of the operation. This technology could also be used by stock brokers to guarantee transparency of purchase and sale operations of stock market securities.

1-Definition of the Blockchain concept:

Block chain technology is one of the most important innovative technologies of our time (Djihad & Chettouf, 2022).

The Blockchain constitutes a database, which contains the history of all exchanges carried out between its users since its creation, secure and distributed: it is shared by its different users, without an intermediary, which allows everyone to check the validity chain (Djihad & Chettouf, 2022).

Block Chain or the chain of blocks in French is defined as a technology for transmitting and storing data in digital format without a control body. In addition, Block Chain technology can be considered as a large distributed register which makes it possible to record the movement of money, delivery of goods and services, exchange of secure data and others (Melian, 2015) is characterized by decentralization, that is to say that there is no control body that manages or intervenes in the operations carried out within the Block Chain. This technology contains the history of exchanges from the date of its creation without any modification (Zibin, et al., 2017).

2- Characteristics of the block chain:

The Block Chain is extremely secure and transparent thanks to the way of which it is designed and managed. Users cannot add, delete or modify recording history without being detected by other participants.

However, transactions via Block chain technology are carried out directly without the need for these intermediaries thanks to the Peer-to-Peer (P2P) model in French Pair-to-pair Buterin, et al.,2017), A Next-Generation Smart Contract and Decentralized Application Peer-to-Peer is a data exchange model in which the computer plays two roles simultaneously, server and client.

The peer-to-peer system can sometimes be centralized, that is to say, exchanges between computers go through a central server. Computers connected to this network via the P2P Protocol are often called "nodes". The P2P system reduces

transaction costs because consumers are no longer required to pay commissions relating to banking transactions.

3– The mechanism of blockchain technology:

Before examining how the block chain works, we will first see its components.

3–1 The components of the Block Chain:

3–1–1 cryptographic hashing:

Hashing transforms a random data input (keys) into a string of bytes of fixed length and structure (hash value):

- The hash of a transaction makes it easier to identify it on the block chain. Indeed, cryptographic hash functions are often used to achieve numerous operations within the block chain.
- The fundamental goal of cryptography is to allow two people called traditionally, Alice and Bob communicate through an insecure channel such that a passive opponent Eve cannot understand what is being exchanged and that the data exchanged cannot be modified or manipulated by an active Martin opponent (Kansab, 2024).

3–1–2 Cryptographic keys:

Cryptographic keys are absolutely important in the operation of the blockchain because they allow the transaction to take place (Kansab, 2024). Indeed. There are two types of cryptographic keys, the first is called symmetric and the other is called asymmetric. The first type is often used in transactions, with a code identical to that of the recipient. However, asymmetric key cryptography allows you to have two different keys, the public key and the private key (public key and private key). The public key is known by Bob and Alice, this key is used to sign the transaction (Used to sign the transaction), moreover, the public key is used to encrypt the transaction and the private key to decrypt said transaction (Liebkind, 2024).

3–1–3 Digital signature:

The digital signature or digital signature in English is a cryptography technique used to verify the integrity of the information exchanged, to authenticate the information transferred and to ensure that the latter is neither modified nor manipulated. The digital signature is equivalent to the signature on paper and it uses asymmetric cryptography to encrypt the data sent (Schoaba, et al., 2011).

3–1–4 Transactions:

Carrying out a transaction on a block chain involves several steps of mechanisms. Here's a simplified overview:

- Transaction creation: The user creates a transaction by specifying the recipient, the amount and optionally other relevant details. Transaction signing: The transaction is cryptographically signed using the private key of the sender to prove their authorization.
- Transaction broadcast: Once signed, the transaction is broadcast on the block chain network to be verified and added to a block.
- Transaction verification: Network nodes verify the validity of the transaction by ensuring that the sender has the necessary funds and that the signature is authentic.
- Block Inclusion: Once verified, the transaction is grouped with other transactions to form a block. This block is added to the block chain through a consensus process, such as proof of work or proof of stake.
- Confirmation: Once the block is added, the transaction is confirmed and considered irreversible, permanently added to the blockchain. These steps may vary slightly depending on the blockchain protocol (Bitcoin, Ethereum, etc.) and the (Liebkind, 2024).

More transactions depending on the block capacity and transaction size, the data sent often includes the following elements, the sender's address, the sender's public key, the digital signature and the input.

3-1-5 The registers^[VI]:

The purpose of the registers is to collect and record transactions carried out via the blockchain. Today, registers are digitalized and transformed into large databases to make it possible to record large volumes of transactions carried out every day (Guegan, 2017).

3-1-6-The Blocks:

Transactions within the Block Chain are submitted by users of this technology via a platform which can be office software, application on Smartphone or a digital wallet. When transactions are verified and published by network nodes, they are grouped and recorded in a block.

Block chain transactions are published only and only if the full nodes publish the transaction which generates a new block to save the latter. Generally composed of two parts, Block Header and Block Body.

- Previous block hash: Within the block chain, any block generated is the heir of the block previous one, in fact, each new block uses the previous block hash in order to create its own hash. The sequence of blocks: Blocks are chained

together via hash embedding from the previous block into each new one block created. This sequence makes it possible to have the chain of blocks. In case the previous block is changed for any reason, the hash would be different, which results in a modification at the level of the header of the block created^[1] (Liebkind, 2024).

^[9]3-2-Participants of the Block chain:

3-2-1 Miners:

Minors are all people who put their computers in charge of verifying transactions carried out in the block chain. Mining requires computers very efficient with CPUs of good power in order to carry out calculation operations block chain complex^[10] (Zibin, et al., 2017).

3-2-2-Nodes:

A node can be defined as any device in a network, a node can be physical or it can be a virtual node. Indeed, a node is any electronic device that represents a point in a network where information can be received or sent, it can be a smartphone, laptop or desktop (Binance, 2018).

3-3 Modalities for executing transactions via consensus mechanisms

3-3-1 Definition of consensus:

Consensus in the Block Chain means that users and participants must have public Block Chain networks, we notice that there is a race between miners to create a new block, because this allows you to earn an amount of crypto- currency and fees for each transaction, each miner receives a gain for his participation in the operations of the block Chain. However, we can arrive at a situation where two nodes work on the same operation, in order to avoid these conflicts, public block chains use consensus models such as proof of work, ((Binance,2018)).

3-3-2 Consensus models:

Proof of work:

This consensus model states that the user publishes the next block provided that they are the first to complete the work. The pro user its work by trying the solution obtained^[11] (Zibin, et al., 2017).

Proof of stake:

It is a common consensus algorithm considered as an alternative to the algorithm.

POW, POS is inexpensive and consumes little energy. It involves the attribution of responsibility for managing the public registry at a participating node in proportion to the number of virtual currency tokens he holds.

Smart contracts:

The goal of a consensus algorithm is to allow the secure updating of a state according to certain specific state transition rules, where the right to perform state transitions is distributed **between** users^[۱۳] who have the right to collectively make transitions via an algorithm” (Buterin, 2017). The major objective of smart contracts is to provide greater security than traditional contracts.

4- Contribution of Block Chain technology to the banking sector:

Block Chain is a technology that has existed since 2008 with the emergence of bit coin. Today, many sectors of the economy, such as banking, for example, are integrating this innovation into their traditional practices in order to gain time, efficiency and competitiveness. **The Block Chain helps increase the efficiency of the financial industry by minimizing costs. More and more banks worldwide have started to take an interest in this technology and its applications in** finance^[۱۳] (Zibin, et al., 2017).

4-1-Adoption of Block Chain technology by global banks:

Indeed, the financial sector is one of the sectors most impacted by this Technology. Block chain technology uses the P2P protocol to carry out the transaction by minimizing transaction costs. Indeed, major global banks have also started to adapt the Block Chain to take advantage of the technology and improve financial services. Block chain is a solution for financial inclusion (Rahal & Ferouani, 2023).

4-2-The effects of this technology on the banking sector:

4-2-1-Transparency and speed of banking and financial transactions:

Block Chain technology and the Internet of Things today represent a significant opportunity for the revolution of several sectors including the financial sector. First, Block Chain mainly attacks intermediation professions. These The latter are considered the main activity of the banking sector because all Transactions between traders are carried out within this system. In addition, banks ensure, as soon as they appear, the safeguarding of records relating to transactions to justify payments and limit embezzlement and fraud. However, the Block Chain offers a similar solution, on the one hand, it is mainly based on the use of a named distributed register (Distributed ledger), this register is intended to record all transactions from the creation of the block chain, moreover, this register is decentralized, in other words, there is no central unit

to control this register. This latter is accessible to anyone, which gives the block chain transparency missing in traditional banking systems (Rahal & Ferouani, 2023).

4-2-2 The Blockchain is Secure:

Block Chain is extremely secure thanks to the architecture used to develop this technology. On the one hand, information cannot be added, modified, or deleted without being detected by users. On the other hand, transactions can only be carried out if all the nodes give their agreements to create a new block to record these transactions. It ensures data security during transactions and payments between different users. Block chain has notably been adopted by banks to secure remote payments or stock trading, and to avoid hacking. It redistributes the cards by offering a decentralized system, where authority is reassigned to the different users of the network. This multiplication of data allows the systems to be described as virtually inviolable (Michael, 2018).

4-2-3 The Block Chain limits fraud:

Take the example of Alice and Bob, Alice wants to buy a service provided by Bob, Bob has provided the service for Alice, but Alice did not pay Bob for his service. However, if Bob uses block chain, it will easily avoid this kind of problem thanks to smart contracts (Michael, 2018).

4-2-4 Blockchain reduces transaction costs:

Block Chain uses the P2P system (Nakamoto, n.d.) to carry out the transaction: This protocol is often used in sharing files between users without the need for a central server to control downloads. The use of this protocol lowers transaction costs, in addition the user no longer has to pay the banking commission for banks which is often high for wholesalers carrying out large transactions.

4-3-Blockchain and payment operations:

Checks can be issued in blank or used by anyone who has access to your checkbook, which obviously constitutes a significant risk if the bank does not systematically verify the regularity of your signature. A card payment may also be rejected. "This regulatory-compliant block chain technology provides an extremely fast and secure means of payment that can be used by anyone with a smartphone, regardless of their financial situation, age or social status" (Kansab, 2024).

8. Previous^[19] studies:

Blockchain technology in Arab countries or the Kingdom of Saudi Arabia

(Mousavi et al., 2025) study aimed to demonstrate how blockchain and smart contracts are applied in Islamic banking, i.e., on trading and issuing smart Sukuk, and determine the challenges and applications in practice addressed in their use. Blockchain increases the efficiency, accessibility, and transparency of Islamic finance and offers innovative solutions for Sukuk issuing and trading, the report says. Discussions with industry players reflected keen interest in the need for smart Sukuk to lead to greater financial inclusion and cost savings and address inherent regulatory and operational hurdles. The research concludes that blockchain and smart contract applications in Islamic finance have immense potential in transforming traditional financing processes, enabling more efficient operations, and promoting social financing. The paper suggests additional research on the quantitative relationship between smart Sukuk and economic growth, emphasizing technology's leading role in the growth of Islamic finance.

(Alsakhnini et al., 2023/2024) study examines heightened interest and implementation of blockchain technology in the Middle East, and its potential benefits in certain sectors such as finance, healthcare, and public services. Though still in its infancy stage, the technology is evolving extremely fast, and therefore there is a need to understand its effects within the region in an all-encompassing sense. The study aimed to offer an overview of the Middle Eastern status of blockchain and cryptocurrency technologies, summarize challenges and opportunities of adoption, as well as the implications of the technologies on regional integration and economic development. From the research results, there has been an increasing usage of blockchain in the Middle East in multiple sectors, the most prominent ones being Saudi Arabia and the UAE. But it also foresees far-reaching challenges like low data concentration, regulatory ambiguity, and cultural issues that may make mass adoption irrelevant. The study claims that although blockchain technology is highly promising for making the Middle East more transparent and efficient, much greater emphasis must be given to filling gaps of existing shortcomings and exploring its socioeconomic impacts. Multidisciplinary studies and overall regional evaluation are recommended for further studies to further explore the possibilities and limitations of the technology.

Farhah (2024) study discusses the presence of blockchain technology and its impact on public and private organizations' business models with the aid of the support of literature review that indicates the dissemination of blockchain research, particularly in business and economics. The study will establish the nature and effect of blockchain in institutions, states and institutions that implemented the technology and implications on law, comparing its effectiveness with central systems, and evaluating economic effects and adoption issues. Studies presume that the blockchain technology is playing a replaceable role in accelerating digitalization and transparency towards desirable destinations of nations like the UAE and Saudi Arabia, and is hurling operation and regulation as daunting challenges into its implementation. Hence, the study identifies that blockchain is key in realizing economic efficiency and transparency as well as more research, education of stakeholders and public-private cooperation to enable the successful implementation of blockchain solutions.

Albarak and Alokley (2021) paper addresses the influence of financial technology (FinTech) on the financial sector of Saudi Arabia. The paper presents how the blockchain technology is affecting the financial performance of the Saudi Arabian Al Rajhi Bank. Since there are increasing trends for banks to turn to new technology, blockchain has the potential to render financial transactions more secure, efficient and transparent. The research seeks to close gaps in the existing literature for the specific impacts of blockchain on Arab banking, such as Islamic financial institutions. Taking a descriptive-analytical research approach, the research gathered primary data from a structured questionnaire filled by 51 employees of Al Rajhi Bank. It is reiterated in the findings that the operational efficiency of banking is maximized by blockchain technology through accelerating the speed of transactions and reducing costs. Moreover, it raises the level of transparency and facilitates the prevention of fraud, and thus the customer trust level in banking activities is enhanced. The results of this research are aligned with Saudi Vision 2030 vision to promote digitalization in the financial sector, calling for the necessity to adopt innovative technologies to be competitive. The research has employed empirical practical implications of blockchain adoption in Islamic banking and provides recommendations on successful implementation, employee training, consumer awareness, and industry partnership. The study also calls for consultation with regulators to help develop an enabling environment for the adoption of blockchain. In this way, Al Rajhi Bank can take advantage of the benefits of blockchain technology, enhance operating performance, and establish a firm platform in the rapidly evolving field of finance. Generally, the

research presents a hub for future research on blockchain in banking and practical strategies in utilizing technology towards enhancing financial performance and service delivery.

The study finds that the ecosystem consists of key players like FinTech firms, technology innovators, financial customers, established financial institutions, and the government. The study also shows high consumer readiness to shift towards FinTech services and government support under Vision 2030, stimulating innovations. The startups are, however, affected by a lack of regulatory permits, competition in the market from international players, and the absence of specialized human capital. Lastly, the study verifies that the FinTech ecosystem of Saudi Arabia is at the infancy level but has great potential to grow. Mainstream financial stakeholders are advised according to the study to collaborate with startups and invest more in training and education as ways of filling market demand. The results of this research are aligned with Saudi Vision 2030 vision to promote digitalization in the financial sector, calling for the necessity to adopt innovative technologies to be competitive. The research has employed empirical practical implications of blockchain adoption in Islamic banking and provides recommendations on successful implementation, employee training, consumer awareness, and industry partnership. The study also calls for consultation with regulators to help develop an enabling environment for the adoption of blockchain. In this way, Al Rajhi Bank can take advantage of the benefits of blockchain technology, enhance operating performance, and establish a firm platform in the rapidly evolving field of finance. Blockchain technology is playing a strong role in banking by propelling innovation, enhancing operational efficiency, and enabling new financial services, according to the research. It asserts that the stakeholders who intend to utilize blockchain technology in the right manner in the banking industry need extensive knowledge about these topics.

The impact of blockchain technology on the financial performance of banks

Bhandari et al. (2025) present a case study of using blockchain to promote sustainability finance transparency and accountability. Sustainable finance refers to the integration of ESG factors into financial decisions in a way that contributes to society's well-being in the long run. It has, however, been plagued by greenwashing and insufficient transparent reporting. Blockchain technology provides promising solutions to the aforementioned issues through its decentralized and unbreakable ledger by enabling transparency and accountability. The study aimed at investigating the potential of blockchain technology in facilitating transparency and accountability in

sustainable finance. The study aimed to chart current applications, and future development possibilities at the intersection between blockchain and sustainable finance. The study affirmed that blockchain technology could help increase transparency in sustainable finance by providing tamper-proof records of financial transactions and sustainability information. This feature eradicates greenwashing and data manipulation issues, thereby improving stakeholder trust. Further, the decentralized blockchain promotes real-time auditing and verification of ESG compliance, making reporting processes easier and reducing administrative activities.

Zbon's study (2024) study aims to measure the impact of the use of blockchain technology in improving the efficiency of the Iraqi banking sector. In addition, its role in reducing the cost of banking services and developing them in the financial sector, represented by Iraqi banks. The extent to which the research sample accepts the adoption of this technology. The research community represents some Iraqi banks in Baghdad. There are ten banks with various branches, and these banks were represented by the following (five branches of Al-Rasheed Bank. Four branches of Al-Rafidain Bank, and Al-Taif Islamic Bank). Where the blockchain technology will increase efficiency and economic returns and reduce costs and financial burdens. The results of the research concluded that blockchain technology represents the best technical solutions currently available. To reduce the material costs of operations in the financial sector. As well as, speeding up financial transactions. While ensuring the safety of financial transactions and transactions, and reducing manual procedures. It contributes to meeting the needs of the financial sector of banks by eliminating the need for intermediaries, saving a measure of time and money helping reduce the operational cost to the lowest cost and improve the capital. It also contributes to enhancing transparency within the sector. Eliminating opportunities for human error in providing banking services, which ultimately contributes to enhancing operational efficiency and improving the quality of banking services provided to customers. The most prominent recommendations of the research were the need for Iraqi banks to rely on blockchain technology, which contributes to reducing the cost of banking services, raising operational efficiency and taking effective measures to support its application.

Mela's study (2024) study aimed to identify the extent of Possibility of Applying the Blockchain Technology in the Libyan commercial Banks, to achieve the objectives of the study, the study followed descriptive analytical method, A precise questionnaire was designed and prepared as a main tool for collecting primary data, it was distributed

to a sample of employees in the Libyan commercial Banks in khomes city, the study reached several results, the most important of which are: the study showed working in Libyan commercial banks in khomes city they are familiar with Blockchain technology and basic applications, The possibility of application the blockchain technology in the banks under study works on reducing financial transaction costs, Based on the results of the study, the study recommended the necessity of Holding training courses for employees in the banking sector to introduce the blockchain technology and also Increase researches on blockchain technology topics.

Addula et al. (2024) discusses the use of Artificial Intelligence (AI) and blockchain technologies in banking. The study aims to provide a comprehensive insight into the advantages and limitations of integrating the two technologies in banking, with a research design that integrates qualitative and quantitative research methods. The integration of blockchain and AI offers a number of opportunities in banking, e.g., sophisticated security with encryption, improved process efficiency, and provisioning of new services to customers. Blockchain enables integrity and transparency of transactional records, and AI algorithms can analyze large amounts of data to detect patterns that indicate fraud. This integration can be used to bring about democratization of access to financial services, particularly in low-income communities where there is limited traditional banking infrastructure. The research also points towards the need for an understanding of the challenges presented by this merger, including the regulatory problems and the necessity for a thorough investigation of emerging patterns. An in-depth knowledge of these factors is vital for industry leaders, lawmakers, and researchers to fully leverage the potential of such revolutionary technologies in the financial market.

Abu Al-Khair's study (2023) study aimed to identify the impact of the use of Block chain technology as one of the digital transformation mechanisms on enhancing the quality of the audit process. As well as the implications of blockchain technology on the accounting profession in terms of triple-entry accounting, which is described as an improvement to traditional double-entry accounting. A survey form was distributed to the research sample. The study reached the importance of Block chain technology as one of the mechanisms of digital transformation and that the audit process affect by the application of Block Chain technology in many matters, which is to provide a digital ledger based on a database based on Block chain technology instead of the general ledger, the transformation from continuous review to real-time review (immediate review), creating future jobs, new tasks and skills for auditors such as

reviewing smart contracts, providing management consulting and necessary analytical studies in light of the application of this technology, and the field study concluded that there is a significant effect of the use of block technology Block chain to enhance quality of the audit process.

Commentary on Previous Studies

This study closely compares to other studies on blockchain technology in the banking and financial sector. It agrees with Abu Al-Khair (2023) on the need to consider blockchain's role in enhancing transparency, security, and credibility in financial activities, particularly its ability to reduce fraud and provide reliable transactions. Analogously, the study concurs with Rahman et al. (2024) in considering the impact of blockchain on the efficiency, security, and lowering cost of banks. Just like in Zbon (2024), the current study highlights the economic benefits of using blockchain technology, particularly the elimination of operation cost and improving banking financial performance. It shares with Mousavi et al. (2025) a typical issue regarding blockchain's role to improve trust and compliance among Sharia-compliant banks.

Despite such similarities, the present research and previous studies are different in a few essential points. In contrast to Mela's (2024) research on the prospects of Libyan commercial banks' embracing blockchain technology, the present study focuses particularly on Saudi Arabia's banking sector through an extensive case study of Al Rajhi Bank. Methodologically, the current research employs a descriptive-analytical approach accompanied by a survey of employees in banks, while Bhandari et al. (2025) conducted a systematic literature review to find out the impact of blockchain on financial transparency. Moreover, while Addula et al. (2024) explored the use of AI and blockchain in banking, the current research is limited to analyzing the role of blockchain alone, without referring to artificial intelligence application. In addition, the work of Alsakhnini et al. (2024) provides a broad overview of blockchain adoption throughout the Middle East, whereas the current research limits its focus to Saudi Arabia and conducts a targeted, case-by-case analysis.

The originality of this study is apparent in a variety of aspects. It is one of the studies that specifically examines Al Rajhi Bank, providing an in-depth case study approach rather than a general industry report. In contrast to most previous studies relying on secondary data, this study collects primary data through a formal questionnaire, enabling the possibility of having direct remarks from bank employees on using blockchain. Further, the research bridges the linkage between blockchain adoption and Saudi Vision 2030 through its focus on the utilization in digitalization and economic

growth, which was not researched so in-depth by existing works. This serves to complement the lack of existing Arab research focusing directly on the influence of blockchain on banks.

From previous studies reviewed, this research has been blessed in a number of aspects. Rahman et al. (2024) and Zbon (2024) findings were a source of data on the manner in which blockchain has played a role in enhancing financial effectiveness and security that guided the study's hypotheses. The concerns expressed in Alsakhnini et al. (2024) regarding regulatory and operational issues helped inform the discussion on challenges of adopting blockchain in Saudi banks. In addition, Bhandari et al.'s (2025) review of literature facilitated the identification of the most significant research variables that required empirical verification in Saudi Arabia. The study also utilized research by Mousavi et al. (2025) to analyze the compatibility of blockchain technology with Sharia-compliant principles of banking to render its use pertinent to Islamic finance.

Lastly, the current study builds and extends previous works and offers a more localized and empirical examination of the impact of blockchain on Al Rajhi Bank. It differs from its predecessor in terms of geography, approach, and primary data collection method, presenting new insights into the role of blockchain in improving banking performance in Saudi Arabia. Through this contribution, the study bridges the research gap in the Arab region on blockchain uptake in the finance industry and makes a contribution towards future discussions on digital transformation in Islamic banking.

9. Hypotheses

Hypothesis 1 (H1): The utilization of blockchain technology in Al Rajhi Bank greatly enhances the security of financial transactions over the traditional banking system.

Hypothesis 2 (H2): The use of blockchain technology significantly lowers Al Rajhi Bank's operational expenses in comparison to conventional financial procedures.

Hypothesis 3 (H3): There is a positive impact of blockchain technology on Al Rajhi Bank's financial transactions' speed and accuracy, leading to improved operational effectiveness.

Methodology:

The study employed a qualitative research method to achieve the objectives of this study, where interview and document analysis was employed as the main research instruments. From this, we learn the extent to which blockchain technology has impacted the financial performance of Saudi banks, specifically Al Rajhi Bank.

1. Research Approach

The study utilized the descriptive–analytical method, which is appropriate for financial and human study. The method offers a complete analysis of how blockchain technology affects banking operations, security, efficiency, and costs reduction. From qualitative interview information and official reports, the study gives theoretical and empirical evidence of the use of blockchain in Saudi banks.

2. Study Tools

A. Interviews: Interviews with banking staff at Al Rajhi Bank, IT staff, and financial analysts carried out to observe the implementation of blockchain and its impact on financial performance. The interviews were semi–structured, and this allowed us to freely discuss problems while being careful not to neglect basic research issues. The major issues of discussion in the interview were the benefits of blockchain in increasing financial security and transparency. How blockchain reduces operational cost and improves the efficacy of banking activities. Banking constraints and challenges in implementing blockchain technology. How blockchain affects anti–fraud mitigation, customer trust, and regulation compliance.

B. Document Analysis

Document analysis was also used throughout the study. Official reports, financial reports, policy reports, and studies on Saudi banks' adoption of blockchain were read. Al Rajhi Bank, Saudi Arabian Monetary Authority (SAMA), and financial regulatory body reports were reviewed to understand Saudi Arabian banking laws regarding blockchain. Blockchain banking technology and their monetary effects were asked for an interview about. Case studies on how different banks are adopting the technology were emphasized. Strategic objectives for digital transformation of the banking sector are included in Saudi Vision 2030.

3. Study Population and Sample

The research concentrated on examining bank staff, IT experts, and financial analysts in Al Rajhi Bank who were directly interacting with blockchain technology or money management. Specific sampling was applied while choosing the participants to

determine the right knowledge to acquire useful and meaningful information. The research also cross-checked with official finance and regulation reports to validate the results obtained from the interviews.

4. Data Analysis Techniques

Thematic analysis was also used in qualitative data interpretation gathered, making it possible to identify leading themes and patterns from interview responses and document analysis. The method assisted in categorizing responses based on corresponding themes like security, efficiency, and cost reduction. It involved contrasting interview results with document analysis data for the confirmation of findings. It sought to identify trends and challenges encountered in the application of blockchain technology in Saudi banking sector.

5. Checking Research Validity and Reliability

The research used triangulation, expert checking of banking and blockchain specialists, and systematic coding to render its findings valid and reliable in ensuring data interpretation consistency.

Findings:

On thematic analysis of Al Rajhi Bank's interview answers, certain overarching themes emerged that reflect the far-reaching impact of blockchain technology on banking operations, security, customer trust, and business efficiency in the bank. Security and trust were recurring themes in many answers, and they were indicative of the fundamental role played by blockchain in safeguarding sensitive financial data.

Visitors pointed out that the advanced encryption methods and decentralized nature of blockchain significantly enhance security levels, rendering it virtually impossible for unauthorized access. This enhanced security system not only reduces fraud and cyber attacks risk but also builds confidence among customers, who feel secure knowing their transactions are recorded securely and irreversibly. The interviewees also identified that there was a dramatic fall in cases of fraud after they adopted the utilization of blockchain, which indicates a direct correlation between the technology and enhanced security in financial transactions. This increased level of security is essential for a bank operating in strict adherence to Islamic finance guidelines, where morality and transparency are incorporated into the ensures customers' trust

The second general theme that arose concerns operational effectiveness, and it describes how the bank's transaction processing has been transformed by blockchain technology. The respondents hypothesized that blockchain has resulted in a massive improvement in the velocity at which financial transactions are conducted, reducing the time for such exercises as clearing and settlement by a massive factor. Instead of a days-long query, transactions take only minutes to do with the use of smart contracts, which execute agreements automatically without delay. Not only does the technology hasten the process of transactions, but it also alleviates the anxiety that comes with reconciliations by hand, which eventually means cheaper operational costs. The bank achieved up to 30% saving on transaction fees and significant amounts of money on dispute resolution fees due to increased transparency in transactions. These process enhancements enable Al Rajhi Bank to handle higher volumes of transactions on a daily basis, thus improving customer service and satisfaction overall

The second dominant theme that came forth was the emphasis on compliance and transparency. The participants highlighted how the nature of blockchain itself encourages greater transparency in banking transactions. Every transaction is noted on an open ledger by all the concerned parties, leaving a huge audit trail.

Transparency creates accountability among the stakeholders and better facilitates the bank to monitor compliance with regulatory regulations. It is that customers can independently check their transaction record that has been touted as the key to building trust. Secondly, where blockchain technology meets regulatory compliance, as here in the context of Islamic finance, comes into play; the bank is in a position to streamline reporting procedures, thus obeying regional regulations as well as moralistic paradigms governing financial operations. Such exposure is not only useful for the bank but also central to establishing the credibility of Islamic banking operations within the broader financial landscape.

The customer experience and innovation theme was prominent, suggesting that the bank's repeated focus on obtaining latest technologies is an attempt to enhance the overall customer banking experience. The venture into blockchain solutions, such as using digital wallets for secure peer-to-peer transactions and developing blockchain-based remittance products, reflects the bank's enthusiasm to be technology pioneers. The interview subjects believed that the customers have benefited from such creative services, not only meeting needs at the present moment but creating the foundation of the future as well. Becoming a disruptive bank in this competitive banking field with the establishment of blockchain makes Al Rajhi Bank a new-generation bank to its customers and creates a sense of loyalty that customers feel positive about the institution's adoption of new banking innovations. Such pro-innovation culture is well enabled by the bank's vision for pushing customer experiences ahead, together with the plans outlined in Saudi Vision 2030, which are innovation- and economic diversification-oriented.

Nonetheless, analysis also revealed some challenges as well as limitations for Al Rajhi Bank in applying and integrating blockchain technology. One of the frequent issues was ignorance about blockchain among some employees of the bank, and it would require ongoing training and development in order to render the employees efficient. Such lack of knowledge would be a disadvantage in the proper use of blockchain solutions, rendering it challenging to adopt the proper training programs and support mechanisms to allow the staff to utilize the technology to its maximum. Also, introducing blockchain onto today's legacy systems was introducing unintended complexity. Feedback from the bank was that the initial investment cost of implementing the change to blockchain infrastructure would be intimidating with fears of planning and commitment in the long term. In addition, it was hard to establish strong relationships with other banks to formulate blockchain initiatives. Issues of

data privacy, compliance with national laws, and the incorrect assumption that blockchain can be used interchangeably with cryptocurrencies were some of the issues that needed to be tackled in order to facilitate better comprehension of the .benefits of the technology

Lastly, the thematic analysis of the interview data from Al Rajhi Bank shows a general perception of acknowledgment of the disruptiveness of blockchain technology within the banking industry. Security and trust, efficiency of operations, transparency and compliance, innovation, and customer experience are all interconnected themes to one another that demonstrate the holistic way that the bank adopted the disruptiveness of the said technology. Al Rajhi Bank's alignment with Saudi Vision 2030 objectives and addressing challenges as a pro-active exercise also say a lot about the bank's leadership role in the Saudi fintech revolution. In the future, the bank's investment in staff training, overcoming integration challenges, and continuing innovation will also be key to unlocking the full set of advantages that blockchain technology can provide, ultimately creating a more robust and dependable banking system for customers.

Discussion

The findings highlight major outcomes related to the impact of blockchain technology on a number of dimensions of banking activities, security, customer trust, operational efficiency, and ongoing innovation. Notably, security and trust were the key themes that emerged and became core pillars, underpinning the role of blockchain in securing sensitive financial data within the organization. All the respondents emphasized how the decentralized nature of the blockchain's architecture and its sophisticated cryptography methods naturally tighten up security functions such that it is much harder for unauthorized access. Besides preventing fraud and cyberattacks from occurring at all, this highly secure security system also enhances consumer confidence by providing assurance that their money transactions are .properly and reliably recorded

The respondents reported a considerable decline in cases of fraud after the implementation of blockchain technology, validating the direct causal link between usage and the heightened sense of financial security measures. This increased sense of security is of greater interest to Al Rajhi Bank, as its commitment to Islamic finance practice relies on principles of transparency and morality in a bid to sustain .customer trust

Another dominant theme that has come out of the analysis is one of efficiency of operations, describing how blockchain technology has revolutionized financial transaction processing in Al Rajhi Bank. The respondents made frank remarks regarding the spectacular enhancements achieved through the use of blockchain in daily processing of financial transactions. Operations that took days to settle—like clearing and settlement—are now done in minutes, in large part due to the adoption of smart contracts, which make transactions run like clockwork automatically. Not only are these developments accelerating streams of transactions but also releasing operational expense conventionally associated with reconciliation tasks on a considerably reduced scale. Notably, the bank attained a substantial decrease in transaction fees by up to 30%, along with substantial savings on dispute resolution, which is attributed to enhanced transparency in transactions. These improvements in business processes allow Al Rajhi Bank to manage more transactions per day .efficiently, resulting in improved customer service and satisfaction

The issue of compliance and transparency also came strongly through, illustrating the way the very nature of blockchain technology promotes higher levels of transparency in banking activities. Through the comments, the participants highlighted that each transaction is logged into a shared ledger seen by all entities with the right to do so, thereby providing an overall audit trail. The higher transparency promotes a culture of accountability among stakeholders, improving the ability of the institution to monitor compliance with regulatory mandates effectively.

The ability of the customers to audit their transaction history on their own was introduced as a central aspect in building confidence between the bank and its clients. Beyond the bank's internal operations, interesting is the intersection of blockchain technology and regulatory compliance in Islamic finance; the technology provides the bank with an ability to effectively manage reporting processes so that it will be in line with local regulations as well as ethical protocols guiding financial transactions. This openness benefits Al Rajhi Bank but also acts as a foundation in upholding the integrity of Islamic banking operations within the wider financial community, keeping the institution in good standing as a trustworthy financial .partner

Customer experience and innovation was a second prevailing theme, testifying that the Al Rajhi Bank drive to apply cutting-edge technology is with the aim of further enhancing customers' banking experience. Exploration of innovative blockchain applications, such as the initiation of digital wallets for secure peer-to-peer

transactions and remittance services based on blockchain, attests to the bank's bold positioning as a technological leader. The participants expressed that customers have shown great appreciation of these innovative services that meet current demands and shape the way for further improvements. Therefore, embracing blockchain has placed Al Rajhi Bank as a pioneering establishment in the competitive banking sector by gaining loyalty from customers who appreciate the incorporation of advanced financial technologies in their banking transactions. This alignment with the customer's needs is also in tune with the overall strategic objectives presented in Saudi Vision 2030, which champions economic diversification .and innovation

Despite these promising correlations, objective examination indicated some of the challenges and limitations in the application and use of blockchain technology by Al Rajhi Bank. The most common issue raised by the participants was the lack of awareness of blockchain technology, not only in the bank but also in the broader financial community. This limitation is consistent with sentiments in more recent studies, such as Al-Matari et al. (2023) and Ibrahim (2020), which advocate for large-scale training and education initiatives to trigger knowledge and use of blockchain technology. The lack of knowledge about blockchain could constrain the correct use and scalability of such technological innovations to the operations of the bank. Filling this knowledge gap is imperative in order to maximize the benefits of blockchain technology so that employees and customers will understand its value proposition and mechanism so they can make the most out of it in banking. This section refers to the necessity of ongoing education and research so that loopholes could be plugged and the institution could utilize the actual potential of blockchain to its fullest in the pursuit of enhanced security, operational efficiency, and overall customer experience to the demands of modern banking.

Conclusion:

In conclusion, the study presents concrete evidence of blockchain technology's disruption to Al Rajhi Bank's operational capability and financial performance. Several major outcomes of the objective analysis of the interview findings present the importance of blockchain in guaranteeing security, operational efficiency, transparency, and customer trust within the banking sector. Firstly, application of blockchain technology has immensely enhanced the security system of Al Rajhi Bank. The decentralized nature of the technology along with state-of-the-art

encryption methods has been able to ward off fraud and cases of cybercrime to a great extent, and the same has helped in developing high levels of customer trust.

This aspect is of highest relevance in the case of Islamic banking, where transparency and ethics are of highest significance. Secondly, operational efficiency in the wake of implementing blockchain is unimaginable. The ability to handle transactions at previously inconceivable speeds, at lower operating costs, allows the bank to conduct more transactions with greater efficiency. In addition to guaranteeing customers' satisfaction, these technologies help Al Rajhi Bank enhance competition in the current banking industry. Further, the study displays how blockchain technology enhances regulation, transparency, and accountability in banking. Blockchain's rigid and non-editable ledger allows for rigorous auditing and facilitates the customers to audit their transaction history independently. Such added transparency not only serves to help the institution garner the trust of the customer, but it also aids in conforming to Islamic finance's ethical framework. Further, based on the research, it concludes that Al Rajhi Bank's aversion to leveraging advanced blockchain-enabled solutions reflects back to responding to the needs of changing customers and enhancing the entire banking experience. The swift adoption of new technology is in line with Saudi Vision 2030's strategic goal, which encourages innovation and economic diversification of the financial sector. All these advantages aside, some of the issues with the use of blockchain technology currently, most significantly the increasing awareness and education about the technology, are identified in the study. Sealing this knowledge gap is a prerequisite to releasing the potential of blockchain and enabling customers and employees to achieve its potential. This study is a valuable addition to enhancing Al Rajhi Bank's position in the context of blockchain technology and sealing an important knowledge gap in Arab research studies. It stresses the necessity of continued research, education, and coordination among stakeholders to enable the effective adoption of blockchain solutions in banking. The findings pave the way for future research on the economic impact of blockchain technology and its wider applications in the banking sector, with particular reference to Islamic finance and the unique challenges facing banks in the Middle East region.

Recommendations

- Comprehensive employee training programs need to be launched to make employees thoroughly capable of using blockchain solutions efficiently.

- Customer education programs need to be developed to familiarize customers with blockchain technology, its benefits, and security measures.
- Al Rajhi Bank must invest in research and development to maintain its competitive edge and respond to evolving customer needs. Al Rajhi Bank must partner with blockchain fintech start-ups to have transfer of expertise and uptake of innovative solutions.
- Al Rajhi Bank has to work actively with the regulatory bodies to create a constructive environment to facilitate the implementation of blockchain. Al Rajhi Bank should conduct pilot plans to try out the execution of various blockchain solutions on a selected group of banking processes.
- Al Rajhi Bank needs to articulate its emphasis on customer-facing blockchain services such as secure remittance services and digital wallets to foster their adoption. Al Rajhi Bank must institute metrics to measure and monitor the success of blockchain adoption in the bank and areas of success and areas for improvement.
- Al Rajhi Bank should be a contributing participant in forums and associations that concern blockchain technology and banking solutions. Al Rajhi Bank should implement its blockchain initiative according to Saudi Vision 2030 to highlight the prospects of digital transformation toward economic diversification.

References[٧٤]:

- Abdulhakeem, S. A., & Hu, Q. (2021). Powered by Blockchain technology, DeFi (Decentralized Finance) strives to increase financial inclusion of the unbanked by reshaping the world financial system. *Modern Economy*, 12(01).
- Abul-Khair, A. A. M. (2023). "A Proposed Framework for Using Blockchain Technology as a Basis for Enhancing the Quality of the Audit Process in a Digital Transformation Environment" with a Field Study in the Egyptian Business Environment. *Scientific Journal of Financial and Administrative Studies and Research*, 15(4), 1–44. <https://doi.org/10.21608/masf.2023.325472>
- Ali, O., Ally, M., & Dwivedi, Y. (2020). The state of play of blockchain technology in the financial services sector: A systematic literature review. *International Journal of Information Management*[٧٥], 54, 102199.
- Al-Shater, Munir Maher Ahmed (2019). Blockchain Technology and its Impact on the Islamic Finance Sector, *Journal of Research and Applications in Islamic Finance, University of Malaya*, 3(2).
- Balnour, Mohamed Al-Sassi & Dawaba, Ashraf Mohamed (2022), Blockchain and its applications in Islamic banks Blockchain
- Binance academy. (2018). <https://www.investopedia.com/terms/b/blockchain.asp>. (2018).
- Nakamoto, S. (n.d.). Bitcoin: a Peer-to-Peer electronic cash system. <https://bitcoin.org/bitcoin.pdf>
- Buterin, V. (2014). A next-generation smart contract and decentralized application platform. white paper, 3(37), 2–1.
- Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., & Arami, M. (2020). How Blockchain can impact financial services—The overview, challenges and recommendations from expert interviewees. *Technological forecasting and social change*, 158, 120166.
- Chen, T., & Wang, D. (2020). Combined application of blockchain technology in fractional calculus model of supply chain financial system. *Chaos, Solitons & Fractals*, 131, 109461.
- Dijihad, R., & Chettouf, R. (2022). Applications de la technique bockchain. *revue Fractals*, 131, 109461.
- fractional calculus model of supply chain financial system. *Chaos, Solitons&*

- Liebkind, J. (2024, December 13). Public vs. Private Blockchains: Challenges and Gaps. Investopedia. <https://www.investopedia.com/news/public-vs-private-blockchains-challenges-and-gaps/>
- Ibrahim, Rasha Ahmed Ali (2020). The impact of adopting blockchain on reducing the cost of banking services and upgrading them in Egyptian banks. <https://search.mandumah.com/Record/1089028>
- Kansab, J. (2024). Contribution of block chain technology to the banking sector. *Journal of Economics and Sustainable Development*, 70–70(70), 70–07. <https://asjp.cerist.dz/en/downArticle/598/7/1/243702>
- Mela Ali Abdullah (2024). The Extent of Possibility of Applying the Blockchain Technology in the Libyan commercial Banks: A Case Study of Commercial Banks Operating in Khomes Citym, *Afāiqtisadiyyāī Journal* – Vol 10. Issue 1.
- Melian, s. (2015). Blockchain; Blueprint for a new economy 1st edition.
- Michael, p. (2018). Michael Page; what impact on the French banking sector. Récupéré sur, <https://www.michaelpage.fr/market-trends>). Overview, Department of Commerce, USA, 2018.
- Nadir, Tarubia (2020). GCC Strategies for Adopting Blockchain Technology and the Potential Outcomes of its Implementation – A Reading of the UAE Experience, *Journal of Economic Additions*, Ahmad Draya University, 4 (2).
- Rahal, A., & Ferouani, B. (2023). blockchain a strategic solution for financial inclusion theoretical approach to the Algerian economy. *revue EL BACHAIR, ASJP, CERIST*, 1039–1048.
- Revue Banque, 810,. 80–82. <https://www.lafinancepourtous.com/decryptages/finance-et-societe/nouvelleseconomies/>
- Schoaba, V., Gomes, F., & Castelo, L. (2011). digital signature for modil currencies scieces juridiques et sociales vol 7 n 2, *ASJP, CERIST*, 226–237.
- scieces juridiques et sociales, volume 7 n 2, *ASJP, CERIST*, 912–929.
- transaction–blockchain/). (s.d.).
- Zbon Haider Muhammad (2024). The impact of the use of block chain technology in improving the efficiency of the Iraqi banking sector, *Iraqi Economic Journal*, Issue 80.
- Zibin, z., Shaoan, X., Hong–Ning, D., Xiangping, C., & Huaimin, W. (2017). Blockchain Challenges and Opportunities A Sitalik Buterin. the meaning of Decentralization.

- Al-Matari, E. M., Mgamal, M. H., Senan, N. a. M., Kamardin, H., & Alruwaili, T. F. (2023). Fintech and financial sector performance in Saudi Arabia: An empirical study. *Journal of Governance and Regulation*, 12(2), 43–65. <https://doi.org/10.22495/jgrv12i2art5>
- Mousavi, S.H., Tohidinia, A., Mousavi, S.M. (2025). Transforming Islamic finance: the impact of blockchain and Smart Sukuk. *Access to science, business, innovation in the digital economy*, ACCESS Press, 6(1), 184–201, [https://doi.org/10.46656/access.2025.6.1\(10\)](https://doi.org/10.46656/access.2025.6.1(10))
- Alsakhnini, M., Almoaiad, Y., & Skyline University College. (2024). A review of applications of blockchain technology in the Middle East. In *Kurdish Studies*, *Kurdish Studies* (Vols. 12–12, Issue 1, pp. 103–130) [Journal–article]. *Kurdish Studies*. <https://doi.org/10.58262/ks.v12i1.008> (Original work published 2023)
- Farhah, M. F. A. (2024). The blockchain: the next technological revolution in the world of the economy. *Journal of Economic, Administrative and Legal Sciences*, 6(15), 119–140. <https://doi.org/10.26389/ajsrp.f260122>
- Albararak, M. S., & Alokley, S. A. (2021). FinTech: Ecosystem, opportunities and challenges in Saudi Arabia. *Journal of Risk and Financial Management*, 14(10), 460. <https://doi.org/10.3390/jrfm14100460>
- Rahman, S. M. M., Yii, K., Masli, E. K., & Voon, M. L. (2024). The blockchain in the banking industry: a systematic review and bibliometric analysis. *Cogent Business & Management*, 11(1). <https://doi.org/10.1080/23311975.2024.2407681>
- Addula, S. R., Meduri, K., Nadella, G. S., & Gonaygunta, H. (2024). AI and Blockchain in Finance: Opportunities and Challenges for the Banking Sector. *IJARCCCE*, 13(2). <https://doi.org/10.17148/ijarcce.2024.13231>
- Bhandari, M., Tiwari, G., & Dhakal, M. (2025). Enhancing transparency and accountability in sustainable finance through Blockchain Technology: A Systematic Review of the literature. *Journal of Intelligent Management Decision*, 4(1), 23–43. <https://doi.org/10.56578/jimd040102>